

Computed tomography stroke findings and population demographics at Pelonomi Hospital, Bloemfontein

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Background: Stroke remains the highest cause of death in patients more than 50 years old in South Africa and the fourth highest cause of death overall. There is a paucity of information regarding this disease in Free State province.

Objectives: To assess the stroke profile of patients referred for computed tomography (CT) imaging to our institution along with evaluating factors that could improve stroke management.

Method: The demographic information, stroke risk factors, stroke types and time to imaging were evaluated for all patients who presented for CT stroke imaging from July 2014 until July 2015. Information was gathered prospectively from the hospital and radiology information systems.

Results: The study included 174 patients (53.5% women, 46.5% men). Their mean age was 59 years (SD 14.6). The most prevalent risk factors were hypertension (83.7%), smoking (20.5%) and diabetes (15.0%). The population group consisted of 67.8% ischaemic ($n = 118$) and 32.2% ($n = 56$) haemorrhagic strokes. The majority of patients with a known time of symptom onset ($n = 102$) presented after 8 h (82.4%). The median order to report time (ORT) was 61 min (range 18–1361 min). The median arrival to report time (ART) was 32 min (range 4–893 min).

Conclusion: Our stroke population did not differ significantly from others in South Africa and Africa overall. Pre- and in-hