

47th Congress of the European Society of Paediatric Radiology (ESPR 2010) Booklet of abstracts

Contents

1	Program committee	2
2	List of abstracts	3
3	Official Opening	3
4	Scientific session 1: Head and Neck 1	3
4.1	Brain malformations in children with syndromic craniosynostosis	3
4.2	Postnatal biometry of the corpus callosum in MRI: reference data	3
4.3	MR imaging and neurodevelopmental spectrum in a series of children with Rhombencephalosynapsis	4
4.4	The clinical and radiological presentation of preterm cerebellar haemorrhage	5
4.5	Subpial hemorrhage in the neonate. About 12 cases.	5
4.6	Creatine synthesis and transport defects: Clinical presentation, MRI and treatment in a series of 12 children	6
4.7	Tumefactive Demyelination in Childhood - Diagnostic Uncertainty, Predictive Imaging Features and the Pursuit of Causation	7
4.8	Neuroimaging in Cockayne syndrome	7
4.9	Optimisation procedure for paediatric intraoperative MSCT axial protocol	8
4.10	Intra-operative MRI for paediatric brain tumours - initial experience with a dedicated high-field (3T) system.	8
4.11	Usefulness of surface-rendering views of cerebral MRI to the diagnosis of developmental cortical abnormalities in patients with medically intractable epilepsy.	9
4.12	MRI Findings in children with Tuberculous meningitis: a comparison of HIV infected and non-infected patients	10
4.13	A Retrospective Review of Pituitary MR Findings in Pediatric Patients on Growth Hormone (GH) Therapy	10
5	Uroradiology Taskforce	11
6	Coffee break	11
7	Posters Head and Neck	11
7.1	Cranial nerve enhancement in children with TBM (tuberculous meningitis): Incidence, distribution, and clinical correlation	11
7.2	MULTINODULAR THYROID GLAND (MNTG) IN CHILDREN: CORRELATION OF ULTRASOUND (US) AND CLINICAL FINDINGS	11

7.3	The radiological diagnosis of intracranial lipomas: about 4 cases	12
7.4	Optimisation of fast T2 mapping of the premature brain: a phantom study	13
7.5	Contribution of fetal MRI to the diagnosis of X-linked hydrocephalus: report of four cases	13
7.6	Lesions of the cranial vault in children: CT and MRI findings	14
7.7	Pre- and postnatal brain MR imaging findings of an unusual case of molar tooth malformation with supratentorial heterotopia and hamartoma of the tuber cinereum	14
7.8	Bilateral optic nerve aplasia in twins	15
7.9	Multimodality imaging appearances of neonatal meningitis	16
7.10	Advancements in fetal MRI and postnatal surgical planning for central nervous system disorders	16
7.11	Ultrasound Versus Computed Tomography in Detecting of Nasal Fractures : Comparision between children and adult patients.	17
7.12	Dirt Bike Injuries in Children	17
7.13	Congenital intracranial lipomas: pre and post-natal imaging features and pitfalls.	18
7.14	The corpus callosum: normal imaging appearance, variants, and pathologic conditions	19
7.15	Effect of maturation on MRI diffusion measures on corticospinal tract (CST) in preterm newborn near term.	19
7.16	Pediatric otospongiosis	20
7.17	Review of a cohort of Rennes' hospital patients with neuronal migration defects.	21
7.18	Stroke in the Neonate	21
7.19	Head and neck infections in infants and children - a pictorial essay	22
7.20	A pictorial review of Neurofibromatosis type 1.	22
7.21	First and second branchial arch syndromes: multimodality approach	23
7.22	Imaging of middle ear cholesteatoma in children	23
7.23	The New Image of the Neurodisability.	24
7.24	PHACE Syndrome : the spectrum of findings at imaging.	24
7.25	Posterior reversible encephalopathy syndrome: Two cases in children	25
7.26	Diffuse periventricular leukomalacia in preterm children: Assessment of grey matter changes by MRI.	26
7.27	Mandibular Lesions in Children; Imaging Findings on Multi-detector CT (MDCT) versus Plain Radiographs	27
7.28	Radiological aspects of microtia in 28 patients	27
7.29	Congenital sensorineural hearing impairment	28
7.30	Imaging of maxillary tumors in children	28
7.31	MRI findings in the intracranial complications of acute sinusitis: the added value of Diffusion Weighted Imaging.	29
7.32	Pictorial and literature review of septo-optic dysplasia (de Morsier's Syndrome).	29
7.33	Moya moya disease.Rare and severe case	30
7.34	Correlation of linear and volumetric measurements with clinic-radiological diagnosis of hydrocephalus in children with TBM (Tuberculous meningitis)	31
7.35	Division of the Corpus Callosum into Multiple Points for Measuring Thickness and Generating Fiber Tracts - A Semi-Automated Method for Determining Normal Values and for use as a Surrogate Marker of Hemispheric Disease	31
7.36	Ultrasound findings of congenital cervical cystic lesions, in the pediatric age	32
7.37	"Eye (I) spy with my little eye" - ultrasound of the paediatric eye	32
7.38	Spinal ultrasound in infants suspected spinal dysraphism	33
7.39	MRI appearances of primary intracranial arachnoid cysts in infants and children	34
7.40	Nontumoral bilateral occlusion of the Monro foramina : a pediatric case report	34
7.41	Grey Matter Gliomatosis Cerebri :a new pediatric entity and MRI pattern	35
7.42	Volitional dyskinesia caused by a post-traumatic infarction of the globus pallidus in a child	35
7.43	White matter signal abnormalities on MRI in children with HIV encephalopathy	36
7.44	Cerebellum volume in children with syndromic craniosynostosis	37

8 Research conference: High field MRI	37
9 Scientific session 2: Head and Neck 2	37
9.1 Correlations between late radiological findings and long-term neurodevelopmental outcome in inflicted traumatic brain injury	37
9.2 Shaken Baby Syndrome: Judicial admissions highlight chronic violence	38
9.3 Delayed puberty or hypogonadism caused by pituitary transfusional hemochromatosis	38
9.4 Retinoblastoma: role of high resolution MR imaging to evaluate efficacy of chemiotherapy	39
9.5 Retinoblastoma: correlation between high resolution MRI and histology for optic nerve assessment prior to enucleation	40
9.6 Unilateral sensorineural hearing loss in children : MRI or CT first ?	40
9.7 MRI in recurrent ear cholesteatomas in children	41
9.8 Thyroid cancer in children - variable sonographic presentation and difficulties in diagnosis	42
9.9 Application of an automatic computerized algorithm for the analysis of upper airways reduction in patients with Pierre Robin sequence studied by MDCT.	42
9.10 Can malignant transformation of pediatric solid gliomas be predicted with MRSI? A comparison grading between children and adults	43
10 Quiz Skeletal dysplasia	44
11 Scientific session 3: Genitourinary	44
11.1 Re-appraisal of the sonographic characteristics of the neonatal kidney	44
11.2 Renal cysts in tuberous sclerosis complex (TSC): patterns and significance	44
11.3 Contrast-enhanced, real-time volumetric ultrasound imaging of tissue perfusion: preliminary results .	45
11.4 Ultrasound (US) evaluation of peritoneal thickness in children and young patients in peritoneal dialysis (PD): a single centre experience.	45
11.5 MCUG: Are we in line with current recommendations?	46
11.6 MR Voiding cystourethrography (MRVC) for vesico-ureteric reflux in unsedated infants	47
11.7 Non-contrast enhanced MR angiography of renal arteries in pediatric patients: a feasibility study. . .	47
11.8 Comparison of non-contrast and contrast-enhanced MR angiography of the renal arteries in pediatric patients - initial experience.	48
11.9 Demonstration of Automated Characterization of Renal Function and Tissue Enhancement in Dynamic Magnetic Resonance Imaging (MRI) Using Factor Analysis of Dynamic Sequence (FADS). . .	49
11.10 Functional-morphological MR urography (MRU) - 12 years of experience from technical development to clinical practice	49
11.11 The Imaging Features of Infantile Urolithiasis Resulted From Melamine	50
12 Oncology Task Force	51
13 URO MR special session	51
14 Oncology Task Force	51
15 Coffee break	51
16 Posters urogenital	51
16.1 Posterior urethral valves: cystography and cystoscopy results correlation	51
16.2 Role of ultrasound in management of scrotal swelling in children	51
16.3 Intrapelvic Wilms' Tumour: A Rare Entity for the Most Commonly Encountered Malignant Renal Tumour in Children	52
16.4 Herlyn-Werner-Wunderlich syndrome: Imaging findings in 13 cases	53

16.5	Inter-observer reproducibility of non contrast-enhanced MR angiography of renal arteries in pediatric patients.	53
16.6	Rare cases of scrotal blood effusion in newborn mimickers of neonatal testicular torsion	54
16.7	Antenatal ultrasonographic diagnosis of mild to moderate fetal pyelectasis is not always a significant finding for urinary tract pathology.	54
16.8	The role of catheter-free methods for vesicoureteric reflux detection in children	55
16.9	Ultrasound characterisation of the paediatric breast - a pictorial review	56
16.10	Multiple Giant Bladder Diverticula in Menkes Kinky Hair Disease.	56
17	Scientific session 4: Interventionnal	57
17.1	Achieving hemostasis after transhepatic portal vein access in children	57
17.2	CT-guided radiofrequency ablation of osteoid osteoma in a pediatric population : our experience in 9 children.	57
17.3	Primary aneurysmal bone cysts in children: percutaneous Ethanol injection and proposal of a vascular classification	58
17.4	Computed tomography guided RFA as a treatment method in pediatrics	59
17.5	Arterial embolisation of pulmonary sequestration in children.	59
18	Symposium Sickle cell Anemia	60
19	Research : Molecular imaging, cooperative work	60
20	ESPR gold medalist, Honorary Members, IPR announcement	60
21	Posters Interventionnal	60
21.1	Sclerotherapy with tetracycline hydrochloride (HCL) solution in treatment of solitary hepatic cyst in childhood	60
21.2	Percutaneous treatment of primary aneurysmal bone cyst by alcoholic solution of zein in 25 patients	60
21.3	How to manage treatment-resistant post-operative pelvic lymphocele in an infant - our local experience: combined percutaneous catheter drainage and transcatheter sclerotherapy	61
21.4	CT-guided percutaneous biopsy of spinal lesions in children	62
22	Posters antenatal	62
22.1	Can fetal MRI give prognostic criteria in gastroschisis?	62
22.2	Fetal MRI: luxury or necessity? Our experience using 0.6T open machine.	63
22.3	Fetal gastrointestinal MRI: all that glitters in T1 is not necessarily colon...	63
22.4	Fetal abdominal masses as enhanced by ultrafast magnetic resonance imaging: comparison with postnatal imaging features and histologic results	64
22.5	Fetal MRI in the diagnosis of congenital lung lesions associated with diaphragmatic hernia	65
22.6	Congenital tumors: Imaging when life just begins	65
22.7	Fetal CT : When ? How ? what for ?	66
22.8	Prenatal diagnosis of intestinal malrotation with fetal MRI	66
22.9	Normal relative values of cerebral biometry in fetal magnetic resonance imaging.	67
22.10	Antenatal MRI in the diagnosis of upper abdominal foetal masses.	68
22.11	Walker Warburg syndrome: how prenatal US ocular anomalies can help to reach the diagnosis? . . .	68
22.12	Role of MRI in diagnosis of non-CNS fetal abnormalities	69
22.13	"Isolated" Dandy-Walker malformation (DWM) on prenatal imaging	69
22.14	Imaging findings and utility of fetal central nervous system MRI	70
22.15	Rhombencephalosynapsis (RES) prenatal imaging : retrospective multicenter study of 17 cases detected by ultrasound +/- subsequent MRI.	71

23 Scientific session 5: Antenatal	71
23.1 Fetal body MRI - comparison to prenatal ultrasound and postnatal findings	71
23.2 Impact of maternal sedation on quality of fetal cerebral MRI	72
23.3 Distortion of the anterior part of the interhemispheric fissure. Significance and impact on prenatal diagnosis.	72
23.4 Prenatally Diagnosed Congenital Lobar Hyperinflation (CLO)- Not Uncommon and Non Surgical Management is Feasible	73
23.5 Sonographic evaluation of the fetal pancreas	73
23.6 Abnormal fetal hepatic signal on MRI	74
23.7 When will multidetectorCT (MDCT) of the fetus improve prenatal management: a retrospective survey; 7 years experience, 150 cases.	75
23.8 Prenatal imaging characterization of congenital bronchopulmonary malformations (BPM)	75
24 ESPR and J Lefebvre Lecture	76
25 Coffee break	76
26 Posters cardiovascular	76
26.1 Is Diastolic Dysfunction in treated Tetralogy of Fallot (TOF) patients related to pure volume overload or is it secondary to other associated abnormalities?	76
26.2 MR IMAGING APPEARANCES OF ANOMALOUS PULMONARY VENOUS DRAINAGE - A PICTORIAL REVIEW	77
26.3 Hemangiomas revisited: the useful, the unusual and the new.	77
26.4 Tietze syndrome in infants and young children: Clinical and imaging findings	78
26.5 Anomalous Left Coronary Artery from the Pulmonary Artery (ALCAPA):A rare cause of heart failure in children	78
26.6 Comparison of Ergospirometry (ESM) with cardiac Magnetic Resonance imaging (cMRI) in patients with surgically repaired tetralogy of fallot (TOF)	79
26.7 CMR and Echo assessment of right ventricle function and venous pathway obstruction after atrial switch operation (Senning procedure)	79
26.8 Cardiac MRI of transposition of the great vessels: a review of MRI appearance of normal and abnormal, pre and post operative findings and of long term complications.	80
26.9 Long-term follow-up of large atrial septal occluder (Amplatzer device) with cardiac MR imaging in a pediatric population	81
26.10The difficulties of ultrasound diagnostics of non-compact myocardium in children with underlying carditis	81
27 Posters Chest	82
27.1 Tracheobronchial stenoses by vascular anomalies: role of multislice CT	82
27.2 Congenital Lung Lesions and their mimickers	82
27.3 Severe respiratory and neurological presentation of H1N1 in pediatric patients	83
27.4 A new CT scorig system to detecting clinically relevant changes in pediatric patients with cystic fibrosis	83
27.5 Chest CT imaging interpretation in young patients with cystic fibrosis (CF): comparison of axial versus spiral HRCT	84
27.6 Congenital cystic pulmonary malformations (CCPM) diagnosed antenatally: imaging and histopathological correlations.	84
27.7 Anterior Lower Mediastinal Tumors in Infants and Children: CT findings	85
27.8 Multimodality Imaging Evaluation of Pulmonary Vascular Anomalies and Abnormalities in Children	86
27.9 Pediatric pulmonary and thoracic aspergillosis	86
27.10CT findings of mycoplasma pneumonia in pediatric patients	87
27.11Unexpected detection of congenital diaphragmatic hernia (CDH) in childhood	87
27.12Acute Respiratory Distress Syndrome in Children: the Early Findings of Chest Radiography	88

27.13	The Radiological Findings and its Clinical Value in Children with Influenza A (H1N1) Infection . . .	89
27.14	Left Sided Diaphragmatic Hernia and Life threatening Infusion Thorax following Umbilical Vein Catherisation in a Premature Baby	89
27.15	Idiopathic spontaneous pneumomediastinum in childhood	90
27.16	Chest radiographic findings, clinical presentation and immune status in HIV infected children	90
27.17	Imaging findings of congenital tuberculosis in four infants	91
27.18	Imaging investigation of congenital chylothorax presented in two newborns	91
27.19	Use of ultrasonography for the diagnosis of pneumothorax in the neonatal intensive care unit	92
28	Scientific session 6: Cardiovascular	92
28.1	Umbilical venous catheter position evaluation by an ultrasound	92
28.2	Pericardial Effusions in Adolescent Girls with Anorexia Nervosa. Clinical course and risk factors . .	93
28.3	Evaluation of free breathing 3D Steady-State Free-Precession (3D SSFP) sequence for the study of congenital cardiac and thoracic vascular disease: comparison to conventional angiographic MRI sequence (MRA)	94
28.4	Basal plane selection at cardiac MRI – Influence on heart Volumetry and cardiac Performance Pa- rameters	94
28.5	Right Branch Bundle Block at cardiac MRI – Influence on Heart Volumetry and cardiac Performance Parameters	95
28.6	The role brain MRI in a complex pre-surgery examination of newborns with TGA: terms and conditions.	95
28.7	Free Breathing Fast 3D Cine Steady-State Free Precession Imaging for Assessment of Ventricular Function in Pediatric Patients	96
29	CT Dose Task Force	96
30	Scientific session 7: Chest	96
30.1	CT of congenital lung abnormalities - 9 year experience.	96
30.2	Cross-sectional study on tracheomegaly in children following fetal tracheal occlusion because of severe congenital diaphragmatic hernia	97
30.3	Chest radiograph and computed tomography evaluation of lung parenchyma and airway abnormalities in pediatric patients with laryngeal cleft.	98
30.4	Comparison of the evolution between CT and lung function tests (LFT) in the follow up of Primary Ciliary Dyskinesia (PCD) patients	98
30.5	Aortopulmonary collateral blood flow in cystic fibrosis assessed by phase-contrast MRI	99
30.6	Idiopathic pulmonary haemosiderosis and concomitant coeliac disease.	99
30.7	Pictures of a pandemic: A pediatric ICU case review series of H1N1 Influenza A.	100
30.8	Doppler Ultrasonography in Childhood Pulmonary Consolidations: Diagnostic Contribution to Gray Scale Imaging and Prediction of Clinical Outcomes of Pneumonias	101
30.9	The importance of high resolution CT in the diagnosis of pulmonary graft versus host disease after allogeneic bone marrow transplantation - a correlation between lung abnormalities on HRCT and clinical GVHD diagnosis	101
30.10	The Radiological Appearances of Complications of H1N1 Influenza (Swine Flu) Infection in Children	102
31	CT Dose Task Force	103
32	SFIPP General assembly	103
33	Scientific session 8: Digestive tract	103
33.1	Meconium obstruction in extremely-low-birth-weight premature infant: US contribution to diagnosis and management	103
33.2	Contrast Enema Findings in Patients Requiring Re-operation for Hirschsprung Disease(HD)With Surgical Correlation	103

33.3	Midgut malrotation in children with a so-called “normal” duodenojejunal flexure (DJF)	104
33.4	Schatzki ring and eosinophilic esophagitis	105
33.5	Benign pneumatosis hepatis in children with colitis: Imaging with ultrasound	105
33.6	CT enterography: Inter-reader agreement and diagnostic performance in pediatric inflammatory bowel disease	106
33.7	Prevalence of penetrating and stricturing complications, and extraintestinal manifestations detected by CT enterography in pediatric inflammatory bowel disease patients	106
33.8	MRI and MR Enterography Assessment of IBD in pediatric patients	107
33.9	Are the biliary trees of children under three months of age visible on MR	108
33.10	Prevalence of Hepatic Pseudolesion Around the Falciform Ligament in Pediatric Age Group Evaluated by Portal-Dominant Phase Multidetector Computed Tomography (MDCT)	108
33.11	Liver MRI with DWI in children with liver disease	109
33.12	Evaluation of liver fibrosis with diffusion weighted image in infants	109
33.13	Prognostic significance of Doppler ultrasound measurements in follow-up of children after liver transplantation (LTX)	110
33.14	Long term outcome of portal vein size discrepancy in pediatric liver transplants	111
33.15	Congenital portosystemic shunt: complications and outcome after closure: about 19 pediatric cases .	111
33.16	Ultrasonographic evaluation of the free abdominal fluid in asymptomatic children.	112
33.17	Separation of bowel gas on abdominal radiographs in neonates: sonographic correlation	112
34	Hip dysplasia Task force	113
35	Coffee break	113
36	Posters Digestive tract	113
36.1	Evaluation of disease activity in idiopathic inflammatory small bowel disease: MR imaging.	113
36.2	Intestinal pneumatosis: a rare complication of GVHD after bone marrow transplantation	114
36.3	Chronic Gastric Volvulus (CGV) In Infants: An Insidious Diagnosis	114
36.4	Imaging features of non-hematological splenic lesions in infants and children	115
36.5	Paediatric Liver MRI: a pictorial review.	115
36.6	Cholangitis as the presenting symptom of autosomal recessive polycystic kidney disease (ARPKD) .	116
36.7	Focal nodular hyperplasia in children	116
36.8	The utility of balloon catheter inflation in Fluoroscopic Loopograms	117
36.9	Sonographic findings predicting unsuccessful pneumatic reduction of intussusception	118
36.10	Ultrasound of Paediatric Intussusception - 5 years in a tertiary paediatric hospital.	118
36.11	Spontaneous meso-portal and porto-portal shunts following orthotopic liver transplantation (OLT) in children.	119
36.12	Hirschsprung’s disease: 15 year retrospective review of Contrast Enema findings at a large tertiary care pediatric hospital.	119
36.13	Imaging findings of a spontaneous rupture of common bile duct in a young female patient : case report	120
36.14	MR enterography in pediatric Crohn’s disease: preliminary results	120
36.15	US diagnosis of long segment severe necrotising enteritis caused by Candida albicans in a boy with ALL, febrile neutropenia and septic shock	121
36.16	Wandering liver in a neonate. A case report	121
36.17	Beyond Biliary Atresia: Ultrasound diagnosis of alternative causes of neonatal Conjugated Jaundice.	122
36.18	Color-Doppler findings in the postoperative evaluation of mesenterico-left portal shunt (Rex-shunt) for the treatment of portal hypertension due to extra-hepatic portal vein thrombosis in children. . .	123
36.19	Differentiation between Hirschsprung allied disease and Hirschsprung’s disease in childhood with Barium enema	123
36.20	CT features in childhood Crohn’s disease	124

36.21MR enterography in inflammatory bowel disease with endoscopic and histopathologic correlation- a pictorial essay.	124
36.22CT Findings of Mesenteric Laceration in Four Pediatric Patients	125
36.23MRI appearances of focal infantile hepatic hemangioma	126
36.24Occult Injuries in Pediatric Abdominal Trauma.	126
36.25Spectrum of Imaging abnormalities in Paediatric Inflammatory bowel disease	127
36.26Pictorial essay of imaging findings in children with biopsy proven eosinophilic esophagitis	127
36.27An easily constructed simulator facilitates training of radiologists in gastrojejunal tube insertion . .	128
36.28Evaluation of liver fibrosis with T2 relaxation time in infants	129
36.29Pharmacological premedication efficacy in intussusception's management by enema in pediatrics: preliminary outcomes	129
36.30Result of air enema reduction in 737 cases of intussusception	130
36.31The role of ultrasound compared to plain radiography in the diagnosis and management of necrotizing enterocolitis	130
37 Scientific session 9: Oncology	131
37.1 Are the RECIST criteria useful in assessing response in paediatric rhabdomyosarcoma?	131
37.2 Characterizing individual cancers using dynamic MRI enhanced by macromolecular contrast media (MMCM)	131
37.3 Whole body MRI with DWIBS sequences for disease detection and staging of pediatric oncological patients	132
37.4 Comparing the value of the sequences T1, T2, STIR and DWIBS by whole body magnetic resonance imaging for staging and monitoring patients with Hodgkins lymphoma in childhood	133
37.5 Whole-body MRI, including diffusion-weighted imaging, compared to FDG-PET for staging Hodgkin lymphoma - initial experiences	134
37.6 Derivation of histographic apparent diffusion coefficient (ADC) changes associated with successful response to first line chemotherapy of adolescent and childhood lymphoma.	134
37.7 Value of diffusion weighted images in differentiating responders to chemotherapy for osteosarcoma .	135
37.8 Does Serum-Ferritin Level in Children receiving Blood Transfusions in the Treatment of Acute Leukemia correlate with Iron Load of the Liver? Initial Results	136
38 Oncology Task force synthesis	136
39 ESPR General Assembly	136
40 Lunch	136
41 Posters Oncology	136
41.1 Pediatric Rhabdomyosarcoma: Cross-sectional imaging findings with pathologic subtype correlation	136
41.2 Pictorial review of normal appearances and variants on paediatric 18-F FDG PET-CT.	137
41.3 Pediatric Dermatofibrosarcoma Protuberans: Case Report of a Rare Soft-Tissue Sarcoma	137
41.4 Imaging findings of childhood rhabdomyosarcoma in KK Women's and Children's Hospital, Singapore.	138
41.5 Comparison of STIR-HASTE and PROPELLER MRI for the evaluation of extranodal chest wall disease extension in pre-treatment paediatric and adolescent patients with known lymphoma	139
41.6 MR patterns of acute leukemia in 17 children presenting with skeletal complaints	139
42 Posters Miscellaneous Radiation protection	140
42.1 UNEXPECTED LOCATIONS AND COMPLICATIONS OF INTRAVASCULAR CATHETERS, TUBES, SHUNTS AND OTHER DEVICES IN CHILDREN. ROLE OF DIAGNOSTIC IMAGING AND MANAGEMENT.	140
42.2 The Revival of the Silver Lining	140
42.3 Online software for automated calculation of the effective dose for pediatric MDCT	141

42.4	Routine quality control (QC) of hardware and sequences in pediatric MR Imaging	142
42.5	Evaluation of a new phosphor plate technology for neonatal portable chest radiographs	142
42.6	Quality Assurance: A New Method of Monitoring Radiation Exposure for Portable Chest Radiographs in Neonates	143
42.7	Dose Distribution in Pediatric Abdominal CT Examination - Using elliptically-shaped sheet-roll phantom -	143
42.8	A focused performance improvement program to increase on time starts for fluoroscopy patients . . .	144
42.9	Pharmacokinetics and Safety of Gadobenate Dimeglumine in Patients 2-5 Years of Age	145
42.10A	simple tool for enhancing transcription of radiological reports	145
43	Symposium Low dose, total body imaging 2	146
44	Scientific session 10: Miscellaneous, radiation protection	146
44.1	An interactive oral presentation of a video study into children's perceptions of the radiology department and its various imaging modalities.	146
44.2	Contrast enhanced low MI sonography in paediatrics - applications and limitations	146
44.3	Digital X-ray examinations in the neonatal intensive care unit: Dose optimisation using a neonatal chest phantom	147
44.4	Processing optimization in Pediatric femur examinations - a phantom project focusing on dose optimization when using Canon's new DR Spectra software	148
44.5	Dose savings in Computed Tomography (CT) due to a new, dedicated Kernel for Image Reconstruction - Influence on Image Quality	148
44.6	Proposed technique to reduce radiation dose in pediatric chest and abdomen CT along with reduction in image noise without compromising lesion detection by using adaptive iterative reconstruction versus filtered back projection CT.	149
44.7	Radiation exposure of obese children from body CT: are they appropriately treated as adults? . . .	149
44.8	Implementation of pediatric automatic exposure control (AEC) CT protocols which are based on weight, clinical indication and number of prior CTs	150
44.9	Labeling of contrast agent containers - a potential source of confusion and error	151
45	CT Dose Task Force Synthesis	151
46	Scientific session 11: Musculoskeletal 1	151
46.1	Prevalence of the Classic Metaphyseal Lesion in Infants at Low versus High Risk for Abuse	151
46.2	3D Ultrasound in the Follow-Up of Developmental Dysplasia of the Hip Managed in a von Rosen Splint - Antenatal Applications Extended?	152
46.3	Acetabular immaturity - dysplasia in young adults. Preliminary results.	153
46.4	MRI findings of <i>Kingella kingae</i> osteomyelitis in children	153
46.5	Incidence of Avascular necrosis in patients with Acute Lymphoblastic Leukemia	154
47	Hip Dysplasia Task Force Synthesis	154
48	Coffee break	154
49	Posters Musculo-skeletal	154
49.1	TITLE. THE SO-CALLED OSTEOCHONDROSIS: A GROUP OF DIFFERENT CLINICAL ENTITIES. IMAGING FINDINGS IN CHILDREN AND ADOLESCENTS. THE EPONYMS	154
49.2	Imaging Pyomyositis in children	155
49.3	Use of ultrasonography for the diagnosis of temporomandibular joint disorders in children with juvenile idiopathic arthritis.	156
49.4	MRI assessment of bone marrow changes in children with juvenile idiopathic arthritis: inter and intra-observer variability in a multicenter study	156

49.5	Size, shape and position of the mandibular condyle during childhood.	157
49.6	Lipofibromatosis - A rare pediatric soft-tissue tumor.	157
49.7	Multimodality Imaging of Skeletal Manifestations of Sick Cell Anemia in Children	158
49.8	Diffusion Weighted Imaging at 3 Tesla for normal pediatric hip.	159
49.9	Diffusion Weighted Imaging at 3 Tesla for Legg-Calvé-Perthes Disease: preliminary results.	159
49.10	Use of Ultrasonography as the useful approach in diagnosis and management of JRA of the knee and hip: comparison between US and MRI data	160
49.11	The Usefulness of MRI in Juvenile Idiopathic Arthritis	160
49.12	Paediatric non-accidental hand fractures:a radiographic review	161
49.13	Post mortem skeletal surveys in suspected non-accidental injury: an imaging review	162
49.14	Spinal MRI findings in juvenile idiopathic arthritis	162
49.15	Cat-scratch disease: our US experience	163
49.16	An audit of spinal ultrasound for sacral dimples detected on routine newborn examination.	163
49.17	THE HAND AS AN INDICATOR OF SYSTEMIC DISEASES IN CHILDREN	164
49.18	Ultrasound of the pectoralis complex in patients with Poland syndrome	165
49.19	Assessment of active inflammation in juvenile dermatomyositis: A novel scoring system.	165
49.20	The L5 interpedicle distance - a useful measurement on scoliosis images	166
49.21	The supra-acetabular notch of the acetabulum: MR imaging findings of this anatomical variant.	166
49.22	Does ultrasonographic findings of patellar tendon correlated with hormone concentrations in adoles- cent female volleyball players?	167
49.23	Dynamic ultrasound in neonatal hip instability. Quantitative evaluation of instability and presenta- tion of new normative references.	167
49.24	Osteoid osteoma in paediatric patients. Significance of dynamic gadolinium enhanced MR imaging.	168
49.25	Lessons learned from the follow-up skeletal survey	169
49.26	Ultrasound abnormalities of peripheral joints in Juvenile Idiopathic Arthritis (JIA) and correlation with clinical examination.	169
49.27	Congenital indifference to pain with anhidrosis- a radiological review	170
49.28	Chondrodysplasia punctata type 2, x-linked dominant (CDPX2): case report and review of the literature	170
49.29	Osteo-articular infection in young children: What's new?	171
49.30	Imaging of the spine in scoliosis, is nuclear medicine necessary in addition to MRI?	172
49.31	Limb length measurement with the EOS system: comparison with conventional systems.	172
49.32	The importance of contrast and post contrast subtraction MRI studies as the ultimate diagnostic tools in the differentiation between osteomyelitis and osteonecrosis in children with haematological disorders.	173
49.33	Multimodality imaging of nontraumatic back pain in children	174
49.34	Imaging in Congenital Spinal Deformity	174
49.35	Computer assisted evaluation of leg length inequality and alignment disorders in children.	175
49.36	Transient synovitis of the hip (TSH): involvement of the asymptomatic side.	175
49.37	Juvenile idiopathic arthritis: Assessment of synovitis with early and late gadolinium enhanced MR imaging.	176

50 Scientific session 12: Musculoskeletal 2 177

50.1	Prevalent Vertebral Fractures among Children Initiating Glucocorticoid Therapy for the Treatment of Rheumatic Disorders	177
50.2	Body Imaging findings in children on ketogenic diet	177
50.3	Is there an increased fracture risk in healthy infants and toddlers with Vitamin D deficiency?	178
50.4	Computer assisted evaluation of progression of spinal curvature in scoliosis.	178
50.5	3D X-Ray analysis of the idiopathic scoliotic spine before and after surgery	179
50.6	Ultrasound abnormalities of enthesitis in Juvenile Idiopathic Arthritis (JIA) and correlation with clinical examination.	180

50.7	Ultrasound findings on patients with JIA in clinical remission: a pilot study	180
50.8	Development of the wrist. Normal standards based on MRI for 6-15 year olds.	181
50.9	Carpal erosions in children with Juvenile Idiopathic Arthritis (JIA) as assessed on MRI. Repeatability of a novel scoring system.	181
50.10	Proposal of an MRI synovitis score in juvenile idiopathic arthritis: inter and intra observer reliability in a multicentre study.	182
50.11	Is a gadolinium enhanced sequence always required in knee MRI for patients with JIA?	183
50.12	Dating of fractures: an analysis of key radiological features in children aged five years and under . .	183
51	Closure of the congress	184
	Index of authors	184

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2 List of abstracts

3 Official Opening

4 Scientific session 1: Head and Neck 1

4.1 Brain malformations in children with syndromic craniosynostosis

Joyce Florisson, Fedde Van der Lijn, Henri Vrooman, Wiro Niessen, Irene Mathijssen, Maarten Lequin

Purpose - Objective

Children with syndromic craniosynostosis appear to have a higher rate of structural brain abnormalities than in the general population, but most reports describe a low number of patients and little detail on type of brain malformation. They often show unexplained neurological impairment. We hypothesise that the hippocampus may be abnormally developed which may influence the neurological outcome.

Material and methods

In a prospective study we assessed the shape and volume of the hippocampus in 55 children with syndromic craniosynostosis between the age of six and fourteen years treated in the Craniofacial Center in Rotterdam. The study population included Apert, Crouzon/Pfeiffer, Muenke and Saethre-Chotzen syndrome patients, and patients with a complex form of craniosynostosis. We included 5 healthy controls. All patients and controls underwent brain MRI of the brain using a 1.5T system. Shape of the hippocampus was assessed visually on a 3D T1 volume set. Volume measurements were performed on hippocampus segmentations obtained with an in-house developed automated method followed by manual editing.

Results

Ten patients visually showed a hypoplastic hippocampus on the 3D data set. Preliminary results of volume measurements done by post processing technique show that the hippocampus of these patients indeed have a lower volume compared to our healthy controls.

Discussion and conclusions

Abnormal dysplastic hippocampus seen in children with syndromic craniosynostosis may play a role in the development of their neurological impairment.

Conflict of interest

none

4.2 Postnatal biometry of the corpus callosum in MRI: reference data

Catherine Garel, Ioana Cont, Corinne Alberti, Emilie Josserand, Marie-Laure Moutard, Hubert Ducou le Pointe

Purpose - Objective

To provide on a large cohort of children reference biometric data of the corpus callosum (CC) in Magnetic Resonance Imaging (MRI).

Material and methods

Normal cerebral MRI were collected retrospectively and several parameters were measured: frontooccipital diameter (FOD), anteroposterior diameter of the corpus callosum (APD), length of the corpus callosum (LCC), thickness of the genu (GT), the body (BT), the isthmus (IT) and the splenium (ST), position of the splenium in relation to the tegmentum (S/T). Reference values were built using a method recommended by the WHO. Inter and intra-observer agreement was evaluated as well as a possible gender effect.

Results

622 children were included (320 boys, 302 girls), ranging from 1 day to 15 years 6 months. Normal values (from 3rd to 97th percentile) are provided for each parameter. All parameters showed rapid growth until the age of 3, then their growth slowed down (FOD, APD, LCC, GT, ST) or stopped (S/T). Growth of BT and IT was completed by 7-8 years. CC modelling (IT/ST) was completed by 3 years. DFO was statistically higher in boys from the age of 1. The other parameters did not show any gender effect. Inter and intra-observer agreement was excellent with an intra-class correlation coefficient higher than 0.75 for all parameters except for IT.

Discussion and conclusions

We present reproducible reference charts for biometry of the CC in MRI, on a large cohort of children.

4.3 MR imaging and neurodevelopmental spectrum in a series of children with Rhombencephalosynapsis

Laurent Pasquier, anne Larroque, Mathilde Ferry, Bertrand Bruneau, m Chami, vincent Des Portes, Sylvie Odent, Laurent Guibaud

Purpose - Objective

Rhombencephalosynapsis (RS) is an uncommon cerebellar malformation defined by vermian agenesis with fusion of the hemispheres and of the dentate nuclei. Previously, we had described the wide neuropathological spectrum with associated malformations in a study of 40 fetal cases (Pasquier et al., Acta Neuropathol, 2009).

Material and methods

we aimed at describing MR imaging and neurological spectrum for 12 post-natal cases.

Results

Posterior coronal MR Imaging demonstrate fused cerebellar hemispheres, abnormal horizontal orientation of folia, an interhemispheric indentation linked to the flocculo-nodular lobe always described upon pathological study. On axial sections, MRI show reduced cerebellar size, a convex aspect of the posterior edge of the cerebellum and a 4th ventricle morphologically abnormal. On sagittal section, we noticed absence of a normal vermis especially with no primary fissura. From a developmental point of view, all children showed mild truncal ataxia, motor delay and visual defects as strabismus. Most children had mild to moderate mental impairment but one quarter of them were attending a normal school. Significant mental retardation was found out in children with either triventricular ventriculomegaly which needed derivation or abnormal karyotype.

Discussion and conclusions

Neurodevelopmental prognosis of RS remains hard to give during prenatal period because of the lack neurological and radiological data. We intend to widen this series in order to help clinicians and families when a prenatal diagnosis of RS is done

4.4 The clinical and radiological presentation of preterm cerebellar haemorrhage

Ginette Ecury-Goossen, Jeroen Dudink, Maarten Lequin, Monique Feijen-Roon, Sandra Horsch, Paul Govaert

Purpose - Objective

To analyse clinical symptoms and findings on cranial ultrasound in preterm infants preceding the diagnosis of cerebellar haemorrhage.

Material and methods

Retrospective analysis of all preterm infants with a postnatal CUS or MRI diagnosis of cerebellar haemorrhage admitted in a tertiary care centre between January 2002 and June 2009.

Results

Fifteen infants were identified; median gestational age was 25 2/7 weeks and median birth weight 725 grams. Six types of haemorrhage were discerned: subarachnoid (n=3), folial (n=1), lobar (n=9, of which 4 bilateral), giant lobar (n=1, including vermis) and contusional (n=1). In eleven infants CUS showed lateral ventricle dilatation preceding identification or coincident with cerebellar haemorrhage, which on standard CUS could not be explained by supratentorial IVH. Such ventriculomegaly was found in all but one of the lobar haemorrhages (9 out of 10). Thirteen infants suffered from notable, otherwise unexplained motor agitation in the days preceding the diagnosis.

Discussion and conclusions

Unexplained ventriculomegaly can be a first sign of cerebellar haemorrhage and should instigate sonographic exploration of the cerebellum. Motor agitation may be a presenting symptom of cerebellar haemorrhage in preterm infants.

Conflict of interest

None

4.5 Subpial hemorrhage in the neonate. About 12 cases.

Adeline Gasner, Corinne Veyrac, Catherine Baud, Caroline Roulleau, Magali Saguintaah

Purpose - Objective

To describe the US and MR findings of subpial hemorrhage, usually referred as lobar hemorrhage. To discuss the perinatal conditions and evolution.

Material and methods

We reviewed 12 neonates, prematurely born in 6, with an hemorrhagic subpial lesion, often associated with an ischemic-hemorrhagic underlying lesion. It was discovered on US (at day 1-3), performed routinely (2 preterm) or because of neurological symptoms (n=10). Nine patients underwent MRI. Two infants died, with a pathologic examination in 1.

Results

US demonstrated a highly echodense lesion, peripherally located, involving the superficial cortical layer, with preserved gyriform configuration. In 4 cases, an associated extracerebral hemorrhagic collection was detected. A rapid liquefaction of the peripheral cortical lesion (day 6-21) was observed. MRI showed an underlying ischemic-hemorrhagic lesion in 3 cases. The lesion evolved to a large focal cortico-subcortical atrophy. The birth was complicated in 8 cases : cord procdence in 1, cesarean section in 7 (failure of instrumental extraction:3, acute fetal distress:2, placenta praevia:2). Two patients died. In 1 case, the pathological data were perfectly correlated with the US aspect. The neurological examination was normal in 8 out of the other 10, at discharge. The follow-up (4 months-2 years) found hemihypertonia in 1 patient and no epilepsy.

Discussion and conclusions

The subpial hemorrhage involves superficial cortex. It shows typical US and MR patterns and evolution. It seems to be correlated with excellent prognosis.

4.6 Creatine synthesis and transport defects: Clinical presentation, MRI and treatment in a series of 12 children

Nathalie Boddaert, vassili valayannopoulos, Anne Philippe, Isabelle Desguerre, David Grévent, Christine Barnerias, Manuelle Kossorotoff, Laureline Berteloot, Arnold Munnich, Pascale De Lonlay, Francis Brunelle

Purpose - Objective

Creatine metabolism disorders include biosynthesis (AGAT and GAMT deficiencies of recessive autosomal inheritance) and cerebral transport (SLC6A8 gene, X-linked) defects. We describe the clinical presentation, MRI and treatment in a series of children with creatine deficiency.

Material and methods

12 children (9 years-old), 5 with GAMT deficiency and 7 with creatine-transporter deficiency (CRTR), all with brain MRI with MRS.

Results

clinical presentation included mental retardation and speech delay in all children, intractable seizures (n=7) and behaviour disturbances (n=7). 8/12 children were diagnosed using the MRS. MRS showed no peak (n=10) or very low peak of creatine (2 females with CRTR-deficiency). Children with GAMT deficiency were treated with oral creatine for 3 years with dramatic improvement in seizures, normalisation of creatine in brain-MRS but persistence of abnormal behaviour. The patients with CRTR deficiency have been treated for 2 years with oral creatine combined or not to its natural precursors L-Arginine and L-Glycine. No improvement of their clinical signs (except from myopathic signs) or brain creatine in MRS has been observed so far.

Discussion and conclusions

The metabolic screening of children with non-specific mental retardation associated or not to autistic symptoms, seizure or dystonia should include brain MRS as soon as possible in order to diagnose patients with creatine metabolic defects. Treatment has been proven of benefit in creatine biosynthesis defects.

Conflict of interest

no

4.7 Tumefactive Demyelination in Childhood - Diagnostic Uncertainty, Predictive Imaging Features and the Pursuit of Causation

Mark Walsh

Purpose - Objective

A clinicrodiologic review of five paediatric cases of pathologically confirmed tumefactive demyelination is presented with the aim to address the diagnostic uncertainty in this rare paediatric entity. The predictive value of previously reported anatomic and functional magnetic resonance imaging (MRI) features are qualified and the importance of a comprehensive metabolic screen is encouraged.

Material and methods

Five cases of tumefactive demyelination (age range: 3 to 14 years; mean age: 6 years) managed at our institution between January 2008 and December 2009 were identified and their clinical records, imaging history and pathologic findings were analysed. Data collection was tailored to clarify the degree of diagnostic certainty at initial and follow-up MRI, qualify important radiopathologic correlates and identify predisposing neurometabolic disorders.

Results

Patients differed widely in demographics, clinical presentation and treatment response; however, anatomic and functional MRI findings showed significant overlap and correlated well with histopathologic findings. A metabolic screen obtained in all patients revealed an underlying in-born error of metabolism in 3 of 5 patients.

Discussion and conclusions

Tumefactive demyelination is exceptionally rare in the paediatric age group with an imaging differential that invariably includes infective, inflammatory and neoplastic pathologies. A systematic analysis and practical application of previously published data is offered to increase diagnostic confidence and facilitate stratification of the radiologic differential diagnosis. The importance of a metabolic screen in paediatric demyelinating conditions is explored and encouraged.

4.8 Neuroimaging in Cockayne syndrome

Mérimée Koob, Vincent Laugel, Myriam Durand, Hélène Dollfus, Izzie Namer, Jean-louis Dietemann

Purpose - Objective

Cockayne syndrome (CS) is a rare multisystem disease of autosomal recessive inheritance that is characterized by neurological and sensory impairment, cachectic dwarfism, and photosensitivity. We report the neuroimaging features in CS from genetically and biochemically proven cases with different clinical subtypes.

Material and methods

Twenty Cockayne patients aged 3 months to 53 years (nine CS type I, six CS type II, two COFS, three CS type III) were studied, both prospectively and retrospectively. MRI, spectro-MR, and CT scans were analyzed.

Results

The main imaging features were hypomyelination, calcifications, and brain atrophy. Calcifications were most frequently found in the putamen, less often in the cortex, the caudate nuclei, and the dentate nuclei. Severe, progressive white matter and cerebellar atrophy was observed. Early-onset patients (COFS and CS type II) showed more severe atrophy and hypomyelination and large cortical calcifications at the depths of the sulci, often accompanied

by calcifications of nearby leptomeningeal vessels. Atrophy was less important in late-onset patients (CS type III). Lactate, a decreased choline value in the white matter, and a decreased N-acetylaspartate value in the grey and the white matter were observed on proton MR spectroscopy.

Discussion and conclusions

Neuroimaging is helpful in the diagnosis of CS and can help differentiate the clinical subtypes, which can have a significant impact on prognosis.

Conflict of interest

No

4.9 Optimisation procedure for paediatric intraoperative MSCT axial protocol

antonio ciccarone, Giovanna Zatelli, claudio fonda

Purpose - Objective

Our experience highlighted that we needed to optimise axial protocol in paediatric MSCT axial protocol as a function of head size. This approach promised a feasibility control of dose to paediatric head that can reach values 5 times more than a MSCT with standard gantry diameter.

Material and methods

Noise study in PMMA (polymethylmetacrilate) phantom of 4 diameters (8, 13, 16, 20 cm) gives information about its variability as a function of mAs and/or diameter phantom, for a fixed kV. A relationship between tube current and phantom diameter for a fixed noise can be obtained. Good imaging quality for diagnosis of encephalic parenchyma correspond to 5-6 HU noise as mean in a roi with grey and white matter. We extrapolate tube current to obtain 4 HU noise in axial protocol of homogenous phantom. CTDI measurements are performed as a function of phantom diameters

Results

120 kV tube tension involve 5 mAs for child while in case of infant to 3 years old a decreasing to 4 mAs is necessary for preserve the same image quality. 140 kV tube tension give us 3 mAs and 2 mAs for the two ranges of age

Discussion and conclusions

These results show as it is possible to build an optimised axial paediatric protocols in intra-operative MSCT that preserve the same diagnostic image quality varying head size of neurosurgery patients

4.10 Intra-operative MRI for paediatric brain tumours - initial experience with a dedicated high-field (3T) system.

Laurence Abernethy, Shivaram Avula, Vidula Godhamgaonkar, Barry Pizer, Michael Jenkinson, Conor Mallucci

Purpose - Objective

We describe our initial experience with intra-operative 3T MRI to aid neurosurgery for paediatric brain tumours. We demonstrate the feasibility and utility of advanced imaging techniques in identifying residual tumour, but also describe the practical problems and potential pitfalls of high-field MRI in this setting.

Material and methods

Since September 2009, a Philips Achieva 3T XL MRI scanner has been used for intra-operative scanning at Alder Hey Childrens Hospital. The scanner is co-located with the neurosurgical operating suite, which is equipped with a BrainLAB image-guided navigation system. 1-2 children per week undergo brain surgery with intra-operative MRI. The suite is designed to allow use of the scanner for diagnostic imaging at other times.

Results

Intra-operative MRI has been successfully completed in 14 children to date. Residual tumour unexpected by the neurosurgeon was identified in 2 cases (14

Discussion and conclusions

Complete surgical removal of tumour is the most important prognostic factor for most paediatric brain tumours. Intra-operative MRI helps the neurosurgeon to achieve this goal, without the need for second-look surgery, but interpretation of intra-operative images can be challenging. Postoperative anatomical distortion, oedema, haemorrhage, magnetic susceptibility artifact and blood-brain barrier breakdown may cause confusing patterns of signal abnormality and enhancement. We plan to investigate whether diffusion-weighted and perfusion imaging can improve specificity.

Conflict of interest

None.

4.11 Usefulness of surface-rendering views of cerebral MRI to the diagnosis of developmental cortical abnormalities in patients with medically intractable epilepsy.

Marc Hermier, Alexandra Montavont, Alexis Arzimanoglou, Jean Isnard, Philippe Ryvlin

Purpose - Objective

The diagnosis of developmental cortical abnormalities is challenging. In patients with medically intractable epilepsies, surgical planning depends on the location and extent of these anomalies. We tested the hypotheses that surface rendering views may be routinely obtained, and may contribute to the diagnosis.

Material and methods

Surface rendering views were obtained from a 3D T2-weighted FLAIR sequence, obtained at 3T, in patients undergoing presurgical evaluation for medically intractable epilepsy. The results of surfacic analysis were compared with those of other MRI findings (high-resolution T2, inversion-recovery, and 2D reformatting of the 3D T1 and 3D FLAIR acquisitions), and with the results of stereo-EEG, PET, and MEG.

Results

38 patients (mean age, 13 years) were included. Surfacic reconstructions could be routinely obtained during the MRI session (mean reconstruction time, 16 min). In many patients, cortical abnormalities were larger and/or more diffuse than previously thought based on slice images. In some patients with 2D "MRI-negative" epilepsy, surface analysis suggested anomalies that were correlated with PET and MEG findings. Surfacic views suggested diffuse cortical anomalies in several patients with otherwise negative MRI. Several kinds of malformations of cortical development are illustrated. Some limitations of the technique are described.

Discussion and conclusions

Surface rendering analysis of the cerebral cortex may be contributive to the presurgical screening of disorders of cortical development in children. It was considered complementary to conventional MRI.

Conflict of interest

None

4.12 MRI Findings in children with Tuberculous meningitis: a comparison of HIV infected and non-infected patients

Gerrit Dekker, Savvas Andronikou, Ronald Van Toorn, Christelle Ackermann

Purpose - Objective

To compare the MRI features of TBM in HIV-infected and uninfected children.

Material and methods

Retrospective descriptive study comparing clinical, laboratory and MRI features of 8 HIV-infected and 19 HIV-uninfected children with TBM.

Results

Cerebrospinal fluid findings, age of onset, disease severity and outcome were similar between the two groups. HIV infected TBM children are more likely to have evidence of TB on chest radiography (75

Discussion and conclusions

Most notable differences observed in HIV infected patients were a 100

Conflict of interest

No conflict of interest declared.

4.13 A Retrospective Review of Pituitary MR Findings in Pediatric Patients on Growth Hormone (GH) Therapy

Sarah Lenihan Tsai, Eoghan Laffan, Sarah Lawrence

Purpose - Objective

To review the MR imaging findings in patients on GH therapy, some with multiple pituitary hormone deficiencies (MPHD), others with isolated growth hormone deficiency (IGHD). We sought to define number of pituitary gland abnormalities and compare to current literature.

Material and methods

We reviewed the MRI findings in 55 pediatric patients on GH therapy, known to have either MPHD or IGHD. We compared initial MR report with the imaging findings of a pediatric neuroradiologist.

Results

Fifteen patients (27

Discussion and conclusions

The imaging findings are consistent with current published data. MR imaging of the pituitary gland is an important clinical tool. Those patients with the classic triad are at higher risk of developing MPHD and must be screened more closely.

5 Uroradiology Taskforce

6 Coffee break

7 Posters Head and Neck

7.1 Cranial nerve enhancement in children with TBM (tuberculous meningitis): Incidence, distribution, and clinical correlation

Ayanda Mapukata, Savvas Andronikou, Ronald Van Toorn

Purpose - Objective

To determine the incidence and distribution of cranial nerve enhancement (CNE) on MRI in children with TB Meningitis and correlate this clinically

Material and methods

MRI's of children with TBM were retrospectively reviewed for the presence of CNE and correlated for cranial nerve fallout

Results

Of 37 children, 9 (24

Of 8 patients who presented with cranial nerve palsy, 2 showed no CNE. In 3 patients vision resolved, and there was resolution in 1 patient each of oculomotor and abducens palsy.

Discussion and conclusions

Cranial nerve impairment is seen in up to 70Conclusion: CNE in children with TBM involves the optic, oculomotor and abducent nerves and correlates with clinical palsy.

Conflict of interest

No conflict of interest

7.2 MULTINODULAR THYROID GLAND (MNTG) IN CHILDREN: CORRELATION OF ULTRASOUND (US) AND CLINICAL FINDINGS

Cristian Garcia, Dror Koltin, Csilla Balassy, Alan Daneman

Purpose - Objective

MNTG in pediatrics has received little attention in the literature and the information is confusing. The purpose of this study is to correlate US and clinical findings of MNTG in children.

Material and methods

We reviewed patients up to 18 years, who had thyroid US between 2001 and 2009 in whom multiple (2 or more) thyroid nodules were reported. We reviewed the US images and clinical charts of each patient. The final diagnosis was based on clinical, US, cytological-histological and laboratory findings.

Results

MNTG was found in 61 patients, 56 females and 6 males and age ranged from 6.8 to 18.1 years (mean 14.2 years). Seventeen had cytological-histological study. Autoimmune disease was present in 32 (Hashimotos in 30, Graves disease in 2). Malignancy was diagnosed in 3 (2 papillary Ca, 1 Hodgkin lymphoma) and adenoma in 1. The remaining 26 were isolated, benign and nonspecific MNTG. The thyroid gland was not enlarged in 28 cases.

Discussion and conclusions

This study suggests that MNTG is more common in children than suggested in the literature. MNTG is not an entity itself, US findings are often nonspecific and correlation with clinical, laboratory and eventually histological findings might be required. The thyroid gland is not always enlarged and the term MNTG should be used instead of multinodular goiter.

Conflict of interest

None

7.3 The radiological diagnosis of intracranial lipomas: about 4 cases

Lilia Lahmar, ines brahim, Wiem Douira, Hela Louati, Lilia Ben hassine, Ibtissem Bellagha

Purpose - Objective

Intracranial lipomas (ICL) are rare benign congenital lesions. Their preferential location is cisterns. They are usually asymptomatic and incidental findings during neuroradiological investigations. Other brain malformations are often seen in association with ICL. The aim of this study is to illustrate cross sectional imaging features with a revue of literature.

Material and methods

We report the cases of 4 children. They were ranged in age from 6 months to 14 years. Two patients have presented seizures, one presented confusion with frontal headaches and one growth retardation. Only one patient had an emergency brain CT scan while all of them had MRI.

Results

For one patient, CT scan has detected a cisternal fat density mass. MRI has detected in the 4 cases a mass hyperintense on T1 and T2 weighted images which fades after fat saturation and does not contrast after injecting gadolinium. The location was in 3 cases in cisterns and in one case in the sylvian fissure. In all cases, lesions were infracentimetric. In one case, we detected a corpus collosal hypoplasia and anoxo-ischemic white matter lesions associated with ICL.

Discussion and conclusions

ICL are uncommon lesions whose development remains poorly understood. They are associated with specific malformations that reinforce the hypothesis of a malformative origin. The characteristic finding on both CT and MRI of ICL makes the diagnosis easier.

7.4 Optimisation of fast T2 mapping of the premature brain: a phantom study

Laetitia Maurin, Dominique Sirinelli, Jean Philippe Cottier, Laurent Barantin

Purpose - Objective

The assessment of myelination progress is a major purpose of newborn brain imaging. Some studies proved that the reduction of the T2 relaxation time of white matter reflects the progress of myelination. However, to our knowledge no study has yet investigated quantitative T2 sequences used in pediatric neurology. The aim of this work was to optimize and compare the different T2 map sequences suitable for premature newborn imaging so we could find one for clinical routine brain maturation study.

Material and methods

All the images were acquired on a 1.5T Signa HDx MRI device. Four sequences (4 echoes SE, SSFSE, ASSET, T2-MAP) were tested on test object (Spin Safety TO4, France) containing different MnCl₂ solutions. For each sequence accuracy and long term reproducibility was studied and compared to the SE sequence used as standard.

Results

Each of the four sequences allowed reproducible estimation of T2. After mathematical correction, T2 values found for each sequence were comparable to those calculated by the reference sequence. The major argument that led us to keep the SSFSE sequence for premature newborns T2 maps was its duration. This particular sequence was optimized in order to decrease final acquisition time.

Discussion and conclusions

This work allowed us to create a sequence, SSFSE 4 echoes, reliable and reproducible to calculate T2 maps of premature brains with a duration suitable for routine clinical practice.

7.5 Contribution of fetal MRI to the diagnosis of X-linked hydrocephalus: report of four cases

Shigeko Kuwashima, Yasushi Kaji, Teisuke Hashimoto

Purpose - Objective

X-linked hydrocephalus (XLH) is the most common form of congenital, inherited hydrocephalus; its onset of hydrocephalus may occur in utero and progress with gestational age. V-P shunt has no effect on neurological outcome in this disease. Therefore, it is important to make a prenatal diagnosis of this disease. To describe our experience with fetal MRI in the evaluation of XLH in four boys and to compare these data with neonatal neuroimaging findings.

Material and methods

Four fetuses were referred for MRI of hydrocephalus detected by ultrasound (US). These fetuses were evaluated with MR imaging at 26-28 weeks of gestation. No premedication was given for the examination. After birth, they underwent CT or MRI of the brain.

Results

Ventriculomegaly, aqueduct stenosis, callosal hypoplasia, and enlarged massa intermedia were recognized in all fetuses. In three of the four fetuses, adducted thumbs were clearly recognized in the MRI. We could not evaluate this finding in the remaining fetus, because the thumbs were not included in some of his MRI sequences. In neonatal neuroimaging findings, severe ventricular dilatation, callosal hypoplasia, enlarged massa intermedia, anterior vermis hypoplasia, and aqueduct stenosis were observed in all four patients. All four patients had bilateral adducted thumbs.

Discussion and conclusions

We have characterized the MRI appearance of XLH. This information had an important effect on prenatal counseling and therapeutic planning.

7.6 Lesions of the cranial vault in children: CT and MRI findings

Maria Theofanopoulou, Niki Lama, Ioannis Nikas, Konstantinos Sirgiannis, Aglaia Diamantopoulou

Purpose - Objective

Skull vault lesions are common and they may be clinically identified as palpable masses or incidentally encountered in radiologic examinations. Their differential diagnosis which often presents difficulties is important in order to decide further management: biopsy, surgical intervention or follow-up. Purpose of this scientific exhibit is to present a review through imaging of the most frequently encountered calvarial lesions in children.

Material and methods

Lesions included in our presentation are categorized as tumoral and non-tumoral.

Results

Plain radiographs are usually the first imaging approach in evaluating lesions of the cranial vault. In infants US is often used to further characterize the lesion. CT is able to evaluate localization (inner or outer table), lytic or sclerotic patterns, contour of the lesion and the presence of calcifications, whereas MR is better at delineating soft-tissue involvement, bone marrow abnormalities and extension into the intracranial cavity. The most commonly encountered lesions in children and young adults were: cephaloceles, dermoids, epidermoids, LCH, , angiomas, fibrous dysplasia, osteomas and sinus pericranii and neuroblastoma metastases.

Discussion and conclusions

Imaging is essential in achieving a correct diagnosis or limiting the differential diagnosis of most calvarial lesions in the pediatric population, thus aiding in their further management.

7.7 Pre- and postnatal brain MR imaging findings of an unusual case of molar tooth malformation with supratentorial heterotopia and hamartoma of the tuber cinereum

Wiltrud Rohrschneider, Michael Viellieber, Birgit Goertz, Ulrich Merz, Barbara Filsinger

Purpose - Objective

To report the pre- and postnatal MR imaging findings of an unusual case where molar tooth sign (MTS) is associated with supratentorial heterotopia and hamartoma of the tuber cinereum.

Material and methods

Case report: A 34-year-old woman was referred for fetal MRI following routine US during pregnancy that revealed hypoplasia of the cerebellar vermis, callosal hypoplasia and hydrocephalus.

Results

Fetal MRI disclosed MTS, and in addition suspected subependymal heterotopia along the walls of the moderately enlarged lateral ventricles. Delivery was planned in a perinatal centre. The newborn girl showed a prominent forehead, hypertelorism, otherwise no visible malformation. From the third day she developed disturbances of central respiration, tonus and reflex pattern. Postnatal MRI confirmed the MTS (severe vermian hypoplasia, bat wing configuration of the fourth ventricle communicating with the cisterna magna, large cerebellar hemispheres with vertically oriented folia, thin isthmus region, elongated, thickened and maloriented superior cerebellar peduncles), better delineated the full extent of supratentorial subependymal and subcortical heterotopia, and additionally revealed a hamartoma of the tuber cinereum.

Discussion and conclusions

The MTS was first described in Joubert syndrome and has been shown to occur as a component of several other syndromes. The very rare combination of molar tooth malformation with supratentorial heterotopia and hamartoma of the tuber cinereum suggests a *forme fruste* (in the absence of clinical malformations) of Varadi-Papp syndrome, or Oro-Facial-Digital syndrome type VI.

7.8 Bilateral optic nerve aplasia in twins

Catherine Christophe, Yan Cathyliu, Gretel Guissard, Françoise Meire, Isabelle Delpierre

Purpose - Objective

To report the possible autosomal dominant transmission of isolated optic nerve aplasia (ONA).

Material and methods

3-year-old dizygotic blind twins (from non consanguineous parents) with normal appearing eyes and bilateral ONA, and their father with left microphthalmos, were investigated by ultrasound and by MRI with tractography (DTI). History of the 3 cases and the family was otherwise unremarkable.

Results

Ultrasonography and MRI of the twins showed almost normal structure of both eyes but absence of optic nerves, central retinal vessels, chiasm and tracts. Ultrasonography of the father showed a normal right eye but left heterogeneous microphthalmos that prevented analysis of the optic nerve. MRI demonstrated left ONA with chiasm and optic tracts asymmetry (L>R). Anatomy of the brain and of the pituitary gland was normal in the 3 patients. Optic radiations on DTI (deterministic tractography) were present but decreased in size symmetrically in both children and asymmetrically (L>R) in the father.

Discussion and conclusions

To our knowledge, this is the first documented familial ONA report in non-syndromic patients illustrating the possible autosomal dominant transmission of isolated ONA. This may be present as a same entity in blind patients with quite normal sized eyes and in unilateral microphthalmic patients who have to be investigated with MRI to orientate genetic counselling. Pathogenesis of ONA remains unknown but can be approached by MRI with DTI.

7.9 Multimodality imaging appearances of neonatal meningitis

Eric Faerber, Sarah Long

Purpose - Objective

To display the imaging features of the sequelae of meningitis in the neonatal period

Material and methods

Multipolar multimodality cerebral imaging (ultrasound computed tomography and magnetic resonance imaging) was used to demonstrate numerous sequelae of meningitis due to varied organisms such as group B streptococcus, *Citrobacter koseri*, and *Serratia marcescens*. The patients in this cohort include both premature and full-term neonates.

Results

A wide spectrum of abnormalities including communicating and obstructive hydrocephalus, leptomeningeal enhancement, cerebral edema, infarction, micro and macroabscesses, subdural effusion and empyema are demonstrated.

Discussion and conclusions

Meningitis occurs more frequently in premature than full term neonates. It is also more common in the first few months of life than in later infancy. Imaging of patients with meningitis frequently is normal early in the course and is best reserved for the demonstration of complications and sequelae. Neuroimaging following neonatal meningitis may show unexpected parenchymal lesions due to an immature blood brain barrier, tropism of certain organisms, and ischemia with infarction.

Conflict of interest

There is no conflict of interest.

7.10 Advancements in fetal MRI and postnatal surgical planning for central nervous system disorders

Seth Crapp, Inbal Cohen, Hector James, Phillip Aldana

Purpose - Objective

The goal of this study was to investigate advancements in the diagnostic capabilities of in-utero magnetic resonance imaging for a variety of central nervous system disorders, determine the accuracy of prenatal diagnoses by comparative analysis of fetal and postnatal MRI, and the impact on surgical outcomes.

Material and methods

A retrospective analysis was performed of patients seen between 2004 and 2008. A total of 47 fetal MR imaging studies were performed at a single institution which revealed a variety of central nervous system disorders that could potentially require a neurosurgical intervention including: cerebrovascular malformation(s), cranial arachnoid cyst, encephalocele, hydrocephalus, spina bifida, intracranial hemorrhage, cerebellar hyperplasia, ventriculomegaly and congenital absence of the septum pellucidum. All patients underwent neurosurgical intervention based on prenatal MR findings and underwent post-natal MRI, after which comparative analysis was performed to determine accuracy of prenatal diagnosis.

Results

Prenatal MR imaging is useful and accurate in diagnosing a variety of central nervous system disorders. Also, fetal MRI provides several benefits in management of central nervous system abnormalities in-utero by aiding in early diagnosis of CNS disorders requiring neurosurgical intervention, and early surgical planning and intervention thus improving postnatal outcomes.

Discussion and conclusions

New ultra fast MRI techniques offers improved accessibility and detailed images which may obviate the need for other imaging modalities in preoperative planning and postnatal imaging of CNS disorders.

Conflict of interest

None

7.11 Ultrasound Versus Computed Tomography in Detecting of Nasal Fractures : Comparison between children and adult patients.

Heung Cheol Kim, Myung Sun Hong, Hong Myung Sun, Im Kyung Hwang

Purpose - Objective

Though CT is the most useful imaging method for nasal bone evaluation, the diagnostic accuracy of CT examination has been poorly explored. So, especially in children, we doubt whether CT would be available for diagnosis of nasal bone fracture. Also we investigate the possibility whether US study could be alternative to CT examination.

Material and methods

We reviewed the medical records and imaging studies of 72 consecutive patients with nasal trauma who were examined with facial CT and nasal US. The sensitivity, specificity and accuracy for depiction of the nasal bone fractures were calculated for facial CT and US images, using clinical diagnosis as the standard of reference, in 2 groups of children and adult group, respectively.

Results

In children group, the sensitivity, specificity and accuracy of CT were 52.0

Discussion and conclusions

In US examination, there were no significant differences in diagnostic accuracy between 2 age groups. In contrast, the sensitivity and accuracy of CT examination in the children group were significantly lower than those in the adult group. Therefore, in detecting nasal fracture of children, US could be more reliable diagnostic tool than CT.

7.12 Dirt Bike Injuries in Children

Raghu Ramakrishnaiah, Chetan Shah, DOnna Parnell, Bruce Greenberg

Purpose - Objective

Our purpose was to identify dirt bike injury patterns in children and compare to other known non-automobile motorized vehicle patterns.

Material and methods

The study included 85 children(83 boys, 2 girls) with dirt bike injuries treated at a tertiary care pediatric hospital. The mean age was 12.3 years(SD=3 years). Imaging studies and hospital medical records were reviewed to identify injury locations and patient outcome. One-tailed Z-Test was used to determine significance of location frequency of extremity fractures. Chi-square test was used to determine the significance of long term disability with injury type.

Results

Head injuries were present in 14 children and included:skull fractures(9), brain contusion(5), dural hemmorrhage(2). No deaths occurred, but long term disability was associated with head injury(5 children, $p=0.004$). Visceral organ injuries were in 18 children and included:liver(6), spleen(6), lung(5), kidney(2). One child had lung and liver contusions. Long bone fractures were the most common injury (64 fractures in 46 children). The most common were:femur(24), tibia(13), fibula(10), humerus(7). Lower extremity fractures were more common than upper extremity fractures($p=0.001$). Neither extremity fractures or visceral injuries were associated with long term disability.

Discussion and conclusions

Long term disability was associated with head injury. Fractures are more common in the lower than upper extremities. Unlike all-terrain vehicle injuries, extremity injuries were not associate with long term disability and torso injuries tend to be solitary rather than multiorgan.

Conflict of interest

none

7.13 Congenital intracranial lipomas: pre and post-natal imaging features and pitfalls.

Emily Stenhouse, Michelle Fink

Purpose - Objective

To describe the spectrum of antenatal and postnatal imaging findings in congenital intracranial lipomas and to highlight the potential pitfalls in diagnosis.

Material and methods

All patients with intracranial lipomas imaged in our institution in the last 15 years were identified by a keyword database search. Clinical presentation, imaging findings, initial reports and errors of interpretation were reviewed.

Results

A total of 46 cases were identified, including 3 presenting antenatally. These included ribbon and tubular pericallosal lipomas, lipomas within the quadrigeminal and suprasellar cisterns, lipomas of the tectal plate and hypothalamus and lipomas within the Sylvian fissure. Associated intracranial anomalies were present in 27 (56

Discussion and conclusions

Intracranial lipomas are often an incidental finding on imaging. In our series, we illustrate their anatomical and imaging spectrum, and highlight potential imaging pitfalls. Awareness of these findings should optimize accurate diagnosis and patient management.

7.14 The corpus callosum: normal imaging appearance, variants, and pathologic conditions

Murat Kocaoglu, Veysel Akgun, Bilal Battal, Nail Bulakbasi, Cem Tayfun

Purpose - Objective

The aims of this exhibit are: 1. To discuss the role of state-of-the-art imaging tools and techniques in the imaging evaluation of corpus callosum. 2. To describe the classification of corpus callosum pathologies. 3. To recognize the patterns and imaging features of diseases that may involve the corpus callosum.

Material and methods

Ultrasonography, computed tomography and magnetic resonance (MR) imaging can be used in the assessment of corpus callosum; however, MR imaging is the method of choice for the imaging evaluation of this area.

Results

The corpus callosum is the largest white matter tract that crosses the two hemispheres. Many different types of lesions can occur within this structure such as congenital anomalies (agenesis, dysgenesis) with or without various associated abnormalities (interhemispheric cyst, pericallosal lipoma, Dandy-Walker complex), toxic and metabolic diseases (adrenoleukodystrophy, mucopolysaccharidosis), ischemic-hypoxic disease, demyelinating diseases (multiple sclerosis, ADEM), tumors, trauma (surgery, diffuse axonal injury) and transient signal changes (influenza induced encephalopathy).

Discussion and conclusions

An understanding of the patterns and extent of disease processes of the corpus callosum facilitates diagnosis, staging and estimating prognosis. MR imaging including diffusion weighted MR imaging, diffusion tensor imaging, MR spectroscopy and perfusion weighted MR imaging allow detailed evaluation of corpus callosum.

Conflict of interest

No conflict of interest

7.15 Effect of maturation on MRI diffusion measures on corticospinal tract (CST) in preterm newborn near term.

Carine Lallemand, Bertrand Bruneau, Arnaud Le Guen, Christian Barillot, Catherine Treguier, Pierre Darnault, Alain Beuchée

Purpose - Objective

Diffusion tensor imaging (DTI) is a recent technique which reliability in preterm newborns needs to be tested

Material and methods

Retrospective study of 14 cerebral 3 Tesla MRI realized in 14 newborns, between 2005 and 2007. We analyzed: -reproducibility and repeatability in measurements performed by 3 operators for 10 MRI -accuracy and precision of the measurements of one operator and relations between PMA, fractional anisotropy (FA) and apparent diffusion coefficient (ADC) for all subjects.

Results

Preterm newborns of 30.4 weeks (24.7;34.3) had cerebral MRI at 38.3 weeks of PMA (35.2;49.3). ADC measures variability was mainly associated with patient to patient variations; FA measures variability was mainly related to lack of reproducibility and repeatability. For both, the accuracy was high (>0.97) but precision confirmed to be low and improved with averaging 3 successive measurements. ADC decreased and FA increased with PMA, with a cut off around 39 weeks ($p<0.05$). ADC was significantly lower ($p<0.01$) and FA tended to be higher in left vs. right CST.

Discussion and conclusions

Quantitation of DTI parameters in white matter tracts of preterm newborns near term appears to be accurate. Averaging successive measurements improves the lack of repeatability and reproducibility in single measurement. Maturation is significantly responsible of a rise in FA and an ADC fall near 39 weeks. Asymmetry in FA and ADC might suggest an earlier left maturation of CST.

7.16 Pediatric otospongiosis

Raul Galvez, Sanjay Prabhu, Quinton Gopen

Purpose - Objective

Otospongiosis is a disease affecting the homeostasis of the otic capsule in adults and is among the most common causes of acquired hearing loss. However, there is sparse literature pertaining to this condition in children. OBJECTIVE: To identify cases of otospongiosis in tertiary care pediatric hospital & provide a review of imaging & clinical characteristics. To review current treatment for otospongiosis.

Material and methods

Retrospective search was made of radiology& otolaryngology database to identify cases of otospongiosis at a tertiary care Children's Hospital.

Results

3 cases with conductive hearing loss & imaging findings of fenestral otospongiosis were identified (n=3, all females, ages 1-9 & 2 cases were bilateral). One patient died from end stage renal disease without treatment for hearing loss. One was treated with a unilateral hearing aid & 1 was treated with stapedectomy and ossicular prosthesis.

Discussion and conclusions

Otospongiosis is a common cause of conductive hearing loss but few cases are reported in children where treatment can have a significant impact in development & quality of life. Since this disease appears to be under recognized and underreported, the course and long term prognosis are unknown & further research is warranted. Pitfalls including normal variants that can mimic otospongiosis in neonates are discussed. Improved spatial resolution on multislice CT should help diagnosis of otospongiosis in children.

Conflict of interest

None.

7.17 Review of a cohort of Rennes' hospital patients with neuronal migration defects.

Chloé Quélin, Catherine Treguier, Bertrand Bruneau, Laurent Pasquier, philippe loget, Sylvie Jaillard, Christele Dubourg, sandra Mercier, Celine Rozel, Catherine Fallet-Bianco, Cherif Beldjord, Jamel Chelly, Nadia Bahi-Buisson, Sylvia Napuri, Sylvie Odent

Purpose - Objective

Neuronal migration defects belong to the cortical dysgenesis spectrum, developmental pathologies related to a disorder of cortex and cerebral convolutions establishment, whose causes are very different (genetic and environmental). These malformations are associated with psychomotor retardation and often pharmacoresistant epilepsy. They mainly include the agyria/pachygyria/subcortical band heterotopia spectrum, neuronal heterotopia and polymicrogyria, that are genetically well characterized. Indeed, tubulin genes have been recently shown to be involved in specific forms of lissencephaly or polymicrogyria, highlighting the role of microtubules during neuronal migration.

Material and methods

Given these new data, it seemed interesting to review 36 cases of the Rennes' hospital with neuronal migration defects to see clinical, radiological (MRI) or pathological and genetical aspects of these disorders. This study included 12 fetuses (from medical termination of pregnancy) and 24 alive patients, all seen at least once in genetic consultation.

Results

Among these subjects, the clinical and genetic heterogeneity was high, with pachygyria in 50

Discussion and conclusions

To conclude, we suggest in agreement with the literature data, a strategy of genetic diagnosis for the main neuronal migration disorders.

7.18 Stroke in the Neonate

Kyoung Ja Lim, Ji Hyeon Cha

Purpose - Objective

Ischemic perinatal stroke (IPS) was defined in 2006 by an international group of experts as “a group of heterogeneous conditions in which there is focal disruption of cerebral blood flow secondary to arterial or cerebral venous thrombosis or embolization, between 20 weeks of fetal life through the 28th postnatal day, confirmed by neuroimaging or neuropathologic studies.” The pathophysiology of IPS is complex and multifactorial. It involves not only environmental but also maternal, fetal, placental, and neonatal factors. In contrast to adult stroke, the clinical presentation of neonatal stroke is often non-specific, including seizures, apnea, lethargy, poor feeding, hypotonia and asymmetrical weakness. Ambiguous neonatal symptoms often delay the diagnosis, which can affect neurological outcome. As recognized in the neonatal period, symptomatic perinatal stroke occurs in about one in 4000 term neonates. We present 6 magnetic resonance image cases of neonatal infarction with various finding.

Material and methods

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Results

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Discussion and conclusions

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Conflict of interest

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7.19 Head and neck infections in infants and children - a pictorial essay

Bogdana Tilea, Marianne Alison, Loic Le Henaff, Guy Sebag, Monique Elmaleh- Bergès

Purpose - Objective

To illustrate the different imaging aspects of head and neck infections in children. To review the indications of imaging and the contribution of each modality (US,CT,MRI) to diagnosis and management To emphasize the role of imaging in the detection of severe complications To remind to look for a congenital anomaly in case of recurrent neck infection

Material and methods

Database review from a Pediatric tertiary referral center.

Results

Imaging studies are needed only in case of clinical signs of complicated sinusitis, mastoiditis, phlegmon or deep neck abscesses. Ultrasound is indicated as a first choice modality in neck infections and may be sufficient in superficial and well-delineated process. CT with contrast is the gold standard in evaluation of orbital, skull base and deep neck infections, giving information on soft-tissue and bone involvement. MRI give an excellent soft tissue resolution, depict vascular (arteritis, sinus thrombophlebitis) or/ and brain complications and detect skull base osteomyelitis before CT, due to bone marrow signal modifications.

Discussion and conclusions

Head and neck infections have severe, sometimes, life-threatening potential. The role of imaging is to detect the complications that need prompt management and, eventually, to raise the diagnosis of a congenital abnormality in case of local recurrent infection.

7.20 A pictorial review of Neurofibromatosis type 1.

Adam Oates, Sarah Fleming, Julie Cooper, Louise Hattingh

Purpose - Objective

To provide a review of the common imaging characteristics of Neurofibromatosis type 1 that we have seen in our practice in two medium-sized UK teaching hospital trusts.

Material and methods

Neurofibromatosis (NF) is the most common of the phakomatoses. It is divided into a number of different subtypes with NF1 and NF2 being the most common and, of these, NF1 representing 90

Results

We will provide the diverse multisystem findings of neurofibromatosis using a range of different imaging modalities. This will include the classic plain film skeletal manifestations but also MRI findings which are perhaps not as well described.

Discussion and conclusions

Neurofibromatosis type 1 is not an infrequent disease process and it is important to recognise the common imaging characteristics.

Conflict of interest

None.

7.21 First and second branchial arch syndromes: multimodality approach

Tarek Laswad, Leonor Alamo, Elodie Sengen, Francois Gudinchet

Purpose - Objective

To evaluate the role of various imaging modalities in the diagnosis and classification of a wide spectrum of branchial arche syndromes (BAS) and to emphasize the use of multimodality imaging approach for preoperative planning and follow-up.

Material and methods

24 children, nine girls and 15 boys with a mean age of 15 years. Teleradiograms, Orthopantomograms and CT scan were performed for all patients and MRI in selected patients. The imaging features were compared with surgical, anatomopathological findings, and postoperative follow-up imaging features.

Results

16 had hemifacial microsomia. Two Goldenhar Syndrome. Four mandibulofacial dysostosis (Treacher Collins syndrome) and two Pierre-Robin syndrome. Axial CT images allowed more detailed analysis of middle and internal ear structures as well as skull base abnormalities. Axial and 3D CT images depicted associated cerebral and soft tissue anomalies in nine patients. Teleradiograms, orthopantomograms, and CT images were applied as the main planning tools for land mark measurements of maxillofacial surgery.

Discussion and conclusions

First and second branchial arche syndromes are best understood using a multimodality imaging approach in order to increase the diagnostic efficiency as well as for mapping and grading before surgery.

7.22 Imaging of middle ear cholesteatoma in children

Brigitte Bourlière-Najean, Catherine Desvignes, Richard Nicollas, Guillaume Gorincour, Nathalie Colavolpe, Alix Ruocco, Jean Michel Triglia, Philippe Petit

Purpose - Objective

The aim of the study is to evaluate the value of diffusion-weighted MR imaging and delayed contrast enhanced T1 weighted spin-echo sequences in the diagnosis of cholesteatoma and the feasibility in children.

Material and methods

We reviewed the MRI of 26 children (mean age 9.7 year) before ear surgery for diagnosis or recurrence of cholesteatoma. All exams were performed with a 1.5-T unit by using the same imaging: unenhanced T2-weighted imaging, unenhanced diffusion-weighted imaging at b factors of 0 and 800 sec/mm², unenhanced and postgadolinium (early and delayed) T1 weighted SE imaging. Results from MR were evaluated by two radiologists and compare with reports of surgery.

Results

Cholesteatoma was surgically found in 10 patients. A correct diagnosis was made in 6 cases. There were 4 false negatives, 2 were microinclusions in external auditory canal and one was 3mm. The other one was the first one of our study. There was one false positive, which was cholesterol granuloma.

Discussion and conclusions

Several studies have demonstrated the role of diffusion-weighted MR imaging and delayed contrast enhanced T1 weighted spin-echo sequences in the differentiation of recurrent cholesteatoma from fibrous or granulation tissue, if the dimension is more than 2 to 5 millimeters. Our study confirm these findings and demonstrate that this examination is possible in children of 5 year-old or older.

7.23 The New Image of the Neurodisability.

Gil Simoes, Phil Dart

Purpose - Objective

We retrospectively examined the clinical utility of obtaining imaging studies in children/ young adult with Neurodisability admitted to the hospital during May 2006 to August 2009.

Material and methods

Hospital imaging studies listings were identified for 19 children/young adults with Neurodisability.

From this group of patients:

We reviewed all the imaging studies performed during their time of admission, the clinical indications were crossed matched with radiological reports.

We analyzed the radiological reports to relate to the care of the patients

Results

One hundred and forty two diagnostic images were performed during 3 years and 3 months period. Nineteen children/ young adults with severe of neurodisability (Mean age15.6 year,age range 20years 2/12 months) qualified.

Of the 142 imaging procedures, 72(50.7

Discussion and conclusions

Children/young adults with severe Neurodisability benefit from imaging studies in acute admission to a district general hospital. The complex and multidisciplinary nature of their diseases are dynamic and multifactorial rather than static entities. Therefore diagnostic imaging is an efficient way to aid the clinician to relate and accurately assess and recommend therapies.

7.24 PHACE Syndrome : the spectrum of findings at imaging.

Jenny Bracken, Ian Robinson, Aisling Snow, Alan Irvine, David Rea, Rosemary Watson, Eithne Phelan

Purpose - Objective

PHACE (Posterior fossa defects, Haemangioma, Arterial anomalies, Coarctation of the aorta and Cardiac defects, Eye abnormalities) syndrome describes a constellation of abnormalities which can occur in association with segmental craniofacial infantile haemangioma. Posterior fossa and cerebrovascular abnormalities are the most common extracutaneous features of PHACE syndrome. We highlight the spectrum of imaging abnormalities seen.

Material and methods

We retrospectively reviewed both imaging and clinical records of all patients diagnosed with PHACE syndrome between 1998 and 2009. Information sought included patient demographics, presentation, craniofacial segments involved, imaging findings and other extracutaneous abnormalities.

Results

12 patients were diagnosed with PHACE syndrome over 11 years. All had a segmental haemangioma. The most commonly involved facial segments were: S1(n=12), S2(n=8), and S3(n=5). None of the patients had S4 involvement. All patients underwent MR brain imaging(including MRA). The most common extracutaneous abnormalities found were neurovascular(n=10), with many patients having multiple anomalies. The spectrum of arterial anomalies included hypoplasia(n=9), ectasia(n=3), anomalous origin/course(n=2) and persistent fetal anastomosis(n=2). Other anomalies found included: cardiac defects(n=9), eye abnormalities(n=7), coarctation of the aorta(n=2), posterior fossa malformations(n=1) and sternal anomalies(n=1).

Discussion and conclusions

Intracranial anomalies are the most common extracutaneous feature of PHACE syndrome. The presence of such anomalies, in particular of the intracranial arteries and/or posterior fossa, should prompt the radiologist to consider PHACE syndrome.

Conflict of interest

None

7.25 Posterior reversible encephalopathy syndrome: Two cases in children

Mare Lintrop, Pilvi Ilves, Viive Tolpats, Inga Talvik

Purpose - Objective

The PRES is a clinical and radiological entity defined by headache, altered mental status, seizures, visual abnormalities and characteristic findings in MRI. The purpose of this study is to describe two cases of PRES in children and correlate clinical symptoms with radiological findings.

Material and methods

A 3-year-old boy with acute T-cell lymphoblastic leukaemia after intensive chemotherapy, and a 5-year-old girl with osteomyelitis and septic shock after extensive treatment with antibiotics developed visual alterations and seizures. They were hypertensive with blood pressure up to 170/110mmHg. Both had cerebral CT-scans on the day of neurological symptoms onset followed by MRI investigations.

Results

Both cerebral CT-scans revealed occipital and posterior biparietal symmetric hypodensities in cortical region and subcortical white matter. Sinus venous thrombosis as a possible treatment complication was ruled out. MRI investigations showed T2 signal intensity increase, principally affecting the subcortical white matter, involving the occipital and parietal lobes bilaterally. DWI and ADC maps showed signal changes in the areas accordingly to FLAIR abnormalities, indicating vasogenic oedema prevalence and ruling out acute stroke. Follow-up MRI after clinical recovery showed almost complete resolution of T2 and DWI signal abnormalities.

Discussion and conclusions

PRES is an increasingly recognized complication of pediatric cancer treatment particularly in pediatric acute leukemia. The role of neuroimaging is to establish PRES diagnosis and to exclude other causes of neurological symptoms.

Conflict of interest

Autors declare no conflict of interest

7.26 Diffuse periventricular leukomalacia in preterm children: Assessment of grey matter changes by MRI.

Loukia C Tzarouchi, Loukas G Astrakas, Anastasia Zikou, Aikaterini Drougia, Styliani Andonikou, Maria I Argyropoulou

Purpose - Objective

Preterm children manifest cognitive, educational and behavioral deficits, suggestive of grey matter (GM) injury. A higher prevalence is observed in preterm children with diffuse periventricular leukomalacia (PVL). Our purpose was to evaluate changes in the volume of 116 GM areas in preterm children with diffuse PVL.

Material and methods

Ten preterm children (gestational age 31.82.4 weeks, corrected age 21.7820.32 months) with diffuse PVL and 36 age-matched preterm controls with normal structural appearance on brain MRI were enrolled. Using a T1-weighted high resolution 3D spoiled gradient echo sequence, volumes of 116 GM areas were calculated after segmentation using the Voxel Based Morphometry and the Individual Brain Atlas Statistical Parametric Mapping software packages. Two-tailed Student's t-test was performed to test for differences between groups.

Results

Decreased regional GM volume was observed in the hippocampus, the amygdala, the olfactory gyrus, the temporal and frontal lobes in preterm children with PVL when compared to controls ($P < 0.05$). Increased regional GM volume was demonstrated in the basal ganglia, the occipital and parietal lobes ($P < 0.05$).

Discussion and conclusions

White matter injury, hypoxic-ischemic injury or metabolic insults may explain the reduced GM volumes in areas associated with cognition and memory in preterm children with diffuse PVL. Brain plasticity may be at the base of the regional GM volume increase in diffuse PVL.

7.27 Mandibular Lesions in Children; Imaging Findings on Multi-detector CT (MDCT) versus Plain Radiographs

Bo-Kyung Je, Younghen Lee, Baek Hyun Kim

Purpose - Objective

To illustrate the imaging findings of various mandibular lesions detected on MDCT compared with plain radiographs

Material and methods

During recent 5 years, 28 children (16 boys, 12 girls, 4 month – 16 year-old age, mean age 10.5 years) were performed facial bone MDCT and underwent surgery with mandibular lesions for treatment or just for diagnosis. We presented the imaging findings of both plain radiographs and MDCT. To deal with the raw CT data, we used two programs, RAPIDIA and Voxar.

Results

We categorized the mandibular lesions into three groups; congenital anomaly, fractures, and tumors including cysts and neoplasms. In the category of congenital anomaly, three infants were included with facial asymmetry. There are four children with mandibular fractures at different sites in the category of fractures. In the last category, various kinds of cysts and neoplasms were included. There were three radicular cysts, six dentigerous cysts, a odontogenic keratocyst, a Stafne cyst, a periapical cyst, three odontomas, two ameloblastomas, three Langerhans cell histiocytosis, and a primitive neuroectodermal tumor.

Discussion and conclusions

MDCT can provide detailed images and useful information in the treatments as well as diagnosis of mandibular lesions in children.

7.28 Radiological aspects of microtia in 28 patients

Valérie Cassetto, Nicole Revencu, Renaud Menten, Philippe Clapuyt

Purpose - Objective

Microtia is a congenital malformation of the external ear, characterized by a small shaped auricle. This defect can be either isolated or part of a syndrome. CT and MRI can depict associated malformations and thus play an important role in management of patients.

Material and methods

CT and/or MRI studies of 28 children with microtia (42 ears), age 0 to 23 years (mean age 3,4 years), 15 male and 13 female were retrospectively analysed. Anomalies of external auditory canal (stenosis or atresia), middle ear and ossicles, round or oval windows and inner ear were noted.

Results

In minor microtia, auditory canal stenosis is the most common associated abnormality and in major microtia, atresia is predominant. In 7/28 cases, microtia is isolated and mostly unilateral (5/7 cases). All of the 7 cases have middle ear malformations. None has inner ear malformations. In 21/28 cases, dysplasia of middle and/or inner ear is associated with other congenital malformations (CHARGE, Goldenhar...). Eleven are bilateral.

Discussion and conclusions

Temporal bone embryology is complex: external ear, middle ear and bulk of the ossicular chain develop independently of the inner ear and can explain certain anomalies. Genetic aspects of microtia are discussed. Isolated or syndromic microtia can be associated with temporal bone anomalies. Radiological evaluation is mandatory for optimal children management.

7.29 Congenital sensorineural hearing impairment

Brigitte Bourlière-Najean, Catherine Desvignes, Stéphane Roman, Guillaume Gorincour, Audrey Aschero, Jean Michel Triglia, Philippe Devred, Philippe Petit

Purpose - Objective

The aim of this exhibit is to review the normal inner ear anatomy, the genetic causes of sensorineural hearing loss and how high-resolution CT, MRI and audiologic testing contribute to the evaluation.

Material and methods

We reviewed several cases from our institution.

Results

We described the imaging techniques and low radiation protocol in children and demonstrate the different anatomic abnormalities.

Discussion and conclusions

The knowledge of inner ear pathology helps to guide treatment, particularly for cochlear implantation, prognosis and genetic counseling.

7.30 Imaging of maxillary tumors in children

Tamara Kreindel, Natacha Kadlub, Valere Belle, Eva Galliani, Aurore Coulomb, Hubert Ducou le Pointe

Purpose - Objective

To report in 73 children non-traumatic maxillary lesions with histopathological confirmation.

Material and methods

Retrospective study from January 1999 to Mai 2009. The patient's age ranged from 2 months to 16 years (average: 8 years old). The imaging files (44 x-rays, 67 CT, and 3 MRI) were analyzed by double-blind study via two radiologists.

Results

21 histopathological diagnoses were identified in 73 patients. 26/73 had a dental origin. All lesions developing at a distance from the tooth proved to have a non-dental origin. The diagnoses of the lesions with an aggressive imaging pattern (15) were: infection (5), histiocytosis (2), non ossifying fibroma (5) and malignant non odontogenic tumour (3). Slowly evolutive lesions were sclerotic (17) lytic (38) and mixed (3). The sclerotic lesions were ossifying fibromas (4), fibrous dysplasias (9) and odontomas (4). The mixed lesions were 2 hemangiomas and one teratoma. The lytic lesions were radicular cysts (8) (with an intimate relationship with the dental root) and dentigerous cysts (5) (with dental inclusion). The lytic lesions developing at a distance from the tooth were: simple bone

cysts (6), aneurysmal bone cysts (6) and giant cell granulomas (4). The other lytic lesions were 1 ameloblastoma, 1 adenomatoid odontogenic tumour, 1 melanotic neuroectodermal tumour of infancy, 5 keratocystic odontogenic tumours, and 1 odontogenic myxoma.

Discussion and conclusions

Imaging semiological analysis of maxillary lesions makes it possible to narrow the range of histopathological diagnoses

7.31 MRI findings in the intracranial complications of acute sinusitis: the added value of Diffusion Weighted Imaging.

Monica Rebollo Polo, Elka Miller, Thara Persaud, Nishard Abdeen, Aiser Glaya, Hurteau Julie

Purpose - Objective

Intracranial complications of acute sinusitis are rare but life-threatening and usually associated with important neurological sequelae. The purpose of this pictorial review is to illustrate the intracranial complications of acute bacterial sinusitis, with emphasis on the added diagnostic value of newer MRI techniques such as Diffusion Weighted Image (DWI).

Material and methods

MRI examinations of children who presented with intracranial complications of sinusitis at our Institution during the last year were reviewed.

Results

4 intracranial complications on 3 different patients were found: - Patient 1: frontal abscess open to the ventricular system, restricted diffusion was noted within the abscess wall. MRS showed a lactate peak. - Patient 2: subdural empyema, and cerebritis: restricted diffusion was noted in the extra-axial collection and in the underlying cortico-subcortical brain parenchyma. Perfusion Imaging showed lack of perfusion of the involved brain parenchyma. Follow-up imaging showed significant brain atrophy. - Patient 3: sinus venous thrombosis: restricted diffusion was noted in the sphenoid sinuses and in the right cavernous sinus. All DWI abnormalities resolved in the follow-up within 2-3 weeks.

Discussion and conclusions

MRI is the imaging modality of choice in the evaluation of intracranial complications of sinusitis in children. DWI can be a valuable sequence in the diagnosis and follow-up of these complications.

Conflict of interest

None

7.32 Pictorial and literature review of septo-optic dysplasia (de Morsier's Syndrome).

Sarah Fleming, Adam Oates, Julie Cooper, Louise Hattingh

Purpose - Objective

Septo-optic dysplasia is a rare sporadic developmental anomaly which results in a combination of optic nerve hypoplasia, pituitary dysfunction and agenesis of the septum pellucidum. Approximately 30

Material and methods

Cases of septo-optic dysplasia were collected from two medium sized teaching hospital trusts. The MR images of these cases were then used to demonstrate the classic findings of septo-optic dysplasia. A literature review of septo-optic dysplasia was also conducted.

Results

The MR images of optic nerve hypoplasia and septum pellucidum absence were illustrated alongside the information gathered from the literature review.

Discussion and conclusions

Septo-optic dysplasia although a rare condition can be easily demonstrated with MR. As the septum pellucidum is not always absent, it is important to consider pituitary dysfunction when optic nerve hypoplasia is present. Likewise, optic nerve hypoplasia should be considered in children with pituitary dysfunction or vision impairment.

Conflict of interest

None

7.33 Moya moya disease.Rare and severe case

Evanthia Botsa, Athanasios Michos, Maria Gavra, Diamadis Vontzalidis, Irini Orfanou

Purpose - Objective

To describe the clinical, diagnostic, and outcome features of a rare,interesting case of moyamoya disease.

Material and methods

A 16 month old Greek female presented with left hemiparesis. A month ago she suffered from transient paresis of the left leg. All physical and neurological examination at that time revealed no abnormalities. She underwent an urgent CT, MRI with MR angiography and afterwards a conventional cerebral angiography. To exclude secondary moyamoya phenomenon due to metabolic, autoimmune or infectious diseases, she underwent extensive laboratory studies. She was treated with bilateral neurosurgical revascularization procedures with encephalomyosynangiosis. Moreover she started antiplatelet and antiepileptic treatment.

Results

MRI and MR angiography clearly demonstrated bilateral severe stenosis at the terminal portion of the internal carotid arteries and the proximal portion of the anterior arteries.Occlusion of the left middle cerebral artery and stenosis of the right posterior cerebral arteries.An extensive network of cerebral collaterals was developed. There was no evidence of familial MMD in our patient. After the diagnosis she had more ischemic strokes. Improvement was noticed after the surgery gradually.

Discussion and conclusions

MMD remains rare outside the Far East. Reviewing the literature, one realizes that the knowledge about MMD in non-Asians is minimal. Our patient is extremely rare due to the early age at onset of symptoms, the severity of clinical status and the extended radiological findings.

7.34 Correlation of linear and volumetric measurements with clinic-radiological diagnosis of hydrocephalus in children with TBM (Tuberculous meningitis)

Helga von Bezing, Savvas Andronikou, Ronald Van Toorn, Tania Douglas

Purpose - Objective

To correlate clinico-radiological diagnosis of hydrocephalus with linear and computerised volumetric measurements on MRI

Material and methods

MRI's of children with TBM were reviewed for hydrocephalus and used with clinical and surgical notes for a final diagnosis of hydrocephalus. The Evans index (EI); Frontal-occipital horn ratio (FOHR); Frontal-Occipital Horn Width Ratio (FOHWR) were measured. MRI volumes were segmented on a slice-by-slice basis into brain and CSF areas using FSL. The largest connected component of non-zero-valued pixels in each slice was used as a mask to extract the brain and CSF regions. The number of pixels comprising each of these regions in each slice was used to calculate the ratio: $CSF / brain + CSF$.

Results

Fourteen of 30 patients (46

Discussion and conclusions

TBM complicated by hydrocephalus may show large extra-axial CSF spaces indistinguishable from chronic disease and malnutrition. Treating hydrocephalus in TBM is critical but imaging diagnosis by visual inspection remains subjective. Numerical grading is objective, allows analysis and comparison of sequential scans. Ventricular volume on MRI is considered best but linear measures of hydrocephalus are also possible on CT. Conclusion: Linear measures of hydrocephalus in TBM are more reliable than volumetric assessment and can be performed on a single slice.

Conflict of interest

No conflict of interest.

7.35 Division of the Corpus Callosum into Multiple Points for Measuring Thickness and Generating Fiber Tracts - A Semi-Automated Method for Determining Normal Values and for use as a Surrogate Marker of Hemispheric Disease

Bruce Spottiswoode, Savvas Andronikou

Purpose - Objective

To describe and test a semi-automated system that divides the midline corpus callosum into a number of segments, determines thickness at each, and performs fiber tracking from these segments.

Material and methods

The corpus callosum is parcellated in its midline to provide a series of points for measuring thickness and seeding DTI fiber tractography. Peripheral white matter disease load is then evaluated using interhemispheric tract symmetry and features of the midline corpus callosum as a surrogate marker of peripheral white matter condition.

Results

The tool proved successful in measuring and plotting corpus callosum midline thickness and FA but was not as sensitive for peripheral white matter lesions. FA was consistently greater in the left hemisphere.

Discussion and conclusions

Diseases affecting cerebral white matter may lead to left-right asymmetries and atrophy of interhemispheric connections, namely the corpus callosum. Conclusions: The technique successfully determined values of corpus callosum midline thickness, FA and interhemispheric differences. Future research will determine normal values for age and compare corpus callosum thickness with peripheral white matter volume loss in large groups of patients using the semi-automated technique. It was not a sensitive tool for assessing focal white matter disease based on interhemispheric asymmetry of the corpus callosum.

Conflict of interest

None

7.36 Ultrasound findings of congenital cervical cystic lesions, in the pediatric age

Savas Deftereos, Paraskevi Mintzopoulou, Alexandros Chatzistefanou, Eugenia Vranou, Aggelos Tsalkidis, Panagiotis Prassopoulos

Purpose - Objective

To review and describe the distinctive ultrasound imaging features of congenital cystic lesions of the neck, in children.

Material and methods

Ultrasound is the imaging modality of choice for the initial assessment of cervical cystic lesions in children and can often suggest the correct diagnosis. Cystic lesions may represent a variety of conditions having a congenital, inflammatory, infectious, vascular, tumoral, or combination of these, origin. Personal history and physical examination, as well as knowledge of the embryologic features and anatomy of the region, can give clues for the correct diagnosis.

Results

The most common congenital cervical lesion is the thyroglossal duct cyst. The brachial cleft anomalies derive usually from the second brachial cleft. Cystic hygroma is often found in multiple contiguous spaces. Ranula is considered to be a retention cyst. Teratomas include the epidermoid cyst, dermoid cyst, and teratoid cyst. Rare lesions are the thymic cysts. Laryngocele is an abnormal dilatation of the laryngeal saccule. Location and ultrasound findings, even in complicated cysts, can be helpful in the differential diagnosis of these cervical cystic lesions and the clinical management.

Discussion and conclusions

It is important to be familiar with the usual location and typical US features of the congenital cervical cystic lesions are essential for the differential diagnosis of this wide spectrum of lesions.

7.37 “Eye (I) spy with my little eye” - ultrasound of the paediatric eye

Joanne Sharkey, Brian Fleck, Alan Mulvihill, Kaseem Ajilogba

Purpose - Objective

To describe and illustrate the ultrasound features of a spectrum of paediatric ocular and orbital diseases with multimodality correlation.

Material and methods

A retrospective review of orbital ultrasound examinations performed over a two-year period (January 2008 - December 2009) at a tertiary children hospital was performed. A pictorial review of the ultrasound features of a spectrum of childhood orbital disorders, with multimodality correlation is presented.

Results

A spectrum of pathologies such as drusen, ocular trauma, cataract, tumours and developmental lesions, is discussed and illustrated.

Discussion and conclusions

The technique, indications and limitations of orbital ultrasound; the normal ultrasonographic anatomy of the orbital structures; and the ultrasound features, with multimodality correlation, of several paediatric orbital pathologies are presented. The awareness of the use of orbital ultrasound and the recognition of the characteristic features of various orbital disorders should be very helpful in making a correct diagnosis that allows appropriate management. Thus, ultrasound complements clinical and ophthalmological assessments.

7.38 Spinal ultrasound in infants suspected spinal dysraphism

Aspasia Rigopoulou, Maria Tsimara, Irini Tsota, Athanasios Diamantopoulos, Fotini Alexiou, Androniki Trouli

Purpose - Objective

An ultrasound study of twenty infants with dorsal midline skin stigmata to exclude an underlying pathology of the vertebral spine or tethered cord syndrome.

Material and methods

With a 7.5-10 MHz linear probe we scan the spine. The infant was laid prone on a pillow or on parent's shoulder. All newborns were less than 4 months of age

Results

All infants had normal ultrasound scans i.e a central hypoechoic spinal cord with hyperechoic walls and hypoechoic subarachnoid space surrounding the cord and the conus medullaris. All the vertebral bodies had normal appearance. The level and the position of the conus medullaris and filum terminale was, in term infants, normally lied above the mid level of the L2 while in pre-term infants was between L2 and L4. The position of the cord was normal centrally oriented in the spinal canal and with a normal pulsatile movement. The thickness of the filum terminale was <2 mm. Axially, the spinal cord was hypoechoic, round or oval-shaped within the anechoic subarachnoid space

Discussion and conclusions

The ultrasound is a reliable tool of first line screening test in neonates to characterize spinal and cord anomalies such as masses, spinal dysraphism, traumatic lesions etc. The diagnostic value of SUS has been shown to be equal to MRI, it is performed without sedation and there is no effect from the pulsatile movement of the spinal cord

7.39 MRI appearances of primary intracranial arachnoid cysts in infants and children

Georgia Papaioannou, Dimitra Loggitsi, Ilias Kampas

Purpose - Objective

To present MRI features of developmental intracranial arachnoid cysts in infants and children.

Material and methods

10 lesions with features of arachnoid cyst were revealed in 9 children (6 males, 3 females) who underwent head MRI among a total of 248 paediatric head MRI scans performed the past 2 years in our institution. Indications for these particular scans included: headache, hyperemesis, autism, trauma, asymmetric skull configuration, speech difficulties, and optic hypoplasia. The mean age of the examined children was 7.5 years (range 4 months ??" 14 years).

Results

The incidence of arachnoid cysts in our paediatric series was approximately 4

Discussion and conclusions

Arachnoid intracranial cysts represent rare, usually incidental findings in the paediatric population. Not often they may become symptomatic due to their location and size or if they get complicated.

Conflict of interest

no

7.40 Nontumoral bilateral occlusion of the Monro foramina : a pediatric case report

cyrine drissi, Nadia Hammami, anis kerkeni, Rym Sebaï, Lotfi Belghith, sonia nagi, mohamed ben hamouda

Purpose - Objective

To present a case of nontumoral occlusion of the foramen of Monro and discuss the imaging findings and contribution of MRI in the diagnosis.

Material and methods

An eight-year-old child developed a typical clinical picture of intracranial hypertension. Magnetic resonance imaging (MRI) was performed rapidly. A three-dimensional Fourier transform constructing imaging in the steady state (CISS) sequence was included in the protocol.

Results

MRI demonstrated active bilateral hydrocephalus. The third and fourth ventricles were normal. The diagnosis of tumor was ruled out on MRI and the diagnosis of nontumoral bilateral occlusion of the Monro foramina was suspected. Neuroendoscopy confirmed the diagnosis of atresia of Monro foramina. An endoscopic fenestration of the septum pellucidum was performed.

Discussion and conclusions

Hydrocephalus caused by unilateral or bilateral atresia of foramen of Monro is a rare clinical condition. Imaging techniques, and especially MRI with the use of the three-dimensional Fourier transform constructing imaging in the steady state (CISS) MR sequence, allow us to rule out tumor or infectious obstruction and suspect the diagnosis of atresia of the foramen of Monro. Neuroendoscopy confirms the diagnosis and simplifies the shunting of the cerebrospinal fluid.

Conflict of interest

None of the authors report a conflict of interest.

7.41 Grey Matter Gliomatosis Cerebri :a new pediatric entity and MRI pattern

Catherine Treguier, Beatrice Carsin-Nicol, Bertrand Bruneau, Celine Chappé, Laurent Riffaud, Kamal Chouklati, Stefan Saikali, Pierre Darnault, Didier Frappaz, Matthieu Vinchon, Nicolas André, Jacques Grill, Christine Edan

Purpose - Objective

According to WHO's definition, gliomatosis cerebri (GC) is a neuro-epithelial neoplasia of unknown origin consisting of a diffuse neoplastic glial cell infiltration involving more than two cerebral lobes. It remains a rare disorder, especially in the childhood population.

Material and methods

We report the clinical, neuroradiological, pathological and follow-up data of 14 children included in a multicentric cohort.

Results

First symptoms were seizures and refractory epilepsy (50). Despite polychemotherapy combined with radiotherapy or partial resection surgery, the three-year overall survival was 11 months.

Discussion and conclusions

FLAIR sequences appeared to be helpful for the diagnosis of GC by discriminating encephalitis or bithalamic gliomas and so arising this new entity of grey matter abnormality.

7.42 Volitional dyskinesia caused by a post-traumatic infarction of the globus pallidus in a child

cyrine drissi, Mohamed Jarraya, anis kerkeni, Hanène Benrhouma, Nadia Hammami, Narjes Fradj, rim sebai, sonia nagi, Neziha Khouja, mohamed ben hamouda

Purpose - Objective

Our aim is to illustrate an anatomoclinical study of a rare case of volitional dyskinesia caused by a post-traumatic infarction of the globus pallidus in a child.

Material and methods

An 11 year old girl developed a left temporal epidural hematoma following head trauma. She underwent emergency operation. Post-operative CT showed a good evacuation of the hematoma and no abnormality in the brain parenchyma. Sequelae included right hemiparesis and cognitive disorders. Four weeks later, she developed volitional dyskinesia of the right hand. A brain MRI was performed 6 weeks after the initial trauma.

Results

The MRI showed a lesion of the left globus pallidus which appeared hyperintense on T2-weighted images (WI) and hypointense on T1-WI. On FLAIR-WI, it was hypointense surrounded by a hyperintense gliotic rim. No sign of hemorrhage was detected on the T2 gradient echo sequence. After confrontation with the initial and post-operative CTs, the diagnosis of post-traumatic infarction of the globus pallidus was made. The patient reports partial regression of the volitional dyskinesia under benzodiazepine treatment.

Discussion and conclusions

Posttraumatic cerebral infarction is a relatively rare consequence of head injury, especially when involving the basal ganglia. In this particular location it can be revealed by delayed onset movement disorders. MRI is the most efficient method for studying movement disorders, allowing interesting anatomoclinical correlations.

Conflict of interest

None of the authors report conflict of interest.

7.43 White matter signal abnormalities on MRI in children with HIV encephalopathy

Christelle Ackermann, Savvas Andronikou, Barbara Laughton, Ronald Van Toorn, Els Dobbels, Steve Innes, Reghana Taliep

Purpose - Objective

Background and purpose: Children vertically infected with HIV may manifest with catastrophic encephalopathy, loss of brain growth, motor abnormalities, and cognitive dysfunction. Incidence and characteristics of white matter abnormalities have not been documented or correlated with laboratory and neuro-developmental assessments. Aim: To describe the incidence, distribution and characteristics of white matter MRI signal abnormalities in children with HIV encephalopathy and correlate them with laboratory and neuro-developmental values.

Material and methods

Methods: HIV positive children under 14 years of age presenting with encephalopathy who underwent MRI were included. A neuroradiologist blinded to the CD4 count, viral load and neuro-developmental scores (Griffiths) reviewed the MRI's for white matter abnormalities.

Results

Results: 23 children (15 boys) with a mean age 2 years 7 months. Multifocal high signal intensity lesions on T2 and FLAIR were documented in 13 patients (57

Discussion and conclusions

Conclusion: HIV encephalopathy in children shows a predilection for frontal and parietal lobe white matter with multiple focal T2 and FLAIR hyperintense lesions similar to those seen with microvascular disease. Further research includes fibre tracking and white matter volume assessment.

7.44 Cerebellum volume in children with syndromic craniosynostosis

Joyce Florisson, Fedde Van der Lijn, Henri Vrooman, Wiro Niessen, Irene Mathijssen, Maarten Lequin

Purpose - Objective

In syndromic craniosynostosis patients the posterior fossa seems small. We hypothesise that in these patients the cerebellum may be underdeveloped which may influence the neurological outcome. Therefore we assessed the volume of the cerebellum using an automated segmentation method.

Material and methods

We assessed the volume of the cerebellum in 55 patients, which were enrolled in a prospective study in children with complex or syndromic craniosynostosis between the age of six and fourteen years treated in the Craniofacial Center in Rotterdam. The study population included 8 patients with Apert's syndrome, 18 with Crouzon/Pfeiffer syndrome, 8 with Muenke syndrome, 13 Saethre-Chotzen patients, 8 with a complex craniosynostosis. Besides these patients we included 5 healthy controls. All included patients and controls underwent MRI of the brain using a 1.5 T GE system. Volume measurements were performed on segmentations obtained with atlas registration.

Results

Results of volume measurements show that the cerebellum of these patients indeed is smaller than those of our healthy controls. For all groups we found a tendency to have a lower volume of the cerebellum compared to our healthy volunteers. We found a significantly lower volume of the cerebellum in patients with Crouzon/Pfeiffer syndrome and in patients with a synostosis of the lambdoid sutures compared to our healthy control group

Discussion and conclusions

A small cerebellum in syndromic craniosynostosis children may hamper their neurological development.

Conflict of interest

none

8 Research conference: High field MRI

9 Scientific session 2: Head and Neck 2

9.1 Correlations between late radiological findings and long-term neurodevelopmental outcome in inflicted traumatic brain injury

Pilvi Ilves, Mare Lintrop, Inga Talvik, Annika Sisko

Purpose - Objective

To find out the correlations between late (more than 9 months postinjury) radiological findings and the long-term neurodevelopmental outcome of infants with inflicted traumatic brain injury (TBI).

Material and methods

Clinical and radiological investigations (magnetic resonance imaging and computed tomography) of 24 infants with inflicted TBI were performed during the acute phase of injury (1-3 days), and the early (4 days up to 3 months) and late (>9 months) postinjury phases. The clinical outcome in survivors (n=22) was based on the Rankin Disability Scale and the Glasgow Outcome Score. The mean (95

Results

The outcome of infants with inflicted TBI was poor. Five out of 24 infants (21

Discussion and conclusions

Late radiological findings significantly correlate with neurodevelopmental outcome of infants with inflicted TBI.

9.2 Shaken Baby Syndrome: Judicial admissions highlight chronic violence

Catherine Adamsbaum, Caroline Rey-Salmon

Purpose - Objective

Shaken Baby Syndrome (SBS) is characterized by subdural hematoma (SDH). Evidence of the hypoxic nature of the brain lesions has revived the debate about how violent the acts need to be, and thus how to protect the child.

Material and methods

This retrospective observational study looked at forensic evidence from 29 out of 112 cases referred for SBS over a seven-year period. Inclusion criteria were SDH on CT scan and the perpetrator's admission of a direct relationship between the act and the child's pathology. The group studied was compared to the 83 cases without full confessions. All medical records from birth to diagnosis and written investigation reports were reviewed.

Results

All of the confessions came from investigations. There was no significant difference between the group studied (n=29) and the group without full confessions (n=83). Shaking was described as extremely violent in all cases, and was usually repeated, sometimes daily, over several months (55

Discussion and conclusions

The high frequency of chronic SBS is a strong argument for reporting suspected cases to social and judicial authorities, and helps explain the impossibility of dating the injuries.

Conflict of interest

No conflict of interest

9.3 Delayed puberty or hypogonadism caused by pituitary transfusional hemochromatosis

cyrine drissi, sonia nagi, Nadia Hammami, anis kerkeni, rim sebai, lotfi belghith, mohamed ben hamouda

Purpose - Objective

To describe magnetic resonance imaging (MRI) findings in patients with transfusional pituitary hemochromatosis and the clinical manifestation of hypogonadotropic hypogonadism or delayed puberty.

Material and methods

Pituitary MR imaging at 1T was performed in 4 patients (2 males, 2 females) with major thalassemia referred either for delayed puberty (n=2) or hypogonadotropic hypogonadism (n=2). Gradient-echo T2-weighted images (WI) were included in the protocol.

Results

The mean age was 16.75 years. MRI showed a normal anterior pituitary gland in size and shape. It showed markedly decreased T2 signal intensity in the anterior lobe of the pituitary gland, best seen on gradient echo T2 images. One patient had associated gradient-echo T2 hypointensity of the choroid plexus. Posterior pituitary gland and stalk were normal in all cases. These findings are consistent with pituitary hemochromatosis, with additional choroid plexus iron deposit in one case.

Discussion and conclusions

Pituitary hemochromatosis is an uncommon cause of hypogonadism except in patients with β -thalassaemia major due to post-transfusional iron overload. MRI is a good technique for detecting pituitary hemochromatosis because findings are highly characteristic.

Conflict of interest

None of the authors report conflict of interest.

9.4 Retinoblastoma: role of high resolution MR imaging to evaluate efficacy of chemioherapy .

MASSIMO BASILE, marzia mortilla, SAVELLI SARA, claudio fonda

Purpose - Objective

To evaluate the efficacy of high resolution MRI in the follow up of patients with retinoblastoma treated with neoadjuvant chemotherapy.

Material and methods

Included in the study were nine pediatric patients (age range: 6 months- years) with unilateral or bilateral retinoblastoma. Of these six were gone under enucleation of one eye, and all have followed conservative treatment with neoadjuvant chemotherapy alone or combined with laser. All patients were imaged on high frequency ultrasound and magnetic resonance. MR imaging was performed using conventional and surface microscopic coils of 47 or 23 mm inner diameter with commonly available 1.5 T scanner (Philips, Achieva, Nova Qasar double gradients). The examination protocol includes conventional sequences in all three planes for the brain study with or without administration i.v. of mdc.

Results

The higher resolution of microscopic coil was compared with conventional or neurovascular coil and with ultrasound. In our experience if compared with conventional coils, the high resolution imaging is more sensible and specific in the identification of number, size and extension of these lesions. This is not true if compared with ultrasound, particularly in identification of vitreous diffusion.

Discussion and conclusions

The advantages of this method, represented by higher spatial resolution, high signal/noise ratio and relatively fast time acquisition, suggest the HR-MRI with ultrasound in follow-up of patients with ultrasound.

9.5 Retinoblastoma: correlation between high resolution MRI and histology for optic nerve assessment prior to enucleation

Hervé Brisse, Sophie Gerber, Xavier Sastre, Isabelle Aerts, Livia Lumbroso-Le Roic, Laurence Desjardins, François Doz, Sylvia Neuenschwander

Purpose - Objective

To assess the accuracy of high resolution MRI using surface coil in depicting early stage of optic nerve involvement prior to enucleation.

Material and methods

Twenty four children were prospectively included (mean age: 26 months). MRI was performed under general anaesthesia using head and surface coils. FSE T2-WIs and SE T1-WIs (without fat saturation) were performed with and without Gd-DTPA (with subtraction) in transverse +/- sagittal planes. High resolution surface coil sequences were obtained with a 7 cm FOV, 2 mm slice thickness and 0.3 x 0.3 mm in-plane pixel size. MR data were reviewed in consensus by 2 radiologists, blinded from pathological results. MR data were secondarily compared to histological findings.

Results

MRI and histology negatively agreed in 20/24 and positively in 2/24 patients (accuracy = 92). Two patients had very limited (< 0.8 mm) enhancement on MRI without histological postlaminar invasion, obviously related to posterior bulging of the lamina cribrosa.

Discussion and conclusions

High resolution MRI with surface coil is an accurate method to depict or rule out early stage of postlaminar extension of retinoblastoma. However, very limited (< 1mm) distal optic nerve enhancement on MRI should be interpreted cautiously.

Conflict of interest

No conflict of interest

9.6 Unilateral sensorineural hearing loss in children : MRI or CT first ?

Bogdana Tilea, Marianne Alison, Robin Azoulay, Guy Sebag, Monique Elmaleh- Bergès

Purpose - Objective

To evaluate the incidence of inner ear and CNS abnormalities in children with unilateral sensorineural hearing loss(USNHL) identified with CT and/or MRI.

Material and methods

Retrospective case review of children referred for USNHL in a tertiary care children's hospital between 1999 and 2009.

Results

From a database of 3078 children consecutively investigated by CT and /or MRI for ear disorders, 234 had a USNHL. 143 children underwent CT only (61

Discussion and conclusions

This study confirm the prevalence of inner ear malformations among UNSHL aetiologies in children ; cochlear nerve aplasia/hypoplasia is nearly as common as labyrinthine malformations, and only assessed by MRI as well as brain abnormalities.

9.7 MRI in recurrent ear cholesteatomas in children

Anne Geoffray, Jean-François Nebbia, Myriam Guesmi, Marco Albertario, Béatrice Leloutre, Sonanda Bailleux, Claude Maschi

Purpose - Objective

Recurrent cholesteatoma after middle ear surgery is not accurately detected by clinical examination. CT, reliable when negative, is not contributive when showing opacities in the middle ear. Until recently, second look surgery was performed to rule out recurrences. MRI with post-gadolinium delayed sequences and diffusion weighted (DWI) sequences has proved to be useful in adults. The purpose of this study was to assess MRI reliability particularly DWI in children.

Material and methods

We reviewed MRI examinations of 15 children (17 ears). Findings were compared to surgical findings or clinical follow-up in all cases, and to CT (12/17)

Results

6 patients had positive MRI for recurrence with surgical correlation in all . 11 patients had negative MRI with surgical correlation in 5, clinical and MRI follow up in 2, clinical follow up only in 4.

Discussion and conclusions

In this small series MRI proved to be reliable to depict or exclude recurrent cholesteatoma, it adjusted CT diagnosis in 6 cases on 12. However, it was not possible to rely on DWI sequence only , which was positive in 2 cases although delayed Gadolinium sequence showed enhancement consistent with fibrotic tissue. To follow-up children with possible recurrent cholesteatoma, MRI should be performed before CT, required only before surgery after positive MRI . When MRI is negative, surgery may be postponed .

Conflict of interest

none

9.8 Thyroid cancer in children - variable sonographic presentation and difficulties in diagnosis

Thomas Riebel, Erwin Lankes, Dirk Schnabel

Purpose - Objective

To demonstrate the sonographic and even histopathological problems in diagnosing thyroid cancer in children.

Material and methods

The sonograms of 15 patients with the suspicion of thyroid cancer (12 females, 3 males; mean age: 14ys) were analyzed and correlated with clinical and histopathological data, retrospectively.

Results

In 7 patients a solitary node and in the other 8 multiple lesions (bilateral in 7) were demonstrated on ultrasound, leading to an open biopsy in all. The sonographic suspicion was confirmed in 11 cases with difficulties in detecting small malignant foci in 7 of them, histologically. The other 4 patients had benign follicular lesions. No definite differences in the variable sonographic pattern could be ruled out between the 2 groups. Even the propagated suspicious sign for malignancy like echopoorness, indistinct margins, increased perfusion and calcifications showed to be nonspecific, retrospectively.

Discussion and conclusions

Concerning the detection of thyroid cancer in children, one has to be familiar with its quite variable sonographic presentation. When ultrasound raises suspicion for malignancy, a thorough histological examination after at best open biopsy still seems the safest way not to overlook small malignant areas in otherwise benign changes.

Conflict of interest

None

9.9 Application of an automatic computerized algorithm for the analysis of upper airways reduction in patients with Pierre Robin sequence studied by MDCT.

Sergio Salerno, Antonio Lo Casto, Salvatore Vitabile, Giuseppe La Tona, Mario Giuffrè

Purpose - Objective

The Pierre Robin sequence (PRS) is characterized frequently by reduction or partial obstruction of the upper airway with respiratory dysfunction that may be treated with mandibular distraction osteogenesis. To precisely assess the upper airway reduction caused by PRS an automatic algorithm was applied to the images obtained by multidetector computed tomography (MDCT).

Material and methods

3 patients affected by PRS were submitted to MDCT with 3D reconstruction. 3 patients with similar age and sex, unaffected by craniofacial anomalies and studied in MDCT for other reasons, act as a control group. MDCT images were processed using an automatic algorithm for upper airway localization and measure. The proposed algorithm is based on a dynamic region growing procedure and exploits the brightness contrast between the upper airway area and surrounding tissue areas.

Results

The algorithm shows interesting performance in term of accuracy. The developed algorithm can be integrated in a useful Decision Support System and used as an automatic clustering method. The elaboration however implies a long time and is sensible to the quality of MDCT images obtained.

Discussion and conclusions

MDCT with 3D reconstruction technique provides and accurate representation of craniofacial anomalies in patients with PRS. The application of a dedicated computerized algorithm is a useful tool for the evaluation of upper airway obstruction to aid decision making for mandibular distraction osteogenesis and in follow up.

Conflict of interest

none

9.10 Can malignant transformation of pediatric solid gliomas be predicted with MRSI? A comparison grading between children and adults

Luciana Porto, M Kieslich, U Pilatus, E. Hattingen E. Hattingen

Purpose - Objective

To investigate whether morphologic similar glial tumours in adults and children may also show metabolic similarities in proton magnetic resonance spectroscopy (MRS).

Material and methods

49 patients with astrocytomas were evaluated retrospectively using normalized measures of total choline (tCho), N-acetyl-aspartate (NAA) and total creatine (tCr). These metabolites were used to differentiate between diffuse, fibrillary astrocytoma (WHO II) and anaplastic astrocytoma (WHO III) in children and adults. Neuropathological grading was performed using WHO criteria. Twelve children (5 Astro II, 7 Astro III) and 37 adults (21 Astro II, 16 Astro III) were included in this study. MRS was performed before treatment in patients with histologically proven astrocytomas. Metabolite concentrations of tCho, NAA and tCr were normalized to contralateral brain tissue. A Mann-Whitney U-Test was performed to evaluate differences within the respective groups.

Results

In both groups, loss of NAA and increase of tCho were more pronounced in WHO III than in WHO II. The best discriminant function to differentiate between low and high grade gliomas was found to be the ratio of NAA/Cho ($p < 0.01$) for the different groups.

Discussion and conclusions

Metabolite ratios were more informative than metabolite changes in differentiating low and high grade gliomas in children as well as in adults.

Conflict of interest

No conflict of interest to declare

10 Quiz Skeletal dysplasia

11 Scientific session 3: Genitourinary

11.1 Re-appraisal of the sonographic characteristics of the neonatal kidney

Félicie Sherer, Anne Massez, Freddy Avni

Purpose - Objective

The aim of the present study was to redefine the sonographic features of the neonatal kidney.

Material and methods

27 healthy and 6 small for gestational age (SGA) full term neonates were studied by US on their first day of life. The 27 neonates were thereafter divided into two groups. Group 1 (12 neonates): two supplementary examinations were performed at days 2 and 3. Group 2 (15 neonates) two supplementary examinations were performed before and two hours after feeding. Sonographic analysis included several measurements: renal length, cortical and medullary thickness and calculation of a cortico-medullary ratio. The cortical echogenicity was assessed by comparison with the liver and spleen. The various characteristics were compared and statistics applied.

Results

- At day 1, the mean long axis of the kidneys was $4,22 \pm 0,38$ cm in the full term healthy neonates - This mean renal long axis was not different between days 1, 2 and 3.
- The renal length increased significantly after feeding ($p=0,032$)
- The C-M ratio was $0,3 \pm 0,05$ in healthy neonates, compared to $0,38 \pm 0,04$ in the SGA ($p=0,0019$).
- The right renal cortex is more frequently defined as hyperechoic than the left one.

Discussion and conclusions

The cortico-medullary ratio is increased in SGA neonates. Cortical hyperechogenicity is more clearly encountered for the right kidney. The kidney size reacts to hydration.

11.2 Renal cysts in tuberous sclerosis complex (TSC): patterns and significance

Laurent Garel, Françoise Rypens, Andrée Grignon, Josee Dubois

Purpose - Objective

To review the patterns and significance of renal cysts in TSC.

Material and methods

Through a careful review of the literature and a retrospective re-examination of our own material (renal cysts in TSC phenotype patients: 9 cases), we will outline the patterns, frequency and significance of renal cysts as shown by US or CT in TSC phenotypes.

Results

Renal cysts are considered a minor diagnostic feature of TSC. Renal cysts are present in 47

Discussion and conclusions

Renal cysts may be associated with both TSC1 and TSC2 and are usually small and few in number. Sometimes, widespread glomerular cysts result in the glomerulocystic kidney pattern of TSC seen mainly in utero or in the newborns. In the rare TSC2/ADPKD, contiguous gene syndrome, renal cysts typical for classic APKD are associated with TSC phenotype.

11.3 Contrast-enhanced, real-time volumetric ultrasound imaging of tissue perfusion: preliminary results

Harriet Paltiel, Horacio Padua, Patricio Gargollo, Glenn Cannon, Ahmad Alomari, Gregory Clement

Purpose - Objective

The goal of this study was to exploit the rapid frame rates available with a 3D matrix phased array US transducer to obtain real-time perfusion information from a tissue volume in an experimental model of testicular torsion.

Material and methods

Contrast-enhanced US imaging was performed in 20 rabbits during intravenous infusion of the contrast agent Definity® before and after unilateral spermatic cord torsion and contralateral orchiopexy. The degree of torsion was 0 in 4, 180 in 4, 360 in 4, 540 in 4, and 720 in 4. An automated technique determined perfusion differences between experimental and control testes by analyzing the time history of US image intensity. Mean US intensity rate of change and ratios between mean US intensity rate of change of experimental and control testes were compared to testicular perfusion and mean perfusion ratios obtained with radiolabeled microspheres, a “gold standard”.

Results

Rate of change in US image intensity as a function of the degree of torsion closely followed the radiolabeled microsphere measurements. A scatterplot of postoperative intervention/control US perfusion ratios versus radiolabeled microsphere ratios demonstrated a correlation coefficient of 0.90, $p < 0.0001$.

Discussion and conclusions

Perfusion changes within a tissue volume are detectable using live 3D acquisition of US contrast-enhanced images, and correlate well with perfusion measurements obtained with radiolabeled microspheres. This method is of potential utility in the clinical quantification of tissue perfusion.

Conflict of interest

None.

11.4 Ultrasound (US) evaluation of peritoneal thickness in children and young patients in peritoneal dialysis (PD): a single centre experience.

Irene Maria Borzani, Sara Testa, Ursula Matta, Alice Castelli, Aurora Balzani, Maria Angela Pavesi, Gaetana Rispoli, Gianluigi Ardissino, Alberto Edefonti, Pietro Biondetti

Purpose - Objective

Sclerosing peritonitis is a rare but life-threatening event in pts on PD, characterized by peritoneal thickening and calcification, which leads to a severe small bowel occlusion and sometimes death. The role of US evaluation in this condition is not well established in literature: we propose to test US for the assessment of peritoneal membrane thickness in young pts on PD.

Material and methods

Between April and September 2009 we prospectively performed US abdominal evaluation of 21 pts (16M) on PD, median age 6.4 yrs (0.6-27); the median PD duration was 27.6 mo. (0.1-108). After a normal abdominal US evaluation we studied the peritoneum with high frequency probe at three different ventral windows.

Results

Twelve pts (57

Discussion and conclusions

Our data suggest that US examination can represent a safe tool to monitor peritoneal changes during PD, allowing good peritoneal visualisation and dynamic evidence of small bowel distribution that can correlate with clinical symptoms even when they are still mild.

11.5 MCUG: Are we in line with current recommendations?

Charlotte Slaney, Daniel Carroll, Jacqueline Hughes

Purpose - Objective

Micturating cystourethrogram (MCUG) is not risk-free, a small number of patients subsequently develop urosepsis. In view of this, we examined our practice to determine whether we were adhering to current recommendations. We also examined whether the results of the MCUG subsequently changed patient management.

Material and methods

A retrospective review of patients undergoing MCUG from September 2007-October 2009 was performed. The indication, result of the MCUG and USS findings were recorded. Indications were compared against guidelines for the management of UTIs and antenatal hydronephrosis. Hydronephrosis was stratified into three groups, <10mm, 10-15mm and >15mm. The results were evaluated to see if important MCUG findings would have been missed by following NICE guidelines.

Results

There were 106 patient episodes for MCUG. MCUGs were ordered for two main reasons, either UTIs (23) or antenatally diagnosed hydronephrosis (67). 12 patients had MCUGs for other indications. 4 scans were excluded. VUR would have been missed in 1 patient without performing an MCUG. 67 patients had MCUG for antenatal hydronephrosis. In the patients with <10mm, and 10-15mm hydronephrosis, an abnormal MCUG was only seen in patients with other abnormalities on USS.

Discussion and conclusions

No abnormalities were missed in patients with <15mm dilatation with no other abnormalities on USS. We recommend that MCUG has limited value as a first-line investigation for patients with either simple hydronephrosis or UTI.

11.6 MR Voiding cystourethrography (MRVC) for vesico-ureteric reflux in unsedated infants

Owen Arthurs, Martin Graves, Pat Set, David Lomas

Purpose - Objective

The current gold standard for diagnosing vesico-ureteric reflux remains the Micturating Cystourethrogram (MCUG), using X-ray fluoroscopy, despite the risks of ionizing radiation exposure. Here, we evaluate the feasibility of performing MR voiding cystourethrography using intravesical gadolinium in unsedated infants.

Material and methods

Standard MCUG images were obtained following Urografin administration via urethral catheter. In MRI, initial FIESTA and SSFSE sequences were used to look for renal tract dilatation or congenital anomaly. Real time interactive SSFSE and SPGR images were obtained during bladder filling with dilute gadolinium until voiding, to assess the posterior urethra. SPGR images were obtained pre and post filling to identify vesico-ureteric reflux.

Results

6 children (mean age 1.5 months; 5 males) with urinary tract abnormalities underwent conventional MCUG, followed by MRVC. No adverse events. Every case of reflux identified with MCUG was identified by MRVC. Over 12 renal units, there was 83

Discussion and conclusions

MR voiding cystourethrography for vesicoureteric reflux is possible using intravesical gadolinium in unsedated infants. Further assessment is underway to evaluate its full diagnostic potential.

Conflict of interest

None

11.7 Non-contrast enhanced MR angiography of renal arteries in pediatric patients: a feasibility study.

Iosif Mendichovszky, Stephanie Donaldson, Ken Hindle, Alan Jackson, Abdusamea Shabani

Purpose - Objective

Contrast-enhanced MR angiography (CE-MRA) of the renal arteries (RA) is routinely used for radiological evaluation of renal artery stenosis (RAS). Nephrogenic Systemic Fibrosis (NSF) and its link to gadolinium-based contrast agents have created a renewed interest for non CE-MRA techniques, particularly in adults and children with renal impairment. The aim of this study was to investigate the feasibility of renal non CE-MRA in pediatric patients.

Material and methods

Twelve children (5 male, 7 female), mean age 13 years, underwent renal non CE-MRA using a cardiac- and respiratory-gated 3D TrueFISP sequence with a range of inversion preparation pulses (mean TI = 627 ms). For each inversion time, 2 radiologists independently scored the diagnostic quality of the thin-MIP reconstructed images in 3 regions of the renal arteries: origin to first RA branch, first RA branch to the renal parenchyma and within the renal parenchyma. The scoring scale was: "excellent", "good", "fair" and "poor".

Results

All patients scored “excellent” or “good” for visualizing the first 2 regions of the renal arteries (origin to first RA branch, first RA branch to renal parenchyma) with good inter-observer reproducibility. Visualization of intra-renal arteries proved challenging and dependent on the chosen TI.

Discussion and conclusions

This study shows that non-contrast renal MRA using an IR-TrueFISP protocol is feasible in pediatric patients and allows good visualization of the entire length of the renal arteries.

Conflict of interest

None.

11.8 Comparison of non-contrast and contrast-enhanced MR angiography of the renal arteries in pediatric patients - initial experience.

Stephanie Donaldson, Iosif Mendichovszky, Ken Hindle, Alan Jackson, Abdusamea Shabani

Purpose - Objective

Contrast-enhanced magnetic resonance angiography (CE-MRA) is commonly used to visualise renal artery stenosis in children. The aim of this study was to compare the signal-to-noise (SNR) quality of a novel non CE-MRA technique (Siemens NATIVE) with an established CE-MRA protocol for renal artery imaging in pediatric patients.

Material and methods

Non CE-MRA scans of the renal arteries were performed in 14 patients (mean age 13.0 years) on a 1.5T Siemens Magnetom Avanto scanner. 8 patients also received CE-MRA scans, as part of the routine clinical protocol. The imaging protocol consisted of a NATIVE inversion-recovery cardiac- and respiratory-gated 3D TrueFISP acquisition (mean TI = 689 ms), followed by a 3D FLASH CE-MRA scan after administration of 0.1 mmol/kg Gd-DTPA. Mean signal-to-noise ratio (SNR) in the descending aorta and maximum aortic diameter above the renal arteries was calculated on both sets of images. Paired t-tests were performed to assess SNR differences between techniques.

Results

No significant differences in aortic diameter were found between the NATIVE and CE-MRA scans ($p = 0.92$) and the SNR measured on the NATIVE images was significantly higher than those from the CE-MRA images (89.4 vs 31.0, $p=0.024$).

Discussion and conclusions

Non-contrast enhanced MRA provides comparable image quality to CE-MRA. The use of this method is desirable in a pediatric population where there are concerns about the use of MR contrast agents.

Conflict of interest

None.

11.9 Demonstration of Automated Characterization of Renal Function and Tissue Enhancement in Dynamic Magnetic Resonance Imaging (MRI) Using Factor Analysis of Dynamic Sequence (FADS).

Matthew Schmitz, Ruth Lim, Jinsong Ouyang, Michael Gee, Raul Uppot, Randheer Shailam, Georges El Fakhri

Purpose - Objective

The goal of this project is to assess the feasibility of factor analysis of dynamic sequences (FADS) software to analyze dynamic, contrast-enhanced renal magnetic resonance imaging (MRI). This will allow automatic identification of renal tissue types and compartments by analyzing all of the available dynamic MRI data. This technique obviates the need to manually draw regions of interest (ROIs) around and within the kidneys.

Material and methods

Using FADS software, dynamic coronal T1 fat-saturated images were analyzed from contrast-enhanced renal MRI studies for three children (five kidneys). FADS software rapidly generated time-intensity curves with minimal supervision and allowed us to describe the dynamic frames by a series of factors (i.e. unique time-intensity curves) and factor images representing cortex, medulla, and collecting system without the need to manually draw ROIs.

Results

Of five kidneys analyzed, four were normal and FADS software was successful in automatically generating unique time-intensity curves for each corresponding to renal cortex, medulla, and collecting systems. One kidney showed abnormal factor images and time-intensity curves as it was involved by innumerable cysts and angiomyolipomas as part of tuberous sclerosis.

Discussion and conclusions

FADS software can successfully, semi-automatically, and rapidly identify the renal cortex, medulla, and collecting system on dynamic contrast-enhanced renal MRI studies. This enables detailed quantitative assessment of cortical and medullary renal function in normal and abnormal kidneys.

11.10 Functional-morphological MR urography (MRU) - 12 years of experience from technical development to clinical practice

Wiltrud Rohrschneider

Purpose - Objective

To present my experience with static-dynamic MRU from technical development and animal experiments over clinical studies to practical clinical routine.

Material and methods

After development of a static T2w-3D-IR-TSE, and a dynamic 40 minute Gd-enhanced T1w-FFE sequence, the MRU method was established using 30 piglets (20 with surgically induced ureteric obstruction) for comparison with US, EU and DRS.

Results

MRU was superior to EU and US concerning morphology, and differential renal function and urinary excretion showed highly significant correlation with DRS. In further clinical studies encompassing 185 kidneys with various malformations of the urinary pathways, MRU proved to allow valuable, often unique morphological characterization, and was superior to DRS for functional assessment. When 67 duplex kidneys were evaluated, the morphology obtained by MRU correlated well with the results of surgery. The software was transferrable to a different MR system in another hospital, where it is continuously applied in clinical routine.

Discussion and conclusions

MRU is now part of the diagnostic work-up of pediatric urinary tract malformation in selected cases. It is particularly valuable in duplex or ectopic kidneys, complex malformations, as well as for pre- and post-surgical evaluation. Moreover, MR-angiography or evaluation of other structures (e.g., spine, pelvic floor, genital system) may be achieved in the same session. Its' unique value lies in the combination of morphological and functional information, allowing for simultaneous assessment of associated malformations.

11.11 The Imaging Features of Infantile Urolithiasis Resulted From Melamine

Xinyu Yuan, Yang Yang

Purpose - Objective

To investigate the imaging features of infantile urolithiasis resulted from Melamine and the diagnostic value of different imaging examinations.

Material and methods

The imaging data (including Abdominal plain films, Non-enhanced helic CT and Dopplor Ultrasound) of 17 infants with Urolithiasis caused by melamine (melamine group) were reviewed retrospectively and were compared with the data of control group comprised of 7 cases with urinary stones without relation to melamine(non-melamine group).

Results

Of the melamine group, 8 cases could be found several stones in urinary tract. CT attenuation of the stones in melamine group were lower than those in non-melamine group. In two patients, the amount of stones were found with CT was more than that with US.

Discussion and conclusions

Multiple, small size and lower attenuation composed the imaging feature of melamine-related stone. Non-enhanced helic CT is more sensitive than US in diagnosing urinary stone.

Conflict of interest

The features of infantile urolithiasis resulted from melamine

12 Oncology Task Force

13 URO MR special session

14 Oncology Task Force

15 Coffee break

16 Posters urogenital

16.1 Posterior urethral valves: cystography and cystoscopy results correlation

Hela Louati, Ines Ben hassen, Wiem Douira, Lilia Ben hassine, Lilia Lahmar, Faouzi Nouira, Beji Chaouachi, Ibtissem Bellagha

Purpose - Objective

The aim of this study is to confront the results of cystoscopy and cystography in the diagnosis of posterior urethral valves.

Material and methods

We report a retrospective study over a period of 18 years between January 1991 and January 2009, collecting 58 children, consulting in the surgical department for urinary signs, fever or addressed after antenatal diagnosis. An ultrasound, a voiding cystourethrogram (VCUG) and a cystoscopy were performed in all cases

Results

The average age is 25.6 months, between 1 day and 13 years. The reasons for consultation are a urinary tract infection in 21 cases, dysuria in 10 cases, acute retention of urine in 7 cases, renal failure in 7 cases, and fever in 2 cases. A urinary tract dilatation is diagnosed prenatally in 11 cases. The VCUG (not done in one patient because of positive urine cultures) shows a dilated posterior urethra in all the cases (57). Cystoscopy concludes at under montanal valves in 53 cases, a stenosis montanal type diaphragm ($n = 1$), a valve veru montanum ($n = 1$), a partially obstructive mucosal folds ($n = 1$), in one case, is initially negative and then rebuilt to objective montanal valves, nonconclusive (1). All the valves have been disrupted by cystoscopy.

Discussion and conclusions

Imaging of the urethra remain based on VCUG which ability to visualize the urethra and reflux is the main advantage.

Conflict of interest

NO

16.2 Role of ultrasound in management of scrotal swelling in children

Jeevesh Kapur

Purpose - Objective

To evaluate the role of ultrasound in assessment of acute and chronic scrotal swelling in the Pediatric Age group and its impact on further management.

Material and methods

Pediatric scrotal ultrasounds performed for scrotal swelling over a period of two years were reviewed and the outcome and management of the patients were assessed

Results

Total of 40 ultrasounds performed for scrotal swelling. Spectrum of diagnosis included epididymitis (13 cases), testicular torsion (3 cases), hematomas/lymphoceles (5 cases), encysted hydroceles of spermatic cord (4 cases), testicular/epididymis appendix torsion (5 cases), hydrocele (6 cases), testicular tumors (2 cases), testicular varicocele (1 case) and scrotal hernia (1 case). Surgical intervention was required in only 4 cases. Rest of the cases were managed conservatively.

Discussion and conclusions

Ultrasound is the first and usually the only investigation required for assessment of the scrotum and provides an accurate insight into the underlying process. It is able to easily distinguish causes of acute scrotal swelling such as testicular torsion and epididymo-orchitis from not so acute ones such as hematomas, lymphoceles and testicular tumors. A spectrum of acute, chronic and neoplastic causes of scrotal swelling is presented, highlighting the use of ultrasound as the investigation of choice.

Conflict of interest

No conflict of interest.

16.3 Intrapelvic Wilms' Tumour: A Rare Entity for the Most Commonly Encountered Malignant Renal Tumour in Children

AZIAN ABD. AZIZ, Krishna Kumar Govindarajan, Yih Chai Feng, Roslina Suboh

Purpose - Objective

Wilms' tumour commonly presents as abdominal mass that originates from the renal parenchyma. We encountered and thus report and illustrate a case in which this malignant tumour filled and expand the renal pelvis with minimal parenchymal infiltration.

Material and methods

A previously healthy 2 year old boy was admitted to our hospital for painless gross hematuria. There was no abdominal swelling or distension. No history of trauma or bleeding disorder. On examination no abdominal or flank mass was palpable. The cause was revealed from radiological investigations: on Ultrasound, a solid well defined non-vascular lobulated mass was seen occupying and expanding the left renal pelvis with moderate hydronephrosis, on Computed Tomography (CT) as a well defined non-enhancing hypodense left intrapelvic renal mass and on Magnetic Resonance Imaging (MRI) as T1 hypointense and T2 hyperintense intrapelvic mass with evidence of upper pole parenchymal infiltration.

Results

A left nephrectomy was performed and the histology revealed a Wilms' tumour.

Discussion and conclusions

Wilms' tumour must be considered in children presenting with gross haematuria even when the location of the tumour is not typical; as illustrated in our case. The radiological images, gross specimen of the tumour and the histological images will be illustrated.

Conflict of interest

None.

16.4 Herlyn-Werner-Wunderlich syndrome: Imaging findings in 13 cases

Young ah Cho, Mi-wha Lee

Purpose - Objective

Uterine didelphys, obstructed hemivagina and ipsilateral renal agenesis is a rare congenital anomaly referred to as Herlyn-Werner-Wunderlich syndrome. We evaluated diagnostic imaging findings in this rare condition

Material and methods

Imaging findings and medical records of 13 patients (5 newborn and 8 adolescents) with this syndrome were retrospectively reviewed

Results

US (13) and MR(7) clearly demonstrated uterine didelphys (11) and bicornuate uterus(2) with obstructed hemivagina. And variable renal anomalies were noted; right renal agenesis (7), left renal agenesis(3), multicystic dysplastic kidney (2) and cystic renal dysplasia(1). The adolescent girls had symptoms of dysmenorrhea, pelvic pain and palpable pelvis mass and newborn had renal agenesis or renal anomaly on prenatal US of clinical history

Discussion and conclusions

US and MRI are useful in the diagnosis and classification of this syndrome. Especially, female neonates with renal malformations on prenatal/postnatal US need to be screened for genital malformations. It would be helpful to diagnose this syndrome in asymptomatic neonatal period. Early diagnosis and surgical treatment can relieve the symptoms and prevent complication related to this syndrome

16.5 Inter-observer reproducibility of non contrast-enhanced MR angiography of renal arteries in pediatric patients.

Iosif Mendichovszky, Alan Jackson, Abdusamea Shabani

Purpose - Objective

Contrast-enhanced MR angiography of the renal arteries (RA) is routinely used for radiological evaluation of renal artery stenosis (RAS) in pediatric patients with fibromuscular dysplasia and RAS post renal transplantation. The aim of this study was to assess inter-observer agreement of renal non CE-MRA in pediatric patients by quantitative measurements of renal arteries.

Material and methods

Twelve children (5 male, 7 female), mean age 13 years, underwent renal MRA using a cardiac- and respiratory-gated 3D TrueFISP sequence with a range of inversion pulses (mean TI = 627 ms). Two radiologists independently measured the diameter of each renal artery in 3 regions (proximal, mid- and distal renal artery) on thin MIP reconstructed images.

Results

Bland-Altman analysis of right and left renal artery measurements in the 3 above-mentioned regions showed excellent inter-observer agreement. The measurement bias for right renal artery diameter was: proximal region 0.01 mm (95

Discussion and conclusions

Good inter-observer reproducibility was found for repeated measurements in 3 distinct regions of the renal artery using a renal non CE-MRA technique in pediatric patients.

Conflict of interest

None.

16.6 Rare cases of scrotal blood effusion in newborn mimickers of neonatal testicular torsion

Maria Clementina Pupillo, manuela de vivo, giancarlo fabrizzi, stefano de crescenzo, lucia amici, valeria bolli

Purpose - Objective

aim of this paper is to describe the features of neonatal scrotal haematomas to distinguish them from those of testicular torsion. Our purpose is to improve the confidence with uncommon but possible bleeding causes with inguinoscrotal expression.

Material and methods

five neonates presenting with initial diagnosis of testicular torsion underwent US and Doppler US exam of both abdomen and scrotum. In all these cases we had a correct diagnosis and surgery was avoided.

Results

we have found 2 cases related with the umbelical plast clamp, because of an incorrect clamping technique or an infant's lying over the clamp; one baby had a large, liver birth injury and the last two had adrenal gland haemorrhages with passage of blood effusion into the open peritoneal-vaginal duct.

Discussion and conclusions

We want to emphasize the importance of including haematoma in the differential diagnosis of the acute neonatal scrotum and the crucial role of a complete abdominal US exam in order to distinguish the non surgical patients from those requiring an immediate surgical exploration.

16.7 Antenatal ultrasonographic diagnosis of mild to moderate fetal pyelectasis is not always a significant finding for urinary tract pathology.

Savas Deftereos, Eugenia Vranou, Aggelos Tsalkidis, Paraskevi Mintzopoulou, Alexandros Chatzistefanou, Panagiotis Prassopoulos

Purpose - Objective

The purpose of this study is to evaluate the outcome of infants with prenatal ultrasonographic diagnosis of renal pyelectasis.

Material and methods

71 infants were followed for up to 2 years and included in this prospective study. All of them had fetal ultrasonographic diagnosis of mild to moderate renal pelvic dilatation (RPD). Postnatal ultrasound examination was performed at day 7 and months 1, 3, 5, 7, 12 and 24 after birth. RPD was considered when pelvic anterior-posterior diameter (APD) was 10-15mm. Resolution of RPD was considered when APD became less or equal to 5mm on at least 2 consecutive ultrasonograms. All infants underwent voiding cystourethrography (VCUG).

Results

Normal or nonsignificant findings were diagnosed in 59 of 71 (83, 10

Discussion and conclusions

Mild to moderate RPD seems to be a self-limiting condition and antibiotic prophylaxis should not be performed based only in RPD diagnosis. VCUG maybe is a helpful tool in order to prevent children from unnecessary treatment.

16.8 The role of catheter-free methods for vesicoureteric reflux detection in children

Damjana Kljucevsek, Tomaz Kljucevsek, Tanja Kersnik Levart, Rajko Kenda

Purpose - Objective

In recent years, the exact role of vesicoureteric reflux (VUR) has become controversial and cannot be uniformly determined. The connection among VUR, urinary tract infection and chronic kidney disease development is hard to predict. Nevertheless, the knowledge of the existence of VUR in some groups of children is still an important issue.

Material and methods

The number of techniques available for the assessment of VUR is increasing. Besides well known catheter-using cystographies, some catheter-free methods like catheter-free radionuclide voiding cystography, catheter-free voiding urosonography, ultrasound measurement of the midline to orifice distance, colour flow Doppler ultrasound, ureteric jet Doppler waveform measurement and three-dimensional ultrasound-based virtual cystoscopy are described and reviewed according to their characteristic and clinical role in patients with VUR.

Results

It can be seen that no catheter-free technique for VUR detection exists, which would be considered as being able to replace one of the widely used cystographies. Some of them can be used as screening method.

Discussion and conclusions

Whenever there is reasonable doubt about how important VUR is to our knowledge, it seems more justified that the methods of its detection are performed in a more user-friendly manner as regards catheterisation, radiation and availability. New studies employing new, catheter-free methods or improvement of the described ones may prove useful in improving sensitivity and providing additional data on this important issue.

16.9 Ultrasound characterisation of the paediatric breast - a pictorial review

May-ai Seah, Marius Poitelea

Purpose - Objective

This educational exhibit will review the radiological appearances of the paediatric breast. The presentation will examine the embryology and normal development of the breast, demonstrate the normal appearances during puberty and review childhood breast disorders.

Material and methods

Breast embryology will be described and illustrated. In conjunction, images of the normal breast (as classified by Tanner) will be shown to demonstrate breast development. Case histories and archived images will be used to depict disease and abnormality. For example, a case of bilateral breast enlargement in a newborn baby that secreted 'Witch's milk' (neonatal galactorrhoea) will be used to illustrate the changes that can be caused due to the influence of maternal hormones.

The use of ultrasound in a selection of clinical settings will be presented and discussed. For example in the diagnosis of gynaecomastia, which is a common condition in adolescent boys.

Important and common pathological conditions will be represented. Inflammatory conditions such as mastitis and breast abscesses, benign lesions including cysts, fibroadenomas, haematomas, galactocoeles, fat necrosis and examples of rare malignant lesions (which are more likely to be disseminated from lymphoma, leukaemia, rhabdomyosarcoma or neuroblastoma than primary malignancy), will be presented.

Results

n/a

Discussion and conclusions

The exhibit will review the normal appearances of breast development and the radiological characteristics of common benign conditions and rare malignant breast lesions.

Conflict of interest

none

16.10 Multiple Giant Bladder Diverticula in Menkes Kinky Hair Disease.

Martine K.F. Docx, Cécile Hoskens, Nathan Demeyere, Francois Eyskens

Purpose - Objective

A 7 month old boy was described , with an extreme failure to thrive and delay in hair growth. His hair was very sparse and lightly colored. There was a low copper level of 21 g/dl (normal values:70-155 g/dl) and a low ceruloplasmine level of 8.7 mg/dl (normal values: 33-43 mg/dl), confirming the diagnosis of Menkes kinky hair disease.

Material and methods

Ultrasonography of the abdomen revealed a mass communicating with the bladder lumen. A voiding cystography demonstrated multiple giant bladder diverticula without obstruction of bladder outlet. Axial and coronal T2-weighted and coronal T1-weighted images before and after administration of contrast showed numerous bladder diverticula (n=7).

Results

The bladder wall was irregular and hypertrofied .A right mega-ureter was found. Menkes's syndrome is an-X-linked recessive genetic disorder of the copper metabolism with mutations in the ATP7A gene. The characteristics of Menkes disease are failure to thrive, pilli torti, skin laxity, joint hypermobility, cerebral vessel tortuosity, osteoporotic bones with flared metaphyses, progressive cerebral atrophy and bladder diverticula.

Discussion and conclusions

The most frequent urological complication are bladder diverticula which can cause obstruction in bladder outflow and infection. Menkes disease can be associated with urinary bladder hemorrhage and spontaneous rupture of bladder diverticula and finally even complete bladder rupture .The etiology of these diverticula are unknown and prudency should be paid to these urinary complications.

17 Scientific session 4: Interventionnal

17.1 Achieving hemostasis after transhepatic portal vein access in children

Andrada Popescu, Jamal Al Taani, Cynthia Rigsby, Jackson Norman, James Donaldson, Stanley Kim

Purpose - Objective

To evaluate the success rate, risks and complications associated with achieving hemostasis during transhepatic portal vein access(TPVA)in children with portal vein pathology. Treatment of portal vein pathology requires the use of a larger vascular sheath for easy access and of anticoagulation to prevent thrombosis, which in turn increases the risk of bleeding.

Material and methods

Medical records and images from all percutaneous TPVA interventions from 2001-2009 were reviewed. TPVA was performed in patients with liver transplant, Rex shunt, and congenital anomalies of the portal venous system in whom venography, angioplasty, stenting, thrombolysis, and embolization procedures were performed. Clinical follow-up after the procedures was obtained and any complications were noted.

Results

57 procedures were performed using TPVA in 40 patients ages 4 months to 19 years(mean 7.2 years). Hemostasis was achieved with no complication in 56/57 procedures by embolizing the intrahepatic tract with gelfoam in 54 patients(96

Discussion and conclusions

TPVA in children is an effective and safe route of access allowing interventions on the portal venous system using large vascular sheaths and anticoagulation. There is a low postprocedural complication rate and parenchymal tract embolization with gelfoam,if performed carefully, can prevent postprocedural complications.

17.2 CT-guided radiofrequency ablation of osteoid osteoma in a pediatric population : our experience in 9 children.

Valérie Merzoug, Antoine Feydy, Philippe Wicart, Eric Mascard, Catherine Adamsbaum

Purpose - Objective

To compare our results to previous published datas on osteoid osteoma (O.O) treated by radiofrequency ablation (RFA) in children. To report the high efficiency of this technique in unusual localizations.

Material and methods

Nine children with O.O (6 boys and 3 girls, aged from 2 years to 16 years, mean age: 9,7 years) were treated in our institution with CT guided RFA from March 2008 to November 2009. The O.O. localizations were: 5 tibias, 2 femurs, 1 hip and 1 posterior facet joint of the L5 vertebra. The RFA procedure was always performed under general anesthesia, with a straight electrode. The clinical follow up ranged from one month to two years.

Results

Technical and clinical success rates were similar to those reported in the literature: 100Pain disappeared immediately after the procedure in eight patients, and after 3 days in one patient in whom a drill device was used because the cortical bone was too thick. No major neither minor complication was noted. No recurrence of pain was reported during the follow up.

Discussion and conclusions

Our study confirms the excellent rate of clinical success of OO RFA in children including unusual localizations. It emphasizes the rapid pain regression and the fast physical recovery following procedure. Therefore, CT guided RFA should be preferred to open surgery if the diagnosis of O.O is certain.

17.3 Primary aneurysmal bone cysts in children: percutaneous Ethanol injection and proposal of a vascular classification

Karine Lambot-Juhan, Zagorka Péjin, Stéphanie Pannier, David Grévent, Laureline Berteloot, Sophie Emond-Gonsard, Nathalie Boddaert, Christophe Glorion, Francis Brunelle

Purpose - Objective

Percutaneous sclerotherapy is an effective treatment for biopsy-proven aneurismal bone cyst (ABC). We report our experience about 29 children treated with Ethanol and propose a vascular classification of the ABC based on aspect of aspirated liquid and drainage per-procedure.

Material and methods

From January 1995 to November 2009, we reviewed 29 patients from 2 to 16 years (mean 9.6 years) who underwent percutaneous Ethanol injection for ABC. Upper extremity was involved in 19 patients, lower extremity in 5, pelvis in 3 and spine in 2. Procedure was under general anaesthesia and fluoroscopy. Appearance of the cyst fluid was clear, partially bloody, or bloody. Drainage was absent or venous. Treatment response was considered good when no clinical complain and X-ray significative ossification, fair when one of those conditions was not present and failure when none was.

Results

Cyst fluid and drainage were available in 21 patients. No drainage in 11 among 14 clear and partially bloody liquid cysts, classified as lymphatic. Drainage in the 7 bloody liquid cysts, classified as venous. The mean follow up was 2 years 6 months (3 months-7.5 years). Treatment response was good in 20 cases, fair in 4, failure in 2.

Discussion and conclusions

ABC can be classified as lymphatic or venous and be considered as bone vascular malformation, treated as of soft tissue malformations. Ethanol injection is a safe and effective treatment of ABC.

17.4 Computed tomography guided RFA as a treatment method in pediatrics

Evanthia Botsa, Ioannis Koutsogiannis, Paraskevi Tsagkouli, Konstantinos Stathopoulos, Loukas Thanos

Purpose - Objective

To evaluate the efficacy and safety of Computed Tomography guided RFA as a minimally invasive treatment for lung, liver malignancies and osteoid osteomas.

Material and methods

A total of 23 children were treated with 26 sessions of RFA during the last 2 years. Our cases referred to 17 patients with osteoid osteomas, 3 patients with liver and 3 patients with lung tumours. RFA's were performed under sedation. RF energy was applied for 8-12 min at 95°C. A technically successful ablation was regarded if the electrode was placed within the center of the lesion and the desired temperature was achieved. Clinical success for osteoid osteomas was evaluated with Brief Pain Inventory before and after treatment. Whereas patients with liver and lung malignancies were evaluated radiologically after 1,3,6 months and 1 year.

Results

Technical success was 100

Discussion and conclusions

CT-guided percutaneous RFA is a safe, efficient, cost effective and minimally invasive method for treatment of osteoid osteoma and a promising treatment method for tumors.

17.5 Arterial embolisation of pulmonary sequestration in children.

Laureline Berteloot, Yann Revillon, Sophie Emond-Gonsard, Karine Lambot-Juhan, Brigitte Charron, Nathalie Boddaert, Francis Brunelle

Purpose - Objective

Nowadays, pulmonary sequestrations are diagnosed antenatally leading to a therapeutic dilemma: should those sequestrations diagnosed in healthy child be treated and how? After a first study published in 2000, we are presenting our experience of embolisation in 34 patients.

Material and methods

From January 2001 to June 2009, 34 patients were included in this retrospective study (19 males, 15 females); mean age: 22 months. The diagnosis was antenatal in 30, incidental in 1, and not known in 3. The right femoral artery was punctured under general anaesthesia. The arterial pedicle(s) was entered and occluded with Ivalon and, when possible with one or more minicoils. Mean duration of the examination was 40mn. Follow up included AP chest film and clinical examination.

Results

None of the sequestration regressed spontaneously after birth (mean follow up of 22 months). The localisation of sequestration was: left inferior lobe (76) Venous drainage was: pulmonary (64) Two technical failures were experienced. No complications occurred. 90 Follow-up (mean 20 months): 30 patients remain asymptomatic and 2 needed surgery

Discussion and conclusions

Embolisation is a feasible and safe treatment in antenatally diagnosed pulmonary sequestration.

18 Symposium Sickle cell Anemia

19 Research : Molecular imaging, cooperative work

20 ESPR gold medalist, Honorary Members, IPR announcement

21 Posters Interventionnal

21.1 Sclerotherapy with tetracycline hydrochloride (HCL) solution in treatment of solitary hepatic cyst in childhood

Giancarlo Fabrizzi, Cecilia Lanza, valeria bolli, Giovanni Pieroni

Purpose - Objective

To describe a new treatment of symptomatic hepatic cyst in childhood: sclerotherapy with tetracycline hydrochloride (HCL) solution. To outline the advantages of this technique. To describe results of the method based on a series of 11 patients.

Material and methods

We treated 11 children (4 girl and 7 boys; mean age 5 years old) with large solitary hepatic cyst with sclerotherapy by one-shot injection of tetracycline HCL solution. Seldinger technique was used for catheter insertion. After aspiration of 10 cc of the cyst content, the cyst was opacified by injecting the same volume of iomeprol, under fluoroscopic guide to check for the absence of communication between the cyst and the biliary tree. We injected 100-200 mg of tetracycline HCL solution (5

Results

No complication was observed postoperatively. Patients were dismissed from hospital after 4 days. Complete regression was found at 3 months US and MR examination.

Discussion and conclusions

Intracystic instillation of tetracycline HCL is an effective and safe technique and may become the first choice therapy for benign hepatic cysts in childhood.

21.2 Percutaneous treatment of primary aneurysmal bone cyst by alcoholic solution of zein in 25 patients

Benoit MOREL, Loic VIREMOUNEIX, Jean Pierre PRACROS, Laurent Guibaud

Purpose - Objective

Assess the feasibility, efficacy and safety of percutaneous embolization with an alcoholic solution of zein in primary aneurysmal bone cyst in a pediatric population.

Material and methods

Twenty-five patients with primary aneurysmal bone cyst were treated with percutaneous embolization in our unit using an alcoholic solution of zein (Ethibloc TM). Twenty patients had a previous surgical curettage and presents a recurrence. Five patients had percutaneous embolization as primary treatment because they can't have a previous surgical curettage due to a potential decaying approach (n = 5). Lesions involve the peripheral skeleton (n = 22) or the axial skeleton (n = 3). Guidance was realize by fluoroscopy (n=22), by CT scan (n=2) or by a trans-bone course with a surgical pin (n=1).

Results

Twenty five patients were treated. Twenty one (84

Discussion and conclusions

Our results confirm the feasibility, efficacy and safety of percutaneous embolization for postsurgical recurrence of primary aneurysmal bone cysts and as primary tretment for lesions whose surgical approach is complex particularly in axial skeleton.

21.3 How to manage treatment-resistant post-operative pelvic lymphocele in an infant - our local experience: combined percutaneous catheter drainage and transcatheter sclerotherapy

Kin Sun Tse, H.S. Fung, T.W. Fan, T.K. Tsang, W.Y. Leung, S.Y. Chao, P.C.H. Kwok, S.C.H. Chan

Purpose - Objective

To present a case of pelvic lymphocele in an infant after anal pull-through operation, and highlight the practical aspects of sclerotherapy in paediatric population for lymphocele, as it is not elucidated in the literature.

Material and methods

Our patient with imperforate anus received anoplasty at 3 months old, subsequently complicated by circumferential lymphocele formation around rectum causing intestinal and bladder outlet obstruction requiring diversion. Despite transabdominal and transrectal drainage, the pelvic lymphocele recurred. Further treatment - combined percutaneous catheter drainage and transcatheter sclerotherapy, was performed.

Results

Based on the experience from sclerotherapy of vascular anomalies, our lymphocele was aspirated and then instilled with sclerosing agent after exclusion of extravasation. The dosage was adjusted and regime designed according to size and daily output of the remaining collection. Adequate contact of sclerosant with the lymphocele wall was ensured. Minocycline was the first agent employed (initially every 4 days, then daily for 5 consecutive days). The lymphocele reaccumulated, which necessitated another agent sodium tetradecyl sulphate (three sessions). Subsequently two sclerotherapy sessions with 70

Discussion and conclusions

The usefulness of percutaneous drainage and transcatheter sclerotherapy in pelvic lymphocele was illustrated. Our experience can offer a glimpse on the choice of sclerosing agents, treatment protocol and practical issues in this uncommon condition in paediatric population.

21.4 CT-guided percutaneous biopsy of spinal lesions in children

Evanthia Botsa, Ioannis Koutsogiannis, Konstantinos Stathopoulos, Evaggelia Sotiropoulou, Gerasimos Kremmidas, Loukas Thanos

Purpose - Objective

To detect the effectiveness and safety of CT-guided percutaneous biopsy in the evaluation of spinal lesions in children. A useful diagnostic method for inaccessible lesions.

Material and methods

26 patients underwent the fnb procedure. Patients ranged in age from 5 to 16 years, with a mean age of 10 years. Bone lesions referred to all parts of the spine. Each patient was positioned according to the location of the lesion. The choice of the needle route was made depending on the lesion depth and the vital organs surrounding it. The approach of the target was made transcervical, transcostovertebral or posterolateral paravertebral. All biopsies were performed under sedation. All patients were punctured with a trocar cutting system 14G. All material obtained were sent for culture, cytological and histopathological examination.

Results

According to pathologist's findings 7 patients had lymphoma, 3 osteosarcoma, 5 istiocytosis, 5 tuberculosis spondylitis, 6 staphylococcal spondylitis. Sufficient and proper material was obtained in 80.7

Discussion and conclusions

CT-guided percutaneous biopsy has a useful role in diagnosis and management of young patients with spinal lesions. It is a safe, minimal invasive method performed under sedation. Knowledge of spinal anatomy, indications and contraindications of the method, appropriate technique and awareness of possible complications are essential for success.

22 Posters antenatal

22.1 Can fetal MRI give prognostic criteria in gastroschisis?

Olivier Prodhomme, Coralie Dumont, Alain Couture, Corinne Veyrac, Magali Saguintaah, Catherine Baud

Purpose - Objective

To define the usefulness of fetal MRI in gastroschisis. Indeed, some cases evolve to a vanishing gut and few of the parameters described on US are accurate enough to determine the prognosis.

Material and methods

Since 2006, 21 fetuses with gastroschisis underwent MRI (from 32 weeks of amenorrhea). The large bowel with its high T1 signal was easily differentiated from the midgut. The abdominal wall defect was measured.

Results

In all cases, the proximal colon located outside the abdominal cavity. The extraabdominal bowel was enlarged in 12 cases but was attributed to a disparity of the colon size up and down-to the wall defect in 10 of them. A proximal dilatation (stomach, duodenum, jejunum) was observed in 5 cases (intraabdominal in 4), correlated with a GI tract complication in 4 of them. After 30 weeks, in all but 2 cases, the wall defect area was $>140\text{mm}^2$ and one of its diameters (axial or sagittal) was $>15\text{mm}$. Two fetuses had a smaller defect ($<80\text{mm}^2$ and $<10\text{mm}$): one developed a vanishing gut, the other a jejunal atresia with micro-intestine down-to the obstruction.

Discussion and conclusions

On MRI, a proximal gut dilatation suggests a GI tract complication. MRI can differentiate an extraabdominal midgut dilatation from a colonic size disparity. The size of the abdominal wall defect can be measured: can these parameters help to determine, antenatally, the prognosis of gastroschisis?

22.2 Fetal MRI: luxury or necessity? Our experience using 0.6T open machine.

floriana zennaro, elisabetta cattaruzzi, gloria pelizzo, pierpaolo guastalla, giuseppina d'ottavio

Purpose - Objective

Fetal magnetic resonance imaging (MRI), has been used to evaluate fetal anomalies, and it has become a very popular prenatal imaging modality. It is now the time to consider if and when it really helps.

Material and methods

Ninety-seven women with fetal malformations underwent sonography and MRI. All ultrasound examinations were performed by two 2D and 3D Ultrasound machines: Voluson 730 expert and Voluson E8 and all MRI examinations using a Philips Panorama 0.6T open machine. Ultrasound and MRI findings were compared and both related to postnatal outcome. Postnatal results were obtained by clinical, images methods or autopsy. The benefit of Magnetic Resonance was expressed according to: no additional information, add information or change the diagnosis.

Results

Mean gestational age was 26 weeks. Most frequent malformations were related to SNC (51

Discussion and conclusions

Fetal MRI is a developing tool for unique situations where ultrasound doesn't provide enough information. However, it is important to realize that ultrasound is and will remain the primary fetal monitoring technique.

22.3 Fetal gastrointestinal MRI: all that glitters in T1 is not necessarily colon...

Marina Colombani, Mathilde Ferry, Catherine Garel, Marie Cassart, Alain Couture, Laurent Guibaud, Freddy Avni, Guillaume Gorincour

Purpose - Objective

To analyze the localization value of T1 hypersignal dilated bowel loops in fetuses with gastrointestinal tract occlusion

Material and methods

Retrospective 4-year multi-center study, analyzing cases of fetal occlusions in which MRI demonstrated T1 hyper-signal content in the dilated loops. Data collected included term at diagnosis, bowel appearance on US, CFTR gene mutations, amniotic dosages of gastrointestinal enzymes. The suggested prenatal diagnosis was eventually compared to postnatal imaging and surgery.

Results

Eleven patients were included. The median term at US diagnosis was 23 Wks (13-32); in 8 cases there was one dilated loop, while several segments were affected in 3. The median term at MRI was 29 Wks (23-35). One case presented CF mutations. Final prenatally suspected diagnoses were distal ileal atresia or colon in 9 cases and proximal atresia in 2. Postnatal findings were proximal jejunal atresia in 9 cases and meconium ileus in 2. In 5 cases the surgical findings demonstrated short bowel syndrome.

Discussion and conclusions

In cases of fetal occlusion, a T1 hypersignal should not be considered as a sign of distal ileal or colic occlusion. The obstruction may be proximal, implying a risk of small bowel syndrome, which requires adequate parental counseling

Conflict of interest

None

22.4 Fetal abdominal masses as enhanced by ultrafast magnetic resonance imaging: comparison with postnatal imaging features and histologic results

sara savelli, marco di maurizio, monica antonello, lucia pasquini, bruno noccioli, claudio fonda

Purpose - Objective

Fetal MRI represents a valuable adjunct to antenatal ultrasonography for the evaluation of cystic and solid abdominal masses. The purpose of this work is to analyse the diagnostic utility of fetal MRI in prenatal evaluation of fetal abdominal masses.

Material and methods

22 pregnant women with an US detected abdominal masses other than renal mass underwent fetal MRI. Standard T2w, SSFP, FLAIR, T1w and DWI sequences were acquired in multiple abdominal fetal planes. Evaluation of mass consistency, localization, content, architecture, mean diffusivity and 3D measurement were obtained and differential diagnosis was attempted. Fetal MRI findings were compared with postnatal US, MRI or CT findings and with histological result when available.

Results

16 cystic masses and 6 solid masses were assessed. Postnatal imaging confirmed the consistency of the mass in all but one, the organ of origin in 18 and the extent of the lesion in 17. Clinical or histologic findings demonstrated 2 neuroblastomas, 1 adrenal hemorrhage, 1 aortic aneurysm, 1 urachal cyst, 1 lymphangioma, 10 duplications, 3 mesenteric cysts, 2 ovarian cyst and 1 fetus in fetu.

Discussion and conclusions

Thanks to its multiplanar and multiparametric capability with high FOV fetal MRI improves US evaluation of abdominal masses giving more detailed anatomical, spatial and dimensional data and thus orienting toward a more accurate differential diagnosis and treatment planning.

Conflict of interest

none

22.5 Fetal MRI in the diagnosis of congenital lung lesions associated with diaphragmatic hernia

Michelle Fink, Fabricio Costa, Ricardo Palma-Dias

Purpose - Objective

To describe the association of congenital lung lesions (CLL) with congenital diaphragmatic hernias (CDH) and to illustrate the contribution of fetal MRI in this diagnosis.

Material and methods

The imaging of 2 patients was reviewed. In case 1 the initial fetal ultrasound (US) showed a left sided CDH, in case 2 a right sided echogenic lung lesion. Both underwent fetal MRI at 32 weeks gestation.

Results

The final diagnoses of a left CDH with a left cystic CLL, and a right CDH with a right solid CLL were established with MRI. MRI also allowed the assessment of total normal fetal lung volume (FLV), excluding the CLL, in both fetuses. The latter was good in case 1 and poor in case 2, correlating with the neonatal course.

Discussion and conclusions

An association of CDH with CLL (in particular pulmonary sequestration) is recognized, and thought to secondary to mechanical interference with diaphragmatic fusion by the sequestration in the embryo. In imaging the fetus with CDH, MRI has the advantage over US of being able to fully evaluate the ipsilateral lung, thus making it easier to recognize a co-existent CLL. In addition, although a single clinical review suggests that the association may confer an outcome advantage, being able to assess the total FLV excluding the CLL with MRI is more likely to be a useful indicator of neonatal outcome.

22.6 Congenital tumors: Imaging when life just begins

Leonor Alamo, Elodie Senggen, Reto Meuli, Francois Gudinchet

Purpose - Objective

The purposes of this pictorial essay are to describe the most frequent types of congenital tumors and to define the role of the different imaging methods in the diagnosis and characterization of congenital tumors.

Material and methods

We retrospectively reviewed the congenital tumors diagnosed and treated in our Institution in the last 10 years. Tumors were considered as congenital if detected during pregnancy or in the first three months of postnatal life.

Results

We reviewed the imaging exams performed in 43 cases of congenital tumors. We describe the typical imaging findings of each type of tumor and the role of the different imaging technics in the diagnosis and characterization of the tumors.

Discussion and conclusions

Congenital tumors constitute a unique group of neoplasms with differ in many aspects from tumors presenting later in life. Although mostly benign, the therapeutical possibilities may be limited because of the tumor size or localization. During pregnancy, the main role of imaging technics (fetal US and MRI) is to provide an accurate information about the anatomical origen and the extension of the tumor. This information may help to reduce the differential diagnosis of the tumor and to optimize the therapeutical chances

Conflict of interest

No conflict of interest.

22.7 Fetal CT : When ? How ? what for ?

Guillaume Gorincour, Kathia Chaumoitre, Brigitte Bourlière-Najean, Florence Bretelle, Sabine Sigaudy, Claude d'Ercole, Nicole Philip, Alain Potier, Philippe Petit, Michel Panuel

Purpose - Objective

To study the role of fetal CT in prenatally suspected bone conditions

Material and methods

Retrospective 4-year multicenter study of all fetuses undergoing CT for suspected bone anomaly.

Results

We collected 198 cases. CT was performed in 106 cases (53 Sixty-one scans were abnormal (30.,9All patients with abnormal findings on US and CT were confirmed postnatally or at necropsy. The vast majority of patients with isolated short long bones and a normal CT were lost to follow-up.

Discussion and conclusions

In isolated short long bones, fetal CT proves mostly normal, but protocolized follow-up is mandatory. Fetal CT can confirm and better image focal dysostoses or sonographically suspected bone dysplasias.

Conflict of interest

None

22.8 Prenatal diagnosis of intestinal malrotation with fetal MRI

Marina Colombani, Alix Ruocco-Angari, Brigitte Bourlière-Najean, Audrey Aschero, Smart Zeidan, Catherine Desvignes, Nathalie Colavolpe, Philippe Devred, Pascal De Lagausie, Nicole Philip, Philippe Petit, Guillaume Gorincour

Purpose - Objective

To study the ability of fetal MRI, independently of ultrasound, to detect intestinal malrotation

Material and methods

Five-year retrospective study of our fetal non-CNS MRI database

Results

Four hundred and one fetal MRI scans were performed and analyzed. In 34 cases (8.5

Discussion and conclusions

Thanks to high contrast resolution on T2-weighted sequences, Fetal MRI can accurately depict an abnormal position of the proximal small bowel, even if sonographically unsuspected, and with excellent postnatal correlation

Conflict of interest

None

22.9 Normal relative values of cerebral biometry in fetal magnetic resonance imaging.

Marianne Alison, Nadia Belarbi, Bogdana Tilea, Priscilla Armoogum, Corinne Alberti, Monique Elmaleh- Bergès, Catherine Adamsbaum, Guy Sebag

Purpose - Objective

To provide normal relative biometric data to assess symmetric growth of fetal brain structures. To facilitate objective diagnosis of microcephaly, corpus callosum or cerebellar hypoplasia, in case of asymmetric measurements.

Material and methods

Normal cerebral fetal parameters have been collected in 589 fetuses from 26 to 40 weeks. Brain circumference (BC) was calculated from cerebral fronto-occipital (FOD) and biparietal (BPD) diameters: $[(CFO+BPD)/2] \times 3.14$. Length of the corpus callosum (LCC) was correlated with the cerebral fronto occipital (FOD) diameter. Transverse cerebellar diameter (TCD) was correlated with the biparietal diameter (BPD). Surface area (VS) and height (HV) of the vermis were correlated with brain circumference (BC).

Results

Normal values of BC are provided. Normal ratio of LCC relative to FOD, TCD relative to BPD and VS and HV relative to BC are provided according to gestational age. Standard deviation of LCC,TCD,VS and HV according to respectively FOD, BPD, BC and BC are also provided in order to overcome gestational age.

Discussion and conclusions

Normal values of BC could be useful to exclude microcephaly even if BPD or FOD are under normal range. Normal ratio of cerebral biometric data may be useful to compare short corpus callosum, small cerebellum hemispheres or vermis to supratentorial parameters and to assess harmony of measurements.

Conflict of interest

This study was funded by grant AOR 05 048 from the Hospital Clinical Research Program (Ministry of Health).

22.10 Antenatal MRI in the diagnosis of upper abdominal foetal masses.

Jennifer Hauptfleisch, Kaye Platt, Subhasis Chakraborty

Purpose - Objective

Ultrasound (US) is the imaging technique of choice for prenatal screening. However, when evaluating certain foetal abnormalities, antenatal MRI scans provide diagnostic information which is useful in counselling parents, postulating foetal prognosis and determining postnatal treatment strategy.

Material and methods

We present pictorial review of four interesting cases of foetal upper abdominal masses along with their follow up post natal imaging in the Children's Hospital in Oxford, UK. A 1.5-T magnet was used to acquire the single series of T2 weighted images of the foetuses.

Results

Three masses were in the left upper quadrant (LUQ) and the fourth in the right supra-renal area. MRI findings included duplex kidneys, a lung sequestration and a complex solid- cystic mass, not associated with the left kidney, but indeterminate on MRI. Post partum neonatal ultrasound confirmed the MRI findings of both duplex kidneys and the lung sequestration. The indeterminate solid-cystic mass was unchanged on neonatal USS and a neonatal MRI confirmed the finding.

Discussion and conclusions

Prenatal MRI is a helpful second-line imaging modality when delineating foetal abdominal masses. A single T2 weighted series provided adequate imaging to make a diagnosis, reduced acquisition time which decreased movement artefact with no known foetal or maternal complications. No further actions or investigations were indicated in utero. The prenatal diagnosis enabled perinatal planning and parental counselling.

22.11 Walker Warburg syndrome: how prenatal US ocular anomalies can help to reach the diagnosis?

Marie Brasseur-Daudruy, Gérard Labadie, Valentine Ickowicz, Danielle Eurin, Pierre-Hugues Vivier, Eric Verspyck

Purpose - Objective

To discuss the usefulness of ultrasound (US) ocular anomalies in the diagnosis of Walker Warburg Syndrome (WWS)

Material and methods

Two fetus explored by US and Magnetic Resonance Imaging (MRI).

Results

A consanguineous couple with previous history of miscarriage and neonatal death (hydrocephaly and posterior fossa anomalies- termination of pregnancy and autopsy refused) was referred for encephalocele at 15 WGA (weeks gestation age). Termination of pregnancy was refused. US at 33 WGA revealed bilateral abnormal ocular echoic structures. WWS was suspected. The baby died within the first hours. Autopsy was refused. Post-natal ocular US revealed bilateral conical structures within the globes evoking retinal detachment. A positive search for POM T2 gene mutation confirmed the diagnosis. A second consanguineous couple with previous history of anencephaly was referred for US examination at 26 WGA. US revealed ventriculomegaly, meningocele and the same ocular pattern. WWS was suspected and termination of pregnancy was performed. Post-mortem MRI showed simplified gyral pattern and Z shaped brainstem. Search for mutations was negative but autopsy confirmed the diagnosis.

Discussion and conclusions

WWS is a rare autosomal recessive disorder characterized by diffuse neurodysplasia, manifested by brain and eye abnormalities. Cerebral anomalies (lissencephaly, encephalocele, cerebellar and brainstem) can suggest WWS, particularly in cases with positive familial history. US ocular anomalies can be useful to suggest the diagnosis in a couple not at risk for this condition.

22.12 Role of MRI in diagnosis of non-CNS fetal abnormalities

ibrahim adaletli, yigit ozpeynirci, fahrettin kilic, haluk emir, sebu kurugoglu, riza madazli

Purpose - Objective

In this study is focused on the role of MRI for prenatal diagnosis of non-central nervous system (CNS) anomalies.

Material and methods

27 fetuses were included into the study. All were referred from an experienced perinatologist either with the suspect of having non-CNS anomalies or having complex anomalies detected by ultrasound (US). Fetal MRI was performed on a 1.5 T system (Siemens, Erlangen) in sagittal, transverse, and coronal orientations using a T2-weighted sequence (HASTE; TR/TE, 1,380/103; field of view, 380 mm; slice thickness, 4 mm; matrix 256 ?- 256; number of excitations, 1).

Results

In the 27 fetuses investigated for non-CNS abnormalities were localised in the abdomen (22), in the chest (3), in the placenta (1) and in the spine (1). The MRI diagnosis were: urinary tract anomalies (n=11), cystic lesion (n=4), cloacal anomaly (n=2), hemangioendothelioma of the liver (n=1), imperforated hymen (n=1), retroperitoneal lymphangioma (n=1), sacrococcygeal teratoma (n=2), extrapulmonary sequestration (n=1), pulmonary sequestration (n=1), thymic lymphangioma (n=1), diastematomyelia (n=1) and placenta percreata (n=1).

Discussion and conclusions

In recent years, the role of fetal MRI in diagnosing non-CNS abnormalities has been expanded and MRI has become widely used for that purpose. MRI has its complementary role to prenatal US in a suspicion of an abnormality, in better depiction of complex anomalies or understanding the characteristics of the lesions.

22.13 “Isolated” Dandy-Walker malformation (DWM) on prenatal imaging

Laurent Guibaud, anne Larroque, Vincent des Portes, Damien Sanlaville, Jean Pierre PRACROS

Purpose - Objective

To improve the prenatal counselling of “isolated” DWM in light of recent literature which has shown the potential good clinical outcome of fetuses presenting with isolated DWM characterized by partial vermian agenesis with identification of 2 fissures and 3 lobes (O. Klein, Childs Nerv Syst.)

Material and methods

Retrospective observational study of 5 consecutive prenatal cases of DWM

Results

In all cases, DWM was described as isolated without any associated CNS or extra-CNS malformations. In all cases, despite good quality imaging including MRI, the anatomical analysis of the dysgenetic vermis was extremely limited regarding fissuration and lobulation. In 3 cases, cytogenetic anomaly was found, including subtelomeric deletion 6p (post-natal embryotoxon n=1) and partial trisomy 17. One foetus with 6pdel was terminated. In 4 of the 5 post-natal cases, MR confirmed DWM with still difficulties in vermian analysis. In one case, post-natal MR showed a large Blake pouch cyst associated with a marked mass effect on the distal part of the tentorium. The four patients required ventriculo-peritoneal shunting due to early post-natal hydrocephalus. The post-natal outcome of the 2 patients without cytogenetic anomaly is favourable.

Discussion and conclusions

In the prenatal period, one should be aware of the difficulties of vermis anatomical analysis and of the potential high incidence of subtelomeric anomalies in “isolated” DWM”. In the post-natal period, the paediatricians should look for post-natal hydrocephalus.

22.14 Imaging findings and utility of fetal central nervous system MRI

Georgia Papaioannou, Dimitra Loggitsi, Ilias Kampas

Purpose - Objective

To present the fetal central nervous system (fCNS) MRI findings and evaluate its utility with respect to prenatal ultrasonography (pUS).

Material and methods

77 fCNS MRI scans performed in our institution over the past 2 years in 70 pregnant women (7 were scanned twice) using a 1.0T high-field open-magnet. The mean gestational age was 27.07 weeks. 2 cases represented twin pregnancies with only one fetus scanned. Indications for MRI as suggested by pUS were: Ventriculomegaly (51.95

Results

fCNS MRI confirmed the pUS findings in 79.2

Discussion and conclusions

MRI for evaluation of fCNS is a valuable complement to pUS. It not only confirms anomalies suggested by pUS, especially in technically difficult scans, but it may also reveal other sonographically occult CNS anomalies. The later may be associated with worse outcome, thus affect parents’ consultation and fetal management.

Conflict of interest

no

22.15 Rhombencephalosynapsis (RES) prenatal imaging : retrospective multicenter study of 17 cases detected by ultrasound +/- subsequent MRI.

Brigitte Maugey-Laulom, Mathilde Ferry, Laurent Guibaud, Marie Cassart, Valentine Ickowicz, Catherine Garel, Alain Couture, Pascale Bach, Agnès Villette

Purpose - Objective

To define prenatal rhombencephalosynapsis (RES) imaging, brain malformation characterized by congenital fusion of the cerebellar hemispheres and vermis defect.

Material and methods

Over a 8-year period (2000 - 2008), 17 cases of prenatal detection of RES were selected by a retrospective study (conjoint work GRRIF) with available autopsy (16 terminations of pregnancy), or post-natal MRI. Data from 17 ultrasonography (US) and subsequent 11 MRI imaging were provided.

Results

Subsequent MRI was performed in 11 cases at mid-gestational age of 28 w: RES diagnosis was confirmed in 7 cases, and established in 3 (1 autopsy diagnosis). Axial planes always showed a small rounded 4th ventricle, and a convex posterior margin of the cerebellum.

Associated anomalies were seen in 8/17 : 4 supratentorial midline defect were observed in the 5 cerebral nervous system (CNS) anomalies.

Discussion and conclusions

Fetal hydrocephalus associated with a small cerebellum on US axial cross-section and absence of hyperechoic vermis, should alert ultrasonographer to consider RES diagnosis. MRI confirmed or established the diagnosis, and evaluated more accurately CNS additional anomalies.

23 Scientific session 5: Antenatal

23.1 Fetal body MRI - comparison to prenatal ultrasound and postnatal findings

Lisa Raviv-Zilka, Aviva Ben-Shlush, Jeffrey Jacobson, Michal Berkenstadt, Michalle Soudack

Purpose - Objective

Fetal MRI is considered a valuable second line imaging tool for feti with complex ultrasonographic findings. Few studies have focused on the value of MRI in assessing body fetal pathologies. The purpose of this study was to compare prenatal ultrasound reports with prenatal MRI and postnatal body imaging, surgery or necropsy findings, and to assess MRI accuracy, pitfalls, and indications.

Material and methods

Sixty six pregnant patients, gestational mean 29.5 weeks, underwent fetal body MRI between June 2004 and June 2009. We retrospectively compared the imaging data of prenatal US to MRI and to the postnatal pathological, surgical or clinical findings from the hospital records or by direct correspondence with the patients.

Results

66 fetal body MRI studies were performed for body pathology assessment. Postnatal evaluations were available for 89MRI revealed the same findings as US in 29

Discussion and conclusions

MRI of the fetal body is a valuable tool for complex anatomic inquiries. Our study shows the increased accuracy of MRI in comparison to US imaging in difficult cases. MRI provides additional anatomical detail which may be crucial for informed decision by the caring physicians and the future parents.

23.2 Impact of maternal sedation on quality of fetal cerebral MRI

Catherine Garel, Marie Cassart, Marie Brasseur-Daudruy, Emilie Josserand, Catherine Adamsbaum, Corinne Alberti

Purpose - Objective

To evaluate the impact of maternal sedation on the quality of fetal cerebral MRI. Cojoined GRRIF work.

Material and methods

100 fetal cerebral MRI (10 MRI performed consecutively in 10 centres) were evaluated by 2 radiologists who were unaware of the possible use of sedation. The quality of images was graded from 0 to 2, according to the presence of motion artefacts, the symmetry of the acquisition plane and the contrast image quality. An examination was considered “good” when at least 2 planes in T2 and a complementary plane in T1 were graded 2 and when both radiologists were in agreement. The gestational age, the quantity of amniotic fluid, the type of presentation and the number of fetuses were recorded. A statistical analysis evaluated the inter-observer agreement and the relation between examination quality and the above mentioned factors.

Results

48 and 52 examinations were performed with and without sedation respectively. Gestational age ranged from 22 to 38,5 weeks (average: 32 weeks). 43 examinations were considered “good”. There was a good agreement between the two radiologists in 92 cases and kappa value of 0.84 (CI95). Examination quality was not correlated with gestational age, quantity of amniotic fluid, type of presentation and the number of fetuses. It was statistically better in sedated patients ($p=0.028$). “Bad” examinations were correlated with bad T1 images.

Discussion and conclusions

Maternal sedation improves quality of fetal cerebral MRI. It is mainly due to improvement of T1 images quality.

23.3 Distortion of the anterior part of the interhemispheric fissure. Significance and impact on prenatal diagnosis.

Laurent Guibaud, Edwin Quarello, Mathilde Ferry, Vincent des Portes, Jean Pierre PRACROS

Purpose - Objective

To illustrate and understand the significance of a distortion of the anterior part of the interhemispheric fissure and underline its impact on prenatal diagnosis.

Material and methods

Retrospective observational study of 12 cases (prenatal n=9, postnatal n=3) presenting a distortion of the anterior part of the interhemispheric fissure with emphasis on associated anatomical anomalies on pre- and postnatal imaging and biological data.

Results

Associated anatomical anomalies were identified in 9 cases including especially midline anomalies (syntelencephaly n=2, lobar holoprosencephaly n=1, Aicardi syndrome n=1, septo-optic dysplasia n=1, Kalleman Demorsier syndrome n=1), but also anterior neural tube defects (n=2), schizencephaly (n=1) and abnormal gyration n=1. A 6p deletion was identified in one case without associated CNS anomalies. In 2 cases, the finding was isolated on the prenatal work-up (MRI and karyotype) with healthy babies on the post-natal follow-up.

Discussion and conclusions

Analysis on a routine axial plane of the anterior part of the interhemispheric fissure can be a clue for diagnosis of midline anomalies and other supra-tentorial anomalies. If this finding looks “isolated” on ultrasound, MRI is mandatory to analyze carefully optic nerves and chiasma, olfactory anatomical structures and gyration. Karyotype is recommended especially to look for 6p deletion.

23.4 Prenatally Diagnosed Congenital Lobar Hyperinflation (CLO)- Not Uncommon and Non Surgical Management is Feasible

Richard Barth, Beverley Newman, Erika Rubesova, Shreyas Vasanawala

Purpose - Objective

To raise awareness of CLO frequency as a cause of a prenatally diagnosed fetal chest mass and assess opportunity for non-surgical management. To describe fetal MRI findings and correlate with postnatal imaging and clinical outcome.

Material and methods

A retrospective database search of fetal chest masses diagnosed at our institution from 2005-2009 and subsequently confirmed to represent CLO on postnatal computed tomography (CT). Fetal MR imaging characteristics were correlated with postnatal CT. Postnatal clinical symptoms and outcome were reviewed.

Results

38 cases of fetal chest mass were identified. 11/38 (29

Discussion and conclusions

CLO is a significant cause of a fetal chest mass. Prenatal MRI correlates well with postnatal CT. The majority of prenatally diagnosed CLO's remain asymptomatic after birth and can be managed conservatively without surgical resection.

23.5 Sonographic evaluation of the fetal pancreas

Sanjiva Pather, Nicky Dhaene, Freddy Avni

Purpose - Objective

The aims of the study were to determine - the rate of visualization during normal pregnancies - the size of the pancreas in relation with the gestational age - correlate the gland echogenicity with the gestational age

Material and methods

50 successive normal pregnancies were examined by obstetrical US. After a routine sonographic evaluation of the pregnancy, visualization of the pancreas was attempted using the stomach, the spine and/or the splenic vein as potential landmarks. The rate of visualisation was calculated. The antero-posterior diameters of the head and the body were measured and correlated with the gestational age. Echogenicity of the gland was compared to the liver. It was correlated to the timing of pregnancy as well.

Results

The rate of visualization of the fetal pancreas was 93%. The pancreatic gland echogenicity compared to the liver reduces with increasing gestational age. This reduction in echogenicity seems less apparent in macrosomic fetuses where the gland remains hyperechoic compared to the liver even in the third trimester.

Discussion and conclusions

The fetal pancreas seems easy to visualize, measure and evaluate in utero. Macrosomic fetuses tend to have hyperechoic gland. Our baseline study may help for future characterization of pancreatic diseases.

Conflict of interest

no

23.6 Abnormal fetal hepatic signal on MRI

Marie Cassart, Marc Molho, Guillaume Gorincour, Laurent Guibaud

Purpose - Objective

To evaluate the role of MR imaging in the diagnosis of foetal liver parenchymal anomalies.

Material and methods

We retrospectively reviewed 7 cases of abnormal liver signal in fetuses referred to MR in a context of suspected congenital infection (n=2), digestive tract anomalies (n=3) and foetal anasarque (n=2). The fetuses were aged from 29 to 34 weeks (average GA: 31 weeks). The antenatal diagnoses were compared to histological data.

Results

MR demonstrated unexpected abnormal foetal liver signal (hypointensity on T1 and T2 weighted sequences) suggestive of iron overload in all cases. The diagnosis of iron accumulation in the liver was confirmed on biopsy (n=2) and foetopathology (n=4). The final diagnosis included congenital infection (n=1), syndromal anomalies (n=3) and congenital hemochromatosis (n=3). In all cases, the liver parenchymal anomalies demonstrated by MR were undetectable on US.

Discussion and conclusions

To date MR is the only technique able to demonstrate siderosis or hemochromatosis. The antenatal diagnosis of such a condition is important as it modifies the prognosis of the fetus and may improve the ante- and post-natal management of such a condition. Conjoint work of the GRRIF

Conflict of interest

No

23.7 When will multidetectorCT (MDCT) of the fetus improve prenatal management: a retrospective survey; 7 years experience, 150 cases.

Sarkis Taifour, Aygline Paternostre, Philippe Bouhanna, Brigitte Leroy, Jean philippe Bault, laurence Loeuillet, Joelle Roume, Marc Molho

Purpose - Objective

to evaluate the real contribution of 3DMDCT for prenatal diagnosis in a multidisciplinary approach, in order to define the appropriate indication for this radiological new technique.

Material and methods

From january 2003 to december 2009 a retrospective study was conducted in referral center of fetal medicine. 150 cases with 3DMDCT were studied in order to analyse the condition of indication, the respective role of different imaging techniques and biological studies. Using as reference, radiological, clinical survey, biological analyse, specialist advice in case of birth; radiological, autopsy findings in case of termination of pregnancy.

Results

The main indication was to confirm a severe chondrodysplasia before abortion, the second was to clarify the abnormalities observed in case of dysostosis, to assist the specialist in prenatal counseling, the third indication was to look for other abnormalities in polymalformative syndromes, finally the scanner has been requested in case of doubt on parts of the skeleton in cases of ultrasound difficulties specially for the spine.

Discussion and conclusions

With experience, the use of CT in cases of suspected skeletal dysplasia gradually decreased. An isolated short femur is no longer considered. During the second trimester, a good quality 3DUS is often sufficient in a typical form. The CT scan remain very useful in cases of doubt, when an important decision follows (benefit / risk ratio) specially during the third trimester.

23.8 Prenatal imaging characterization of congenital bronchopulmonary malformations (BPM)

Erika Rubesova, Beverley Newman, Richard Barth

Purpose - Objective

To determine whether the imaging characteristics of BPM can be defined prenatally.

Material and methods

A retrospective institutional review of 20 BPM that were found on prenatal ultrasound and evaluated further by fetal MRI compared with postnatal CT (19) and/or MRI (4). Two radiologists independently reviewed appropriate fetal images for mass size and location (US and MRI), mediastinal shift and presence of cysts (US and MRI), systemic vessels (US and MRI), and mucoid impaction (MRI). Radiologist evaluations, pre and postnatal imaging and surgical/pathology findings (14) were compared.

Results

The lesions had similar features prenatally versus postnatally with minor differences including correct location (19/20); visualization prenatally of a systemic artery (6/7); cysts (10/11) and mucoid impaction (5/8). Both radiologists agreed regarding location, size, and major diagnostic features. There was interreader concordance on the prenatal presence of cysts in 85

Discussion and conclusions

Major BPM features are characterized on fetal imaging and can guide both pre and postnatal surveillance, parental counseling and management decisions. Some fine details are better appreciated postnatally.

24 ESPR and J Lefebvre Lecture

25 Coffee break

26 Posters cardiovascular

26.1 Is Diastolic Dysfunction in treated Tetralogy of Fallot (TOF) patients related to pure volume overload or is it secondary to other associated abnormalities?

Kedar Jambhekar, Chetan Shah, S Bruce Greenberg

Purpose - Objective

Corrected TOF is associated with pulmonary regurgitation and diastolic dysfunction(DD). Pulmonary stenosis(PS) post valvectomy is a model for pure pulmonary regurgitation. Our purpose was to determine if DD is related to pure volume overload.

Material and methods

37 patients with TOF and 21 with PS underwent cardiac MRI. Inclusion criteria included regurgitant fraction >25

Results

TOF patients with E/A>1 included 8 patients with RV:LV>=2 and 13 RV:LV<2. TOF patients with E/A<=1 included 15 with RV:LV>=2 and 1 with RV:LV<2. PS patients with E/A>1 included 3 with RV:LV>=2 and 8 with RV:LV<2. PS patients with E/A<=1 included 9 with RV:LV>=2 and 1 with RV:LV<2. Significant increase in RV size was associated with reduced E/A consistent with DD in both conditions.

Discussion and conclusions

The same pattern of DD with associated RV enlargement in both TOF and PS is present suggesting increased volume associated with pulmonary regurgitation alone is the cause of DD in TOF.

Conflict of interest

None

26.2 MR IMAGING APPEARANCES OF ANOMALOUS PULMONARY VENOUS DRAINAGE - A PICTORIAL REVIEW

SANJAY MAROO, SUSIE GOODWIN

Purpose - Objective

1.To review classification of anomalous pulmonary venous drainage 2.To illustrate MR appearances of various types of total and partial anomalous pulmonary venous drainage.

Material and methods

A pictorial review MR angiography(MRA)appearances of total and partial anomalous pulmonary venous drainage is presented with examples of quantifying blood flow in the affected vein and flow patterns in the ipsilateral pulmonary artery using phase contrast imaging.

Results

1.Post processed MRA data is excellent at demonstrating pulmonary veins and their connections. 2.Anomalous pulmonary venous connections may result in flow abnormalities in the ipsilateral pulmonary arteries.

Discussion and conclusions

Anomalous connections of one or more pulmonary veins may occur in relative isolation or in combination with other cardiac defects.The abnormality may be asymptomatic especially if a single vein is involved or symptomatic with multiple or total involvement.MR assessment of pulmonary venous drainage should include sites of drainage, any stenosis of the draining veins and flow quantification and profiling in the affected vein and ipsilateral pulmonary artery.

Conflict of interest

None

26.3 Hemangiomas revisited: the useful, the unusual and the new.

Rajaneeshankar Palani, Ricardo Restrepo, Umamahesh Matapathi, Luisa Cervantes, Nolan Altman

Purpose - Objective

Hemangiomas are very common vascular tumors occurring in children, presenting mainly in newborns and infants that can have a varied clinical and imaging appearance. The objective of this poster is to present the current perspective as regards the imaging and clinical management of these tumors.

Material and methods

This will be a pictorial presentation. Interesting cases will be shown.

Results

This will be a pictorial presentation. Interesting cases will be shown.

Discussion and conclusions

In our presentation we will discuss: 1. New concepts in the origin of hemangiomas and the link to a stem cell origin. 2. The types of hemangiomas, most common locations and distributions on the skin with the corresponding clinical pictures and well as visceral hemangiomas. Histology when available will be shown as well. 3. Imaging appearance of hemangiomas at different stages using different modalities. 4. Indications for treatment and new treatment options such as laser and propranolol. 5. Pitfalls that could potentially be confused with hemangiomas.

Conflict of interest

No conflict of interest

26.4 Tietze syndrome in infants and young children: Clinical and imaging findings

Benjamin Koplewitz, Eitan Gross

Purpose - Objective

Tietze syndrome or idiopathic costochondrits is rare in infants and young children. It has characteristic self-limiting clinical course and imaging findings. We present clinical and imaging findings in 7 children with Tietze syndrome.

Material and methods

Medical records of all children with Tietze syndrome during a 10 year period in a tertiary academic center were reviewed.

Results

Seven patients were found (1 female, 6 males), all 18-months-old or younger. All had a costo-sternal inflammatory process, without history of trauma or fever. 3 of 7 had vaccination 2-4 weeks prior to initiation of symptoms. Five had chest radiograph, one had sternum radiograph, five had sonography (2 or 3 exams), one had CT and biopsy, 1 had (negative) bone scan. Sonographic findings of costo-chondral junction thickening and heterogenous increased echogenicity of a soft tissue swelling were typical and seen in all 5 cases who had sonography. In all cases the disease process resolved within 4-12 weeks.

Discussion and conclusions

Awareness of the characteristic clinical course and typical sonographic findings of Tietze syndrome enables prompt diagnosis and avoidance of unnecessary, potentially harmful investigations.

Conflict of interest

None.

26.5 Anomalous Left Coronary Artery from the Pulmonary Artery (ALCAPA): A rare cause of heart failure in children

Nash Damry, Martial Massin, Hugues Dessy, Helene Demanet, Pierre Wauthy, Catherine Christophe

Purpose - Objective

To discuss the methods used for the diagnosis of ALCAPA and determine which technique best describes the anomaly

Material and methods

Seven cases of ALCAPA were reviewed retrospectively. Clinical symptoms and diagnostic procedures, including ECG (7 cases), Echocardiography (7 cases), Aortography (3 cases) and Multislice CT scanner (2 cases) were analysed and compared with surgical findings in each case.

Results

Combined ECG-Echo showed signs of ALCAPA in 4 cases/7. In 1 case, coronaries were described as normal on Echo and ALCAPA was diagnosed at surgery. Aortography was diagnostic each time in 3 cases. Multislice CT was diagnostic each time in 2 cases.

Discussion and conclusions

ALCAPA is a rare, but potentially fatal congenital coronary anomaly, occurring in 1 in 300.000 live births. According to certain authors, in the appropriate clinical setting, ECG+Echo can achieve diagnosis with 100%. We think that Multislice CT is very rapid, needs very short sedation times and is able to describe the exact anatomy of ALCAPA with high anatomical precision.

Conflict of interest

No

26.6 Comparison of Ergospirometry (ESM) with cardiac Magnetic Resonance imaging (cMRI) in patients with surgically repaired tetralogy of fallot (TOF)

Katharina Murg, Erich Sorantin, Robert Marterer, Jana Windhaber, Bert Nagel, Peter Schober

Purpose - Objective

This study was conducted to assess the prognostic correlation of cardiopulmonary exercise testing in regard to cMRI and ECG in TOF patients. If such value exists, cMRI resources can be adapted to fit the patients' needs more effectively.

Material and methods

In 28 TOF patients bicycle ESM and cMRI was acquired. Both evaluations followed standardized protocols. On ESM several parameters including VO₂max, VEmax, VO₂/HRmax and Wmax were including the Exercise cardiac power (ECP) were obtained. cMRI consisted of biventricular volumetry (EDV, ESV, SV, EF) and flow measurements within the pulmonary trunk and ascending aorta. ECG tracings were analyzed, too.

Results

Cardio respiratory function parameters were abnormal in 78,5

Discussion and conclusions

QRS complex correlated with cMRI in surgically repaired TOF patients can be possibly used in the future for adopting cMRI follow-ups individually. Thus using limited cMRI resources can be optimized

26.7 CMR and Echo assessment of right ventricle function and venous pathway obstruction after atrial switch operation (Senning procedure)

Tetyana Yalynska, Yevgeniya Yershova, Valentina Khanenova, Raad Tammo, Illya Yemets

Purpose - Objective

To make quantitative evaluation function of the systemic RV using MRI and Echo. To imagine the systemic and pulmonary venous pathway for obstruction and baffle leak.

Material and methods

Fifteen patients after Senning procedure underwent cardiac MRI and Echo with a few formulas based on Echo measurements in 2-D, M-Mode and Doppler. The average patients age was 5,9 years (range,1,4-15,5years), the average post-surgery time 5,5 years (range, 1,0-15,0years). EF RV , EDI RV, and the baffle size were measured.

Results

The average EF RV obtained by MRI was 449,2

Discussion and conclusions

CMR assumes an increasing role in non-invasive assessment of a complex cardiac anatomy and RV function after Senning procedure, but difference between functional rates of systemic RV detected by use of MRI and update Echo proved to be insignificant in our study. We can suppose that EFRV, equal to 40

26.8 Cardiac MRI of transposition of the great vessels: a review of MRI appearance of normal and abnormal, pre and post operative findings and of long term complications.

Mervyn Cohen, Tiffanie Johnson

Purpose - Objective

Cardiac MRI is utilized to review and illustrate all of the different surgical procures that are used for the correction of congenital transposition of the great vessels.

Material and methods

The three levels at which correction of transposition are attempted are the atrial level, ventricular level, and the level of the great vessels. We review all the different corrective surgical procedures performed and the advantages and disadvantages of each procedure. We use MRI to illustrate the normal and abnormal long term anatomical and physiological results.

Results

1. Atrial level correction. This is now seldom performed. Complications are right ventricle failure in the second or third decades, leakage or blockage in the conduits, arrhythmias and sudden death. 2. Ventricular level correction. This is only done in very selected cases with ventricular outflow obstruction 3. Great vessel switch. This restores normal flow of blood through the heart and great vessels. The left ventricle is the systemic ventricle. Complications are pulmonary stenosis and aortic regurgitation

Discussion and conclusions

MRI is an extremely useful imaging method for evaluation of normal and abnormal findings following surgical repair of transposition of the aorta and pulmonary artery. It can demonstrated normal postoperative anatomy, many complications of the surgical repair and assess cardiac function.

26.9 Long-term follow-up of large atrial septal occluder (Amplatzer device) with cardiac MR imaging in a pediatric population

Nicolas Hugues, Chantale Lapierre, Julie Déry, Joaquim Miro, Nagig Dahdah, Marie-Josée Raboisson

Purpose - Objective

To evaluate the position of the atrial septal occluder (ASO) with regard to adjacent cardiac valves and veins and compare the results with those obtained in 2002.

Material and methods

Twenty-four patients (24) who were evaluated by cardiac MRI in 2002 were re-evaluated in 2009 according to the same protocol. Images were compared in order to detect any evidence of: 1) protrusion of the ASO into the opening of the pulmonary and systemic veins; 2) contact between the ASO and the mitral valve or the left atrial roof; 3) extrinsic deformation of the aortic valve and root.

Results

Impingement of the ASO on the right superior pulmonary vein, the right inferior pulmonary vein, the superior vena cava, the inferior vena cava has disappeared in 3, 2, 5, and 2 patients respectively. The device stayed in contact with the mitral valve (n=2 pts) and with the left atrial roof (n=9 pts). Contact with the aortic root and valve persisted in all but 9 patients.

Discussion and conclusions

The distance between the ASO and the surrounding structures increases with growth.

26.10 The difficulties of ultrasound diagnostics of non-compact myocardium in children with underlying carditis

Irina Silnova, Igor Dvoryakovskiy, Elena Basargina, Alexandr Ivanov

Purpose - Objective

Non-compact myocardium is a rare cardiomyopathy characterized by the increased number of trabeculations of a cardiac muscle with the contractility impairment

Material and methods

120 children (from 4 month to 17 years) with dilatation cardiomyopathy were followed for 3 years. The ultrasound diagnostic of the heart was performed on the Sequoia 512 equipment according to standard procedure.

Results

In 40 of 120 children with underlying marked dilatation preferentially of the left ventricle (over then 60

Discussion and conclusions

Thus marked heart dilatation with underlying carditis lead to intertrabecular lacunas appearance, the presence of which is one of ultrasound criteria of non-compact myocardium. The ultrasound diagnostic criteria of non-compact myocardium in children with underlying marked left ventricle dilatation are thought necessary to the revised.

27 Posters Chest

27.1 Tracheobronchial stenoses by vascular anomalies: role of multislice CT

marco di maurizio, SAVELLI SARA, Alessandro Semeraro, Paola Serio, Lorenzo Mirabile, claudio fonda

Purpose - Objective

To evaluate sensitivity and specificity of MDCT in the diagnosis of great vessels anomalies that induced airway stenosis and the resulting malacia ?? comparison with tracheobronchoscopy (TBS) considered as gold standard

Material and methods

We studied prospectively 98 pts (range, 5 days to 16 years) with endoscopic diagnosis of airway stenosis related to a vascular compression on airway tree. 40/96 pts affected by tracheobronchial stenosis > 50

Results

MDCT confirmed vascular abnormality in 38/40 pt (95% Sensitivity and specificity of MDCT with VT were 100

Discussion and conclusions

Material-enhanced MDCT with VT showed high sensitivity and specificity for depiction great vessels anomalies and the degree of tracheo-bronchial narrowing.

Conflict of interest

None

27.2 Congenital Lung Lesions and their mimickers

Nishard Abdeen, Hurteau Julie

Purpose - Objective

To describe the imaging appearance of congenital lung lesions and their mimickers

Material and methods

All cases of congenital lung lesions presenting to our department over the course of 1 year were analysed. Lesions which were thought to be congenital lung lesions but proved to represent other pathologies were also included.

Results

Cases included intralobar pulmonary sequestration, CCAM, congenital lobar emphysema, bronchogenic cyst, pulmonary blastoma, tracheal atresia, scimitar syndrome and pulmonary hypoplasia. Mimicking lesions included neuroblastoma, round pneumonia and echinococcal cyst.

Discussion and conclusions

Imaging findings in a wide variety of congenital pulmonary lesions was illustrated.

Conflict of interest

none

27.3 Severe respiratory and neurological presentation of H1N1 in pediatric patients

Pierre Schmit, Dan Hughes, Jo Dooley, Bob Bortolussi

Purpose - Objective

To review cases of pediatric patients with severe clinical presentation in case of proven H1N1 infection

Material and methods

Between late October and late December 2009, 9 patients with H1N1 proven infection (8 by nasopharyngeal aspirates and 1 by bronchial aspirate) were admitted in our institution with dramatic initial clinical presentation. Ages ranged from 4 weeks to 9 years and 7 of the patients were admitted over a 2 week-period

Results

Eight patients had respiratory symptoms. Non specific viral findings were observed on the initial chest X-ray and within a few days more severe changes were observed including pleural effusion (4 pts), pneumatoceles (3 pts), fixed atelectasis with bronchiectasis (2 pts) and extensive air leak (1 pt). Among these 8 patients, intubation was required in 4, pleural chest tube placement in 5. Imaging work-up included CT in 5 cases. One patient had H1N1 related cerebellitis depicted on MRI.

Discussion and conclusions

H1N1 infection can be severe in children

27.4 A new CT scorig system to detecting clinically relevant changes in pediatric patients with cystic fibrosis

Cecilia Lanza, Lucia Amici, Vittoria Galeazzi, Giancarlo Fabrizzi

Purpose - Objective

The aim is demonstrate if a selective CT scoring system based only on bronchiectasis might be sensitive and relevant in following the course of cystic fibrosis (CF) in pediatric patients. Therefore if the worsening in peripheral bronchiectasis is coupled to a change in a true outcome measure (clinical scores).

Material and methods

We studied 45 children and adolescents with CF (mean age 15.7 years). All patients were followed up with biennial HRCT scans . We compared the HRCT findings with modified Shwachman clinical score. The severity of either bronchiectasis was defined, as 1, 2, or 3 , comparing the internal diameter of bronchi with the diameter of an adjacent blood vessel. A modified Shwachman clinical score, based on the clinical parameters present at the time of HRCT evaluations, was performed by a pediatric pulmonologist, and considered ranges were from 20 (severe) to 100 (normal).

Results

Bronchiectasis were demonstrated only up to the fifth generation bronchi in 14 patients, whereas in 23 subjects more distal bronchi also were involved. The right upper lobe appeared as the most common site of involvement for bronchiectasis (85

Discussion and conclusions

The scoring of bronchiectasis was well related to the clinical score. We suggest that a selective scoring based only on bronchiectasis is sensitive and relevant as the more complex CT scoring systems in following the course of disease in patients with CF.

27.5 Chest CT imaging interpretation in young patients with cystic fibrosis (CF): comparison of axial versus spiral HRCT

Irene Maria Borzani, Maria Chiara Russo, Mauro Campoleoni, Nicola Bonelli, Eliseo Ruggeri, Stella Pedilarco, Maria Angela Pavesi, Alessandra Carnevali, Gaetana Rispoli, Aurora Balzani, Pietro Biondetti, Carla Colombo

Purpose - Objective

Our aim was to propose a pictorial review of salient lung abnormalities detected at chest CT images in young pts with CF, describing pearls and pitfalls of axial and spiral CT protocols.

Material and methods

Between January 2007 and December 2009 we performed 51 inspiratory chest CT scans in pts younger than 19 years (mean age 13.5 years, range 6-18 years), followed at the CF Centre of Milan. We used an axial CT protocol on a single-slice CT scanner until February 2009 (31 CT scans) and a spiral acquisition on a 16-slice CT scanner for the examinations obtained in the following period. We compared the appearance of bronchiectasis, mucus plugging, bronchial wall thickening, nodules, consolidations, bullae and mosaic perfusion on the examinations obtained with the two different modalities in order to describe the technical and interpretation pearls and pitfalls of the two choices, with particular reference to radiation dose.

Results

Both imaging modalities allow good interpretation of pulmonary involvement. Spiral acquisition is better for multiplanar and 3D reconstruction, but radiation dose is higher.

Discussion and conclusions

Spiral CT allows post-processing reconstruction that is not possible with axial acquisition, indicating that clinical information may always be considered in the protocol choice. Radiation dose is lower in axial than in spiral CT, and this is an important limitation, considering the increasing pts survival.

27.6 Congenital cystic pulmonary malformations (CCPM) diagnosed antenatally: imaging and histopathological correlations.

Chantal DURAND, Christian Piolat, Sylvie Lantuejoul, Frédérique Nugues, Sophie Bessaguet, Jean Francois Dyon

Purpose - Objective

To review the imaging and histological features of CCPM detected antenatally in our institution.

Material and methods

57 patients between 1996 and 2008 had CCPM detected prenatally using US and fetal MRI. Post natal imaging included radiograph, US and CT. Patients aged between 2 days and 5 years at the time of surgical resection (mean age: 7months).

Results

Twenty patients had congenital cystic malformations (CCAM), type 1 CCAM (n=7), type 2 CCAM (n=13). Sixteen patients had sequestrations, intra-lobar (n=13), extra-lobar (n=3). Eleven patients had hybrid lesions: CCAM with sequestration. Four patients had bronchogenic cyst. Three patients had congenital focal overinflation, 2 had uncertain histological diagnosis. In CCAM type 1 or 2, antenatal or post natal imaging showed always cystic lesions. In 1 case of CCAM, histology showed aspergillus in cysts and in one case, mucinous cell hyperplasia. In sequestrations, the feeding vessel was always demonstrated on imaging. Extra-lobar sequestrations appeared as lesions of soft-tissue attenuation. In three cases of intra-lobar sequestration, with abnormal systemic vessel at surgery, histology showed normal pulmonary parenchyma. In hybrid lesions, there were no specific imaging findings.

Discussion and conclusions

Must correlate antenatal and postnatal imaging data for a diagnostic approach of CCPM. Hybrid lesions are frequent and imaging features are non specific, but all associated malformations exist. A better correlation of histological and imaging data could improve knowledge of CCPM.

27.7 Anterior Lower Mediastinal Tumors in Infants and Children: CT findings

Shin-Lin Shih, Yi-Fang Chen, Yu-Peng Liu, Fei-Shih Yang

Purpose - Objective

To investigate the CT features of anterior lower mediastinal tumors in infants and children.

Material and methods

Between 2003 and 2008, there were five pediatric patients (4 boys, one girl; mean age, 12 years 10 months; range: 2 months to 18 years) with chest mass obscuring the heart border in chest radiographs. Chest CT scan was performed thereafter. We retrospectively reviewed the image findings in these five patients.

Results

The anterior lower mediastinal tumors in these five patients consisted of Hodgkin's lymphoma, diffuse large B-cell lymphoma, lymphangioma, yolk sac tumor and infantile hemangioendothelioma, all pathologically proven either by surgery or biopsy. The clinical presentations included cough in two patients, right lower chest pain in one, and poor activity in the young infant; one of the patients was asymptomatic. On CT scans, Hodgkin's lymphoma and diffuse large B-cell lymphoma both appeared as a huge soft tissue mass with mixed attenuation and heterogeneously enhancement, extending to right lower hemithorax. Lymphangioma presented as a homogeneous low density mass with marginal enhancement. Yolk sac tumor appeared as an irregular heterogeneously enhancing mass with right pleural effusion. Infantile hemangioendothelioma presented as a homogeneously enhancing mass.

Discussion and conclusions

Precise diagnosis of an anterior lower mediastinal tumor in a child or infant may be made in some cases based on its CT appearance.

Conflict of interest

There is no conflict of interest.

27.8 Multimodality Imaging Evaluation of Pulmonary Vascular Anomalies and Abnormalities in Children

Rachelle Goldfisher, Sanjay Prabhu, Mary P. Mullen, Martha P. Fishman, Edward Lee

Purpose - Objective

Pulmonary vascular anomalies and abnormalities vary widely in their clinical presentation and imaging appearance. Although plain radiographs play an important role in the detection and initial imaging evaluation in children with various pulmonary vascular anomalies and abnormalities, options for additional imaging include echocardiography, conventional angiography, computed tomography, and magnetic resonance imaging.

Material and methods

This pictorial review aims to systematically review: 1) developmental embryology; 2) clinical presentation; and 3) imaging manifestations of various congenital and acquired pulmonary vascular anomalies and abnormalities in children. Anomalies and abnormalities involving the pulmonary arteries include pulmonary agenesis, pulmonary artery hypoplasia, proximal interruption of the pulmonary artery, pulmonary artery sling, pulmonary artery stenosis, pulmonary arteriovenous malformation, pulmonary arterial hypertension and pulmonary embolism. Anomalies and abnormalities of pulmonary veins include anomalous pulmonary venous return, pulmonary vein stenosis, and pulmonary venous varices.

Results

The emphasis in this pictorial review will be on: 1) Indications for advanced imaging and post-processing techniques in CT and MRI (e.g., 2D and 3D imaging) ; 2) comparing advantages and disadvantages of the currently available imaging modalities, and 3) providing systematic approach for classifying and diagnosing various pulmonary vascular anomalies and abnormalities in children.

Discussion and conclusions

Understanding optimal imaging modalities and characteristic imaging appearance of various pulmonary vascular anomalies and abnormalities in children is essential for the accurate diagnosis, which will in turn, result in optimal pediatric patient management.

27.9 Pediatric pulmonary and thoracic aspergillosis

Preeyacha Pacharn, punchama Pacharn, Chantima Rongviriyapanich, Thomas Bryce

Purpose - Objective

To demonstrate pertinent clinical and radiographic features of thoracic involvement of aspergillosis including radiographic differential diagnoses

Material and methods

Aspergillosis is an infection caused by a common soil fungus; *Aspergillus*. This fungus is normally a low pathogenicity, but can cause significant disease in immunocompromised host. Lungs are the most common sites of infection and wide variety of disease can occur. Plain radiographs and CT scans of patients with pulmonary and thoracic aspergillosis will be reviewed.

Results

The following pathologies are illustrated; 1) Allergic bronchopulmonary aspergillosis (ABPA). This is characterized by clinical asthma, blood and sputum eosinophilia and positive immunologic reaction to aspergillus antigen. Central bronchiectasis in patients with asthma is highly suggestive of ABPA. 2) Pulmonary aspergilloma usually occurs in patients with pre-existing cystic lung diseases. The classic radiographic finding is a discrete, round or oval mass in a pulmonary cavity, which moves with gravity. 3) Invasive pulmonary aspergillosis (IPA) which is usually fatal infection in immunosuppressants. Multiple and solitary nodular densities as well as diffuse or focal consolidation have been reported. CT halo sign and CT hypodense signs are suggestive of IPA. 4) Aspergillus osteomyelitis of the thoracic cage in a patient with chronic granulomatous disease.

Discussion and conclusions

-

Conflict of interest

Knowledge of various radiographic findings of pulmonary and thoracic aspergillosis will be helpful in making a correct diagnosis which leads to proper treatment in pediatric patients.

27.10 CT findings of mycoplasma pneumonia in pediatric patients

Jee-Eun Kim, Yoo Jin Kim, Hyung Sik Kim

Purpose - Objective

To retrospectively evaluate the CT findings of mycoplasma pneumonia in pediatric patients.

Material and methods

Thirty one pediatric patients (14 boys, 17 girls) with serologically proven mycoplasma infection underwent chest CT. The mean interval between the clinical symptom and the CT performed was about 19 days. The CT sections were analyzed by two radiologists which included evaluation of main findings, associated findings and late findings of mycoplasma pneumonia. Among the patients who had a follow-up CT, bronchiolitis obliterans was also evaluated.

Results

Among the main findings, air space consolidation was the most common finding, followed by ground glass opacity and nodules. Lymphadenopathy was the most common associated finding. As a late finding, bronchiolitis obliterans were observed in about 6

Discussion and conclusions

CT findings of mycoplasma pneumonia in pediatric patients mostly revealed mixed or air space occupying pattern. Among the mixed pattern, nonsegmental (peribronchial) consolidation was seen in 52

Conflict of interest

No conflict of interest

27.11 Unexpected detection of congenital diaphragmatic hernia (CDH) in childhood

Irene Maria Borzani, Lorena Canazza, Nicola Bonelli, Ernesto Leva, Alessandra Carnevali, Maria Angela Pavesi, Francesco Macchini, Maurizio Torricelli, Pietro Biondetti

Purpose - Objective

Delayed presentation of the CDH in childhood may be associated with abdominal/thoracic symptoms, and sometimes they occur suddenly, with a severe risk of clinical deterioration. Two cases of CDH unexpectedly detected in children are reported.

Material and methods

During 2009, two girls were referred to our emergency department because of acute symptoms related to CDH not detected previously.

Results

Case 1: a 6 years old girl with severe abdominal pain; X-ray and sonography showed evidence of bowel obstruction, and images suggested a gastric volvulus with left diaphragmatic hernia. At surgery, gastric volvulus, and the left diaphragmatic hernia were repaired, and the postoperative clinical course was uneventful. Case 2: a 7 years old girl with pneumonia of the right inferior lobe; chest X-ray showed cranial displacement of the liver. CT scan demonstrated posterior liver herniation and the absence of inferior vena cava with a hypertrophic hemiazygos vein and hepatic veins draining in the right atrium. Surgical correction of the diaphragmatic defect was performed through an abdominal approach, with a very satisfactory post-operative result.

Discussion and conclusions

Radiological examination, even in critical clinical settings, can be of great value in detecting unsuspected CDH occurring later in childhood. Sometimes associated anomalies can be disclosed, and this can give better opportunities in correct surgical planning, thus reducing postoperative complications.

27.12 Acute Respiratory Distress Syndrome in Children: the Early Findings of Chest Radiography

Xinyu Yuan

Purpose - Objective

This study was done to evaluate the early findings of chest radiography of ARDS in children.

Material and methods

100 cases who met the clinical diagnostic criteria established by AECC in 1994 were included in the study. Among them, there were 60 boys and 40 girls, aged from 29days to 14 years (mean aged 4.58 years). The causes of ARDS in the group were pneumonia (58 cases), sepsis (13 cases), toxin (6 cases), trauma (5 cases), inspiration of foreign body (2 cases) and unknown entities (16 cases). Retrospectively, the earliest chest film of each patients was reviewed by two experienced pediatric radiologists independently. Furthermore, the patients were divided into two groups, pulmonary ARDS (ARDSp) and extrapulmonary ARDS (ARDSex), according to the causes of the disease. The findings of chest radiographies in each group were compared by Chi-square (SPSS13.0).

Results

The most common early finding of chest x-ray film in our study was infiltration (85

Discussion and conclusions

The common early appearances of chest radiography of children with ARDS were infiltration, ground glass sign. Different causations would result in different findings on chest films.

27.13 The Radiological Findings and its Clinical Value in Children with Influenza A (H1N1) Infection

Xinyu Yuan, Yang Yang

Purpose - Objective

To assess the value of radiological examination in diagnosis and treatment of Influenza A (H1N1) infection in children.

Material and methods

26 cases from 176 children of confirmed influenza A (H1N1) infection were performed radiological examinations, including head CT scan (6 cases), chest radiography (23 cases), chest CT scan (1 case) and Waters' radiography (1 case). Among them, there were 14 boys and 12 girls, aged from 3 months to 15years (Mean 5.08 years).

Results

All head CT scan (6 cases) were normal and Waters radiography showed thicken mucosa on sinus and paranasus. In 23 cases with chest radiographies, 12 cases (46.15

Discussion and conclusions

Chest radiography is useful in evaluating severity of disease and reducing the mortality

27.14 Left Sided Diaphragmatic Hernia and Life threatening Infusion Thorax following Umbilical Vein Catheterisation in a Premature Baby

Tanja Robl, Erich Sorantin, Doris Zebedin, Michaela Haim

Purpose - Objective

Several complications of umbilical catheterisation are known such as portal venous thrombosis, malposition of the catheter, hepatic laceration to name a few. We report a neonate with a left sided diaphragmatic hernia and life threatening left sided pleural effusion following TRIS (Tris-hydroxymethyl-aminomethane) base therapy using an umbilical vein catheter.

Material and methods

Male, premature baby, Apgar 1/8/9 with antenatal known left side diaphragmatic hernia was delivered by a caesarean section. Umbilical vein catheterisation was performed and fluid, including TRIS, therapy was started. Few hours later severe respiratory distress occurred and on chest x-ray a left sided space occupying pleural effusion could be detected. As a next step sonography was requested.

Results

Ultrasound confirmed left sided pleural effusion causing compression of the left ventricle. Umbilical vein catheter was found in the left portal vein and with a round, 3.0cm hypoechogenic lesion at the tip. Immediately puncture of the left sided pleural effusion relieved respiratory distress. The aspirated fluid showed a glucose concentration of more than 600 mg/

Discussion and conclusions

Several complications of umbilical vein catheterisation as well as TRIS-infusion are known. We report a rare complication in a premature baby with left sided diaphragmal hernia, where the intrahepatic tip of an umbilical vein catheter used for fluid therapy including TRIS lead to a life threatening infusion thorax.

27.15 Idiopathic spontaneous pneumomediastinum in childhood

hanna schulman, Yakov Levy, Baruch Yerushalmi

Purpose - Objective

Spontaneous pneumomediastinum (SPM) in children is a rare benign pathology, seen most commonly in asthmatics, while males are more frequently affected. The purpose of this study is to highlight an uncommon etiology of acute chest pain in childhood and to provide the radiological patterns, including high-resolution CT scan.

Material and methods

We reviewed the chest -x-rays and HRCT of 5 patients presenting in the past 2 years to the emergency room with acute chest pain - all were males between 13 and 16 years. No one had clinical history of asthma or trauma.

Results

The chest-x-ray detected dissection of air in mediastinal structures, soft tissue of the neck and axillae. HRCT of the chest was performed in all patients - no congenital lung pathology like bullous emphysema was detected.

Discussion and conclusions

Idiopathic SPM is a rare benign acute pathology in children - caused by rupture of marginal alveoles and spread of air into the mediastinum through perivascular and peribronchial fat. Dyspnea, wheezing and chest pain are characteristic. The knowledge of its occurrence and typical appearance are useful in the prompt diagnosis and the supportive care. Full recovery is the rule. Chest HRCT can add to final diagnosis and detect predisposing lung pathology.

27.16 Chest radiographic findings, clinical presentation and immune status in HIV infected children

Vicci du Plessis, Savvas Andronikou, Gabriel Struck, Neil McKerrow, Aisne Stoker

Purpose - Objective

To describe chest radiographic findings in HIV infected children and compare these with clinical presentation and level of immune suppression

Material and methods

Retrospective review of the chest radiographs of 92 consecutive children starting anti-retroviral treatment. Radiographic features were compared with clinical staging (WHO) and level of immune suppression (CD4 percentage).

Results

Clinically, 12

Discussion and conclusions

Parenchymal disease, cardiomegaly (representing HIV-related cardiomyopathy) and air-trapping / bronchial disease (representing chronic lung disease) were prevalent, especially in immune suppressed children. In the out-patient setting, WHO clinical staging and chest radiography do not appear to be reliable for determining the patient's level of immune suppression, and the results of laboratory testing should be awaited before treatment decisions are made regarding initiation of anti-retroviral therapy.

Conflict of interest

Not applicable

27.17 Imaging findings of congenital tuberculosis in four infants

Hiroko Hara, Kikuko Oku, Tatsuo Kohno, Gen Nishimura, Ehiichi Kohda

Purpose - Objective

Congenital tuberculosis is extremely rare and is most often secondary to hematogeneous spread across the placenta or from contaminated amniotic fluid during pregnancy. Early diagnosis of tuberculosis in infants is important, as maternal tuberculosis usually confirmed after infants Objective: To describe radiographic findings of congenital tuberculosis in infants.

Material and methods

Chest radiographs, and CT of four infants with congenital tuberculosis were reviewed retrospectively. CT was available in three. Respiratory symptoms started in three on day 25-34, and hepatosplenomegaly in one. The tuberculosis was proved by culture in two. Other two were diagnosed by positive tuberculin skin test on day 38, 55 and imaging findings. Maternal tuberculosis in four was diagnosed following infants.

Results

In two, chest radiographs revealed air-space consolidation, infiltration and nodular opacities, resembling pneumonia, which have deteriorated before antituberculosis drugs. In other one, chest radiograph and CT demonstrated a small pulmonary nodule and mediastinal, and hilar lymphadenopathies. Initial chest radiograph showed diffuse small nodules in another one, representing military tuberculosis. In latter two cases, abdominal CT showed small hepatic hypodense lesion, calcification, and multiple lymphadenopathies in the hepatic hilum and retroperitoneum, representing hematogenous spread.

Discussion and conclusions

Imaging findings of chest radiograph and CT could be useful in diagnosis of congenital tuberculosis in infants, in combination with abdominal CT, clinical course and tuberculin test.

27.18 Imaging investigation of congenital chylothorax presented in two newborns

Maria Tsimara, Aspasia Rigopoulou, Irini Tsota, Athina Chrysanthopoulou, Eleni Konstantatou, Ioannis Paraskevopoulos

Purpose - Objective

Chylothorax is a chylous pleural effusion, usually unilateral, due to a structural defect in the developing lymphatic system. The pathogenesis includes congenital absence of the thoracic duct, obstruction of the bronhomediastinal trunks to the venous system and congenital pulmonary lymphangiectasia.

Material and methods

Two newborn infants(a boy,GA: 37w & a girl,GA:35w).

Results

Both infants were intubated because of respiratory distress.The karyotype was normal. The Rx thorax and US examination revealed pleural effusion,LT- sided in the boy and RT-sided in the girl.Thoracocentesis was performed.The liquid was straw-colored ,opaque with cells 4180/mm3 (96

Discussion and conclusions

Chylothorax or primary fetal hydrothorax (FHT), is the most frequent cause of pleural effusions in the newborn (60

27.19 Use of ultrasonography for the diagnosis of pneumothorax in the neonatal intensive care unit

Rémi Pasquali, Véronique Brévaut-Malaty, Anas Shuaib, Kathia Chaumoitre, Michel Panuel

Purpose - Objective

To determine whether ultrasonography (US) can allow a confident diagnosis of pneumothorax in newborns. US has proven its value to diagnose pneumothorax in the adult practice and reducing to the minimum the number of chest X-rays in newborns is now the rule.

Material and methods

In this prospective study, thirty newborns (median gestational age 40 w, median birthweight 3450 g) with mild to moderate respiratory distress were included. Twenty had a pneumothorax (three bilateral) and the remaining cases had another cause of respiratory distress. They were explored by chest X-ray; in four cases, additional film was needed to ascertain the diagnosis of pneumothorax. Within the four following hours, chest-US was performed by two radiologists (senior staff and resident) without knowledge of the radiological diagnosis. The formerly reported US signs of pneumothorax were evaluated.

Results

The concordance between US performed by the senior staff and X-ray examination was 100

Discussion and conclusions

The ultrasonographic diagnosis of pneumothorax is easy to perform in the neonate. US may avoid the need of additional film in the setting of equivocal radiologic findings of pneumothorax and can be used for the follow-up

28 Scientific session 6: Cardiovascular

28.1 Umbilical venous catheter position evaluation by an ultrasound

Natalia Simanovsky, Katya Rozovsky, Nurith Hiller, Noa Ofek

Purpose - Objective

Umbilical venous catheter (UVC) insertion is very frequent procedure in a critically ill neonate. Catheter position is usually evaluated by an abdominal x-ray. However, the exact position of the catheter can be difficult to assess based on the supine film alone. Our purpose was to determine if ultrasound is reliable for precise evaluation of the catheter's tip position, and can replace the plain film.

Material and methods

We prospectively evaluated UVC position in 67 babies in the neonatal intensive care unit by US and compared it to the x-ray that is routinely used for this purpose. There were 33 girls and 34 boys, aged 1 to 5 days, mean weight 1460 gram, mean gestational age 30 weeks. Distance from the catheter's tip to the diaphragm was measured by US and on the plain film. Exact catheter anatomical location on US was recorded.

Results

In 33 patients no difference in the distance between the catheter tip to the diaphragm was seen between the two modalities. In 31 babies the difference varied from 1 mm to 7 mm, mean 2.2 mm. US correctly identified malposition of the catheter in 3 cases.

Discussion and conclusions

Our study suggests that US is reliable for the identification of the UVC position and can replace plain x-ray, thus lessening radiation exposure and preventing complications.

28.2 Pericardial Effusions in Adolescent Girls with Anorexia Nervosa. Clinical course and risk factors

Martine K.F. Dox, Marc Gewillig, Annik Simons, Luc Mertens

Purpose - Objective

Aim: To evaluate cardiac, biochemical and endocrine differences between female adolescents with anorexia nervosa (AN) with and without pericardial effusions.

Material and methods

We studied 128 female adolescents (9.8 - 17.7 years) with anorexia nervosa (AN) diagnosed according to DSM-IV criteria. They all underwent an echocardiographic evaluation.

Results

. In 29 patients (22.2

Discussion and conclusions

Pericardial effusions are common in adolescent AN patients. They are mostly asymptomatic not requiring any intervention and spontaneously regress with refeeding. They are more common in the patients with the most significant weight loss.

28.3 Evaluation of free breathing 3D Steady-State Free-Precession (3D SSFP) sequence for the study of congenital cardiac and thoracic vascular disease: comparison to conventional angiographic MRI sequence (MRA)

Laetitia Maurin, Elodie Carpentier, Laurent Barantin, Jean-Philippe Métais, Dominique Sirinelli

Purpose - Objective

The purpose of this study was to compare operator-independent free breathing 3D SSFP and conventional MRA.

Material and methods

Fifty patients aged from 1 month to 48 years old (median 15 years), with various cardiac and thoracic vascular disease were explored with 3D SSFP sequence in addition to MRA. All the acquisitions were performed on a 1.5T imaging system with dedicated cardiac coil without any sedation. Two readers evaluated both datasets for findings (from 0: not visualized to 3: excellent definition) of 28 vascular segments (including main systemic and pulmonary arteries and veins, coronaries and interventricular and interauricular septum).

Results

The comparison between the 2 sequences for each segment by the Wilcoxon test did not show any significant difference for the study of the pulmonary arteries and veins, the aorta and the supra aortic branches. A significant difference was found in the analysis of coronary arteries, the systemic venous return, and the continuity of the cardiac septum. In each case, this difference was in favour of the 3D SSFP sequence

Discussion and conclusions

The 3D SSFP sequence in free breathing results in images of sufficient quality for the study of cardiac and thoracic vascular malformations. Concerning the coronary arteries, the systemic venous return and the continuity of the cardiac septum, our study suggests that this sequence could be more accurate than conventional MRA.

28.4 Basal plane selection at cardiac MRI – Influence on heart Volumetry and cardiac Performance Parameters

Erich Sorantin, Robert Marterer, Katharina Murg, Bert Nagel, Tanja Robl, Harald Mangge

Purpose - Objective

Cardiac Magnetic Resonance Imaging (cMRI) represents the gold standard in follow-up of congenital heart disease (CDH). Selection of the appropriate heart basal plane (HBP) represents a crucial step in the process and less is known of its influence on cardiac performance markers (cPM). Therefore this paper was targeted to assess the influence of HBP selection.

Material and methods

26 CDH patients underwent cMRI, where an excellent correlation between ventricular stroke volumes and VENC Imaging based flow measurements of the great arteries was found. Original selection of the HBP and the corresponding cPM served as reference values. Afterwards HBP was varied in both ventricles for the systolic and diastolic phase by one slice and biventricular stroke volumes and ejection fraction (EF) were calculated.

Results

Each variation of HBP caused a significant change in the affected heart parameters ($p < 0.001$). The mean difference in left ventricular (LV) ejection fraction (EF) was 9.1

Discussion and conclusions

At cMRI variation of one slice for HBP selection changes statistically significant cPM in CDH - thus biasing cPM. This effect is more striking for the right ventricle than for the left one.

28.5 Right Branch Bundle Block at cardiac MRI – Influence on Heart Volumetry and cardiac Performance Parameters

Robert Marterer, Erich Sorantin, Katharina Murg, Bert Nagel, Tanja Robl

Purpose - Objective

Cardiac Magnetic Resonance Imaging (cMRI) represents the gold standard in follow-up of congenital heart defects (CHD), where a right bundle branch block (RBBB) exists in up to 80

Material and methods

18 patients with CHD and RBBB underwent cMRI. The original analysis, taking in account the later RV contraction due to RBBB, the corresponding SV (absolute and normalized to body surface area) and EF served as reference values. A second analysis was performed assuming that the right ventricle contracts at the same time as the left one and SV and EF were calculated again. Because the diastolic phase did not change, EDV did not change.

Results

A significant decrease (2.5

Discussion and conclusions

Results confirm that biventricular asynchronous contraction due to RBBB should be obeyed at cMRI based volumetry, otherwise significant underscoring of RV performance will be the consequence.

28.6 The role brain MRI in a complex pre-surgery examination of newborns with TGA: terms and conditions.

Yevgeniya Yershova, Tetyana Yalynska, Andrey Maximenko, Illya Yemets

Purpose - Objective

To present MRI findings of the brain in newborns with TGA soon after birth. To connect these brain alterations with the level and duration of the global hypoxemia on pre-surgery.

Material and methods

28 term newborns with TGA underwent brain MRI with DWI on a 1.5 T system after birth at different age before arterial switch operation (ASO), average age was 6,4days (range 1-10). The preoperative SaO2 was measured.

Results

15/28 (54

Discussion and conclusions

The high percent of brain lesions has been registered in neonates with TGA before ASO. WMI is dominated, greatly depended on brain immaturity in term neonates with TGA, the level and duration of the global hypoxemia on pre-surgery. This data can affect on the time of the cardiosurgery TGA: to reduce time to ASO before lesions happen or postpone ASO if it has been find.

28.7 Free Breathing Fast 3D Cine Steady-State Free Precession Imaging for Assessment of Ventricular Function in Pediatric Patients

lorna browne, Raj Krishnamurthy, Timothy Slesnick, Michael Taylor

Purpose - Objective

To compare free breathing k-t space broad-use linear acquisition speed-up technique (k-t BLAST) accelerated 3D MRI with free-breathing 2D cine steady state free precession (SSFP) imaging in the quantitative evaluation of biventricular function in sedated pediatric patients.

Material and methods

The function of 6 sedated patients (mean age 58 months) was evaluated using a 3D k-t BLAST (acceleration factor of 4) and a conventional 2D SSFP sequence. Ventricular volumes, ejection fractions, and LV mass were calculated with each method.

Results

Both techniques produced similar estimates of ejection fraction. No statistically significant differences were found in calculated volumes, ejection fraction, or LV mass between the two methods. Acquisition time was reduced by approximately 75

Discussion and conclusions

Free breathing 3-D imaging with k-t BLAST techniques can reduce acquisition time and can provide left and right ventricular function quantification comparable to that obtained with free breathing 2D SSFP imaging in sedated pediatric patients.

29 CT Dose Task Force

30 Scientific session 7: Chest

30.1 CT of congenital lung abnormalities - 9 year experience.

Shaheen Dixon, Edward Hannon, Kaye Platt, Subhasis Chakraborty

Purpose - Objective

Comparison of accuracy of diagnosis by CT scan with the surgical and histopathological findings of all antenatally suspected or symptomatic congenital lung abnormalities in children presenting to the Children's Hospital in Oxford over a period of 9 years who went on to have definitive surgery or embolisation.

Material and methods

Retrospective study of our database from July 2000 to September 2009. All patients had a CT scan and also underwent either surgery or embolisation. A total of 69 patients were identified aged from 1 day to 96 months at the time of the CT scan. Two consultant radiologists retrospectively reviewed the CT scans. Sixty-eight patients had surgical resection and one angiographic embolisation. Surgical and histopathological correlation was obtained for 68 patients. Comparison was made of the accuracy of diagnosis on CT scan to the surgical and histopathological findings.

Results

Of 69 patients, there were 34 congenital cystic adenomatoid malformation (CCAM), 19 hybrid lesions (mixed CCAM - sequestration) , 8 Sequestrations, 3 congenital lobar overinflation and 5 other lesions. The accuracy of CT in both diagnosis and detection of abnormal arterial supply and venous drainage were greatly improved following a change in CT protocol.

Discussion and conclusions

We demonstrated that good CT technique when imaging congenital lung lesions results in increased correlativity with surgical and histopathological findings and is also essential to identify aberrant systemic blood vessels.

Conflict of interest

None

30.2 Cross-sectional study on tracheomegaly in children following fetal tracheal occlusion because of severe congenital diaphragmatic hernia

Luc Breysem, Anne Debeer, Filip Claus, Marijke Proesmans, Frederik Dekeyzer, Paul Lewi, Karel Allegaert, Maria-Helena Smet, Jan Deprest

Purpose - Objective

To measure tracheal dimensions in children with congenital diaphragmatic hernia some of them following fetal tracheal occlusion (FETO: n=7; no-FETO: n=16).

Material and methods

Measurements were obtained with CT (age range: 1month-6.5years). Of each parameter, relative difference between two levels was compared between both groups (Mann-Whitney U-test). Regression statistics were applied to maximal and mean tracheal areas versus age. To localize the level of tracheal dilatation, mean areas normalized to 3-years of age were analyzed for each quartile of its position relative to the trachea length (student-t test) and plotted as a function of the latter, for both groups.

Results

Tracheal width, area and perimeter were significantly different. For FETO, a quadratic relation was observed between maximal and mean tracheal areas versus age (resp.R²=0.87,P=0.016 and R²=0.94,P=0.0035) versus a linear relation for no-FETO (resp.R²=0.66, P=0.0001 and R²=0.66, P= 0.0001). Maximal tracheal area in FETO/no-FETO tended to decrease towards the age of 5 years. Significant different mean tracheal areas per tracheal quartile (and normalized for age 3-yr) (p<0.05) were found for all quartiles of the trachea, except for the first.

Discussion and conclusions

We demonstrate a tracheal dilatation in FETO and measurements indicate that this tracheal dilatation is absent in the proximal and maximal in the third quarter. The relative dilatation following FETO tends to level towards the age of 5 years.

Conflict of interest

No conflict of interest

30.3 Chest radiograph and computed tomography evaluation of lung parenchyma and airway abnormalities in pediatric patients with laryngeal cleft.

Jennifer Williams, Edward Lee, Alicia Casey, Carlo Buonomo, Reza Rahbar

Purpose - Objective

Laryngeal cleft (LC) can result in recurrent pulmonary disease, and potentially permanent lung damage. The purpose of this study was to (1) evaluate chest radiographic (CR) findings in patients with surgically confirmed LC and (2) determine if computed tomography (CT) provided additional information over CR in evaluating LC.

Material and methods

Two pediatric radiologists performed a retrospective review of CRs, and CTs in 82 patients with known LC. Lung parenchyma was evaluated for pattern (airspace or interstitial), distribution (upper, middle, or lower lung zones), and extent of abnormalities. Sixteen patients (24

Results

Airspace disease was observed in 86

Discussion and conclusions

Among pediatric patients with LC, CR often showed lung parenchyma and airway abnormalities (75

30.4 Comparison of the evolution between CT and lung function tests (LFT) in the follow up of Primary Ciliary Dyskinesia (PCD) patients

Marie Lémyer Magnin, Pierrick Cros, Malika Mahloul, Sylvain Blanchon, Aline Tamalet, Hubert Ducou le Pointe

Purpose - Objective

Correlation between LFT and radiological abnormalities has been previously evaluated in PCD patients. Our aim was to compare functional and radiological long-term evolution of the disease.

Material and methods

A retrospective single-center study was conducted. LFT and chest CT data were collected of 20 patients followed up during at least 10 years for a PCD in a Reference Center for Pediatric Rare Respiratory Diseases. A simplified Brody score composite was elaborated in order to study CT evolution. CT score and LFT evolution were then compared

Results

During the follow up bronchiectasis and peribronchial thickening were present in all cases, pulmonary hyperinflation in 95

Discussion and conclusions

Because significant correlation between CT score and LFT evolution, LFT seems sufficient for following the disease's evolution. These results suggest reducing CT scan frequency in PCD patients. We suggest performing a CT scan every 5 years in the absence of any particular event.

30.5 Aortopulmonary collateral blood flow in cystic fibrosis assessed by phase-contrast MRI

Joshua Knowlton, Rhonda Vandyke, Rupa Radhakrishnan, Raouf Amin, Gary McPhail, Robert Fleck

Purpose - Objective

Cystic fibrosis (CF) is a common genetic disease in Caucasians. Chronic pulmonary disease and progressive destruction of the pulmonary parenchyma are one of the major morbidities. The purpose of this study is to measure changes in aortopulmonary collateral blood flow by phase-contrast MRI and correlate this with the degree of pulmonary disease as assessed by FEV1

Material and methods

16 CF patients and 31 normal patients without intracardiac shunting were evaluated. FEV1p was obtained from a clinical database. Phase-contrast flow was measured at the ascending aorta, main pulmonary, and both pulmonary arteries. Aortopulmonary collateral blood flow was calculated for each group. The relationship between flow and FEV1p was modeled using nonparametric regression. Group differences were assessed using t-tests.

Results

FEV1p ranged from 40

Discussion and conclusions

Phase-contrast MRI suggests a relationship between the FEV1 and aortopulmonary collateral blood flow that is dependent on the severity of the pulmonary disease. The degree of aortopulmonary blood flow could prove to be an independent predictor of morbidity and mortality in CF patients.

30.6 Idiopathic pulmonary haemosiderosis and concomitant coeliac disease.

Paul Jaffray, E. Christine Wallace, Sjirk J. Westra

Purpose - Objective

To illustrate an association between idiopathic pulmonary haemosiderosis (IPH), a severe, life-threatening condition, and coeliac disease.

Material and methods

The clinical presentation and imaging findings in three children with IPH were reviewed.

Results

Two previously healthy children presented with dyspnoea and haemoptysis, both requiring intensive care admission. The third patient with known coeliac disease was diet non-compliant, and developed identical symptoms. Chest radiography demonstrated varying degrees of consolidation, with chest CT showing mixed ground-glass and consolidative opacities, consistent with alveolar haemorrhage. Haemoglobin values (as low as 4g/dl) and bronchoscopy confirmed alveolar haemorrhage with haemosiderin-laden macrophages identified in lavage washings. A literature review found striking similarity to a few single case reports, leading to the consideration and diagnosis of coeliac disease by endoscopic biopsy and/or serum antibody levels. Intervals of one and eight years had passed from the time of initial presentation to their diagnosis of coeliac disease, during which time gastrointestinal symptoms were completely absent. One patient developed a coeliac-related cardiomyopathy. Earlier diagnosis could have presented this and spared both patients immunosuppressive therapy (and its potential complications) for their presumed vasculitides. Management of coeliac disease resulted in apparent resolution of IPH in all cases.

Discussion and conclusions

Our case series highlights a rare but important association between IPH and coeliac disease. Adequate management of the intestinal disease, even when asymptomatic, appears to prevent pulmonary haemorrhage.

30.7 Pictures of a pandemic: A pediatric ICU case review series of H1N1 Influenza A.

Anobel Tamrazi, MD/PhD, Mymy Buu, MD, Beverley Newman

Purpose - Objective

Review pulmonary and extra-pulmonary imaging needs and findings of H1N1 infection requiring ICU admission.

Material and methods

Retrospective evaluation of 20 ICU inpatients between 6/09-1/10 with H1N1subtype Influenza A was performed. Age, past medical history, clinical and imaging findings were analyzed.

Results

Age range was 10m-16 yrs (mean 6.8 yrs). PMH included: healthy (4), cardiac disease (3), chronic pulmonary disease (7), immunocompromised (6), DM (1). All had acute respiratory symptoms, CXR findings upon admission included: clear lungs (2), peribronchial thickening (2), patchy opacities (6), consolidation (lobar 3, multifocal 6, diffuse 1), effusion (4), pneumothorax (2), pneumomediastinum (3), and pneumopericardium (1). Subsequent complications included: ARDS (4) and cystic changes (4). Cardiopulmonary supportive care included: intubation (11, 2-105 days, mean 25.8), ECMO (2, 7-8 days), and oxygen requirement (18, 2-125 days, mean 25.0). Extra-pulmonary imaging findings included: superinfection (8), medical renal disease (3), hepatocellular dysfunction (3, liver transplant required in one), coagulopathy (5), hemorrhagic pancreatitis (1), bowel wall thickening (2). Imaging studies for these inpatients with zero mortality included: total radiographs (712, n=20), fluoroscopy (12, n=8), ultrasound (54, n=13), CT (24, n=9), MRI (4, n=3).

Discussion and conclusions

A spectrum of pulmonary and extra-pulmonary problems accompanied the H1N1 Influenza A pandemic as it affected children requiring ICU admission. Significant imaging resources were utilized in the care of these children.

Conflict of interest

None.

30.8 Doppler Ultrasonography in Childhood Pulmonary Consolidations: Diagnostic Contribution to Gray Scale Imaging and Prediction of Clinical Outcomes of Pneumonias

Ravza Yilmaz, Ensar Yekeler, Adem Ucar, Ayaz Agayev, Dilek Sahin

Purpose - Objective

Ultrasonography has gained an important role in evaluation of childhood pulmonary opacities abutting mediastinal or costal pleura, especially in younger children. Our aim was to evaluate the role of Doppler ultrasonography in differentiation of pulmonary consolidations and predictive value in clinical outcomes of pneumonias.

Material and methods

102 children with acute pulmonary complaints and pulmonary opacities at chest roentgenogram were investigated by color Doppler sonography. The following parameters were investigated: (1) contribution to gray scale imaging in characterization of pulmonary consolidations, (2) color and spectral flow changes of intercostal and pulmonary arteries in pneumonias, (3) the relationship between arteries flow patterns and pleural effusion types, (4) predictive value of gray scale ultrasound and Doppler ultrasonography in clinical outcomes of pneumonia patients. Twenty healthy children without pulmonary complaints were evaluated for the intercostal arteries.

Results

In 102 children, 83 pneumonic consolidations, 11 atelectases, 5 prominent thymuses, 2 pulmonary sequestrations, and one diffuse pulmonary lymphangiomatosis were diagnosed. Doppler ultrasonography differentiated all atelectases, thymuses, and sequestrations from pneumonic infiltration. Regular-triphasic flow pattern in both intercostal and pulmonary arteries was highly significant for uncomplicated pneumonias. Correlation of intercostal and pulmonary artery Doppler US patterns with mean hospitalization duration was significant.

Discussion and conclusions

Doppler ultrasonography is useful in differentiation of pulmonary consolidations and in prediction of clinical behavior of pneumonic consolidations. Regular-triphasic flow pattern of intercostal and pulmonary arteries is a good prognostic factor for pneumonias.

30.9 The importance of high resolution CT in the diagnosis of pulmonary graft versus host disease after allogeneic bone marrow transplantation - a correlation between lung abnormalities on HRCT and clinical GVHD diagnosis

afshin alavi , vishal jayakar, lucy cook, shefali pandya

Purpose - Objective

Allogeneic BMT is one of the most effective treatments for a variety of haematological and immunological disorders. Stem cell transplantation was pioneered in the Fred Hutchinson Centre in the 1950s and the first successful BMT was performed in 1968.

Unfortunately a number of complications are associated with BMT, affecting all body systems. Pulmonary complications after BMT occur in 25

Material and methods

32 patients with pulmonary symptoms were examined and 83 Pulmonary CTs were performed, from which 66 were after Allogeneic BMT. Then pulmonary abnormalities on HRCT were correlated with the clinical outcomes to verify the correlation with clinical diagnosis of GVHD.

Results

11 patients had acute/chronic GVHD and 19 had pulmonary infection (fungal bacterial and viral) 2 of whom had GVHD. Most of the patients with GVHD especially with lung GVHD had pulmonary abnormalities on HRCT. There was no significant association between clinical GVHD and a specific pathological pattern.

Discussion and conclusions

There is a remarkable association between GVHD and lung abnormalities on HRCT, without particular pathological pattern and this makes HRCT an important complementary tool in the diagnosis of GVHD.

30.10 The Radiological Appearances of Complications of H1N1 Influenza (Swine Flu) Infection in Children

Shilpa Hegde, Amit Maniyar, Anthony Dux

Purpose - Objective

We intend in our presentation to show the variation in radiological features of these complications and their sequelae as well as discussing the lessons that we have learned in the six months since H1N1 first hit the shores of the UK.

Material and methods

Our institution is a paediatric tertiary referral centre with ECMO facilities and has received a number of children of varying age for treatment of complicated H1N1 infection.

Results

There have been 2 fatalities to date, both of whom had underlying premorbid conditions.

Discussion and conclusions

There have been 2 fatalities to date, both of whom had underlying premorbid conditions. The majority of complications were respiratory (mainly with severe pneumonia/ARDS) but other non respiratory complications were also encountered (including CNS and vascular thrombosis). One fairly constant problem has been the severity of lung cavitation which frequently required surgical intervention.

Conflict of interest

There are no conflicts of interest regarding this presentation

31 CT Dose Task Force

32 SFIPP General assembly

33 Scientific session 8: Digestive tract

33.1 Meconium obstruction in extremely-low-birth-weight premature infant: US contribution to diagnosis and management

Magali Saguintaah, Corinne Veyrac, Olivier Prodhomme, Catherine Baud, Alain Couture

Purpose - Objective

to describe the clinical and ultrasonographic aspects of the meconium obstruction syndrome in extreme premature infants, and its management using bedside contrast enema

Material and methods

We retrospectively studied the clinical and sonographic data of 6 extremely-low-birth-weight premature infants (25 to 28 weeks, birth weight < 1000 g) with meconium plug syndrome. A contrast enema was performed in the intensive care unit, using several plain films (2 cases) or sonography guidance with a single film at the end of the procedure (4 cases).

Results

All pregnancies were complicated and delivered with cesarean section. Obstructive symptoms appeared at a variable age (5 to 14 days, 40 days in 1). Ultrasonography always showed a severe microcolon and distal microileon with echogenic or ring-like meconial content. Proximal bowel was always dilated, aperistaltic, with meconial content, and ampullar aspect in 2 cases. The enema was concordant, uncomplicated, successful in 3 cases, unsuccessful in 3 despite several procedures. In the failure group, perforation was discovered peroperatively in 3 with necrosis in 1.

Discussion and conclusions

The meconium obstruction syndrome in extremely-low-birth-weight premature infant involves the distal bowel and shows typical imaging findings, different from the usual meconium plug syndrome. The high perforation risk indicates an early therapeutic enema at bedside, at best with ultrasonographic guidance.

33.2 Contrast Enema Findings in Patients Requiring Re-operation for Hirschsprung Disease(HD)With Surgical Correlation

Kevin Garrett, Steven Kraus, Marc Levitt, Kaveer Chatoorgoon

Purpose - Objective

We describe findings on contrast enema and correlate them with surgical findings at re-operation in patients with poor functional outcome after primary repair for HD.

Material and methods

Patients were identified from colorectal surgery database. At the time of abstract submission, 35 patients had contrast enemas prior to re-operation. Additional patients continue to present for evaluation. The majority had primary repair elsewhere. Patients included were repaired by Duhamel (n=11), Soave (n=21), or Swenson (n=2) technique. One patient had undergone a primary Soave repair and subsequently had a Swenson type reoperation but continued to have poor outcome. One patient's initial surgical repair could not be determined. Images were reviewed by a staff pediatric radiologist and a pediatric radiology fellow.

Results

Findings encountered on contrast enema in these patients include distal stricture/residual narrowed aganglionic segment, dilated/hypomotile distal segment, thickened presacral space due to Soave cuff, dilated Duhamel pouch and partially obstructing twist of the pull-through segment.

Discussion and conclusions

Multiple anatomic and pathologic complications exist leading to poor bowel function in patients after repair of HD. Bowel dysfunction can manifest with either soiling or constipation. Little recent literature exists regarding the radiographic findings in these patients. We had the opportunity to review a substantial series of these patients, describe the contrast enema findings in these difficult cases, and correlate them with operative findings.

Conflict of interest

None

33.3 Midgut malrotation in children with a so-called “normal” duodenojejunal flexure (DJF)

Vivian Tang, Alan Daneman, Oscar Navarro, J Ted Gerstle

Purpose - Objective

To illustrate children with proven midgut malrotation in whom the upper gastrointestinal (UGI) series depicted the DJF in a position that could be interpreted as normal on the anteroposterior (AP) view.

Material and methods

Review of clinical, imaging and surgical findings in 111 children with proven midgut malrotation to determine the frequency in which the DJF appeared normal on the AP view.

Results

We found 7 children (3M/4F; age: 3d-7y; mean age: 16m) with apparently normal DJF position on AP view. Correct diagnosis was made on initial UGI series in 5. Lateral view showed the duodenum was not retroperitoneal and coursed anteriorly in 3, appeared normal in 1, and was not fully outlined in 1. In the latter 2, diagnosis was made on abnormal cecal position in 1 and duodenal obstruction in the other. In the remaining 2, persistent vomiting prompted a repeat UGI series at which time the correct diagnosis was made. Review of the initial UGI series showed an abnormal course of the duodenum on lateral view in both.

Discussion and conclusions

A small but not insignificant proportion of children with midgut malrotation have a DJF which is projected into a normal position on the AP view. Careful assessment of the entire duodenum on both AP and lateral views will help to avoid a false negative interpretation of the UGI series.

33.4 Schatzki ring and eosinophilic esophagitis

Lincoln Diniz, Alexander Towbin

Purpose - Objective

A Schatzki ring is an uncommon finding on esophagram in children. Entities associated with a Schatzki ring include gastroesophageal reflux, hiatal hernia, and eosinophilic esophagitis. The purpose of this study is to evaluate the frequency of the different causes of Schatzki ring in children.

Material and methods

All radiology reports between January 2000 and December 2010 were queried to identify patients with a Schatzki ring. Each upper GI and esophagram identified through the radiology report search was reviewed on PACS to confirm the presence of a Schatzki ring. The patient's electronic medical record was then searched to identify a potential underlying cause of the fluoroscopic finding.

Results

After searching the radiology reports and reviewing the images, there were 40 patients with a Schatzki ring. 14 (35

Discussion and conclusions

Eosinophilic esophagitis and hiatal hernia were the two most common diagnoses associated with a Schatzki ring in this study. Because the imaging findings of eosinophilic esophagitis are nonspecific, endoscopy and biopsy should be considered in all children with Schatzki ring.

33.5 Benign pneumatosis hepatis in children with colitis: Imaging with ultrasound

Andreas Leenen, Joachim Stegmann, Peter Tholen

Purpose - Objective

Pneumatosis is usually seen in premature neonates with necrotising enterocolitis. "Benign pneumatosis hepatis" (BPH) is presence of air in the portal vein or the liver parenchyma in the absence of any serious illness. The aim of this study was to evaluate the sonographic findings of BPH in children with colitis.

Material and methods

We retrospectively reviewed the US findings on 14 patients (seven boys, seven girls; 1 day-4 years, median age 5 months) with pneumatosis hepatis over a period of 3 years. In all examinations a linear high frequency transducer was used including in 4 patients M-Mode of the V. portae. Sonographic findings were correlated with diagnosis, laboratory data and chart review.

Results

Gas bubbles in the hepatic parenchyma were demonstrated in all and floating air bubbles in the V. portae in 5 patients. Pneumatosis intestinalis of the colon was observed in 7 children. Eight out of 14 children (57

Discussion and conclusions

High frequency ultrasound is a very sensitive and specific imaging modality to detect BPH. The knowledge of the pattern of this characteristic finding may help to improve diagnosis. It seems from our series that BPH in uncomplicated colitis is more prevalent than previously thought.

33.6 CT enterography: Inter-reader agreement and diagnostic performance in pediatric inflammatory bowel disease

Daniel Podberesky, John Sullivan, Lee Denson, Shelia Salisbury, Alexander Towbin

Purpose - Objective

To evaluate inter-reader agreement and diagnostic ability of CT enterography (CTE) in pediatric inflammatory bowel disease (IBD) patients when compared to ileocolonoscopy

Material and methods

All CTEs performed at our children's hospital on patients with suspected or known IBD between 10/2008 and 7/2009 were retrospectively and independently reviewed by two pediatric radiologists. Each exam was first evaluated for multiple signs of bowel inflammation. The reviewer then assessed the overall likelihood of active bowel inflammation using a 5-point Likert scale, with a score of 3 or higher considered positive. Cohen's kappa coefficient was calculated to assess inter-reader agreement. A subset of patients who had undergone ileocolonoscopy within 45 days of CTE was used to calculate the sensitivity and specificity of CTE for the detection of terminal ileum (TI) and colon disease.

Results

86 CTEs were reviewed. Cohen's kappa was 0.8713, indicating almost perfect inter-reader reliability. 50 patients who underwent CTE also underwent endoscopy within 45 days of imaging. The sensitivity of CTE compared to ileocolonoscopy for the detection of TI and colon disease was 89.3

Discussion and conclusions

CTE is highly sensitive and specific for the detection of active inflammatory bowel disease in children, with near perfect inter-reader reliability.

Conflict of interest

None

33.7 Prevalence of penetrating and stricturing complications, and extraintestinal manifestations detected by CT enterography in pediatric inflammatory bowel disease patients

Daniel Podberesky, John Sullivan, Shelia Salisbury, Lee Denson, Alexander Towbin

Purpose - Objective

To determine the prevalence of penetrating and stricturing complications, as well as extraintestinal manifestations of inflammatory bowel disease (IBD) diagnosed by CT enterography (CTE) in children

Material and methods

All CTEs performed at our children's hospital on patients with suspected or known IBD between 10/2008 and 11/2009 were retrospectively and independently reviewed by two pediatric radiologists. Each exam was evaluated for the presence of fistulas, abscesses, phlegmons, and strictures, as well as for the presence of extraintestinal manifestations of IBD (gallbladder disease, urolithiasis, fatty liver infiltration, thromboembolic disease, evidence of primary sclerosing cholangitis, and sacroiliitis). The prevalence of each of these findings was calculated.

Results

69 of the 132 total CTE exams (52.3

Discussion and conclusions

Penetrating and stricturing complications, and extraintestinal manifestations are common in pediatric IBD patients. CTE is a valuable imaging modality for the detection of these findings, which may be unsuspected clinically.

Conflict of interest

None

33.8 MRI and MR Enterography Assessment of IBD in pediatric patients

Carla Quijano, Sara Arnold

Purpose - Objective

To describe the imaging technique, findings and challenges of MRI and MR enterography in pediatric patients with suspected or diagnosed IBD.

Material and methods

This retrospective review was approved by the IRB. 21 patients, ages 4 to 19 years, underwent MR, from March 2009 through January 2010. Negative oral contrast was utilized (0.1

Results

22 patients and 24 studies were included in this retrospective review. Of these, 20 had a confirmed diagnosis of Crohn's and 2 patients had suspected IBD. Of the patients with confirmed Crohn's disease, 2 had a negative examination and 18 had diagnostic findings (wall thickening, enhancement, fistula, abscess). Of the 2 patients with suspected IBD, one had mild jejunal wall thickening without significant enhancement, and the second had a negative examination. The challenges encountered in this pediatric population included inability to tolerate oral contrast, limitation related to patient anxiety and prolonged imaging time. The addition of flavoring to oral contrast, mild anxiolysis, and optimization of imaging protocol mitigated these challenges.

Discussion and conclusions

MR imaging in the evaluation of IBD in pediatric patients was successful, however it required age appropriate management considerations.

Conflict of interest

None

33.9 Are the biliary trees of children under three months of age visible on MR

Pascale Siles, Audrey Aschero, Bertrand Roquelaure, Catherine Desvignes, Nathalie Colavolpe, Alix Ruocco, Guillaume Gorincour, Brigitte Bourlière-Najean, Philippe Devred, Philippe Petit

Purpose - Objective

To assess the visibility of the bile ducts of children, without biliopancreatic pathology, of less than 3 months of corrected age.

Material and methods

We designed a prospective study. MR cholangiopancreatography was performed on 13 children who were referred for brain MRI (mean age 38.8 days from 38 weeks and 3 days corrected age to 85 days). 3D bili-IRM were acquired with 0.4mm thick slices and reconstructed on Maximum Intensity Projection. Four patients were explored during general anesthesia.

Results

Due to motion artifacts no biliary structure was identified on 1 child 31 day-old. On 1 child only the gallbladder was visible. In 2 others children only the common bile duct and common hepatic duct were visible. In the 9 others, the whole external biliary tree and the biliary bifurcation were seen. The overall frequency of visualization of the biliary tree convergence was then 69

Discussion and conclusions

On this ongoing series, high technical bili MR was not able to visualize systematically intra and extra hepatic ducts in all our hepatic disease free population.

33.10 Prevalence of Hepatic Pseudolesion Around the Falciform Ligament in Pediatric Age Group Evaluated by Portal-Dominant Phase Multidetector Computed Tomography (MDCT)

Dilek Sahin, Mesut Bulakci, Selim Bakan, Ravza Yilmaz, aghakishi Yahyayev, Adem Ucar, Ensar Yekeler

Purpose - Objective

The goal of our study was to determine in the pediatric age group the prevalence of hypoattenuating hepatic pseudolesions around the falciform ligament and concomitant presence of aberrant venous structures (inferior veins of Sappey) on portal-dominant phase multidetector computed tomography (MDCT).

Material and methods

Portal-dominant phase abdominal MDCT examinations of 320 patients were retrospectively analyzed for the presence of a pseudolesion around the falciform ligament. Reconstructed MDCT images were investigated for the presence of aberrant venous structures and the longest diameter of the pseudolesions.

Results

Pseudolesions around the falciform ligament were detected in 63 patients (19

Discussion and conclusions

Hepatic pseudolesions around the falciform ligament are unrarely seen on portal-dominant phase MDCT images in pediatric population. Detection of triangular shape, craniocaudal extension and inferior veins of Sappey might be helpful in excluding true lesions.

Conflict of interest

No conflict of interest.

33.11 Liver MRI with DWI in children with liver disease

sara savelli, marco esposito, antonio ciccarone, giuseppe indolfi, marco resti, claudio fonda

Purpose - Objective

To evaluate the hepatic diffusion (D) and perfusion coefficient (F) and fraction of perfusion (f) in pediatric patients with liver disease.

Material and methods

We enrolled 20 pediatric patients (age range 8-19 years, mean 14 years) with liver disease at possible fibrotic evolution scheduled for liver biopsy. Prior to biopsy all the patients underwent clinical examination, laboratory tests for assessment of hepatic function, US with Doppler evaluation and liver MRI. Liver MRI consisted in standard T1 and T2 weighted sequences and diffusion weighted Echo Planar sequences in three diffusion directions: in order to reduce eddy current and movement artifacts diffusion images were obtained turning on positive diffusion gradients firstly and negative diffusion gradients secondly for each diffusion direction, for a total of six global gradients in three directions. Hepatic diffusion and perfusion coefficient and fraction of perfusion were also calculated. The results were correlated with laboratory results and histological findings.

Results

Liver MRI with standard sequences showed an alteration of the signal intensity in only 2 patients; DWI sequences showed a low mean ADC value in 11 patients. 8/11 patients with low mean liver ADC value had also fibrotic changes at biopsy.

Discussion and conclusions

Our results highlight the possibility to detect hepatic fibrotic changes in patients with liver diseases by means of DWI, earlier than with standard T1 and T2 sequences.

Conflict of interest

NONE

33.12 Evaluation of liver fibrosis with diffusion weighted image in infants

Mi-Jung Lee, Myung-Joon Kim, Choon-Sik Yoon

Purpose - Objective

The purpose of this study is to evaluate the possibility of liver fibrosis quantification with diffusion weighted image (DWI) in pediatric patients with neonatal cholestasis and normal control.

Material and methods

Institutional review board approved this prospective study and parental informed consents were obtained. DWI was performed during MRCP in patients with neonatal cholestasis. Normal control study was performed during spinal MRI in infants with anorectal malformation and normal liver enzyme profile. A 1.5T scanner was used with b-value = 0, 500, and 1000 s/mm. Liver biopsy was obtained with METAVIR score. The correlation between the fibrosis grade and the apparent diffusion coefficient (ADC) value of the liver was evaluated.

Results

Thirty two infants (male:female = 15:17, age 0-11 months (mean 3.6)) with 21 neonatal cholestasis and 11 normal control were included in this study. The mean ADC value was different between fibrosis grade ($p=0.015$) and correlated with METAVIR score ($r=0.478$, $p=0.006$). There was significant difference in the mean ADC value between the low grade (?1) and high grade (?2) fibrosis (mean: 1.234 vs. 0.964; $p=0.007$). The cut-off point (1.17 x 10⁻³ mm/s) resulted 83.3

Discussion and conclusions

The ADC value is a useful predictor of high grade hepatic fibrosis in pediatric patients with neonatal cholestasis.

Conflict of interest

Nothing to disclose.

33.13 Prognostic significance of Doppler ultrasound measurements in follow-up of children after liver transplantation (LTX)

Jochen Herrmann, Rainer Ganschow, Lutz Fischer, Siegbert Scheibner, Knut Helmke

Purpose - Objective

Doppler ultrasound is a first line tool for monitoring of vascular patency in LTX. The significance of Doppler ultrasound measurements concerning long time prognosis of patients is less well investigated. The aim of the study was to correlate the presence or absence of different flow abnormalities to outcome.

Material and methods

138 pediatric patients with a total of 155 single liver transplantations performed at the University Children's Hospital Hamburg between 01.01.2000 and 31.12.2003. Serial Doppler ultrasound evaluations were performed intra-operatively and regularly at follow-up until 31.12.2007 and prospectively documented. Endpoint of the study was the re-LTX rate.

Results

The re-LTX-rate for the group was 22.6

Discussion and conclusions

In the course after LTX, regular Doppler US measurements indicate organ integrity and are associated to favourable outcome. Hepatic artery thrombosis, prolonged signs of malperfusion, the development of peripheral retrograde portal venous flow and arterial collaterals are negative prognostic factors.

33.14 Long term outcome of portal vein size discrepancy in pediatric liver transplants

Som Mai Lee, Josee Dubois, Amir Khour, Laurent Garel, Francoise Rypens, Chantale lapierre, fernando alvarez

Purpose - Objective

To assess if portal vein size discrepancy implies long term complications.

Material and methods

All liver transplants performed in our hospital between February 1985 and July 2008 were reviewed. Patients with portal vein discrepancy were included in the study. Portal vein discrepancy was defined as follow: post anastomotic diameter minus pre anastomotic diameter equal or superior to 5 mm. The following data were analysed on ultrasound scans: portal vein size pre, post and at the anastomosis, the Doppler spectrum of the portal vein, and the presence of collaterals. The evolution of the spleen size was assessed in correlation with age: splenomegaly refers to a size over 95 percentile for age.

Results

221 liver transplantations were done in that period of time. Eighty-nine files were excluded for incomplete data. Thirty-eight of them presented a portal vein diameter disparity. Thirty two had no progression of the spleen and no complication. Patients were followed for a mean time of 10 years (1-23 y). The mean difference between the post-anastomotic portal vein and the anastomotic was 10.3 mm. 15, 7.8

Discussion and conclusions

Significant spleen progression over the 95 percentile for age is a predictor of complication on the portal system. However, portal vein size discrepancy is not a predictor of poor outcome.

33.15 Congenital portosystemic shunt: complications and outcome after closure: about 19 pediatric cases

Stephanie FRANCHI-ABELLA, Guillaume Thouvenin, Jean Yves Riou, Sophie Branchereau, Daniele Pariente

Purpose - Objective

Congenital PortoSystemic Shunts (CPSS) are rare vascular malformations that can lead to severe cardiopulmonary complications, hepatic tumors and hepatic encephalopathy. Feasibility of their closure is debated and its effects on these complications are not well known. We report a large paediatric series of CPSS after closure.

Material and methods

Between 1999 and 2009, 19 patients (range: neonate to 15 y, medium age 9.5 y) had a closure of CPSS. CPSS consisted of 3 patent ductus venosus, 3 porto-hepatic shunts, 10 side-to-side and 3 end-to-side communications between the portal vein and the IVC. Patients were explored by US, MDCT, abdominal and/or cerebral MRI and angiography with shunt occlusion test. Complications, technique of closure and outcome are described.

Results

The complications associated with the CPSS were hepatic tumors (11), pulmonary arterio-venous shunts (2), pulmonary hypertension (3) and hepatic encephalopathy (3). Closure of the shunt was performed surgically in 11, with interventional radiology in 6 and combined techniques in 2. None developed significant long term portal hypertension. Benign hepatic tumors disappeared in 8 and decreased in 2. Pulmonary shunts disappeared in 1; pulmonary hypertension remained stable in 3. Encephalopathy resolved in all.

Discussion and conclusions

CPSS can be closed whatever its location. Complications secondary to the shunt may resolve or improve after closure except pulmonary hypertension that may only stabilize. Preventive closure of CPSS should be discussed.

33.16 Ultrasonographic evaluation of the free abdominal fluid in asymptomatic children.

Natalia Simanovsky, Nurith Hiller, Natalia Lubashevsky, Katya Rozovsky

Purpose - Objective

Free pelvic fluid could be an important sign in abdominal inflammatory process or in abdominal trauma. It is often present in children with abdominal pain, but it is a non-specific finding. Minimal amount of free pelvic and/or abdominal fluid is considered a normal finding. The purpose of this study was to evaluate the incidence, location, and volume of free fluid in the abdomen and pelvis in a population of asymptomatic children.

Material and methods

We prospectively performed clinically indicated abdominal and pelvic ultrasound in 200 asymptomatic children, using high-resolution transducers. Patients with any remote possibility of having free fluid as a part of the problem that was requiring performance of an US were not included in the study. Fluid volume was measured when fluid was identified.

Results

Free fluid was seen in 12 (6

Discussion and conclusions

Our study suggests that free fluid in other locations than pelvis, and in amounts greater than 1 ml should not be considered physiological and should be investigated according to clinical settings.

33.17 Separation of bowel gas on abdominal radiographs in neonates: sonographic correlation

Cicero Torres Silva, Alan Daneman, Oscar Navarro, Rahim Moineddin, Daniel Levine, Aideen Moore

Purpose - Objective

To determine the causes of bowel gas separation on plain radiographs of the abdomen in neonates.

Material and methods

We prospectively evaluated the abdomen with ultrasound in 75 neonates (gestational age 23-40 weeks) within three hours of having an abdominal radiograph for various indications. We assessed the bowel to determine whether there was bowel wall thickening and whether the loops were gas-filled, fluid-filled or collapsed. We also evaluated for free intraperitoneal fluid and focal fluid collections.

Results

Separation of bowel loops was noted on the abdominal radiograph in 30 neonates: 19 had NEC, 4 ileus, 2 sepsis, 3 had previous bowel obstruction and 2 had no bowel abnormality documented. On sonography the cause for the separation was due to one or a combination of the following features: collapsed bowel in 21, fluid-filled bowel in 19, free peritoneal fluid in 16, and bowel wall thickening in 4.

Discussion and conclusions

Separation of bowel gas is a common finding on abdominal radiographs in neonates. Several causes alone or in combination may result in this finding. The common causes include collapsed bowel, fluid-filled bowel or free peritoneal fluid between the gas-filled loops of bowel. Bowel wall thickening is much less common. Sonography is extremely useful to differentiate the causes of nonspecific separation of gas-filled loops of bowel on abdominal radiographs.

34 Hip dysplasia Task force

35 Coffee break

36 Posters Digestive tract

36.1 Evaluation of disease activity in idiopathic inflammatory small bowel disease: MR imaging.

MASSIMO BASILE, TASCIOTTI LAURA, claudio fonda

Purpose - Objective

To evaluate disease activity in children affected by idiopathic inflammatory bowel disease (IBD) with MR imaging.

Material and methods

Included in the study were 16 children (age range 7-16 years) with suspected or known IBD. Of these 12 have Crohn disease (CD) and 4 indeterminate colitis. All patients were imaged on a 1.5-T MR scanner (Philips, Achieva, Nova Qasar). Previous oral administration of a water solution containing sorbitol, T1w and T2w sequences followed by a dynamic study using 3D T1w images after intravenous administration of gadolinium, were performed

Results

We have found significant correlation between the grade of enhancement bowel wall and the values of C-reactive protein (CRP) during all phase of dynamic study, but not with the erythrocyte sedimentation rate (ESR).

Discussion and conclusions

Disease activity assessment is important in CD for the evaluation of relapse and response to therapy. In our experience, the MR examination is well tolerated imaging technique in children permitting assessment of disease extent, activity and extraluminal manifestations without the use of ionizing radiation and need of fluoroscopic insertion of an enteral tube.

36.2 Intestinal pneumatosis: a rare complication of GVHD after bone marrow transplantation

daniela sanabor, massimo gregori, natasha maximova, pierpaolo guastalla, floriana zennaro

Purpose - Objective

Acute graft-versus-host disease (GVHD), in which donor lymphoid cells damage host tissues, is a serious complication during the first 100 days after allogeneic bone marrow transplantation. The incidence is about 30-70

Material and methods

Young boy affected by Acute Myelogenous Leukaemia (AML) underwent allogeneic bone marrow transplantation (matched sibling donor) because of unsuccessful conventional chemotherapy. Post-transplantation serious intestinal GVHD occurred, probably due to a viral previous infection.

Results

Usual treatment + mesenchymal cells was unsuccessful and a further complication occurred, a cecal extended pneumatosis, revealed by CT scan. Surgery has been discarded as too dangerous while TNFalfa therapy has been started, with very good results. Actually the boy is in good health and is being treated with ciclosporin e thalidomide for AML; no more signs of intestinal pneumatosis.

Discussion and conclusions

we describe a rare further complication on intestinal GVHD, which is a transplantation complication. CT scan is a useful tool in diagnosis of this pathology. Usually surgery is the first indication in intestinal pneumatosis, but in pneumatosis as complication of refractory GVH multiorgan medical treatment seems to be the best choice.

36.3 Chronic Gastric Volvulus (CGV) In Infants: An Insidious Diagnosis

Valeria Bolli, Cecilia Lanza, Manuela De Vivo, Giovanni Pieroni, Vittoria Galeazzi, Lucia Amici, Maria Clementina Pupillo, Carmine Noviello, Benedetta Fabrizzi, Giancarlo Fabrizzi

Purpose - Objective

AIM: acute gastric volvulus is a rare event in paediatric age; the chronic gastric entity, more common in newborns, is being diagnosed with increasing frequency because of liberal use of upper gastrointestinal (UGI) series in patients with repeated non biliary vomiting, growth failure or weight loss, respiratory difficulty, recurrent chest infections. The diagnosis is mainly based on UGI. Misinterpretation of imaging can delay the diagnosis. The aim of this work is to asses the incidence of CGV in symptomatic infants.

Material and methods

METHODS: from January 2008 to December 2009 87 symptomatic patients underwent a UGI (mean age 24 weeks, range 4-52 weeks).

Results

RESULTS: the diagnosis of CGV was made in 21 patients; 5 of these underwent surgical treatment because of the severity of symptoms. The remaining patients underwent postural and dietetic therapy.

Discussion and conclusions

CONCLUSIONS: chronic gastric volvulus is more common in newborns than in older children; it is classified according to the plane of rotation: in the organoaxial entity the stomach rotates on its long axis; in the mesenterioaxial entity the rotation is on its short axis. The aetiology may be primary, when there is laxity or absence of the stomach's attachments, or secondary to anatomic defects, as diaphragmatic hernia, asplenia. The diagnosis can be made by contrast examination, but sometimes is difficult to recognize this entity. Delayed diagnoses cause clinical complications.

36.4 Imaging features of non-hematological splenic lesions in infants and children

Giovanni Pieroni, Cecilia Lanza, valeria bolli, Giancarlo Fabrizzi

Purpose - Objective

Aim of the study is present briefly the ultrasound, MRI and/or CT imaging spectrum of non-haematological lesions occurring in the spleen and discuss differential diagnosis and nosological status of selected lesions.

Material and methods

We reviewed records of 16 imaging benign splenic lesions in pediatric patients, including two hamartomas, two lymphangiomas, four solitary cysts, tree splenic infarcts, one splenomegaly by leishmaniasis and four hemangiomas.

Results

The imaging appearance of splenic hemangiomas may be complex, echogenic solid or complex cystic mass, and differentiation of these lesions from malignant disease may not be possible. The diagnosis of splenic hamartoma may be suggested when findings of increased blood flow on color Doppler images are seen in association with a homogeneous solid echogenic mass. A large subcapsular solitary cystic abnormality discovered incidentally in a child in association with internal septations and tiny mural nodules favors the diagnosis of lymphangioma. Splenic infarcts may be seen with localized processes such as portal hypertension or pancreatitis, or may arise from an embolic source.

Discussion and conclusions

Although solitary splenic lesions are uncommon, their importance lies in that they must be differentiated from the more common neoplastic disorders of the spleen, such as lymphoma and metastasis.

36.5 Paediatric Liver MRI: a pictorial review.

Nasim Tahir, Helen Woodley

Purpose - Objective

Magnetic resonance imaging (MRI) is a non-invasive and effective imaging tool in the evaluation of liver disease in children. The lack of ionizing radiation and excellent tissue characterisation makes it an attractive imaging technique. The purpose of this educational exhibit is:

To discuss optimisation of imaging protocols, parameters and contrast agents in the paediatric population. To discuss the role of MRI in the diagnosis and follow up of paediatric liver disease. To provide a pictorial review of a selection of liver diseases in childhood.

Material and methods

Leeds Teaching Hospitals Trust is a supraregional centre for paediatric hepatology, hepatobiliary surgery and liver transplantation. Consequently there is a large through-put of patients with liver disease (approximately 2500 attendances per annum) many of whom will have MRI in the management and investigation of their liver disease. A prospectively maintained database identifies suitable cases for this exhibit.

Results

The application of MRI in paediatric liver disease will be presented along with a discussion of imaging sequences and a pictorial review.

Discussion and conclusions

This exhibit discusses the technique and use of MRI in paediatric liver disease leading to a better understanding of disease processes which help to optimise patient management and follow up without the use of ionizing radiation. A pictorial review illustrates a variety of congenital and acquired conditions including benign and malignant disease.

36.6 Cholangitis as the presenting symptom of autosomal recessive polycystic kidney disease (ARPKD)

Laurent Garel, Francoise Rypens, Josee Dubois

Purpose - Objective

To outline 3 cases of ARPKD who presented clinically with fever of unknown origin (FUO) related to biliary sepsis as the initial symptom of the disease.

Material and methods

Case 1: A 10 y.o. male presented with general malaise, FUO, and diarrhea after vacation in the Dominican Republic. He was investigated by US, CT, and MRI. Case 2: An 18 mo. infant underwent US and MRI for FUO of several weeks duration. Case 3: A 2 y.o. without past medical history was investigated by US, CT, and MRI because of FUO.

Results

All 3 cases displayed coexisting hepatic and renal lesions of variable degree. Case 1: severe hepatomegaly, discrete renal findings; Cases 2 and 3: characteristic biliary and renal abnormalities. Subsequent liver biopsy grew *Salmonella* in Case 1, *E. coli* in Cases 2 and 3. Antibiotherapy was effective in the 3 cases to treat the biliary infection.

Discussion and conclusions

Biliary sepsis can be the presenting symptom in ARPKD, and can be lethal. US and MRI are diagnostic of ARPKD. Liver biopsy must be performed rapidly in these patients presenting with cholangitis to identify the bacteria and guide therapy.

36.7 Focal nodular hyperplasia in children

Alexander Towbin, Guangju Luo, Hong Yin, Jun Mo

Purpose - Objective

Focal nodular hyperplasia (FNH) is a benign hepatic tumor that is rare in children. In order to understand if there are differences in the etiology or appearance of FNH in children, we analyzed the clinical information and imaging of pathologically proven cases.

Material and methods

A pathology database was used to identify all cases of FNH diagnosed at our institution. The patient's cross-sectional imaging was evaluated for the characteristics and number of FNH lesions. Clinical information was obtained on each patient via a search of the medical records.

Results

Twelve patients with FNH were identified (7M/5F, mean age 12.7 years, range 1-21 years). Six patients (5M/1F) had a remote history of malignancy in childhood. All of these patients had received chemotherapy. In addition, one patient received radiation therapy and three patients received a hematopoietic stem cell transplant. The time interval between the diagnosis of malignancy and FNH ranged from 7-18 years (mean 12.6 years). On imaging, all six cancer survivors had multiple liver lesions. In the remaining six patients (2M/4F) there was no history of malignancy and each of these patients had a solitary FNH.

Discussion and conclusions

Half of the children with FNH in this study were long-term cancer survivors and each of these patients had multiple masses. Recognizing the features of FNH in these patients will aid in diagnosis and appropriate management.

36.8 The utility of balloon catheter inflation in Fluoroscopic Loopograms

James Carmichel1, Kieran McHugh

Purpose - Objective

To assess the use of balloon inflation technique in fluoroscopic loopograms in terms of study quality and complications.

Material and methods

We retrospectively reviewed 263 loopogram studies at GOSH between 2005 and 2010 of which 75 used a balloon inflation technique.

Results

Balloon Loopogram studies were not associated with a higher complication rate.

Discussion and conclusions

The use of intraluminal balloons in the gastro-intestinal tract (GI) tract provokes controversy. We have shown, however, that no inadvertent leak of contrast or other complication occurred in our 75 cases indicating cautious use of an inflated balloon is safe when performing GI loopogram studies in young children. An inflated balloon may allow better loop distension and therefore views of the bowel in question

Conflict of interest

None

36.9 Sonographic findings predicting unsuccessful pneumatic reduction of intussusception

Ildikó Várkonyi , Anna Nyitrai, Éva Kis

Purpose - Objective

Aim of our study is to show sonographic features of intussusception that predict lower success rate of reduction.

Material and methods

Between August 2007 and August 2009 diagnosis of intussusception was made on sonography in 40 children. Abdominal plain radiograph was done as well. Decision for type of treatment was based on clinical, sonographical and radiographical findings. Five children were operated on. In 35 cases pneumatic reduction was attempted, unsuccessfully in 6 cases. Retrospective analysis of sonographic findings in 10 patients (9 boys, 1 girl, aged 6-98 months (median 21 months) with unsuccessful reduction or primary surgical intervention was done.

Results

Free peritoneal fluid was detected in 9/10 patients, bowel wall edema was seen in all. Trapped peritoneal fluid inside of the intussusception was depicted in 6/10 cases. Pathological lead point was suspected on sonography in 5/10 patients and found in 6 cases: 4 patients with Meckel's diverticulum, one with lymph node, and another with duplex bowel duplication. Duplex intussusception was suspected in 2 patients and found at surgery in 3 cases. Bowel obstruction was demonstrated in 5 patients.

Discussion and conclusions

Established contraindications of conservative reduction of intussusception are free abdominal air, peritonitis, shock, sepsis. Based on our results, bowel wall edema, large amount of free abdominal fluid, trapped peritoneal fluid, signs of ileus, suspicion of lead point and duplex intussusception are sonographic predictors for irreducibility.

36.10 Ultrasound of Paediatric Intussusception - 5 years in a tertiary paediatric hospital.

Sara Kernick, Surekha Kumbha

Purpose - Objective

Intussusception in the paediatric population is a common condition easily diagnosed with ultrasound and reduced with air enema. Other pathologies however, can imitate an intussusception on ultrasound and several of these cases are discussed

Material and methods

A 5 year retrospective analysis of ultrasound cases of clinically suspected intussusception at a tertiary paediatric hospital.

Results

500 cases were assessed 60 lymphoma, Crohn's Disease and lymphoma, Crohn's disease or cysts.

Discussion and conclusions

Intussusception is usually readily diagnosed by ultrasound however, other pathologies such as lymphoma and Crohn's disease can imitate true intussusception. Familiarity with the sonographic appearances of intussusception as well as these imitating pathologies is imperative in proper diagnosis and management.

36.11 Spontaneous meso-portal and porto-portal shunts following orthotopic liver transplantation (OLT) in children.

Gregory Vannevel, Renaud Menten, Marie Bitar, Raymond Reding, Philippe Clapuyt

Purpose - Objective

We describe spontaneous shunts between the native veins of the patient and the transplanted liver after portal vein thrombosis.

Material and methods

After OLT, children are regularly followed by liver Doppler-ultrasound. Liver parenchyma, biliary tract, portal vein, hepatic veins and arterial vascularization are systematically checked.

Results

We observed two transplanted children, one with spontaneous meso-portal and one with spontaneous porto-portal bypass after portal vein thrombosis. Distinction from the classical cavernoma can be achieved by their transcapsular situation.

Discussion and conclusions

After OLT, portal vein thrombosis is frequently observed. Cavernoma transformation is usually seen but spontaneous transcapsular shunts are not described yet in transplanted patients. Those bypass correct partially the extrahepatic portal hypertension. However, it was decided to complete preventively those shunts by a surgical mesenterico-left portal vein bypass.

36.12 Hirschsprung's disease: 15 year retrospective review of Contrast Enema findings at a large tertiary care pediatric hospital.

Daniel Vinocur, Michael Callahan, Carlo Buonomo

Purpose - Objective

Hirschsprung's disease (HD) is a congenital disorder of the colon characterized by the absence of ganglion cells in the submucosal and myenteric plexus. At most institutions, the workup for suspected HD starts with a contrast enema (CE). Despite published, original descriptions of CE abnormalities date back to the 1970's, significant questions remain regarding the specificity of these findings. The aim of the current study is to evaluate the different CE findings seen on HD

Material and methods

Retrospective analysis of the past 15 years (1994-2009) of newborns, infants and children with rectal biopsies consistent with HD who also underwent contrast enema. The CE studies are reviewed for the presence of the following image findings: rectosigmoid ratio, transition zone, mucosal irregularities, microcolon, calcifications ileal reflux, filling defects and contrast retention

Results

Review of electronic medical records reveals 15,092 rectal biopsies/specimens performed at our institutions. Of those, 270 are associated with the diagnosis of Hirschsprung's disease. Reviews all of cases who also had a contrast enema and reports the prevalence and specificity of the different findings seen with HD

Discussion and conclusions

Contrast enema is important in diagnosis of Hirschsprung's disease. Even though, many of the classic findings were first published decades ago, their prevalence and specificity varies.

36.13 Imaging findings of a spontaneous rupture of common bile duct in a young female patient : case report

Sook Namkung, Myung Sun Hong, Im Kyung Hwang, Heung Cheol Kim

Purpose - Objective

to illustrate imaging findings in a patient with spontaneous rupture of common bile duct and review a literature.

Material and methods

A 15 month-old female patient was referred to the department of pediatrics with acute abdomen.

Results

Plain abdominal images showed a rapid increase of haziness in whole abdomen, suggesting a rapid accumulation of intraperitoneal fluid. Ultrasonogram and CT scan revealed nonspecific findings except for an ascites. Perforation of common bile duct was proven on exploratory laparotomy. Anomalous pancreaticobiliary union was confirmed with post-operative 1 month follow up MRCP.

Discussion and conclusions

Spontaneous rupture of common bile duct in pediatrics is extremely rare event. However, it should be considered as a possible diagnosis after exclusion of a rupture of urinary bladder when a rapid increase of ascites is demonstrated with imaging work up.

36.14 MR enterography in pediatric Crohn's disease: preliminary results

polina pavicevic, zeljko smoljanic

Purpose - Objective

To develop a new MR imaging protocol for examination of small bowel and to show preliminary results

Material and methods

We prospectively included 18 children,with clinical suspicion of Crohn's disease. MR enterography was performed on a 1,5 T clinical MR system,after oral administration of 2,5

Results

The examinations were considered satisfactory in all patients. Ileal involvement was observed in 5 patients, ileocolonic in 4, jejunoileal in one and isolated jejunal in one. In two patients we revealed perianal fistulas. Thickness of the bowel wall ranged from 4-13mm, postcontrast enhancement was positive in 11, fibrofatty proliferation in 10, and enlarged lymph nodes in 9 patients. The sensitivity and specificity of MR for the positive diagnosis of Crohn's disease were 100

Discussion and conclusions

: MR enterography is effective, non invasive method in the evaluation of known or suspected Crohn's disease. Because of the absence of ionizing radiation, MR enterography should become the gold standard in pediatric patients

36.15 US diagnosis of long segment severe necrotising enteritis caused by *Candida albicans* in a boy with ALL, febrile neutropenia and septic shock

Ziva Zupancic, Senja Mali Brajovic

Purpose - Objective

Necrotising enteritis/colitis (NEC) leads to shock and death if it is not diagnosed early and the affected bowel removed. We present a case of fungal enteritis with an emphasis on the importance of US diagnosis of NEC in the ICU, since US is usually the first method for evaluating septic shock patients in the ICU in order to look for the cause of the shock.

Material and methods

A 16-year-old boy with relapse of ALL, on broad-spectrum antibiotics and with febrile neutropenia, was admitted to ICU dehydrated, in respiratory distress and in septic shock of undetermined etiology. Abdomen was soft, C-reactive protein was 420. An abdominal US was ordered the next day.

Results

US revealed a thickened wall (10 mm) of intestine located in the colon area. The diagnosis of severe colitis was made, pediatrician and surgeon were alerted. At surgery, large loop of gangrenous jejunum jumped out of the abdomen, the duodenum and jejunum were resected (2 m). Histopathologic diagnosis was necrotising neutropenic enteritis with invasive candidiasis.

Discussion and conclusions

To diagnose severe NEC in patients with septic shock by US in the ICU and to alarm the surgeon to undertake the appropriate treatment, is critical for the survival of the patient and a major responsibility of the radiologist.

36.16 Wandering liver in a neonate. A case report

Natalia Barmaliou, Jan F Svensson, Titus Schlinzig, Sylvie Kaiser

Purpose - Objective

In "wandering liver", the liver moves freely from right abdominal side to the left. This is believed to be associated with a persistent ventral mesentery and abnormal hepatic fixation which permits excessive mobility of the liver in the transverse plane. Although first described in 1754, only few cases are presented in the modern literature, most

found during investigations for bowel obstruction, and there are no previous reports in a neonate. The number of asymptomatic cases is unknown.

Material and methods

We present a case of wandering liver in a preterm boy (27 GW, 1000g bw), transferred to our neonatal unit after 15 days. Review of previous x-rays showed the liver both in normal (right) and abnormal (left) position. On upper GI-series no signs of malrotation were found. CT and MRI showed mobility of the liver without restrictions of blood flow in the IVC, portal vein or hepatic veins.

Results

Over time the boy stabilized and was not subjected to any surgical treatment. He has remained asymptomatic.

Discussion and conclusions

As most of the cases described in literature were found during laparotomy for a surgical emergency there is no evidence to support surgical treatment of a non- symptomatic wandering lever. Close follow-up is advisable, and in case of symptoms suggestive of bowel obstruction or circulatory compromise, laparoscopic exploration and appropriate hepatopepy is recommended.

36.17 Beyond Biliary Atresia: Ultrasound diagnosis of alternative causes of neonatal Conjugated Jaundice.

Terry Humphrey

Purpose - Objective

Jaundiced infants are referred for ultrasound to help confirm or refute Biliary Atresia, but the examination can be extended to diagnose other important conditions which can present as conjugated hyperbilirubinaemia. This poster highlights the ultrasound features which allow confident diagnosis of these alternative conditions.

Material and methods

The sonographic findings and case notes of infants referred with conjugated jaundice to a Supraregional Paediatric Liver Unit between 2002 and 2009 were reviewed retrospectively

Results

Ultrasound correctly identified diagnoses including portosystemic shunts, inspissated bile syndrome, gallstones (including a case of Mirizzi's syndrome), choledochal cysts and a pancreatic head mass.

Discussion and conclusions

The utility of ultrasound in diagnosing Biliary Atresia has been previously demonstrated in our institution (ref 1). Early diagnosis allows prompt intervention and improves outcome. However, the role of sonography extends beyond this condition, as it may identify other important causes of conjugated jaundice requiring prompt therapy. In many cases, the ultrasound examination will spare the infant further investigations which may require sedation or anaesthesia. Careful assessment of the biliary system for dilatation and calculi, along with Doppler examination of the liver for vascular malformations should form part of routine practice in these infants. 1. Humphrey T M and Stringer M D. Biliary Atresia: US Diagnosis. Radiology: 2007; 244: 845-851

Conflict of interest

None

36.18 Color-Doppler findings in the postoperative evaluation of mesenterico-left portal shunt (Rex-shunt) for the treatment of portal hypertension due to extra-hepatic portal vein thrombosis in children.

Silvia Rocha, Lisa Suzuki, Hamilton Shoji, Conrado Foeuker, Nelson Elias Gibelli, Luiz Antonio Oliveira, Andrea Ferme

Purpose - Objective

This study aims to present Color-Doppler ultrasonography (CDUS) findings in the postoperative follow-up of patients undergoing mesenterico-left portal shunt.

Material and methods

CDUS were performed in 10 children in the postoperative period to evaluate shunt patency. The exams were performed for three consecutive days immediately after surgery and then every three months.

Results

CDUS findings: hepatopetal high-velocity flow in the graft (81cm/s;SD:29.4 cm/s) and reversed flow in the left portal branch directed to the right portal branch. In two cases graft thrombosis was diagnosed. Signs of significant stenosis were observed in two patients: one at the portal anastomosis site, and other at the mesenteric anastomosis site.

Discussion and conclusions

Extra-hepatic portal vein thrombosis in children often leads to symptomatic portal hypertension, with significant gastrointestinal bleeding and thrombocytopenia secondary to hypersplenism. Surgical treatment is considered for patients that require recurrent blood transfusions or endoscopic procedures and for those who develop hypersplenism. Surgical treatment includes gastric devascularization, spleno/porto-systemic shunts and, more recently, mesenterico-left portal shunt (MPS), by means of an autologous vein graft bypass between the superior mesenteric vein and left portal branch in the recess of Rex. MPS eliminates portal hypertension by restoring portal flow to the liver. CDUS is an important tool in the postoperative evaluation of MPS.

36.19 Differentiation between Hirschsprung alied disease and Hirschsprung's disease in childhood with Barium enema

Xinyu Yuan, Yang Yang

Purpose - Objective

To compare the Barium enema features between Hirschsprung alied disease (HAD) and Hirschsprung's disease (HD).

Material and methods

Randomly nineteen cases of HAD and nineteen cases of HD were enrolled in this study. All cases were confirmed by surgical operation and pathology and performed with barium enema examination prior to operation. The X-ray data were reviewed to calculate the appearance rate of the narrow zone, 'truncation sign', spasm notch, and R/C ratio (the longest diameter of rectum/ that of colon) respectively. Statistically, the parameters of both groups were compared by SPSS11.5.

Results

Statistically, there was significance between HAD group and HD group with the appearance rate of the narrow zone. The Significant difference of the appearance rates of the 'truncation sign' and spasm notch in HAD and HD groups were not found ($p=0.34$ and $p=0.064$, respectively). R/C ratio in group HAD is 0.420.15, and that in group HD is 0.290.12, $t=2.892$, $P<0.006<0.05$, statistically significance is found between two groups. As while, HAD concerned, distal descending colon 37

Discussion and conclusions

HAD appears less narrow zone and R/C ratio than HD; Most position of barium retained of HAD is distal descending colon, while that of HD is distal sigmoid colon.

36.20 CT features in childhood Crohn's disease

hanna schulman, Yakov Levy, Baruch Yerushalmi

Purpose - Objective

Crohn disease (CD) is a chronic inflammatory bowel disease, that may involve any part of the gastrointestinal tract, from mouth to anus-the distal ileum and colon are most frequently affected. It manifests in the late teens and early adulthood- 20

Material and methods

19 patients, 7 females and 12 males, age range between 10 months and 18 years underwent CT scan because of suspected CD and its complications. 15 were of Jewish origin and 4 were Bedouin.

Results

CT detected terminal ileitis in all patients. Colon involvement was revealed in all 4 Bedouin patients. Bowel wall thickening, lumen narrowing, skip areas, rose-thorn and cobble stone ulcers were evident in all patients. 2 had acute bowel obstruction as the presenting symptom. CT depicted extramural complications such as the comb sign due to increased mesenteric vascularity and mesenteric lymphadenopathy. Abscesses were drained in 5 patients.

Discussion and conclusions

The insidious onset and delay of diagnosis are typical of CD in children- therefore CT examination is a prompt accurate diagnostic tool. It enables correct diagnosis, monitoring disease, detects complications, providing therapy by percutaneous abscess drainage.

36.21 MR enterography in inflammatory bowel disease with endoscopic and histopathologic correlation- a pictorial essay.

Neha Kwatra, Pranav Vyas, Laurie Conklin, Benny Kerzner, Elizabeth Hart, Reza Hayeri

Purpose - Objective

Diagnosis and follow up of inflammatory bowel disease (IBD) in the paediatric population can be very challenging. MR enterography (MRE) is a promising modality to image IBD and its complications, especially given the lack of ionizing radiation. We will describe our MR techniques to evaluate IBD and the spectrum of findings with their endoscopic and histopathologic correlates.

Material and methods

MRE for IBD (age range 11-21 years) is being performed for past 18 months using a standardised protocol on 1.5 T MR equipment. Barium sulphate suspension (0.1

Results

Majority of the scans showed small bowel disease. Some scans depicted colonic/rectal involvement. Complications identified were stricture, fistula and abscess formation. Representative examples with endoscopic and histopathologic images would be provided.

Discussion and conclusions

MRE is a powerful tool for evaluation of paediatric IBD. The cine sequence helps assess bowel peristalsis while the contrast enhancement patterns assess disease activity. The lack of ionizing radiation makes it preferable in the paediatric population. Its cross-sectional capabilities make it superior to conventional fluoroscopy for complete disease assessment.

36.22 CT Findings of Mesenteric Laceration in Four Pediatric Patients

Lauren Singer, Daniel Schwartz, E. Christine Wallace

Purpose - Objective

Mesenteric laceration with devascularization of the subjacent bowel is a serious injury with profound consequences. Delayed diagnosis leads to a significant increase in morbidity and mortality. Our purpose is to illustrate the abdominal CT findings of this condition.

Material and methods

This is a retrospective review of four pediatric trauma patients with abdominal pain and CT findings suggestive of severe mesenteric injury. Ages ranged from 5-17 years. There were 3 males and 1 female. Studies were completed from 9/29/2006 to 1/15/2010 with surgery performed 0-3 days following presentation. All patients were involved in motor vehicle accidents and wearing seat or lap belts.

Results

Each of these patients demonstrated fluid collections confined within the mesentery on CT. Other features included stranding in the mesentery, bowel wall thickening, and poor definition of the bowel wall. The sites of focal abnormality correlated to surgically proven mesenteric lacerations. Four patients had a total of eight surgically proven mesenteric lacerations. Two patients also had mesenteric hematomas. The diagnosis in one patient was delayed with significant morbidity underscoring the importance of this condition.

Discussion and conclusions

Imaging of the mesentery is challenging because pediatric patients often have little intra-abdominal fat. Careful attention to this structure in the setting of trauma is critical to identifying mesenteric lacerations which can expedite care and limit complications.

Conflict of interest

None.

36.23 MRI appearances of focal infantile hepatic hemangioma

Michael Chew, Ann Kulungowski, Steven Fishman, Harriet Paltiel, Ahmad Alomari

Purpose - Objective

To describe the MR imaging appearance of focal infantile hepatic hemangioma (IHH).

Material and methods

15 infants with focal IHH and MR imaging were identified. Diagnosis of IHH was made based on a combination of clinical, pathological and/or radiological criteria. MRI and CT scans of these patients were reviewed.

Results

The maximal dimension of lesions was 1.0-11.1 cm. 13/15 lesions (87%) Post-contrast, 14/14 (100%) lesions could be definitively diagnosed on CT.

Discussion and conclusions

Focal IHHs occasionally present as a diagnostic dilemma. The most characteristic finding of IHHs are their intense enhancement, irregular non-enhancing central area, prominent T2-heterogeneity and marked T2-hyperintensity. Both MRI and CT can diagnose focal IHH, but the role of CT and MRI can be complementary. Dynamic post gadolinium MR imaging provides optimal imaging characterization

Conflict of interest

None to disclose

36.24 Occult Injuries in Pediatric Abdominal Trauma.

Nishard Abdeen, Hurteau Julie

Purpose - Objective

Blunt pediatric abdominal trauma is a common entity. Some injuries are difficult to identify on initial imaging evaluation. Awareness of the imaging clues to these injuries is important to make a timely diagnosis and reduce morbidity and mortality.

Material and methods

Trauma register at a tertiary care pediatric hospital was reviewed to identify injuries that were not suspected on initial clinical evaluation or had delayed or subtle presentation.

Results

Seven patients were identified including cases of liver laceration, splenic laceration, pancreatic transection, jejunal transection, renal calyceal rupture, and diaphragmatic laceration.

Discussion and conclusions

A high index of suspicion for the CT findings of "occult" injuries will facilitate their early diagnosis.

Conflict of interest

No conflicts of interest declared

36.25 Spectrum of Imaging abnormalities in Paediatric Inflammatory bowel disease

Shruti Moholkar, Claire Miller

Purpose - Objective

Aim We describe the imaging findings on MR Enterography in children with known and suspected Inflammatory bowel disease.

Material and methods

Retrospective review of the Radiology database identified 102 patients imaged over 18 months. We currently use 500 mls oral Polyethylene glycol, modified from 1000mls previously and IV Buscopan prior to imaging. Pre and post contrast enhanced imaging is performed with the patient imaged in a prone position.

Results

Findings suggestive of active inflammation include bowel wall thickening, hyperenhancement, ulcerations, increased mesenteric vascularity, and perienteric inflammation.

Discussion and conclusions

Inflammatory bowel disease is a chronic complex illness with frequent relapses, affecting young patients, who are most vulnerable to the potential adverse effects of repeated exposure to ionizing radiation. MR enterography may help reduce their lifetime exposure to radiation and help in their long term follow up and management.

MR enterography is easily performed in older children and adolescents without the need for a General Anaesthetic. MR enterography is slowly replacing the small bowel follow through in this age group and provides excellent bowel wall and mucosal detail, presence and extent of extra-luminal disease and complications in addition to lacking ionising radiation.

Conflict of interest

None to disclose

36.26 Pictorial essay of imaging findings in children with biopsy proven eosinophilic esophagitis

Lincoln Diniz, Alexander Towbin

Purpose - Objective

Eosinophilic esophagitis is an inflammatory disease of the esophagus. Patients often complain of dysphagia, food impaction, vomiting and pain. Imaging findings may include strictures, filling defects from food impaction, dysmotility, esophageal rings or mucosal irregularity. The purpose of this pictorial essay is to depict the various imaging findings of eosinophilic esophagitis in children.

Material and methods

Biopsy proven cases of eosinophilic esophagitis were obtained from our institutions gastrointestinal service database, radiology PACS, and the hospital medical records. Imaging studies in these patients were then reviewed.

Results

Findings on upper GI or esophagram included gastroesophageal reflux, filling defects, irregular contractions, Schatzki ring, strictures, dysmotility, mucosal irregularity, ringed esophagus, and pseudodiverticula. In the majority of patients, there were no findings.

Discussion and conclusions

There are multiple potential findings on esophagram in patients with eosinophilic esophagitis although none of the findings are specific for this diagnosis. Eosinophilic esophagitis should therefore be added to the pediatric differential diagnosis of esophageal strictures, dysmotility, irregular contraction, Schatzki ring, ringed esophagus, and mucosal irregularity.

36.27 An easily constructed simulator facilitates training of radiologists in gastrojejunal tube insertion

MohammadReza Hayeri, Raymond Sze

Purpose - Objective

The advantages of fluoroscopic replacement of gastrojejunal (GJ) tubes by radiologists over endoscopic replacement by gastroenterologists include lack of sedation and operating room use. However, many radiologists are not familiar with this procedure. We developed a simulator and training program to help radiologists acquire the skills to perform GJ tube procedures

Material and methods

A GJ simulator was made from a barium bag cut into a stomach shape and a corrugated respiratory tube bent to simulate the course of the duodenum. GJ tubes, syringes, and guidewires could be used on the simulator. The training program included 1) watching an expert use the simulator; 2) supervised trainee practice on the simulator (with simulated complications such as coiling of the tube); 3) watching an expert place a GJ tube on a patient; 4) supervised placement by the trainee on three patients.

Results

Three radiologists completed training and are able to place GJ tubes independently. An additional two simulator-trained radiologists will achieve independence after completing their patient training. All radiologists reported the simulator was effective in helping them develop familiarity and confidence with the procedure.

Discussion and conclusions

A simple GJ training simulator constructed with readily available materials can be an effective component of a training program to help radiologists develop competence in GJ tube procedures.

36.28 Evaluation of liver fibrosis with T2 relaxation time in infants

Mi-Jung Lee, Myung-Joon Kim, Choon-Sik Yoon

Purpose - Objective

The purpose of this study is to evaluate the possibility of liver fibrosis quantification with T2 relaxation time measurement in pediatric patients with neonatal cholestasis and normal control.

Material and methods

Institutional review board approved this prospective study and parental informed consents were obtained. During MRCP with a 1.5T scanner in patients with neonatal cholestasis, T2 relaxation time of liver was calculated with the mean signal intensities measured on images obtained by using spin-echo (TR/TE, 2,000/20, 40, 60, 80, 100, 120, 140, 160) sequences. Normal control study was performed during spinal MRI in infants with anorectal malformation and normal liver enzyme profile. Liver biopsy was obtained with METAVIR score. The correlation between the fibrosis grade and T2 relaxation time was evaluated.

Results

Twenty five infants (male:female = 12:13, age 0-11 months (mean 3.2)) with 10 neonatal cholestasis and 15 normal control were included in this study. T2 relaxation time was not correlated with METAVIR score ($r=0.034$, $p=0.870$). The mean T2 relaxation time was not different between the normal control group and fibrosis group (58.8 vs. 55.4 msec; $p=0.461$) and low grade and high grade fibrosis (57.8 vs. 56.8 msec; $p=0.934$).

Discussion and conclusions

T2 relaxation time for normal infant liver in 1.5T scanner was comparable with adult data (46-54 msec). However, it was not changed with hepatic fibrosis.

Conflict of interest

Nothing to disclose.

36.29 Pharmacological premedication efficacy in intussusception's management by enema in pediatrics: preliminary outcomes

Francesco Esposito, Domenico Noviello, Roberto Carbone, Antonio Strino, Giuseppe D'Anna, Patrizia Oresta

Purpose - Objective

We have elaborated a prospective study about 46 patients to prove a possible correlation between the pharmacological premedication, with anti-inflammatories and sedatives, and the percentage of hydrostatic reduction of intussusception in pediatric patients.

Material and methods

From January 2008 to June 2009 forty-six patients, aged between 3 months and 6 years, came to our observation with clinical suspicion and ultrasound confirmation of intussusception and were subjected to barium enema. Sixteen patients were premedicated with midazolam and/or betamethasone ev.

Results

30 children took barium without pre-medication: there was intussusception's reduction in 19 patients (63

Discussion and conclusions

The intestinal intussusception is a typical pathology among infants between six and twelve months of age, in which the part of the intestine involved goes gradually to lose its vitality and gangrenes. Treatment is surgical; however, before resorting to surgery, the X-Ray department will try to resolve the invagination by barium enema. Our preliminary outcomes seem to show an increase in the percentage of success in intussusception's reduction with barium enema in patients premedicated with anti-inflammatories and sedative than the group of patients not premedicated.

36.30 Result of air enema reduction in 737 cases of intussusception

Anchalee Kruatrachue

Purpose - Objective

To evaluate the successful of air enema reduction for intussusception at Queen Sirikit National Institute of Child Health , Bangkok , Thailand

Material and methods

Medical records of patients treated for intussusception by air enema reduction since 1992 to 2009 were reviewed for the success rate.

Results

The treatment for intussusception at Queen Sirikit national Institute of Child Health(Children's Hospital) was changed from barium enema to air enema reduction since 1992.And was the first institute in Thailand that performed air enema reduction by modified the instrument from blood pressure device.The result of success rate was 68

Discussion and conclusions

The success rate is not as high as the western world because of late presentation with small bowel obstruction.However the success rate is higher than barium enema reduction which prior performed before 1992.

36.31 The role of ultrasound compared to plain radiography in the diagnosis and management of necrotizing enterocolitis

Csilla Balassy, Aileen Moore, J Ted Gerstle, Alan Daneman

Purpose - Objective

To determine the role of ultrasound (US) in the diagnosis and management of neonates with necrotizing enterocolitis (NEC).

Material and methods

We retrospectively evaluated the clinical and imaging findings in 39 consecutive neonates with NEC. Radiographs were analyzed for bowel dilatation/elongation/separation and intramural/portovenous/free gas. US were evaluated for free fluid, free/intramural/portovenous gas, bowel wall thickness/perfusion, and peristalsis. Based on these findings, we determined whether US findings helped establish the diagnosis and/or influenced management.

Results

7/39 (18)

Discussion and conclusions

US plays an important role in the diagnosis and/or management of a significant number of patients with NEC, particularly in those neonates with non-specific radiographic findings. US is not required in those neonates in whom radiographs provide definitive information for diagnosis and/or management.

37 Scientific session 9: Oncology

37.1 Are the RECIST criteria useful in assessing response in paediatric rhabdomyosarcoma?

Kieran McHugh, Rieneke Schoot, Hans Merks, Julia Chisholm, Rick van Rijn

Purpose - Objective

To assess the accuracy of unidimensional (1D) and 3D volume assessments of response after chemotherapy in a cohort of patients with rhabdomyosarcoma (RMS). 3D measurements are routine in paediatric oncology. The response evaluation criteria in solid tumors (RECIST) utilise 1D, have been validated in adult tumours but not in paediatrics.

Material and methods

Tumour measurements in 1D and 3D with CT or MRI were assessed at diagnosis and after three cycles of chemotherapy.

Results

32 patients were excluded (initial primary surgery, paratesticular tumours with no CT follow-up, transfer elsewhere, films missing). 64 patients were identified with relevant imaging over 10 years. There were 36 males and 28 females. Age range 2 months - 16 years (mean 5.6 years). Interval between studies was 45 - 190 days (mean 74.3). Partial response (PR) was seen in 40 with 3D measurements and in 38 with 1D. Stable disease (SD) was seen in 20 with 3D and in 22 with 1D. Complete response was seen in 3 cases. One patient had progressive disease (3D & 1D).

Discussion and conclusions

There were 4 discrepancies (6.3

37.2 Characterizing individual cancers using dynamic MRI enhanced by macro-molecular contrast media (MMCM)

Robert Brasch, Yanjun Fu, Heike Daldrup-Link, Clemens Cyran

Purpose - Objective

An emerging goal for imaging is to characterize cancers to individually define their biology, prognosis, and response to therapy. One appealing approach is to characterize cancers by their blood vessel properties, including permeability to protein-sized molecules and vascular richness. This consistently observed macromolecular hyperpermeability of cancers can be measured to unique advantage using MRI and macromolecular contrast media (MMCM).

Material and methods

Dynamic MMCM-enhanced MRI was assessed in rodents with implanted human cancers for monitoring tumor angiogenesis and response to therapy. A novel MMCM formulation incorporating multiple macrocyclic gadolinium chelates was created specifically for safe use in humans showing leakiness from cancer vessels, but with no leak in normal tissues.

Results

Data show that MMCM leakiness correlates significantly with tumor expression of vascular endothelial growth factor (VEGF), the dominant signaling molecule of angiogenesis. This MRI method can detect therapy responses in as little as 1 hour after a single dose of inhibitor. Tested angiogenesis inhibitors produce significant declines in leakiness including bevacizumab, tyrosine kinase inhibitors, COX-2 inhibitor, DMSO, and thalidomide. MMCM-defined tumor grades correlate with histological measures of tumor aggressiveness.

Discussion and conclusions

Pending governmental approval of PEG-based MMCM, the radiological community can anticipate a sensitive, highly versatile, and quantitative MRI technique, based on MMCM, to individually characterize each patient's cancer based on blood vessel properties.

Conflict of interest

There are no conflicts of interest.

37.3 Whole body MRI with DWIBS sequences for disease detection and staging of pediatric oncological patients

sara savelli, marco di maurizio, marzia mortilla, angela tamburini, maurizio aricò, claudio fonda

Purpose - Objective

Pediatric neoplastic diseases have a high risk to be metastatic at diagnosis, thus a whole body staging is mandatory in the diagnostic phase. MRI has been proposed as a novel modality for whole body imaging. Our purpose was to assess the diagnostic capability of WB-MRI with DWIBS sequences in comparison with appropriate nuclear medicine techniques used for disease detection and staging in pediatric patients.

Material and methods

All consecutive pediatric patients with a biopsy-proven neoplastic disease scheduled for a whole-body staging with nuclear medicine techniques prospectively underwent a whole-body MRI study at our institution with conventional (STIR, T1, Gd-enhanced T1 sequences) and DWIBS sequences. WB images were compared with nuclear medicine images and lung-CT scans considered as standard of reference and diagnostic accuracy was assessed.

Results

24 Pediatric oncological Patients were imaged (16 solid tumors, 8 lymphomas). 25 skeletal and visceral sites were examined and recorded for all patients and for all sequences. Both STIR and DWIBS had high sensitivity for depicting bone and liver metastases but DWIBS provided better tissue contrast in detecting lymph nodes metastases. A fewer accuracy was obtained for lung parenchyma metastases with all images.

Discussion and conclusions

DWIBS sequences have several pitfalls and technical limits. Nevertheless they improve the sensitivity and specificity of whole body MRI with conventional sequences enhancing the conspicuity of the tumor.

Conflict of interest

none

37.4 Comparing the value of the sequences T1, T2, STIR and DWIBS by whole body magnetic resonance imaging for staging and monitoring patients with Hodgkins lymphoma in childhood

Henrique Lederman, Daniel Nava, Flavio Luisi, Heverton Oliveira

Purpose - Objective

Purpose: to compare the performance of the sequences T1, T2, STIR and DWIBS by whole body magnetic resonance imaging for staging and monitoring patients with Hodgkins lymphoma in childhood.

Material and methods

Methods: we studied 12 patients (7 males and 5 females) with confirmed diagnosis of Hodgkin's lymphoma in initial staging or clinical suspicion of recurrence. The patients were referred for whole body magnetic resonance imaging, being carried out sequences weighted in T1, T2, STIR and DWIBS. The analysis and interpretation of images was done on workstations by three independent observers with experience in MRI and pediatric radiology.

Results

Results: there is good agreement between the examiners when they analyzed the four sequences, but the one with better results was the STIR, with perfect agreement between examiners ($Kappa = 1$). In assessing the involvement of solid organs and bone marrow by lymphoma, the four sequences showed similar results. Investigation of the involvement of lymph nodes, the sequences T1 and T2 had similar performance, but lower than DWIBS and STIR sequences.

Discussion and conclusions

Conclusion: in all sequences there is high agreement between examiners and had similar performance to analyze solid organs and bone marrow. To analyze the involvement of lymph nodes STIR and DWIBS sequences are better. The best results were obtained in the STIR sequence Also the STIR sequence (7minutes) is shorter than the DWIBS (13 minutes).

Conflict of interest

none

37.5 Whole-body MRI, including diffusion-weighted imaging, compared to FDG-PET for staging Hodgkin lymphoma - initial experiences

Malou A. Vermoolen, Thomas C. Kwee, Erik M. Akkerman, Henriette M.E. Quarles van Ufford, Frederik J.A. Beek, Marc B. Bierings, Jozsef Zsiros, Willem P.Th.M. Mali, Rutger A.J. Nievelstein

Purpose - Objective

Whole-body magnetic resonance imaging (MRI), including diffusion-weighted imaging (DWI), is emerging as a new, radiation-free method for oncological staging. This study aimed to compare whole-body MRI, including DWI, to 18F-fluorodeoxyglucose positron emission tomography (FDG-PET) for staging newly diagnosed Hodgkin lymphoma (HL).

Material and methods

9 children (5 males and 4 females; mean age, 14.9 years; age range, 12-16 years) with newly diagnosed HL prospectively underwent whole-body MRI (T1-weighted and T2-STIR [n=9], and DWI [n=8]) and FDG-PET. Whole-body MRI and FDG-PET were evaluated by different observers who were blinded to the findings of the other imaging modality. Ann Arbor stages according to whole-body MRI (without and with DWI) were compared to those of FDG-PET.

Results

Staging results of whole-body MRI without DWI were equal/higher/lower to those of FDG-PET in 6, 1, and 2 of 9 patients, respectively. Staging results of whole-body MRI with DWI were equal/higher/lower to those of FDG-PET in 6, 1 and 1 of 8 patients, respectively.

Discussion and conclusions

Our initial results indicate that staging using whole-body MRI (without and with DWI) is equal to staging using FDG-PET in the majority of patients. However, whole-body MRI under- and overstaging relative to FDG-PET occurred in some patients. This study is continuing as an international multicenter trial in collaboration with the European Excellence Network on Pediatric Radiology (EENPR).

37.6 Derivation of histographic apparent diffusion coefficient (ADC) changes associated with successful response to first line chemotherapy of adolescent and childhood lymphoma.

Shonit Punwani, Ananth Shankar, Stephen Daw, Paul Humphries

Purpose - Objective

To derive population averaged ADC histograms from successfully treated lymphoma patients for use as a future reference against which to gauge treatment response.

Material and methods

Eleven patients underwent 1.5T MRI upon lymphoma diagnosis and before chemotherapy. Using anatomical MRI for guidance, trace diffusion weighted images (Short TI Inversion Recovery - Echo Planar Imaging [STIR-EPI] with b 0, 300 and 500) of a 9 cm block containing the greatest number of enlarged nodes was acquired. Post-treatment MRI was performed at 2 weeks and 6 months following first line chemotherapy. For each post-treatment study the region of the body covered by STIR-EPI was matched to the original pre-treatment site.

Regions of interest (ROI) were drawn on b500 MR images to encompass but not extend beyond each area of nodal tissue within the entire imaged volume. Subsequently, ROIs were exported to corresponding ADC maps and ADC values for all individual ROI pixels obtained.

Pixel ADC values were grouped for all patients and ROIs and plotted as individual histograms at each imaging timepoint.

Results

Population averaged median ADC at pre-treatment, 2 week and 6 months post-treatment was 1.4, 1.8 and 2.7x10⁻³mm²s⁻¹ respectively. Median ADC values were significantly different between each timepoint (Dunn's p<0.001).

Discussion and conclusions

Nodal ADC rises following successful chemotherapy. The presented histographic data will be prospectively evaluated in future trials as a marker for gauging treatment success.

37.7 Value of diffusion weighted images in differentiating responders to chemotherapy for osteosarcoma

Philippe Petit, Christiane Baunin, Anderson Loundou, Jean Claude Gentet, Audrey Aschero, Brigitte Bourlière-Najean, Guillaume Gorincour, Gérard Bollini, Catherine Desvignes, Philippe Devred

Purpose - Objective

To assess the predictive value of diffusion weighted MRI in evaluating mid-course and end of course response to chemotherapy in the treatment of osteosarcoma.

Material and methods

This study was carried out on a prospective series of adolescents treated for osteosarcoma of the long bones. Three MRI examinations were performed respectively at diagnosis (IRM1), at mid course of chemotherapy (IRM2) and immediately before surgery (IRM3). A diffusion weighted sequence was acquired using diffusion gradients of b0 and b900. The apparent diffusion coefficients (ADC1, ADC2, ADC3), and their differentials (ADC2-ADC1, and ADC3-ADC1) were calculated for each of these time-points. The results were compared with the histology specimen.

Results

Fourteen patients were included. Patients with no increase in ADC showed a poor response to chemotherapy on their histology results. There was no significant difference in ADC2, ADC3, ADC 2-ADC1 or ADC3-ADC1 differentials between the groups of good and poor responders.

Discussion and conclusions

Diffusion weighted MRI on this short series does not seem to have a potential role to play in determining the prognosis for osteosarcoma either at mid-course or at the end of chemotherapy.

Conflict of interest

No conflict of interest

37.8 Does Serum-Ferritin Level in Children receiving Blood Transfusions in the Treatment of Acute Leukemia correlate with Iron Load of the Liver? Initial Results

Tibor Vag, Karim Kentouche, Ines Krumbein, Martin Stenzel, Eric Lopatta, James Beck, Werner Kaiser, Hans-Joachim Mentzel

Purpose - Objective

Organ siderosis is a complication of transfusion therapy in different anemic conditions. Routine assessment of body iron load is usually done by serum ferritin(SF), however the sensitivity of this marker is impaired by different conditions including inflammation and malignancies. The aim of this study was to correlate SF with mean iron burden (MIB) following blood transfusion and with iron load of the liver using Magnetic Resonance Imaging (MRI) in children suffering from acute leukemia.

Material and methods

16 children (mean 8 years) suffering from acute leukemia and receiving blood transfusions were eligible for this study. 9 patients received a follow up within 8 months. SF was obtained around the time of the MRI-investigation. Mean iron burden (MIB) was calculated by dividing the total iron concentration in all transfused erythrocyte concentrates with body weight. All MRI-images were obtained by a 1.5 system using a gradient echo sequence (TR=48m TE=4.55).

Results

Mean SF was 2400 g/l (range 251-16060), mean erythrocyte concentrations transfused per patient was 9 (range 1-35), MIB after transfusion was 76.8 mg/kg body weight. No correlation could be observed between SF and MRI signal or SF and MIB. However a significant correlation ($p=0.016$) between mean iron burden and MRI-signal was demonstrated.

Discussion and conclusions

MRI seems to be significantly more reliable in the assessment of body iron than serum ferritin.

38 Oncology Task force synthesis

39 ESPR General Assembly

40 Lunch

41 Posters Oncology

41.1 Pediatric Rhabdomyosarcoma: Cross-sectional imaging findings with pathologic subtype correlation

Kevin Johnson, Arie Franco, Gilberto Sostre, Colleen McDonough

Purpose - Objective

The purpose of our study is to determine whether there are cross-sectional imaging features (CT, MRI, or both) of pediatric rhabdomyosarcoma specific to the different pathologic subtypes of the tumor.

Material and methods

We retrospectively reviewed the medical records of 11 pediatric patients who were diagnosed with rhabdomyosarcoma. Patient demographics, including age and sex, as well as final pathologic report were obtained. The initial CT, MRI, or both obtained at presentation, prior to the diagnosis being established, were reviewed by two radiologists. We recorded tumor features including site, size, margins, local extension, and presence of metastases. Presence of calcification, hemorrhage, or necrosis as well as attenuation and heterogeneity of the tumor were also recorded.

Results

Seven of our eleven patients were formally diagnosed with the embryonal subtype of rhabdomyosarcoma, while the remaining four were found to have the alveolar subtype. There was no significant difference in the attenuation and in the heterogeneity of the tumor between the embryonal and the alveolar subtype on CT. Four of our eleven patients had MRI studies (3 of embryonal subtype and 1 of the alveolar subtype) with no radiologic difference between the two subtypes.

Discussion and conclusions

Imaging features at presentation, such as attenuation and heterogeneity, could not correlate to the pathologic subtype of pediatric rhabdomyosarcoma. The radiologist should be aware and consider this important diagnosis.

41.2 Pictorial review of normal appearances and variants on paediatric 18-F FDG PET-CT.

Samuel Stafrace, Margaret Brooks

Purpose - Objective

To demonstrate normal distribution, appearances and variants on 2-[fluorine-18] fluoro-2-deoxy-D-glucose (FDG) PET-CT in the paediatric population.

Material and methods

Indications for PET-CT in the management of children have expanded over the last few years. Patients are often referred to outside institutions for this investigation with the PET-CT images then discussed at local multidisciplinary meetings. Paediatric Radiologists not routinely reporting PET-CT are hence expected to be knowledgeable and comfortable with the normal appearances and variants. Distribution and appearances in children is different to that in the adult population. We have reviewed the local database of paediatric PET-CT performed in our institution.

Results

A pictorial review of the paediatric distribution of 18-F FDG is presented with amongst others examples of normal uptake in the head and neck, thymus, myocardium, ovaries, renal tract, bowel, and brown fat.

Discussion and conclusions

This poster should give the general paediatric radiologist more confidence in reviewing Paediatric PET-CT decreasing the risk of misinterpretation.

41.3 Pediatric Dermatofibrosarcoma Protuberans: Case Report of a Rare Soft-Tissue Sarcoma

Daniela Pinto, João Pedro Caldeira, João Conceição e Silva

Purpose - Objective

To report the case of an adolescent with a dermatofibrosarcoma protuberans (DFSP) and to discuss the role of imaging in this pathology.

Material and methods

We analysed the preoperative Ultrasound and MRI of a 14-year-old boy with a histologically proved DFSP localized in the right shoulder.

Results

Ultrasound revealed a circumscribed echogenic solid mass, in-homogeneous with moderate internal hypervascularity seen on Doppler exam. At MRI a huge inhomogeneous plaque-like soft tissue mass in the thickness of the dermis surrounding the right shoulder joint without invasion of the fascia, muscles or bone structures was seen. The tumor was hypointense to subcutaneous fat and isointense to muscle on T1-weighted imaging. On T2-weighted and fast spin-echo T2-weighted sequences, the tumor was hyperintense compared with that of fat.

Discussion and conclusions

DFSP is a superficial low-grade sarcoma that rarely evolves into a high-grade fibrosarcoma with a high propensity for local invasion and recurrence. Radiologic studies are not routinely performed because of their typical clinical appearance and superficial location. Although imaging findings are not specific and definite diagnosis is achieved upon histological, immunohistochemical and genetical characteristic findings, MRI is the best suited exam to show its location and extent, thus providing the adequate preoperative guide for a successful surgical treatment and prevent local recurrence, as well as in follow-up these patients.

41.4 Imaging findings of childhood rhabdomyosarcoma in KK Women's and Children's Hospital, Singapore.

Husain Naser, Phua Hwee Tang, Mei Yoke Chan, Ah Moy Tan

Purpose - Objective

Rhabdomyosarcoma is a common childhood malignancy. We aim to determine common sites of the primary tumor and pattern of metastasis of the childhood rhabdomyosarcomas seen in KK Women's and Children hospital, Singapore.

Material and methods

This is a retrospective review of the imaging findings of all children with histologically proven rhabdomyosarcoma seen in KK Women's and Children's Hospital between April 2005 and December 2009.

Results

A total of 19 patients were diagnosed with rhabdomyosarcoma between April 2005 and December 2009, 10 males and 9 females, aged 9 months to 13 years at the time of diagnosis.

The distribution of the primary tumours were 9 (47

Discussion and conclusions

Childhood rhabdomyosarcoma most commonly occurs in head and neck and pelvis with metastatic disease present in 11

41.5 Comparison of STIR-HASTE and PROPELLER MRI for the evaluation of extranodal chest wall disease extension in pre-treatment paediatric and adolescent patients with known lymphoma

Shonit Punwani, Elli Papantoniou, Ruchi Kabra, Paul Humphries

Purpose - Objective

To compare Short TI Inversion Recovery (STIR) Half Fourier Single Shot Turbo Spin Echo (STIR-HASTE) MRI used for whole body lymphoma staging against optimised Periodically Rotated Overlapping Parallel Lines with Enhanced Reconstruction (PROPELLER) MRI for detection of chest wall disease extension.

Material and methods

Fourteen respiratory and ECG triggered axial STIR-HASTE and nineteen optimised non-fat saturated multi-breath-hold axial PROPELLER studies performed during pre-treatment lymphoma staging together with the pre-treatment chest CT were retrieved for analysis. Two radiologists unaware of patient and sequence details evaluated each study using a five point scale (1="normal, 2="probably normal, 3=equivocal, 4="probable disease and 5="definite disease) for presence of chest wall extension. Subsequently CT studies were assessed in consensus by both radiologists. Sensitivity and specificity of each reader for STIR-HASTE and PROPELLER sequences were calculated against CT. Inter-reader agreements were assessed using kappa statistics.

Results

Sensitivity and specificity for detection of chest wall extension on STIR-HASTE MRI was 100%. Inter-observer agreement was greater for PROPELLER (kappa 0.65) than STIR-HASTE imaging (kappa 0.48).

Discussion and conclusions

Optimised multi-breath-hold PROPELLER MRI maintains sensitivity for chest wall disease detection whilst markedly improving specificity and inter-observer agreement and should be performed as part of whole body MRI staging.

41.6 MR patterns of acute leukemia in 17 children presenting with skeletal complaints

Gye-Yeon Lim, Dong Myung Yeo, Nak-Gyun Chung

Purpose - Objective

In children, leukemia at presentation can mimic several orthopediatric pathologies, so that a variable delay of the correct diagnosis is reported. We have attempted to describe the clinical and MR findings of the skeletal manifestations of leukemia seen in children on their initial clinical presentation.

Material and methods

We retrospectively analyzed the clinical features and MRI findings of 17 children presenting with skeletal complaints and who were evaluated on skeletal MR and were ultimately diagnosed to have leukemia.

Results

The median time between the initial complaint and the diagnosis of leukemia was one month (range, one week to five months). On MR, more than one anatomic location was involved in ten patients. The sites of involvement was most commonly the hip (38

Discussion and conclusions

We have demonstrated an MR pattern of leukemia in children, who presented with a skeletal complaint. Therefore, recognition of this MR pattern might be helpful for diagnostic and therapeutic approach to avoid delay in making the correct diagnosis of leukemia.

42 Posters Miscellaneous Radiation protection

42.1 UNEXPECTED LOCATIONS AND COMPLICATIONS OF INTRAVASCULAR CATHETERS, TUBES, SHUNTS AND OTHER DEVICES IN CHILDREN. ROLE OF DIAGNOSTIC IMAGING AND MANAGEMENT.

Cristian Garcia, Florencia de Barbieri, Oscar Navarro, Dimitri Parra, Rodrigo Parra, Claudio Berrios

Purpose - Objective

The use of intravascular catheters, tubes, shunts and other devices may be essential in the management of critically ill children. The purpose of this study is to show a number of different and unexpected locations, related complications and management in neonates and older children, emphasizing the role of the radiologist in the early diagnosis

Material and methods

We reviewed retrospectively our experience with the use and imaging findings of intravascular catheters, tubes, shunts and other devices in children.

Results

We found examples of a number of unusual locations of catheters or tubes, some of them related to normal anatomical variants and some in extremely uncommon and unexpected locations. Many of them were associated to complications, which were diagnosed with imaging studies and some were managed by interventional radiologists.

Discussion and conclusions

The use of intravascular catheters, tubes, shunts and other devices is very common in children, especially in those who are critically ill. The radiologist should check their position in every study and be aware of normal anatomical variants, unexpected locations, imaging findings in complicated or non complicated cases and their management

Conflict of interest

None

42.2 The Revival of the Silver Lining

Loes Wiersma, Herma Holscher

Purpose - Objective

To stress the importance of Silver Lining in digital radiology

Material and methods

The term Silver Lining is used in Radiology to denote a millimeter wide unexposed area around the radiographic image. This added space shows how the diaphragms were positioned during exposure.

With the use of analogue imaging techniques the Silver Lining was an important quality control element of the radiological examination. To produce high quality radiographs, and from a radiation protection viewpoint, correct use of the diaphragms is necessary. With the advent of digital techniques this quality requirement has been underexposed.

Results

During post-processing of a digital image it is possible with 'shuttering' to apply a digital diaphragm which does not correspond to the area of patient exposure. The radiographer can, by retrospectively shuttering, produce a seemingly optimum image. With this 'shuttering' essential information can be lost.

If there are no unexposed area around the image the radiologist is unable to check if adequate use of the diaphragms has been made or if essential information has been lost due to shuttering. In this presentation we demonstrate the importance of reassessing the Silver Lining

Discussion and conclusions

With the implementation of a Silver Lining protocol during de post processing of X-ray images, the radiologist can make a report in the knowledge that the image seen at the workstation is indeed the complete image.

Conflict of interest

None

42.3 Online software for automated calculation of the effective dose for pediatric MDCT

Christine Guegan, Marianne Alison, Abderrahmane Nadour, Bogdana Tilea, Robin Azoulay, Guy Sebag

Purpose - Objective

The effective dose (E, Sievert) is used to compare medical radiation dose delivered on different organs, to natural radiation dose, which gives a more concrete idea to sensitize physicians and patients. Effective dose is calculated from the equivalent dose (H) with the weighting factors (W) designed to reflect the different radiosensitivities of the tissues. E depends on the imaged organ and on the age. To provide a software for automated calculation of E delivered in children with a Multidetector row computed tomography (MDCT, Philips, Brilliance64), according to the number of detectors, the imaged area, the age of the patient, and the dose parameters: volumic Computed Tomography Dose Index (CTDI, mGy), length of exploration (L, cm) or Dose Length Product (DLP, mGy.cm).

Material and methods

Calculation of effective dose were performed according to: 1) weighting factors (W) for tissue radiosensitivities according to age, 2) correcting factors to convert a dose index calculated from an adult phantom to a pediatric phantom, 3) the specific over-ranging of the constructor.

Results

The effective dose (E, mSv) and the equivalent natural radiation dose are calculated according to the imaged area, the age, the dose parameters (CTDI, L, or DLP) and the number of detectors used.

Discussion and conclusions

We present a useful tool to easily provide the effective dose and the equivalent natural radiation dose for each pediatric MDCT examination.

42.4 Routine quality control (QC) of hardware and sequences in pediatric MR Imaging

Laurent Barantin, Francine Mardelle, Dominique Sirinelli

Purpose - Objective

As radiologists often use quantitative values in MRI such as T1, T2, ADC to diagnose and differentiate pathologies, it is important to check if hardware (gradients, radiofrequency, ...) and sequences allow accurate determination of these parameters. It is moreover important in pediatric imaging because of myelination, and huge variety of pathologies.

Material and methods

Acquisition were performed with 5 dedicated test objects (spin safety, France), daily and monthly, on the 1.5T MRI device located in the pediatric hospital. We always used standard head coil. Results were archived and calculated with homemade automatic software and with free software ImageJ.

Results

Daily QC, with only 3 minutes of acquisition, allows us to follow-up parameters such as SNR and global geometric deformations. We were able to show variations in SNR which could be important from one day to another. With monthly QC and the follow-up of more than 30 parameters, we found for example that T2 values measured with all T2 mapping sequences were over-estimated.

Discussion and conclusions

QC is very useful to monitor the global health of the imager. It also allows us to prevent dysfunction and to insure that the system is ok for diagnosis. Moreover, it also allows us to correct the T2 values measured by all sequences and to develop an accurate T2-mapping sequence, useful for the study of brain myelination

42.5 Evaluation of a new phosphor plate technology for neonatal portable chest radiographs

Mervyn Cohen, Don Corea, Matt Wanner, Boaz Karmazyn

Purpose - Objective

To evaluate a new thick-needle phosphor plate, compared to existing powder phosphor plates, for computed radiography.

Material and methods

Two studies were performed. Patients acted as their own controls. The first study compared old powder and new needle phosphor plates. 20 infants had chest x-rays with both new and old systems, within three days of each other. Exposure factors were constant for both images.

The second study compared standard and reduced exposure techniques (mAs reduced by 20 Image pairs were randomly presented to five reviewers, with regard to location of the first or second image of each pair being displayed

on the left or the right PACs monitor. For both studies the readers asked to indicate their preference for either the left or right image, using a five-point scale.

Results

Comparing old and new phosphor plate technology at fixed exposure, there was a significant preference for images obtained with the new needle phosphor ($P < 0.01$). When dose was reduced using the new needle phosphor plates, readers could not distinguish between the high and low dose images ($P < 0.19$). A dose reduction of 20

Discussion and conclusions

Using new needle phosphor plates radiation dose for neonatal chest radiographs can be reduced

42.6 Quality Assurance: A New Method of Monitoring Radiation Exposure for Portable Chest Radiographs in Neonates

Matt Cooper, Mervyn Cohen, Kelly Piersall

Purpose - Objective

Radiation dose for neonatal chest imaging should be kept as low as possible. Upward exposure drift is a very undesirable adverse outcome from using digital imaging systems; radiation dose can increase markedly without any detectable change in the final image.

We evaluate a new, simple quality assurance method for monitoring exposure. This method incorporates the recently developed Exposure Index.

Material and methods

Our Agfa Workstation automatically keeps a record of the exposure index for every patient. We analyzed data from 1049 neonatal portable AP chest images from August 1, 2009 to September 21, 2009. A daily exposure of a Gammex Neonatal Chest Phantom was also performed as a control.

We calculated the exposure index for each week of the study.

Results

The mean weekly exposure index was stable indicating no dose drift during the study period. The range of exposures for the study period for both patient chest radiographs and phantom data was bell shaped.

The mean exposure index for the chest radiographs was 496, with a standard deviation of 208.

The mean exposure index for the phantom was 619, with a standard deviation of 43.

Discussion and conclusions

The exposure index is an excellent tool to monitor the consistency of patient exposures on large numbers of neonatal patients. Changes in technologist exposure settings or equipment output can be identified and corrective action taken.

42.7 Dose Distribution in Pediatric Abdominal CT Examination - Using elliptically-shaped sheet-roll phantom -

Rumi Gotanda, Toshizo Katsuda, Tatsuhiko Gotanda, Akihiko Tabuchi, Tadao Kuwano, Hidetoshi Yatake, Yoshihiro Takeda

Purpose - Objective

To keep radiation doses as low as reasonably achievable during pediatric abdominal CT, detailed dose measurement is important. Dose distribution in the elliptically-shaped sheet-roll phantoms [with short-long axis size of 6-8 (neonate), 10-12 (infant) and 12-14 (three-year-old children) cm] were measured using radiochromic film (RF).

Material and methods

The phantoms were made by rolling flexible acrylic sheets in an elliptically-shaped. The RFs were positioned from the center to the surface along the long- and short-axis directions in each phantom. Each phantom was held on the CT bed.

Results

The shape and size of the phantoms were appropriately set by the shape of central core and controlling of the sheet length. When the center dose at 10-12 cm phantom was taken as 100

Discussion and conclusions

The maximum exposed area was the surface in pediatric abdominal CT. However, the surface dose distributions were complicatedly changed by the distance from the center. Additionally, the depth dose distributions in phantom were influenced with the attenuation of CT bed.

42.8 A focused performance improvement program to increase on time starts for fluoroscopy patients

MohammadReza Hayeri, Ebony Johnson, Bridgett Maddox, Audrey Nickens, Patricia Williams, Maggie Johnson, Delores McDaniel, Raymond Sze

Purpose - Objective

The purpose of this project was to increase on time starts and decrease patient wait times for fluoroscopic procedures.

Material and methods

Multiple obstacles contributed to a fluoroscopy service that frequently operated behind schedule, leading to patient and staff frustration. A multidisciplinary team was charged with improving on time starts (defined as the patient entering the fluoroscopy room at their scheduled time). The challenges fell into five main categories: 1) inadequate patient education; 2) unclear intra and interdepartmental communication; 3) add on patients; 4) disorganized work areas; 5) lack of standardized protocols. During the six month-duration of the project, each category was systematically addressed by the team. The mean weekly percentage of on time starts were recorded and shared at weekly team meetings.

Results

In the beginning of the program the percentage of patients with on time starts was 62

Discussion and conclusions

Clinical performance improvement can be achieved through systematic identification of the problems and a multidisciplinary approach to solving them. The ultimate goal is to provide high quality and efficient care while optimizing the patient and staff experience.

42.9 Pharmacokinetics and Safety of Gadobenate Dimeglumine in Patients 2-5 Years of Age

Gianpaolo Pirovano, Mieczyslaw Pasowicz, Ningyan Shen, Miles Kirchin, John Parker, Alberto Spinazzi

Purpose - Objective

To assess blood pharmacokinetics (PK) and safety of gadobenate dimeglumine in children aged 2-5 years undergoing MRI of the CNS.

Material and methods

15 subjects (7m/8f, mean age 3.5y) received 0.1 mmol/kg gadobenate dimeglumine for a clinically indicated study. Blood was drawn 1h predose, and at 5 min, 10 min, 30 min, 1h, 2h, and 6h postdose. Urine was collected up to 24h postdose. Blood and urine samples were analyzed for gadolinium (Gd) using ICP-AES. PK parameters were calculated from blood Gd concentration-time data using compartmental and noncompartmental techniques. Adverse events (AEs) were monitored to 72h postdose.

Results

Peak Gd concentrations (range: 50.6-91.1 $\mu\text{g/mL}$) were seen immediately following contrast injection. Gd blood levels dropped rapidly over 30-60 min, followed by a slower rate of decline. At 6h residual Gd in blood was close to 1.0 $\mu\text{g/mL}$, indicating successful clearance from the blood. Mean urinary elimination half-life was 1.2h. PK parameters were consistent whether determined by noncompartmental or compartmental techniques. Four mild AE were recorded in 2 pts. Changes in vital signs, ECG parameters, and lab tests were unremarkable.

Discussion and conclusions

Gadobenate dimeglumine was well tolerated in children undergoing MRI. PK parameters were similar to those previously observed in adults. Adjustment of gadobenate dimeglumine dosage in children age 2-5 does not appear to be necessary.

Conflict of interest

All authors except Dr. Pasowicz are employees of the Bracco Group

42.10 A simple tool for enhancing transcription of radiological reports

Philipp Walzl, Andreas Melcher, Erich Sorantin, Alexander Kolli

Purpose - Objective

Transcription of radiological reports represents a complex process. No special education for the administrative staff responsible for that task exists. Therefore a simple tool was developed for enhancing the transcription process.

Material and methods

Radiological reports were analyzed by an in-house written software, where all words were cross correlated with the dictionary of the Microsoft (MS) Office software. It was assumed, that all words of a report not included in the dictionary could represent a medical term. A list of these words could serve as an index for misspelled or unknown words.

Results

20,389 CT reports were analyzed (29

Discussion and conclusions

A new tool, based on common available software was developed for enhancing transcription optimized for a given institution. The large number of reports needed to train the system underlines the complexity of the transcription process and identifies this step as the weak part in the whole chain from image acquisition to report delivery.

43 Symposium Low dose, total body imaging 2

44 Scientific session 10: Miscellaneous, radiation protection

44.1 An interactive oral presentation of a video study into children's perceptions of the radiology department and its various imaging modalities.

William King, Joanna Fairhurst, David Murday

Purpose - Objective

Children have very different expectations and understanding of the radiology department that we as clinicians may not be aware of or have forgotten. Some do not know what is going to happen to them whilst some understand fully. We undertook a video interview study to obtain the children's perceptions of our department and its modalities.

Material and methods

We present an interactive video study of children, of varying ages, before and after they have undergone imaging in our department. The video clips are completely from the child's perspective and the answers we get are both interesting and informative. The presentation involves audience participation as audience members have to choose a child on the interactive screen, listen to the child's initial perception of what is going to happen then guess what study is about to be undertaken. The audience then listens to the same child's positive and negative feedback of their experience.

Results

We present children's individual positive and negative experiences of our department and their recommendations for improvement (e.g. Some children find silence or darkness upsetting).

Discussion and conclusions

We aim to stimulate discussion amongst colleagues and refresh in our minds the importance of providing children as positive an experience as possible. Our study suggested that the simplest things go a long way in making children more at ease.

Conflict of interest

Nil

44.2 Contrast enhanced low MI sonography in paediatrics - applications and limitations

Martin Stenzel, Hans-Joachim Mentzel

Purpose - Objective

By means of contrast enhanced sonography it is possible to detect tissue perfusion with high sensitivity and characterize tumours with high reliability. Contrast enhanced sonography is well established in adult patients, however, experience in its intravenous use is limited in children and adolescents. In children it is almost exclusively used to assess vesicoureterorenal reflux.

Material and methods

12 children with different tumour entities and infectious diseases were examined with fundamental and contrast enhanced ultrasound. Sonovue(TM) was used as the contrast medium in several fractions. Two examiners carried out the examinations on a Philips HD11 XE ultrasound machine.

Results

Perfusion of tissue was easily detectable irrespective of breathing movements even in jittery children. Hepatic tumours could be classified depending on enhancement (arterial, portal and late phase). Complicated cysts could be classified due to their lack of perfusion.

Discussion and conclusions

Ultrasound is the first line imaging modality in children and adolescents since it is a radiation-free procedure which can be performed easily. Contrast enhanced sonography overcomes the limitations - moderate sensitivity in detecting low and slow blood flows and motion/breathing artifacts - of Duplex and Power Duplex sonography.

44.3 Digital X-ray examinations in the neonatal intensive care unit: Dose optimisation using a neonatal chest phantom

Martin Stenzel, Christin Gössel, Tibor Vag, Jens-Peter Heyne, Hans-Joachim Mentzel

Purpose - Objective

In order to obey the ALARA principle dose optimisations in paediatric X-ray imaging should be sought. By using a phantom, the best exposition parameters were found.

Material and methods

Dose measurements were done in a neonatal chest phantom (Gammex 610) with lines and tubes attached. Two different X-ray tubes were used and cassettes were read out in a Agfa DX-S digitizer. Five readers assessed 1. anatomic structures, 2. location of lines and tubes, 3. pathological lesions, 4. image noise, 5. overall quality.

Results

1. Most of the anatomic details were sufficiently visible at an ESD of 3 Gy. 2. The most difficult line to correctly delineate was the PIC, at 5 Gy there were errors in detection. 3. A low inter-observer variability was found.

Discussion and conclusions

With modern X-ray imaging systems the dose can be lowered to a minimum value of 5 Gy in neonatal thoracic films. This value is much lower than the one suggested by the European Guidelines on Quality Criteria for Diagnostic Radiographic Images in Paediatrics. A neonatal phantom is of great value in finding the best X-ray parameters to obey the ALARA principle.

44.4 Processing optimization in Pediatric femur examinations - a phantom project focusing on dose optimization when using Canon's new DR Spectra software

Helle Precht, Oke Gerke, Bjørge Hafslund, Bo Mussmann

Purpose - Objective

To develop knowledge for informed considerations regarding dose reduction and image quality in paediatric radiography and to reduce patient dose based on the process heat algorithms in Canon's DR system. Options for software optimization were studied in relation to optimal image quality and follow-up examinations, to investigate when it may be possible to accept inferior image quality and thus comply with ALARA.

Material and methods

A quantitative experimental diagnostic study based on experiments with technical and human phantoms. A technical CDRad phantom was used and the pictures were analyzed using CDRad software, giving results as objective IQF values. The human phantom was replaced with a lamb pelvis with femur, which offers absorption comparable to a 5-year-old child according to the report by NRPB. The human pictures were analyzed by 3 radiologists specializing in paediatric bone examinations using the relative VGA scale and the absolute VGA scale.

Results

Software impact on image quality was great, but the dose effect will always influence the experienced quality. CDRad analysis of the software base caused image quality factors, which are important in human images, to be impossible to assess.

Discussion and conclusions

Optimal image quality is maintained at a dose reduction of 70mAs, all based on MLT(S)-optimized images.

44.5 Dose savings in Computed Tomography (CT) due to a new, dedicated Kernel for Image Reconstruction - Influence on Image Quality

Erich Sorantin, Ulrike Wießpeiner

Purpose - Objective

At CT new, dedicated image reconstruction kernels promise to reduce noise (thus allowing to reduce dose) and keep image contrast. Therefore the paper was targeted to assess image quality in respect to a new, dedicated kernel for CT image reconstruction.

Material and methods

26 oncologic patients (21 children and 5 adults) were scanned by the Toshiba AquilionOne for chest CT follow-up. The first examination was reconstructed with the standard kernel (FC14) at follow-up by a new, dose saving one (FC17), all other parameters were kept constant. Radiation burden was measured by the dose length product. Influence on image quality was evaluated by rating the following parameters: image noise, stripe artifacts, soft tissue discrimination in axilla and mediastinum, visibility of bronchi and bone structure on a five point scale (excellent to bad) by the authors in consensus.

Results

Dose saving of 50

Discussion and conclusions

In chest CT 50

44.6 Proposed technique to reduce radiation dose in pediatric chest and abdomen CT along with reduction in image noise without compromising lesion detection by using adaptive iterative reconstruction versus filtered back projection CT.

ANURADHA SHENOY-BHANGLE, Sarabjeet Singh, Manudeep Kalra, Sjirk J. Westra

Purpose - Objective

Proposed reduction in radiation dose with comparison of image noise and visibility of subtle lesions on Adaptive Statistical Iterative Reconstruction(ASIR) and Filtered Back Projection(FBP) reconstructed pediatric chest and abdomen CT images.

Material and methods

In an IRB approved study, 50 consecutive patients underwent standardized CT on a 64-slice MDCT scanner. Two experienced pediatric radiologists reviewed the FBP and ASIR CT images in a randomised manner for various parameters using a four point scale. Radiation doses in terms of CTDI vol, DLP were compared in age, weight, clinical indication matched patients. Objective image noise and CT numbers were measured in descending thoracic aorta and a homogenous area of liver for chest and abdomen. Student t test was used for statistical analysis.

Results

No significant difference observed in lesion conspicuity or visibility of small structures. Subjective image noise was graded as average in FBP and below average in ASIR images. Objective image noise was lowered by 22

Discussion and conclusions

ASIR lowers subjective and objective image noise without causing any artifacts; lowers CT radiation dose by upto 30

Conflict of interest

Nil.

44.7 Radiation exposure of obese children from body CT: are they appropriately treated as adults?

Sjirk Westra, Singh Sarabjeet, Anuradha Shenoy-Bhangle, Randheer Shailam, Manudeep Kalra

Purpose - Objective

To assess dose and image quality of scans performed with longitudinal automatic exposure control (AEC) on obese children and compare them with fixed mA techniques.

Material and methods

In a sample of 150 pediatric body CT scans, 9 were identified as dose outliers (> 2 SD above group mean). We recorded kV, mA range and CTDIvol. In scans obtained with AEC, we compared CTDIvol with that from a corresponding age-adjusted fixed mA acquisition at 120 kV. We measured image noise as standard deviation of attenuation values within a homogeneous region of interest placed in subcutaneous fat. We compared dose and noise of scans performed with AEC with historic scans performed with fixed mA, when available.

Results

All dose outliers occurred in obese children. 5/6 abdominal CT and 1/3 chest CT dose outliers were scanned at 140 kV. Dose in these outliers was between 1.6 and 3.6 times dose calculated for scans performed at 120 KV and with fixed mA. Noise varied between 7-24, and did not interfere with diagnostic image quality.

Discussion and conclusions

Because of the increased radiosensitivity of children, cancer risk estimates in obese children are increased compared to lean children and adults. Obese children are getting substantially higher doses when using 140 kV and/or AEC without specified maximum mA, than when using age-based fixed mA settings, but these higher doses may be required in order to limit noise.

Conflict of interest

MK received research support from GE Healthcare

44.8 Implementation of pediatric automatic exposure control (AEC) CT protocols which are based on weight, clinical indication and number of prior CTs

Sjirk Westra, Singh Sarabjeet, Randheer Shailam, Michael Moore, Manudeep Kalra

Purpose - Objective

To introduce color-coded pediatric CT protocols with AEC, based on patient weight, clinical indication and number of prior CTs, and evaluate technologist compliance, reduction in dose and effect on image quality.

Material and methods

Pediatric chest and abdomen CT protocols were divided into six color zones: pink (routine or rule out situation), green (low dose or follow-up CT), red (second follow up CT or ultra-low dose indications), yellow (stone protocol), blue (high dose indications for subtle lesions), and grey (CT angiography). Noise Index (NI), mA range, and kVp were adapted differently for each zone based on weight, babies (<20 lbs), cuties (21-60 lbs), kiddies (61-100) and teenies (>101 , <18 years). Radiation doses of 692 protocol scans were compared with non-compliant and historical scans.

Results

Compliance with recommended zones was 53

Discussion and conclusions

CT protocols with NI, mA range and kVp tailored to weight, clinical indication and number of prior CTs are easy to implement and can help in reducing radiation dose to children.

Conflict of interest

MK received research support from GE Healthcare

44.9 Labeling of contrast agent containers - a potential source of confusion and error

Mervyn Cohen

Purpose - Objective

Contrast containers are labeled in a complex manner. This may cause errors when contrast agents are administered.

Material and methods

We reviewed the manner in which the concentrations of contrast agents are presented on the package labels.

Results

We identified many sources of potential error.

Iodine. Each label of iodinated contrast displays two different concentrations. They are the concentration of iodine and the concentration of the chemical compound. This could result in miscommunication between the radiologist and the radiographer. For example an Isovue label says Isovue200/iopamidol 41Barium. The label displays the barium concentration by two different methods. Concentration is presented as weight per weight (w/w) i.e. grams of barium per 100 grams of final solution; and as weight per volume (w/v), i.e. grams of barium per 100 ml of final solution. As an example for EZ-HD a solution with 85 grams of barium per 100 grams of solution contains 250 grams of barium per 100 cc. of solution.

Gadolinium Gadolinium-based contrast agents are packaged with a gadolinium concentration of 0.5 mmol/ml, which is 0.1 mmol/0.2 ml. Dose is sometimes expressed in mmol units and sometimes as volume. Confusion can occur.

Discussion and conclusions

Errors in administration of contrast agents can occur if attention is not paid to confusing labeling of contrast containers

45 CT Dose Task Force Synthesis

46 Scientific session 11: Musculoskeletal 1

46.1 Prevalence of the Classic Metaphyseal Lesion in Infants at Low versus High Risk for Abuse

Paul Kleinman, Jeannette Perez-Rossello, Alice Newton, Patricia Kleinman

Purpose - Objective

Determine the relative likelihood of encountering a classic metaphyseal lesion (CML) in infants at low and high risk for abuse.

Material and methods

This 10 year retrospective study compared the prevalence of CMLs on high detail skeletal surveys in infants at low and high risk for abuse. Low risk defined as: skull fracture without significant intracranial injury on CT, history of a fall and no other social risk factors for abuse. High risk defined as: significant intracranial injury, retinal hemorrhages and skeletal injuries (excluding CMLs and skull fractures). Differences between low and high risk groups were calculated using Fisher exact test.

Results

There were 46 low risk infants, 0.1 - 11.3 months old (mean = 4.3 months) and 22 high risk infants, 0.8 - 10.2 months old (mean = 4.5 months). At least one CML was identified in 13 (59

Discussion and conclusions

Classic metaphyseal lesions are commonly encountered in infants at high risk for abuse and are rare in infants with skull fractures associated with falls, but no other risk factors. These findings support the view that the CML is a high specificity indicator of infant abuse.

Conflict of interest

None

46.2 3D Ultrasound in the Follow-Up of Developmental Dysplasia of the Hip Managed in a von Rosen Splint - Antenatal Applications Extended?

Mark Walsh

Purpose - Objective

To investigate the utility of 3D ultrasound technology in the imaging follow-up of developmental dysplasia of the hip (DDH) in neonates and infants managed in a von Rosen splint.

Material and methods

Thirty patients (age range: 1 - 12 weeks; mean age: 4.5 weeks) managed in a von Rosen splint for femoral head subluxation/dislocation and acetabular dysplasia underwent 3D US with the child in-splint - utilising a static anterior approach - and conventional 2D ultrasound applying the Graf technique out-of-splint. Image sets were reviewed by an experienced paediatric radiologist with the following parameters assessed and compared: 1. Femoral head coverage utilising the Morin technique. 2. Alpha angle measurement. 3. Qualitative comparison of acetabular and labral visualization.

Results

Alpha angle measurements obtained with sagittal 3D ultrasound reconstructions and conventional 2D ultrasound images showed a high correlation. 3D ultrasound reconstructions in the axial, coronal and sagittal planes clearly demonstrated femoroacetabular congruence, acetabular and labral morphology.

Discussion and conclusions

Currently, ultrasound follow-up of patients with DDH managed in a von Rosen splint necessitates removal of the child from the splint to allow assessment of acetabular maturity and femoroacetabular congruence with the attendant risks of suboptimal splint positioning following the study. Current 3D ultrasound technology offers an important

advancement in the imaging follow-up in this patient group allowing assessment of both acetabular maturation and femoroacetabular congruence with the child in-splint.

46.3 Acetabular immaturity - dysplasia in young adults. Preliminary results.

Lene Bjerke Laborie, Ingvild Engesæter, Trude G. Lehmann, Lars B. Engesæter, Karen Rosendahl

Purpose - Objective

We examined the prevalence of acetabular dysplasia at skeletal maturity in healthy young adults, and investigated associations with range of hip-movements.

Material and methods

In a population-based, longitudinal study on DDH, 4004 adolescents were invited to undergo clinical and radiological hip-examinations. 2081(52

Results

Radiographs of 2073 adolescents (58

Discussion and conclusions

A high proportion of 18-19y-olds (16

46.4 MRI findings of *Kingella kingae* osteomyelitis in children

Aikaterini Kanavaki, laura merlini, dimitri ceroni, tristan zand, sylvianne hanquinet-ginter

Purpose - Objective

Kingella kingae is an emerging microorganism recognized as the more frequent pathogene in osteoarticular infections (OAI) of young children. Diagnosis remains a challenge as pediatric patients present only mild symptoms suggesting OAI. Differentiating *K.kingae* from gram+ OAI is essential in starting adequate antibiotic therapy in the due time. This study was designed to assess magnetic resonance imaging (MRI) features useful in differentiating *K.kingae* from pyogenic OAI.

Material and methods

We included 20 patients (mean age 19.4 months) with proved *K.kingae* OAI. MRI findings were compared to those of 20 age-matched children with *S.aureus* OAI. Evaluated parameters were: soft tissue reaction, bone edema, subperiosteal abscess, intra-osseous abscess and chondro-epiphyseal involvement. One senior orthopedist and one senior radiologist interpreted the MRI. Interobserver agreement was also measured.

Results

Interobserver agreement was good for subperiosteal abscess, satisfactory for bone reaction and bad for soft tissue reaction. Compared to gram+ microorganisms, cartilaginous affection was markedly more frequent in *K.kingae* OAI whereas bone edema was less severe and subperiosteal abscess less frequent. Soft tissue analysis and presence of a bone abscess were not useful parameters in discriminating the microorganisms.

Discussion and conclusions

Chondro-epiphyseal preferential localization and less subperiosteal abscess incidence are typical MR findings of K. kingae OAI. MR findings, although not specific, provide useful information to differentiate K. kingae from gram+ OAI, allowing a prompt and more effective treatment

46.5 Incidence of Avascular necrosis in patients with Acute Lymphoblastic Leukemia

Shruti Moholkar, Karl Johnson, Mark Velangi, Wolfgang Hogler

Purpose - Objective

We endeavour to document the incidence of avascular necrosis in children on ALL therapy at our institution.

Material and methods

Retrospective review of the oncology database over the last 3 years to identify children on ALL therapy with review of their Magnetic Resonance Imaging.

Results

24 patients included in the review.

Discussion and conclusions

Avascular necrosis is increasingly being recognised as a complication of acute lymphoblastic leukaemia (ALL) treatment, especially since dexamethasone was included in ALL treatment protocols. Clinical symptoms of avascular necrosis usually present during ALL maintenance therapy but often lag behind the MRI features. MRI is considered the gold standard for detection of avascular necrosis, which predominantly occurs at the weight-bearing lower extremities.

During and after ALL treatment, children should be specifically asked about musculoskeletal pain with low threshold for performing MRI if there is clinical suspicion.

47 Hip Dysplasia Task Force Synthesis

48 Coffee break

49 Posters Musculo-skeletal

49.1 TITLE. THE SO-CALLED OSTEOCHONDROSIS: A GROUP OF DIFFERENT CLINICAL ENTITIES. IMAGING FINDINGS IN CHILDREN AND ADOLESCENTS. THE EPONYMS

Florencia de Barbieri, Oscar Navarro, Carlos Toledo, Rodrigo Parra, Claudio Berrios, Cristian Garcia

Purpose - Objective

There are a number of different clinical entities reported in children and adolescents, that have been put together, under the so-called “osteochondrosis” group, and the literature has been confusing regarding the descriptions of the diseases, etiology, significance, imaging and management of these entities. The purposes of this poster are: to discuss the different types of “osteochondrosis” in children, emphasizing the significantly different clinical and imaging findings among them, and to mention the people who originally described them.

Material and methods

We reviewed retrospectively our experience in the clinical and imaging diagnosis of the different types of “osteochondrosis” in children and adolescents. We also searched the literature to find the eponyms of each of them.

Results

We found representative cases of each type of “osteochondrosis” and selected the best images, including plain radiographs, ultrasonography, CT, and MRI, trying to correlate them with the clinical findings. We also summarized the biography of the people who originally described them.

Discussion and conclusions

The term “osteochondrosis” has been widely used in children and adolescents and is confusing, including a group of clinical entities, with different etiology, significance, imaging and management. We propose to avoid using this term and separate these entities according to these criteria..

Conflict of interest

None

49.2 Imaging Pyomyositis in children

Ignasi Barber, Xesco Soldado, Celestino Aso, Amparo Castellote, Goya Enriquez

Purpose - Objective

Pyomyositis in children is a rare infectious condition, although it is increasingly reported in temperate climates. The purpose of this study is to review our patients and to analyze the imaging findings using US, MRI (including Diffusion WI), CT and Nuclear Medicine.

Material and methods

A retrospective study of the imaging records of 18 patients was made. Different Imaging modalities were used, including US, CT, MRI and NM and Imaging findings were reviewed.

Results

The most frequent muscular involvement was in the pelvis, related to pelvic osteomyelitis. The other cases were: primary iliopsoas pyomyositis, long bone osteomyelitis or septic arthritis with adjacent pyomyositis, multifocal tropical primary pyomyositis, focal pyomyositis in patients with a recent vaccine administration, fungal opportunistic muscular infection and necrotizing fascitis. US was the first imaging technique used and it was determinant for treatment decision in some patients. Magnetic resonance imaging gave the most useful information for determination of the extension and proving bone or joint involvement. The use of DWI was useful in some patients to determine the areas of abscess formation.

Discussion and conclusions

US and MRI are the diagnostic tools of choice for diagnosing pyomyositis in children. DWI may have a role depicting areas of abscess formation and as a quick whole body Imaging when a haematogenous spread is suspected. CT is useful when treatment decision is urgent

Conflict of interest

None

49.3 Use of ultrasonography for the diagnosis of temporomandibular joint disorders in children with juvenile idiopathic arthritis.

Giovanni Pieroni, Cecilia Lanza, Giancarlo Fabrizzi, Vittoria Galeazzi, Lucia Amici, giovanni pieroni

Purpose - Objective

The aim of this work is investigate the usefulness in children with juvenile idiopathic arthritis (JIA) of ultrasonography (US) in the study of temporomandibular joint (TMJ), comparing ultrasonographic diagnosis of TMJ disorders with those based on an accurate clinical examination.

Material and methods

Participants in this study were 47 consecutive pediatric patients (mean age 10 aa) with JIA. All 94 TMJs were evaluated with US to detect the presence of intra-articular effusion and condylar profile erosion . A clinical score based on the Research Diagnostic Criteria for Temporomandibular Disorders (RDC-TMD) was performed in all patients at the time of US evaluations by a pediatricrheumatologist. Agreement between the two diagnostic techniques has been evaluated by means of Cohen's K test.

Results

US showed a good agreement with clinical assessment for the diagnosis of both intra-articular effusion (percentage of agreement 80

Discussion and conclusions

When compared to a standardized clinical assessment, ultrasonographic technique showed a good diagnostic capability to detect TMJ intra-articular effusion and bone erosion. Within all the limitations of this study, it can be suggested that US could represent a promising imaging technique in the study of temporomandibular joint.

49.4 MRI assessment of bone marrow changes in children with juvenile idiopathic arthritis: inter and intra-observer variability in a multicenter study

Laura Tanturri de Horatio, Domenico Barbuti, Claudia Bracaglia, Maria Beatrice Damasio, Karen Rosendahl, Karine Lambot-Juhan, Peter Boavida, Clara Malattia, Lucilla Ravà, Saverio Malena, Paolo Tomà

Purpose - Objective

The present study is part of a multicenter longitudinal study on juvenile idiopathic arthritis (JIA) performed during 2006 - 2009. Controversy still exist as to the prognostic value of bone marrow oedema (BME) in JIA, however, the importance of a reliable scoring method for MRI changes suggestive of BME is essential. Aim: to assess the inter and intra-observer variability for BME in JIA children.

Material and methods

Wrist MRI's in 76 JIA children were read twice (time interval: 6 weeks) by two experienced radiologists from two different centers. BME was defined as an ill-defined lesion within the trabecular bone, returning high signal on T2-w and low on T1-w images, with or without increased enhancement. The extension of BME was scored for each of 14 carpal bones according to the adults OMERACT RA-MRI scoring system, as 0-3.

Results

Bone marrow changes suggestive of BME were seen in 276/1064 (25.9%). The intra-observer agreement was high for reader 1 and 2 (k values: 0.85-1 and 0.49-1) with total intra-observer intraclass correlation coefficient (ICC) of 0.99 and 0.97 respectively. The inter-observer agreement was moderate-good (k values: 0.41-0.79), with a total ICC of 0.89.

Discussion and conclusions

Our results suggest that this scoring system is reliable and can be used for an initial assessment and later monitoring of signal changes suggestive of BME in JIA.

49.5 Size, shape and position of the mandibular condyle during childhood.

Christoph Karlo, Sandra Habernig, Paul Stolzmann, Lukas Müller, Traudel Saurenmann, Christian Kellenberger

Purpose - Objective

To determine size, shape, position and age related changes of the mandibular condyle in children of all age.

Material and methods

420 mandibular condyles of 210 asymptomatic children (mean age, 7 years; range, 0-17 years; 81 girls) were analyzed on transverse CT images. The greatest left-right diameter (LRD), the greatest anterior-posterior diameter (APD) and the anteversion angle (AA) of the mandibular condyles were measured by two readers. An APD/LRD ratio was calculated. The shape of the condyle was graded into 4 types on reconstructed sagittal images by both readers. Parameters were compared using unpaired t-tests and correlated with the children's age using Pearson correlation analyses.

Results

Mean LRD was 14.2 mm (range, 8.2-22.3), mean APD was 7.1 mm (4.9-11.8), mean LRD/APD ratio was 1.90.3 (1.1-3.3), mean AA was 27.7 degrees (3-49). The sagittal types correlated significantly with the children's age (R1: $r=0.55$, $p<0.05$; R2: $r=0.69$, $p<0.01$). The LRD ($r=0.70$, $p<0.01$), APD ($r=0.56$, $p<0.01$), and ratio ($r=0.28$, $p<0.01$) increased significantly while the anteversion angle decreased ($r=-0.26$, $p<0.001$) significantly with the children's age. All parameters were transferred to percentile rank tables in respect to sex and age.

Discussion and conclusions

The mandibular condyle is subject to significant changes in size and shape during childhood. As the size of the condyles increases, the anteversion angles decrease and the shape of the condyle turns from round to oval.

49.6 Lipofibromatosis - A rare pediatric soft-tissue tumor.

Noah Ditkofsky, Stefan Potoczny, Eric Sala, Chitra Pushpanathan, John Hopkins

Purpose - Objective

Lipofibromatosis is a rare pediatric neoplasm that presents as a soft tissue mass, has a predilection for the extremities and has a natural course of continued growth. The continued growth of the lesion can result in disfigurement, loss of function or the need to amputate. The purpose of this display is to increase awareness of lipofibromatosis.

Material and methods

Histopathologic, radiographic, CT and MRI findings are used to describe lipofibromatosis.

Results

Histologically, Lipofibromatosis demonstrates adipose tissue traversed by spindled fibroblast-like cells. Plain film demonstrates a subtle increase in soft tissue density that may displace surrounding structures. CT demonstrates a lesion of increased fat density without a discrete capsule that can insinuate into adjacent muscle, making the lesion's borders difficult to identify. This can distinguish it from lipomas which do not typically invade into surrounding tissue. MRI demonstrates a fatty lesion that insinuates into muscle, is of mixed high T1 signal (similar to subcutaneous fat) and demonstrates drop-out of signal on fat suppression sequences. This lesion is of low signal on T2 and inversion recovery sequences. There is no contrast enhancement. There is no bony edema or secondary edema in adjacent tissues.

Discussion and conclusions

Lipofibromatosis is a relatively new entity that is unfamiliar to most radiologists. Consideration of this lesion in the differential diagnosis of fatty lesions may lead to earlier diagnosis and decreased patient morbidity.

49.7 Multimodality Imaging of Skeletal Manifestations of Sickle Cell Anemia in Children

Ian Robinson, Aisling Snow, Jenny Bracken, Eithne Phelan, Roisin Hayes, Corrina McMahon

Purpose - Objective

Sickle cell anaemia is the commonest monogenic disease world-wide and is most prevalent in those of African ethnicity. It is characterized by the presence of an abnormal Haemoglobin, HbS. This abnormal Haemoglobin can polymerise producing red cell deformity (Sickling) and rigidity causing vasoocclusion and tissue necrosis. Any organ can be affected but bone disease is one of the most frequent symptomatic manifestations. We review the spectrum of skeletal manifestations in this disorder.

Material and methods

We reviewed the radiology records of 351 patients with sickle cell disease. Those patients with imaging of skeletal manifestations of sickle cell disease were identified and their imaging reviewed.

Results

24 patients were identified with skeletal manifestations of sickle cell disease. The spectrum of abnormalities included dactylitis(n=6), epiphyseal infarction(n=3), infarction within long bones(n=4), infarction within other bones, including ribs(n=2) and mandible(n=1), H-shaped vertebrae(n=4), evidence of marrow hyperplasia(n=3) and osteomyelitis(n=3). Imaging modalities used included plain radiograph, ultrasound, scintigraphy, CT and MRI.

Discussion and conclusions

Dactylitis is the most common skeletal manifestation, particularly in infants. Bone infarction however may occur within any marrow containing bone. Epiphyseal infarction may simulate Legg-Calve-Perthes disease. Acute bone infarction may be clinically and radiologically difficult to differentiate from osteomyelitis. MRI is particularly useful in this respect. Multimodality imaging allows early and accurate diagnosis of sickle bone disease facilitating more effective management strategies.

Conflict of interest

None

49.8 Diffusion Weighted Imaging at 3 Tesla for normal pediatric hip.

baunin christiane, vial julie, sales de gauzy jerome, sans nicolas, railhac jean-jacques

Purpose - Objective

To assess Diffusion Weighted Imaging (DWI) and to measure the Apparent Diffusion Coefficient (ADC) for normal hip in children, while analysing the age-related changes.

Material and methods

Prospective study in 23 children (16 boys; 7 girls), age 3.5-10.5 years (mean 6.5). Evaluation of 40 normal hips. Examinations were performed on a 3T unit : DWI Spin Echo EPI sequences in an axial plane, applying b diffusion gradients at 0 and 1000 s/mm². ADC values were calculated within the femoral epiphysis.

Results

Normal ADC values were: 1.27x10⁻³ mm².s for the younger child to 0.42x10⁻³ mm².s for the older one (mean 0.68 x10⁻³ mm².s). No difference was noted between boys and girls, neither than between right and left side. Linear relationship ADC/age was obtained.

Discussion and conclusions

The interpretation of DW images in the growing skeleton poses unique challenge. This stresses the importance of the knowledge of normal reference values of ADC, with their age-related evolution, before using DWI for pediatric hip disorders.

49.9 Diffusion Weighted Imaging at 3 Tesla for Legg-Calvé-Perthes Disease: preliminary results.

baunin christiane, vial julie, gellee stephane, sales de gauzy jerome, sans nicolas, railhac jean-jacques

Purpose - Objective

To assess Diffusion Weighted Imaging (DWI) for Legg-Calvé-Perthes Disease (LCPD) in evaluating the staging and evolution.

Material and methods

Prospective study in 21 children (17 boys; 4 girls), age 3.5-10.5 years (mean 6.5) with 22 pathological hips (14 right side, 8 left side). MRI examinations were performed on a 3T unit : DWI Spin Echo EPI sequences in an axial plane, applying b diffusion gradients at 0 and 1000 s/mm². Apparent Diffusion Coefficient (ADC) values were calculated within the femoral epiphysis in both side (pathological and normal). 30 MRI exams were performed : 21 for all patients at the beginning of the disease (MRI 1), 9 for 9 patients 6 months later (MRI 2).

Results

ADC values on pathological hip were always greater than those on normal hip. MRI 1 : statistically significant difference ($+ 0.8 \times 10^{-3} \text{ mm}^2/\text{s}$) between LCPD side (mean $1.47 \times 10^{-3} \text{ mm}^2/\text{s}$) and normal side (mean $0.67 \times 10^{-3} \text{ mm}^2/\text{s}$). MRI 2 : statistically significant difference ($+ 0.98 \times 10^{-3} \text{ mm}^2/\text{s}$) between LCPD side (mean $1.69 \times 10^{-3} \text{ mm}^2/\text{s}$) and normal side (mean $0.67 \times 10^{-3} \text{ mm}^2/\text{s}$). MRI 1/MRI 2: statistically significant elevation of ADC values.

Discussion and conclusions

LCPD may be difficult to stage. This study shows that DWI seems to have a potential role to play in the follow up of this disease. Further studies will be necessary to check if DWI can provide valuable prognostic informations.

49.10 Use of Ultrasonography as the useful approach in diagnosis and management of JRA of the knee and hip: comparison between US and MRI data

Manuela De Vivo, valeria bolli, Cecilia Lanza, Vittoria Galeazzi, Lucia Amici, Giovanni Pieroni, Maria Clementina Pupillo, Benedetta Fabrizzi, Francesco Sessa, Giancarlo Fabrizzi

Purpose - Objective

purpose of this work is to examine the potential role of musculoskeletal ultrasonography in the assessment and management of inflammatory arthritis, and especially, in juvenile rheumatoid arthritis of knee and hip. An early, accurate detection and quantification of inflammatory tissue is now accepted to be crucial for diagnosis, assessment and management of JRA.

Material and methods

we have studied 60 consecutive patients (mean age 11) with positive biochemical analyses or in progress at the beginning and during the disease progression. Then we have evaluated the results and compared them with clinical and MRI data.

Results

In all patients we have found a good relation between US and MRI features, particularly in the knee, not always with clinical data.

Discussion and conclusions

The key to successful management of JRA is its early objective detection and ongoing surveillance of disease activity. Ultrasonography has emerged as a very useful tool because it's safe and portable, it offers relevant informations about cortical bone and soft tissue, yields high resolution, dynamic images in multiple planes, gives the possibility of comparison with contralateral side and it's less expensive than MRI.

49.11 The Usefulness of MRI in Juvenile Idiopathic Arthritis

Eu Leong Harvey Teo, Asiri Musaed

Purpose - Objective

To illustrate the usefulness of MRI in the evaluation of patient with JIA

Material and methods

JIA is a chronic arthropathy that begins in patients less than 16 years old and persists for longer than 6 weeks. Different categories of JIA are recognized under the International League of Associations for Rheumatology (ILAR) classification. The diagnosis of JIA is often a diagnosis of exclusion. Plain radiographs are used in the initial evaluation of these patients. However, the role of plain radiographs in the diagnosis, follow up and the evaluation of the soft tissue manifestations of the disease is limited.

Results

Ultrasound has been shown to be useful in the evaluation of patients with JIA. However, it is an operator-dependant modality and does not provide a panoramic view of the involved joint. MRI provides excellent contrast resolution and is able to directly image early synovial proliferation, pannus activity, joint effusions, internal joint derangement as well as cartilage and bone erosion. MRI is therefore useful in diagnosing, categorizing the type of JIA, staging the severity of joint involvement, monitoring disease activity and assessing treatment response in patients.

Discussion and conclusions

This poster will illustrate how MRI complements plain radiographs and ultrasound in the evaluation of these patients with JIA. This poster will place emphasis on difficult clinical cases where MRI has proven valuable in the management of these patients.

Conflict of interest

NIL

49.12 Paediatric non-accidental hand fractures:a radiographic review

Gajraj Sharma, Luis Sanz

Purpose - Objective

1.To determine and describe common pattern of occurrence of non-accidental injury 2.To describe the imaging appearance of hand fractures in non-accidental injury. 3.Literature review and provide a radiographic review on non-accidental hand fracture

Material and methods

We retrospectively analyzed and reviewed 5 cases of paediatric non-accidental hand fracture, of all cases of hand injuries in paediatric group. Review of cases and radiographs was undertaken jointly with Radiologist and Paediatrician.

Results

5 cases were identified. We describe radiographic features of these cases, with review of literature. Twisting and jiggling of the fingers result in “metaphyseal corner” fractures, which are highly suggestive of non-accidental injury in contrast with the accidental diaphyseal “torus” fractures. Such mechanism results in sub-periosteal haematoma and it becomes apparent in follow up films as periosteal calcification.

Discussion and conclusions

Non-accidental fractures are tragically not unfamiliar to Radiologist and Emergency Physicians, particularly in the field of paediatrics. Fractures of hands have a strong association with non-accidental injuries, however since 1955, paediatric hand fractures have received little attention with reference to non-accidental injuries. The diagnosis of NAI is multidisciplinary, suspected cases need to be referred to Paediatrics and Radiology for further investigation. It is hoped that this radiographic review will raise awareness amongst clinicians on this subject and assist in identifying common clinical and radiographic patterns so to minimise the risk of these hand injuries going undiagnosed.

Conflict of interest

None

49.13 Post mortem skeletal surveys in suspected non-accidental injury: an imaging review

Owen Arthurs, Helen Moss, Anna Gomez, Pat Set

Purpose - Objective

We perform many skeletal surveys on young children who are suspected of suffering non-accidental injury (NAI), some of whom are recently deceased. Here, we compare the findings from live and dead children to identify potential differences between patient demographics, nature of injury, and the difficulties encountered in obtaining adequate images.

Material and methods

We retrospectively reviewed all skeletal surveys performed on children for suspected NAI under the age of 3 years, between 2004 and 2008.

Results

196 skeletal surveys were performed for suspected NAI, with a mean age of 7.1 months. 16 /67 (23

Discussion and conclusions

The overall incidence of positive skeletal surveys was lower in dead children than those alive, although this may be due to demographics and nature of injury, as well as our local referral pattern. Children who did not survive their injuries were significantly younger. Rigor mortis and post mortem artefacts made obtaining good images difficult; we submit guidance for performing skeletal surveys in the deceased child.

Conflict of interest

None

49.14 Spinal MRI findings in juvenile idiopathic arthritis

Sanna Toiviainen-Salo, Kati Markula-Patjas, Liisa Kerttula, Irma Soini, Outi Mäkitie

Purpose - Objective

Objective: This cross-sectional study aimed to assess the prevalence and the characteristics of spinal MRI findings in children with severe polyarthritic or systemic juvenile idiopathic arthritis (JIA).

Material and methods

Materials and methods: The study included patients with severe JIA treated in a tertiary rheumatologic hospital. Spinal MRI (0.23T) was performed and vertebral deformities, endplate irregularities, intervertebral disc involvement, back muscle status, the spinal canal and neural foramina were analyzed

Results

Results: Altogether 50 patients (41 females; median age 14.8 y; median disease duration 10.2 y) with systemic JIA (14

Discussion and conclusions

Conclusions: Patients with severe JIA have a high prevalence of vertebral, endplate and intervertebral disc abnormalities on MRI. The majority of these abnormalities are located in the lower thoracic spine.

Conflict of interest

None

49.15 Cat-scratch disease: our US experience

Bojan Vucinic, Polina Pavicevic, Zeljko Smoljanic

Purpose - Objective

Cat-scratch disease is common among the children having a cat as a pet. The paper will show US findings in axilla region, and liver and spleen manifestation of this disease.

Material and methods

We followed 12 children in two years study, 7 boys and 5 girls, 4-14 years with anamnestic finding of axillary gland enlargement, fever, pain, laboratory positive findings for inflammation and information of cat contacts. The study was performed on Siemens Antares US equipment.

Results

In all children examination of axilla region showed solitary or multiple enlargement of lymph nodes, seven of them had splenomegaly and two had a hepatic hypoechoic lesions- small cysts- less than 5mm. All patients were laboratory confirmed positive for disease.

Discussion and conclusions

This primary and follow up study showed that US finding has a significant role in diagnosing this disease, in correlation with anamnestic (clinical and laboratory) information.

49.16 An audit of spinal ultrasound for sacral dimples detected on routine newborn examination.

Nasim Tahir, Annmarie Jeanes

Purpose - Objective

Sacral dimples are associated with occult spinal dysraphism. The Royal College of Radiologists guidelines state that isolated sacral dimples which are >5 mm from the midline, >25 mm from the anus or associated with other stigmata of spinal dysraphism should undergo spinal ultrasound. The purpose of this study was to audit our experience of spinal ultrasound performed for sacral dimples.

Material and methods

Patients undergoing spinal ultrasound for sacral dimple were identified from the radiology database of a large teaching hospital during January 2009 - January 2010. The reason for the request was recorded as were the scan findings.

Results

During the study period, 32 patients (21 male, 11 female) underwent spinal ultrasound for sacral dimple. The median time interval from birth to scan was 39 days. The reason for the request was: inability to visualise the base (21), presence of hair (4), >5mm from midline (1), no reason (6). A deep connection was identified in one case. The reason for referral for this patient was the presence of a sacral dimple 40mm from the midline. No abnormality was detected on the other scans.

Discussion and conclusions

Spinal ultrasound for sacral dimples has a low yield. The commonest reason for referral in our study was an inability to visualise the base of the dimple on clinical examination. However, this was not associated with an abnormal spinal ultrasound.

49.17 THE HAND AS AN INDICATOR OF SYSTEMIC DISEASES IN CHILDREN

Florencia de Barbieri, Claudio Berrios, Oscar Navarro, Cristian Garcia

Purpose - Objective

The hand is often involved in skeletal or metabolic disorders, malformations and Syndromes in the pediatric age group and a simple radiograph of the hand may be useful in the diagnostic approach. The purpose of this study is to show those clinical entities where the hand could show findings suggestive of a specific disease and try to characterize the imaging findings.

Material and methods

We classified the different entities that could show radiological hand abnormalities and reviewed our experience in our Institutions, with the imaging studies of those entities, looking for radiological findings that could give a clue for the final diagnosis..

Results

We found a significant number of clinical entities, where a simple radiograph of the hand could give the clue for the final diagnosis and classified them according to the type of underlying disease.

Discussion and conclusions

A simple radiograph of the hand could give the clue for the diagnosis in a significant number of diseases and these findings should be considered by the radiologist at the first diagnostic approach

Conflict of interest

None

49.18 Ultrasound of the pectoralis complex in patients with Poland syndrome

Maura Valle, Maria Grazia Calevo, Francesca Maiuri, Carlo Martinoli

Purpose - Objective

This paper describes the ultrasound (US) findings in patients with Poland syndrome.

Material and methods

We examined n=150 consecutive patients (age range, 8 months to 25 years) affected by Poland syndrome with US. In each study, US provided information about: 1) status of any of the three heads (clavicular, sternocostal, abdominal) of the PMaj; 2) presence and size of the PMaj tendon; 3) status of the pectoralis minor (Pmin); 4) vessel size and blood flow characteristics from the ipsilateral subclavian, axillary and internal mammary arteries; 5) status of the latissimus dorsi. US data were matched with clinical findings. Statistics were performed with multivariate regression analysis.

Results

Complete agenesis of the PMaj was found in 82/150 cases (bilateral in one). These patients had the highest rate of costal and hand abnormalities. Agenesis of the latissimus dorsi was observed in 5

Discussion and conclusions

US can complement clinical examination to assess abnormalities of the pectoralis complex in patients with Poland syndrome.

Conflict of interest

None

49.19 Assessment of active inflammation in juvenile dermatomyositis: A novel scoring system.

Warren Davis, Jim Halls, Amaka Offiah, Clarissa Pilkington, Karen Rosendahl, Catherine Owens

Purpose - Objective

MRI is an established and effective modality for the assessment of inflammatory changes in active juvenile dermatomyositis (JD). The purpose of this paper was to assess the reproducibility of a novel scoring system we have developed for the objective assessment of JD activity. This system defines markers of disease activity (muscle, soft tissue, and perifascicular oedema) in 4 muscle groups (gluteal, hamstring, quadriceps and adductors).

Material and methods

48 children (33 girls) underwent retrospective assessment of their MRI studies by two musculoskeletal paediatric radiologist for the presence of disease activity. Each observer performed the readings on two separate occasions. The degree of concordance between the two observers, and between the two readings was assessed using kappa analysis.

Results

There was fair to moderate agreement between the two observers for all the examined disease activity markers, kappa values ranging from 0.3 to 0.7. There was good intra observer agreement between the two readings (kappa values between 0.5-0.9 in 8 / 10 markers for observer 1 and 9 / 10 for observer 2). There was no difference according to the side evaluated.

Discussion and conclusions

There was fair to moderate agreement between the two observers in the evaluated parameters, and moderate to substantial agreement intra observer correlation in the majority of cases. The proposed scoring system would therefore produce reliable reproducible results.

49.20 The L5 interpedicle distance - a useful measurement on scoliosis images

Alan Oestreich

Purpose - Objective

One measurement that has not been emphasized on frontal scoliosis films, the L5 interpedicle distance, may identify patients with otherwise idiopathic scoliosis who have lumbar spinal stenosis.

Material and methods

With IRB approval, a series of scoliosis images on patients at least 14 years of age had L5 interpedicle measurements recorded, which were then compared to the classic 90

Results

The mean L5 interpedicle measurement in the standards of Hinck was 29mm. In our preliminary series of 30 adolescents, 13 (43

Discussion and conclusions

Discussion. This preliminary study revealed a large number of borderline or significantly low L5 interpedicle distances. In all such subjects, the question of lumbar spinal stenosis, which may be clinically pertinent, especially if scoliosis surgery is contemplated, ought to be considered. Conclusion. Measuring and reporting the L5 interpedicle distance in adolescents with scoliosis can identify subjects who may have pertinent lumbar spinal stenosis.

Conflict of interest

No conflict of interest

49.21 The supra-acetabular notch of the acetabulum: MR imaging findings of this anatomical variant.

Marie Bitar, Jacques Malghem, Jean-Emile Dubuc, Christine Galant, Frédéric Lecouvet, Bruno Vande Berg

Purpose - Objective

The supra-acetabular notch also known as the stellate lesion is an anatomical variant of the acetabulum defined as a tiny focal depression of the subchondral bone plate of the upper aspect of the acetabular roof. Frequently seen on hip radiographs, this notch can be also be recognized at hip MR imaging.

Material and methods

We report the MR imaging findings observed in 4 cases of supra-acetabular notches of the hip and histological findings observed in one resected specimen.

Results

On T1-weighted images, the 4 reported notches appeared as small elongated or cone-shaped low signal intensity areas involving the acetabular roof. Their appearances on T2-weighted images was more variable, most likely due to content variability. Adjacent marrow showed normal signal intensity in 3 cases and abnormal signal intensity consistent with edema in one case.

Discussion and conclusions

Further study is mandatory to assess the frequency and natural history of the supra-acetabular notch and to better define its variable MR patterns.

49.22 Does ultrasonographic findings of patellar tendon correlated with hormone concentrations in adolescent female volleyball players?

UGUR TOPRAK, Sevinc Bostanoglu, Gizem ?rem Kinikli, Gülcan Aktas, Gul Baltaci, Alp Karademir

Purpose - Objective

The purpose of this study was to investigate the correlation between the distribution of patellar tendon structure and the estradiol, progesterone, luteinizing hormone (LH), follicle-stimulating hormone (FSH), and prolactin (P) concentrations in blood in elite female adolescent volleyball players.

Material and methods

Sixty volleyball players (120 patellar tendons) were evaluated axial area and thickness in insertion of proximal and distal of patellar tendon by ultrasonography (US). Concentrations of estradiol and prolactin were assessed via radioimmunoassay (RIA). Progesterone, LH, and FSH concentrations were determined via enzyme-linked immunoassay.

Results

There was found a correlation between FSH and left distal diameter ($r = -.276$; $p < 0.05$); and progesterone and left distal diameter ($r = .315$; $p < 0.05$) by Pearson Correlation coefficient statistical analysis test.

Discussion and conclusions

Our results indicate that there is a significant correlation between FSH and progesterone and the thickness of patellar tendon suggesting that fluctuating levels of sex hormones may influence the stiffness of the patellar tendon. Jumper's leg of all players are related to increased the thickness of the patellar tendon and decreased the levels of FSH and progesterone. Future studies that examine the relationship between sex hormones and the physical performance of the patellar tendon should be focused near the ovulation phase of the menstrual cycle.

49.23 Dynamic ultrasound in neonatal hip instability. Quantitative evaluation of instability and presentation of new normative references.

Thröstur Finnbogason

Purpose - Objective

To quantify the laxity of normal and clinically unstable hips in newborn infants by combining clinical examination and anterior dynamic hip examination.

Material and methods

498 newborn infants with definite or suspected hip instability on clinical examination, and or risk factors for developmental dysplasia of the hip (DDH) underwent a combined clinical and ultrasound examination at a mean age of 12.2 days. A special examination table allowed one examiner to simultaneously perform clinical hip examination and anterior dynamic ultrasound. The quantitative evaluation of instability was made by measuring the distance between the femoral head and the anterior acetabular brim at rest and during stress, and the relative and absolute displacement of the femoral head was calculated.

Results

The mean absolute displacement or laxity was 0.9 mm (SD=0.65) for hips judged to be normal on repeat clinical examination and on static and dynamic ultrasound examinations, 1.2 mm (SD=1.4) for unstable/borderline hips and 3.7 mm (SD=2.19) for dislocatable/dislocated hips. The corresponding relative values were 6.0

Discussion and conclusions

The method adds objectivity to the subjective clinical evaluation of neonatal hip stability and is proposed as a complement to the clinical hip examination in ambiguous cases.

49.24 Osteoid osteoma in paediatric patients. Significance of dynamic gadolinium enhanced MR imaging.

Ignasi Barber, Xesco Soldado, Cesar Fontecha, Amparo Castellote, Goya Enriquez

Purpose - Objective

To demonstrate the usefulness of dynamic gadolinium enhanced MR imaging in paediatric patients with clinical symptoms of bone pain and equivocal findings in the non-contrasted MRI and other imaging techniques

Material and methods

We present three pediatric patients between 2 and 11 years-old. X-ray, Bone scintigraphy and unenhanced MRI were performed for evaluation of bone pain.

Results

The diagnoses of hip arthritis, stress fracture of the tibia and talar dome osteochondritis were considered. A new MR imaging study including dynamic gadolinium enhancement demonstrated the presence of a vascular nidus in the proximal epiphysis of the femur, the metaphysis of the tibia and the talar neck in each one of the three patients. Definitive diagnosis of osteoid osteoma was established using localized CT.

Discussion and conclusions

Osteoid osteoma is a benign tumor that usually begins with the characteristic symptoms of bone pain. CT and bone scan are considered specific imaging techniques for its diagnosis. MR imaging has become a useful imaging techniques in paediatric patients with localized bone pain, absence of radiation and sensibility are the main advantages but usually have a low specificity. Dynamic gadolinium enhanced MR imaging is useful to depict the vascular nidus of

the osteoid osteoma and it should be considered as part of the imaging protocol when this diagnosis is considered. In our short series this technique was paramount for the final diagnosis.

49.25 Lessons learned from the follow-up skeletal survey

Delma Jarrett, Paul Kleinman

Purpose - Objective

The skeletal survey is the standard for radiologic assessment of suspected abuse. Findings may be absent, inconspicuous, or indeterminate initially and studies have shown that a 2 week follow-up survey enhances diagnostic accuracy.

Our objective is to illustrate the value of follow-up skeletal surveys in diagnosing previously occult injuries, confirming anatomic variants, and providing insights into the morphology and behavior of traumatic lesions as they heal.

Material and methods

Review of initial and follow-up surveys performed at our institution for suspected child abuse.

Results

The classic metaphyseal lesion may be inconspicuous initially, but becomes evident with increasing mineralization of the fracture fragment. If there is displacement of the epiphyseal/metaphyseal fragment and periosteal stripping, subperiosteal new bone formation may be visible on follow-up. Acute rib fractures are often invisible initially, and it is only the presence of callus/subperiosteal new bone on follow-up that permits diagnosis. Acromial fractures may be inconspicuous initially, but will show subsequent evidence of healing. Pelvic fractures, a rare abusive injury, may be invisible initially, becoming evident on follow-up. Normal developmental variants, such as those involving the metaphyses and the superior pubic ramus, will usually be unchanged on follow-up.

Discussion and conclusions

The follow-up skeletal survey can be useful in identifying indicators of child abuse, differentiating them from their mimics, and clarifying the age of injuries.

49.26 Ultrasound abnormalities of peripheral joints in Juvenile Idiopathic Arthritis (JIA) and correlation with clinical examination.

Sylvain Breton, Sandrine Jousse-Joulin, Claire Cangemi, Loïc de Parscau, Alain Sarau, Valérie Devauchelle-Pensec

Purpose - Objective

JIA prognosis depends on joint damage due to synovitis. Ultrasonography is a very sensitive tool to detect synovitis. However, there is no standardization of the technique and correlation with clinical findings is poorly described. The aim of our study was to define ultrasound abnormalities in metacarpophalangeal (MCP) and metatarsophalangeal (MTP) joints during JIA and to compare those findings with clinical examination.

Material and methods

Patients with recent JIA in according to Durban criteria were included. MCP (2 to 5) and MTP (1 to 5) were examined bilaterally. Physical examination considered pain and/or swelling. A trained sonographer, blinded to clinical results, diagnosed UltraSound Synovitis (USS) considering OMERACT criteria validated for adults. Particular attention was given to associated synovial hypertrophy, joint effusion, cartilaginous vascularization or bone erosion.

Results

31 patients were included. 558 joints were evaluated. 12.4USS was preferentially located at MTP 1 (22.6Synovial hypertrophy ($p<0.0001$), joint effusion ($p<0.0001$), and cartilaginous vascularization ($p=0.0004$) were associated to USS. Bone erosion was not.

Discussion and conclusions

OMERACT definition of active USS can be used for JIA. US is a non invasive procedure in detecting distal synovitis clinically undiagnosed in JIA.

49.27 Congenital indifference to pain with anhidrosis- a radiological review

hanna schulman, Yakov Levy

Purpose - Objective

congenital insensitivity to pain with anhidrosis(CIPA)is an exceedingly rare autosomal recessive,genetic disease.it is caused by mutations in the Neurotrophic tyrosine kinase receptor ,type1.(NTRK1) The aim of our study was to evaluate the spectrum of skeletal manifestations ,sinoocular complications and the cranial CT features.

Material and methods

In our desert area ,the Bedouin tribes constitute a closed society and the consanguineous marriages are the custom.This has resulted in a large group of 40 children affected by CIPA.The age range was 3 months to 19 years of age-their skeletal surveys were analysed. Brain ct scans were performed in in 10 patients because neonatal hypotonia and/or psychomotor retardation.

Results

We observed the following skeletal patterns- acroosteolysis, pathologic fractures with exuberant callus formation ,avascular necrosis, joint dislocations and deformities ,pseudoarthrosis. osteomyelitis ,vanishing bones. Faccial area included mandibular osteomyelitis and ethmoiditis with orbital cellulitis.The brain CT scan showed mild brain atrophy with mild ventriculomegaly.

Discussion and conclusions

CIPA is a severe condition that leads to self-mutilation early in life. Later their orthopedic conditions reduces ambulation capacity, life quality,and life expectancy with dramatic in fluence on their families. Mental retardation is common.

49.28 Chondrodysplasia punctata type 2, x-linked dominant (CDPX2): case report and review of the literature

Domenico Noviello, Francesco Esposito, Roberto Carbone, Luigi Esposito, Antonio Strino, Patrizia Oresta

Purpose - Objective

Radiological assessment of skeletal and urogenital abnormalities in a case of chondrodysplasia punctata type 2, x-linked dominant (CDPX2), confirmed by genetic counseling.

Material and methods

Comes to our observation M.C., a newborn baby girl 2 days old, for suspected abdominal cystic mass. Radiological (RX, CT, US) and genetical examinations, instead of a mass, show hydroureteronephrosis with an enlarged bladder, in the context of a chondrodysplasia punctata type 2.

Results

The little patient, preterm daughter of an alcoholic and diabetic mother, showed facial dysmorphism, eyelid edema, blepharophimosis, hexadactyly, cutaneous dyskeratosis with macerated skin and congenital heart disease. Radiological examinations revealed dolicocephaly, punctate calcifications of vertebral bodies, ischiopubic rami, sternum, larynx, scapula, olecranon, carpal and tarsal bones, congenital dislocation of the left hip, hydronephrosis.

Discussion and conclusions

Chondrodysplasia punctata (CPD) is a clinically and genetically heterogeneous rare disorder that affects infants and young children, mainly characterized by punctiform calcification of the bones. X-linked dominant CPD, also known as Conradi-Hunermann syndrome, is the most well-characterized form. Accurate incidence and prevalence data are not available for this rare disease (Orphanet suggests a prevalence of 1-9/1.000.000). There are many diseases (growth deficiency, abnormalities of face and neck, skin defects, hydronephrosis) associated with the CDPX2, but before obtaining an essential genetic counseling or an evaluation of the levels of 8-dehydrocholesterol, these calcifications may then suggest the correct diagnosis.

49.29 Osteo-articular infection in young children: What's new?

Béatrice Leloutre, Myriam Guesmi, Marco Albertario, Edouard Chau, Anne Geoffray

Purpose - Objective

Illustrate various clinical and radiological aspects of osteoarticular infections in young children, highlighting the specific contribution of MRI.

Material and methods

We reviewed imaging examinations (plain films, ultrasound and MRI) performed in young children (excluding neonatal period) with suspected osteo-articular infection .

Results

Multiple examples of infection will be presented and discussed. Knee may be concerned as classically but also small bones in the foot or pelvic girdle with extensive soft tissue reaction. Causal organisms are multiple , sometimes not diagnosed even after biopsy.

Discussion and conclusions

In our experience, presentation is often subacute with seasonal peak. Infection preferentially affects children aged 15 to 30 months, and predominantly the lower limb, children presenting with lameness . Clinical symptoms are non specific, biological parameters not always significant. Plain films and ultrasound may help but not in every case. Requested in emergency, MRI STIR sequence with a large field of view to start and then adjusted to region of

interest, assesses the diagnosis, precises topography of anomalies (osseous, articular or both, or soft tissues), detects multifocal disease and guide surgical procedure before treatment Sometimes , it may objectivate another etiology. It has a high negative predictive value. Osteo-articular infection in children should be treated promptly to avoid complications and further functional deficiencies. MRI requested rapidly avoid diagnostic delay, and may detect unsuspected localisations.

Conflict of interest

none

49.30 Imaging of the spine in scoliosis, is nuclear medicine necessary in addition to MRI?

aideen ni mhuineachain, Simon Mc Gurk, Meave McPhillips, Kaseem Ajilogba

Purpose - Objective

Pre operative work up for scoliosis surgery in our institution involves whole spine radiographs and MRI. Bone scan is performed if there is a history of back pain to exclude a discrete bone lesion. This study aims to assess if bone scan is a necessary adjunct to MRI.

Material and methods

Data was collected retrospectively via the electronic patient record. All patients referred from the spinal service for MRI and bone scan between November 2007 and November 2009 were included. Seventeen patients in total (fifteen females and two males). Mean age 14years 2 months (range 9 years 5 months to 16 years 3 months). All investigations were blind reported by two paediatric radiologists. Any discrepancy between MRI and bone scan was recorded.

Results

Bone scan did not identify any additional pathology when compared to MRI. Two abnormal bone scans resulted in localised CT, which were reported as normal and so correlated with the MRI findings. MRI identified extraspinal findings in 4 cases.

Discussion and conclusions

This study shows that spinal MRI alone is an adequate investigation to exclude underlying bony pathology in this group of patients. Bone scan did not add useful information and resulted in further unnecessary investigations. It may still have a role in those patients where MRI is not appropriate.

49.31 Limb length measurement with the EOS system: comparison with conventional systems.

Sylvain Breton, Eric Stindel, Alban Genu, Mathieu Auffret, Bernard Sénécaïl, Pierre Forlodou

Purpose - Objective

The EOS system allows for low dose musculoskeletal radiographic exploration in several indications, including pediatrics. Its place in the limb length evaluation is not well defined yet. The aim of our study was to compare EOS and conventional X-ray systems capabilities for limb length measurement.

Material and methods

Acquisitions were done on 30 dry femurs with two conventional X-ray systems (film and fluoroscopic scanning system), the EOS system (2D and 3D) and a CT-scan. Femur length was measured by two independent observers between the top of the femoral head and the intercondylar fossa. CT-based measurements were considered as the gold standard. Accuracy, as well as the intra and inter-observer reliability were accessed through the 95Dosimetric evaluation of the conventional X-ray systems and of EOS was done by measuring the entrance dose with TLD dosimeters and by comparing the dose-area products on phantoms.

Results

EOS limb length measurement accuracy, intra and inter-observer reliabilities were excellent. The dosimetric study showed a significant dose reduction on the EOS system.

Discussion and conclusions

Unlike conventional systems, where the cone beam creates enlargement of the structures being imaged, EOS slot scan technology enables true size imaging, associated with a significant dose reduction. This makes this system particularly well adapted to measure limb length, especially with pediatric population.

49.32 The importance of contrast and post contrast subtraction MRI studies as the ultimate diagnostic tools in the differentiation between osteomyelitis and osteonecrosis in children with haematological disorders.

afshin alavi , elizabeth dick

Purpose - Objective

When clinical and laboratory results do not distinguish between osteomyelitis and osteonecrosis in children with haematological disorders, diagnostic imaging is required.

The purpose of this investigation is to illustrate the importance of MRI especially contrast sequences and introduce post contrast T1 Fat Sat subtraction sequences as the ultimate tool and unique method for confidently diagnosing osteomyelitis.

Material and methods

We reviewed MRI examinations of 20 children with haematological disorders and acute musculoskeletal pain. The diagnostic value of unenhanced, enhanced and subtraction sequences will then be compared and correlated with the clinical diagnosis, surgical and microbiological results.

Results

Our study revealed few cases with clear diagnosis through unenhanced sequences showing obvious signs of osteomyelitis as periosteal elevation, subperiosteal collection and cortical disruption with draining bone marrow pus. In most of the cases, the soft tissue and skeletal abnormalities in unenhanced sequences either in osteomyelitis or in bone marrow infarction, were similar and post contrast and subtraction sequences were required for the correct diagnosis. In subtraction sequences the inflamed areas are hyperdense and the infarcts or ischemic regions hypointense, without signal.

Discussion and conclusions

The significant association between abnormalities on subtraction and post contrast sequences with surgical and clinical findings of osteomyelitis and bone marrow infarct in children with haematological disorders, suggests that at this moment these sequences are the most valuable tools for distinguishing between the two diagnosis.

49.33 Multimodality imaging of nontraumatic back pain in children

Nishard Abdeen, Hurteau Julie

Purpose - Objective

Low back pain is an uncommon childhood complaint which may be caused by a variety of pathologies, some of which can lead to disability or death. The objective of this poster is to describe the imaging findings in children with back pain.

Material and methods

Patients who had a significant cause of back pain identified on imaging in our department over the last year were reviewed with respect to imaging findings on radiography, CT, and MR.

Results

Eight patients were found, with diagnoses including langerhans cell histiocytosis, osteoblastoma, pyogenic discitis, tuberculous spondylodiscitis, epidural abscess, spinal rhabdomyosarcoma, acute herniation of a large Schmorls node, spondylolysis and spondylolisthesis. The imaging appearance of these cases is described. Correlation between radiography, CT and MR suggested the diagnosis in most cases.

Discussion and conclusions

Children with nontraumatic back pain may have a wide variety of significant pathologies. Multimodality imaging can suggest the diagnosis in a majority of patients.

Conflict of interest

None .

49.34 Imaging in Congenital Spinal Deformity

Andrea Romsauerova, Athanasios Tsirikos, Hilary Sharp, Kaseem Ajilogba

Purpose - Objective

To present the experience of a collaborative approach between radiology and spinal team in the diagnosis and treatment of paediatric patients with congenital spinal deformities in a National Spinal Deformity Centre over a 6-year period as a pictorial review.

Material and methods

A retrospective review of the imaging of all congenital spinal deformity patients registered at the National Spinal Deformity Centre over a 6-year period was performed.

Results

The imaging modalities, spinal anomalies and associated abnormal intraspinal findings are described and illustrated.

Discussion and conclusions

Quality plain radiographs are essential to diagnose vertebral anomalies and other associated bony abnormalities; uniform terminology is needed in evaluating vertebral defects; define the role of CT scans in identifying vertebral anomalies; present the need for MRI scan to exclude intraspinal abnormalities; determine what the surgical team needs in anticipation of curvature correction.

Imaging is of critical importance in the management of congenital spinal deformities. The cooperation between radiologists and spinal surgeons is essential to accurately diagnose the pathology, define prognosis, and apply early surgical treatment when indicated.

49.35 Computer assisted evaluation of leg length inequality and alignment disorders in children.

Robin Azoulay, Ahmed Khadri, Jacques Massoud, Loic Le Henaff, Amina Sekkal, Ana Presedo, Guy Sebag

Purpose - Objective

Radiographic assessment of skeletal maturity is an important aspect for predicting leg length inequality and for planning treatment. A computer assisted method is presented to assess leg length according to bone age and serial measurements.

Material and methods

Ultra low Dose radiology(EOS2D,3D,Biospace) allows to determine leg length & alignment parameters in a manner that minimizes magnification and projectional errors. Computer aided assignment of bone age is performed through the methods of Pyle & Hoerr in the Knee and Acheson in the pelvis.

Results

Measurements from serial lower limb radiographs are automatically plotted against bone age. The software allows automatic construction of tables and graphs projecting future growth on the basis of current size and maturation (Hechard & Carliz graphs, Moseley straight-line graphs). The software assists in the determination of optimal time for surgery to correct a discrepancy. Finally, monitoring of cumulative dose from serial examinations (dose surface product) is also performed.

Discussion and conclusions

Computer assisted evaluation of leg length inequality and alignment disorders may facilitate and secure the procedure in children.

Conflict of interest

This work has been supported by a grant from Medicen Paris Région - Convention n 08 2 90 6489 EJ

49.36 Transient synovitis of the hip (TSH): involvement of the asymptomatic side.

Pierre-Etienne Brinon, Marie Bitar, Philippe Clapuyt, Pierre-Louis Docquier, Renaud Menten

Purpose - Objective

To assess the percentage of bilateral hip involvement in TSH. To show that both hips involvement increase specificity and positive predictive value of ultrasonography (US) for the diagnosis of TSH.

Material and methods

A prospective study including 130 patients with a recent onset, non traumatic hip pain and/or limping is still in progress. Bilateral thickness/shape of the anterior synovial recess and the presence of joint effusion are sonographically evaluated.

Results

We find more than 25

Discussion and conclusions

As a high rate of bilaterality is confirmed in TSH in comparison with other diseases (Legg-Perthes disease, septic arthritis,...), involvement of an asymptomatic hip should increase specificity and positive predictive value of US for the diagnosis of TSH.

49.37 Juvenile idiopathic arthritis: Assessment of synovitis with early and late gadolinium enhanced MR imaging.

Peter Boavida, Karine Lambot-Juhan, Laura Tanturri de Horatio, Maria Beatrice Damasio, Clara Malattia, Lil-Sofie Ording, Catherine Owens, Karen Rosendahl

Purpose - Objective

To analyse wrist synovial MR enhancement characteristics in children diagnosed with JIA and correlate findings with clinical markers of disease activity.

Material and methods

180 children with JIA wrist disease (as diagnosed by the International League of Associations for Rheumatology ILAR revised criteria) were included in the study and the clinically worse affected wrist was imaged. Immediate and 10 minute 3-dimensional gadolinium enhanced sequences were obtained. Synovial enhancement at the radio-ulnar, radio-carpal, mid-carpal, first carpo-metacarpal and second to fifth carpo-metacarpal joints was scored for both sequences according to a recently developed protocol to assess wrist disease in JIA. A total score for the early and late enhancement sequences of each examination was obtained and results were compared with clinical markers of disease severity.

Results

An increase in the amount of synovial enhancement on the delayed sequence when compared with the early sequence was observed in approximately 60

Discussion and conclusions

Studies demonstrating the ability of dynamic MRI to characterise synovial inflammation have concentrated on adults. These established techniques are less suited to young children given the many practical limitations. Instead we propose this simplified approach which has proven accurate when compared to clinical markers of disease activity/synovitis.

50 Scientific session 12: Musculoskeletal 2

50.1 Prevalent Vertebral Fractures among Children Initiating Glucocorticoid Therapy for the Treatment of Rheumatic Disorders

MaryAnn Matzinger, Nazih Shenouda, Brian Lentle, Adam Huber, Martin Charron , Craig Coblentz, Josee Dubois, Reinhard Kloiber, Helen Nadel, Kathy O'Brien, Martin Reed, Kerry Siminoski, Keith Sparrow, Colin Webber, Leanne M Ward, the Canadian STOPP Consortium

Purpose - Objective

Vertebral fractures are an under-recognized problem in children with inflammatory disorders. We studied spine health among 134 children (87 girls) with rheumatic conditions (median age 10 years) within 30 days of initiating glucocorticoid (GC) therapy.

Material and methods

Children were categorized as follows: juvenile dermatomyositis (N=30), juvenile idiopathic arthritis (N=28), SLE and related conditions (N=26), systemic arthritis (N=22), systemic vasculitis (N=16), and other conditions (N=12). Thoracolumbar spine radiograph and dual-energy X-ray absorptiometry for lumbar spine areal bone mineral density (LS BMD) were performed within 30 days of GC initiation. Genant semi-quantitative grading was used for vertebral morphometry. Clinical factors were analyzed for association with vertebral fracture.

Results

Thirteen vertebral fractures were noted in 9 children (7

Discussion and conclusions

In pediatric rheumatic conditions, vertebral fractures can be present prior to prolonged GC exposure.

Conflict of interest

Authors have no conflicts of interest

50.2 Body Imaging findings in children on ketogenic diet

Kamaldine Oudjhane, Amer Shammas, Elizabeth Donner

Purpose - Objective

Purpose: the ketogenic diet is a valuable approach to intractable seizures in children. Long term effects of this diet have been reported .The objective of the study is to appreciate the diagnostic yield of body imaging in the management of such patients.

Material and methods

Material and Methods: This is a retrospective review of radiology database from our institution (12-year period) regarding ketogenic diet identified in diagnostic imaging including DXA scan for bone mineral density (BMD) of lumbar spine, urinary tract sonography and abdomen US and CT. It includes 37 patients (17 boys, 20 girls, age range 2y 5 m- 17y).

Results

Results: DXA scans obtained in 17 patients (21 examinations) demonstrated reduced BMD (Z-score less or equal to -2.0) in 9 patients. Abdominal sonography performed in 12 patients delineated abnormalities in the liver (mainly focal fatty infiltration signs) 6 times. Urinary system US (23 patients) showed nephrocalcinosis -urinary stones in 8 out of 30 studies. Abdomen CT (2 cases) was positive once (focal hepatic fat).

Discussion and conclusions

Conclusions: Most of the adverse effects of ketogenic diet involve growth retardation and nutritional metabolic deficiencies. Our analysis of findings tend to support that these effects target the calcium metabolism with the formation of urinary stones, reduced bone mineral density and the fatty infiltration of the liver.

Conflict of interest

None

50.3 Is there an increased fracture risk in healthy infants and toddlers with Vitamin D deficiency?

Jeannette Perez-Rossello, Henry Feldman, Paul Kleinman, Catherine Gordon

Purpose - Objective

Study imaging findings, biochemical markers and incidence of skeletal fractures in children with Vitamin D deficiency.

Material and methods

Forty-four patients with vitamin D deficiency ($25\text{OHD} < 20 \text{ ng/mL}$) were identified from 360 healthy children (8-24 months). Forty (90.9

Results

All readers identified rachitic changes in 2 patients (5

Discussion and conclusions

In healthy infants and toddlers with vitamin D deficiency, rachitic changes are very mild and uncommon; fracture risk is low.

Conflict of interest

None

50.4 Computer assisted evaluation of progression of spinal curvature in scoliosis.

Robin Azoulay, Jacques Massoud, Ahmed Khadri, Amina Sekkal, Loic Le Henaff, Brice Ilharreborde, Guy Sebag

Purpose - Objective

Radiographic assessment of spinal maturity is an important aspect of the prediction of scoliosis progression and of the treatment planning. A computer assisted method is presented to assess lateral-rotary curve magnitudes according to bone age and serial measurements.

Material and methods

Ultra low Dose radiology(EOS2D,3D,Biospace) allows to determine the magnitude of lateral-rotary curves and geometric parameters (such as vertebral rotational deformity, lateral tilt,Cobb's angle, pelvic tilt and pelvic incidence) in a reproducible manner that minimizes ionizing radiations and projectional errors. Computer aided assignment of bone age is performed through the method of Risser in the iliac crest and the method of Acheson in the pelvis.

Results

Measurements from serial full spine views are automatically plotted against bone age including Cobb's angle in order to produce Duval-Beaupère type curves. The software allows automatic construction of tables and graphs showing current curves progression, monitoring treatment and projecting potential future progression on the basis of current curve and maturation. The software assists in the planning and monitoring of orthopedic treatment and surgery. Finally, monitoring of cumulative dose from serial examinations (dose surface product) is also performed.

Discussion and conclusions

Computer assisted evaluation of progression of spinal curvature may facilitate and secure the procedure in children and adolescent with scoliosis

Conflict of interest

Grant from Medicen Paris Région - Convention n 08 2 90 6489 EJ

50.5 3D X-Ray analysis of the idiopathic scoliotic spine before and after surgery

Jean Pierre PRACROS, Aurelien Courvoisier, Vincent Paoli, Christophe Garin, Laurent Guibaud, Remi Kohler

Purpose - Objective

The three dimensional reconstruction of the spine can be obtained by a new stereo-radiographic device which enables to obtain a full assessment of the patient condition, on a standing position and low dose radiation. The objective of this study is to assess the 3D vertebral orientation before and after surgical treatment of idiopathic scoliosis.

Material and methods

This prospective study includes fourteen patients with the diagnosis of severe idiopathic scoliosis needing surgery. There were two males and twelve females, with a mean age of fifteen years old. Full spine frontal and lateral X-rays as well as 3D reconstruction using the EOS system (Biospace Med, Paris) were performed for each patient pre operatively and 10 days after surgery. Clinical parameters obtained automatically from the reconstruction software (such as computed Cobb angle, sagittal balance parameters and vertebral axial rotations) were compared.

Results

The mean Cobb angle improved significantly from 53 [Range 36-80] to 23 [Range 11-46]. Mean apical vertebra axial rotation statistically decreased from 21 preoperatively [Range 8-37] to 13 postoperatively [Range 0-27].

Discussion and conclusions

The EOS system enables to obtain two and three dimensional visualization of the spine with low dose radiation in standing position. In addition, it provides reliable measurements that can help surgeons plan surgery and quantify the results.

50.6 Ultrasound abnormalities of enthesitis in Juvenile Idiopathic Arthritis (JIA) and correlation with clinical examination.

Sylvain Breton, Sandrine Jousse-Joulin, Claire Cangemi, Loïc de Parscau, Alain Saraux, Valérie Devauchelle-Pensec

Purpose - Objective

Clinical assessment of peripheral enthesitis in JIA is difficult. Ultrasonography is an attractive technique to detect enthesitis compared to clinical examination. The aim of our study was to describe ultrasound findings in peripheral enthesitis in JIA and to compare those findings with clinical examination.

Material and methods

Patients with recent JIA were included. Quadricipital tendon, insertions of patellar ligament, calcaneal insertion of plantar fascia and Achilles tendon were examined bilaterally. Physical examination considered pain and/or swelling. A trained sonographer, blinded to clinical results, diagnosed UltraSound Enthesitis (USE) considering detection of vascularization at the entheseal insertion using Power Doppler. Particular attention was given to associated enthesitis hypertrophy, cartilaginous vascularization, bone erosion or bursitis.

Results

26 patients were included. 213 entheses were evaluated. 9.4 Bone erosion ($p=0.004$) and bursitis ($p=0.009$) were associated to clinical findings and USE. Enthesis hypertrophy and cartilaginous vascularization were not.

Discussion and conclusions

Isolated enthesitis hypertrophy is probably not a reliable sign for detecting enthesitis. Power Doppler vascularization at cortical bone insertion of enthesitis is sensitive as clinical examination and seems to be the better sign for USE.

50.7 Ultrasound findings on patients with JIA in clinical remission: a pilot study

Monica Rebollo Polo, Khaldoun Koujok, Roman Jurencak, Alessandra Bruns, Johannes Roth

Purpose - Objective

To assess whether children with juvenile idiopathic arthritis (JIA) in clinical remission show abnormalities on either grey scale or Power Doppler ultrasound.

Material and methods

Children with JIA in clinical remission defined by the absence of clinically active joints and serologic inflammation markers for at least 3 months were eligible. Ultrasonography of the wrist, knee and ankle with a 13 Mhz linear probe was carried out on previously affected joints. The images were read by 2 independent readers. Findings were categorized as: - structural abnormalities: synovial thickening or increased joint fluid - positive Doppler signal

Results

In 23 patients with varying previous joint involvement: - wrist: 3/8 normal, 5/8 had grey-scale and 1/8 Doppler abnormalities. - knee: 17/17 normal, with no Doppler abnormalities. - ankle: 6/14 had normal ultrasound of the tibiotalar joint, 8/14 grey scale and 2/14 Doppler abnormalities. 9/14 had normal talonavicular joints, 5/14 grey scale and 1/14 Doppler abnormalities.

Discussion and conclusions

The precise determination of active disease vs. remission is clinically relevant. Results of this pilot study indicate that for wrist and ankle joints the clinical assessment alone might not be sufficient. Nevertheless, structural abnormalities do not necessarily translate into active inflammation, as number of Doppler positive joints was lower. This study will inform the design of larger trials to determine the role of diagnostic ultrasound in the evaluation of remission status.

Conflict of interest

None

50.8 Development of the wrist. Normal standards based on MRI for 6-15 year olds.

Lil-Sofie Ording Müller, Derk F.M. Avenarius, Catherine Owens, Maria Beatrice Damasio, Karen Lambot-Juhan, Clara Malattia, Laura Tantarri de Horatio, Claudia Bracaglia, Marie Desgranges, Karen Rosendahl

Purpose - Objective

During a multicentre study of children with Juvenile Idiopathic Arthritis, a wide variation in appearances of the carpal bones was seen. Abnormal findings on MRI were not consistently related to disease activity. Our objective was therefore to assess normal appearances of the wrist, as assessed by MR.

Material and methods

Following ethical approval, 89 children underwent MRI (T1 and STIR) of the left wrist. We assessed number of bony depressions, distribution and amount of joint fluid and the presence of high signal within the bone marrow.

Results

89 healthy children, mean age 9.7y (range 5-15y) were examined. Bony depressions were seen in all, in increasing numbers with advancing age (mean 4.1 in 4-6y olds to 9.2 in 12-15y olds ($p < 0.001$)).

42 of 85 children (49.4

All children had joint fluid in at least one joint. No differences in presence or in amount (mild < 2 mm, moderate > 2 mm) of fluid were seen according to sex ($p = 0.445$) or age ($p = 0.762$) except from the amount of fluid in the CMC2-5.

Discussion and conclusions

The high prevalence of intramedullary signal changes, suggestive of bone marrow oedema, as well as the amounts of joint fluid are noteworthy, and should inform future diagnostics.

Conflict of interest

None

50.9 Carpal erosions in children with Juvenile Idiopathic Arthritis (JIA) as assessed on MRI. Repeatability of a novel scoring system.

Peter Boavida, Karine Lambot-Juhan, Laura Tantarri de Horatio, Maria Beatrice Damasio, Clara Malattia, Catherine Owens, Karen Rosendahl

Purpose - Objective

As part of a multi-centre study in juvenile idiopathic arthritis, we sought to establish a novel MRI scoring system for wrist involvement: addressing the inter- and intra-observer variability of carpal erosions/volume loss.

Material and methods

68 MRI scans of the wrist from 2 international centres were examined for presence of bony erosions. In cases of equivocal findings, additional parameters suggestive of inflammatory change or reduced joint space on a hand radiograph was required. For each of the carpal bones (excluding the pisiform), distal radius and ulna and proximal metacarpals, (14 bones) the bony volume loss was estimated on a 0-4 scale (0, 1=0-25

Results

976 bones were analysed in 68 patients with a median age of 11years 4months. The inter-observer variability was fair to good for the majority of bones (Kappa values of 0.5 for the lunate, trapezium, hamate, base of the 4th metacarpal and 0.8 for the base of the 1st metacarpal). Intra-observer variability was fair for assessing the 2nd and 4th metacarpals, the scaphoid and the distal radius (Kappa values of 0.4- 0.5), and good for the triquetrum, hamate, trapezoid, 1st and 3rd metacarpals (kappa values of 0.6-0.7).

Discussion and conclusions

Overall the reliability of this scoring system is good and its use as a tool in the initial evaluation and follow-up of JIA patients is promising.

50.10 Proposal of an MRI synovitis score in juvenile idiopathic arthritis: inter and intra observer reliability in a multicentre study.

Maria Beatrice Damasio, Clara Malattia, Laura Tantarri de Horatio, karen Lambot-Juhan , Karen Rosendahl, angela pistorio, alberto martini, gianmichele magnano, paolo tomà

Purpose - Objective

As part of an ongoing multi-centre study we aimed at assessing the inter- and intraobserver reliability of an MRI synovitis semiquantitative score for the wrist in patients with Juvenile idiopathic arthritis (JIA)

Material and methods

82 patients with JIA and with arthritis of the wrist were recruited. Synovitis was defined as the area in the synovial compartment with greater thickness and enhancement after MDC than normal synovium. The MRI synovitis scoring system was devised by a consensus of an international working group involving both pediatric radiologists and rheumatologists. Synovitis was assessed independently by two readers with >3 years expertise in musculoskeletal MRI at the distal radioulnar, radiocarpal, midcarpal and carpometacarpal joints, using three separate semiquantitative scoring system according to :a)Degree of enhancement (score range 0-2) b)Degree of inflammation (score range 0-3) c) Presence of joint Effusion . All the MRIs were rescored under blinded conditions 12 weeks after the previous review.

Results

71 MRI out of 82 were included in the study. Total intra-observer intraclass correlation coefficient (ICC) for observer 1 and 2 were respectively 0,94 (950,95 (95and 0,54 (95

Discussion and conclusions

The proposed synovitis score can be reliably employed in children with JIA

Conflict of interest

the authors have declared no conflicts of interest

50.11 Is a gadolinium enhanced sequence always required in knee MRI for patients with JIA?

SUSIE GOODWIN, Greg Irwin

Purpose - Objective

To evaluate our current practice of performing a gadolinium enhanced sequence in all patients undergoing knee MRI scans for known or suspected JIA. Our objective was to rationalise scan protocols amongst the many centres referring to our rheumatology service.

Material and methods

A retrospective review of all knee MRI scans performed at our institute over a 28 month period was performed using PACS. Scans were excluded if unenhanced, from another institute, in adult patients, or for other indications such as trauma or tumour. Presence of synovial hypertrophy/abnormal enhancement, joint effusion, erosions and popliteal lymphadenopathy was recorded.

Results

190 knees were scanned in 153 children. Of 91 contrast enhanced scans, 66 scans performed for JIA were further reviewed. Of scans in which synovial hypertrophy and abnormal enhancement were observed, an important minority demonstrated absence of any other abnormality including joint effusion.

Discussion and conclusions

Results suggest that gadolinium administration is of diagnostic benefit particularly in patients with otherwise normal scans. This is an important group which may represent clinically borderline patients. Extrapolation into MRI protocol supports including contrast enhanced sequences for all patients in the absence of contra-indications. This potentially optimises planning and use of scanner time, avoiding delays for unplanned cannulation and checking of unenhanced scans by radiologists.

Conflict of interest

The authors declare no conflict of interest.

50.12 Dating of fractures: an analysis of key radiological features in children aged five years and under

Ingrid Prosser, Alison Kemp, Sara Harrison, Zoe Lawson

Purpose - Objective

Given the clinical and legal significance of fracture dating in child abuse and lack of primary data, we set out to determine the key radiological variables in fracture healing, and their timeline.

Material and methods

We analysed digital x-rays of children 5 years of age and under, presenting during 2008 with accidental fractures of known timing. X-rays were reviewed independently by three paediatric radiologists, blinded to clinical details, evaluating six features of fracture healing (soft tissue swelling (STS), periosteal reaction, soft and hard callus, bridging and remodelling).

Results

Two hundred and twelve films of 78 fractures from 63 children, (mean age 3.9 years) were analysed. When STS was present, 88

Discussion and conclusions

This data defines the key features from which fracture dating can be estimated in young children. It is possible to date a fracture as acute (less than one week), recent (1-3 weeks) and old (more than 3-6 weeks) based on the presence or absence of five variables in combination.

Conflict of interest

None

51 Closure of the congress

Index of authors

Ajilogba, Kaseem, 3

Aso, Celestino, 5

Barber, Ignasi, 5

Biondetti, Pietro , 4

Bonelli, Nicola, 4

Borzani, Irene Maria, 4

Bryce, Thomas, 4

Calevo, Maria Grazia, 6

Canazza, Lorena, 4

Carnevali, Alessandra, 4

Castellote, Amparo, 5

Enriquez, Goya, 5

Hashimoto, Teisuke, 3

Kaji, Yasushi, 3

Kuwashima, Shigeko, 3

Leva, Ernesto, 4

Macchini, Francesco, 4

Maiuri, Francesca, 6

Martinoli, Carlo , 6

Pacharn, Preeyacha, 4

Pacharn, punchama, 4

Pavesi, Maria Angela, 4

Romsauerova, Andrea, 3

Rongviriyapanich, Chantima, 4

Sharp, Hilary , 3

Soldado, Xesco, 5

Torricelli, Maurizio, 4

Tsirikos, Athanasios, 3

Valle, Maura, 6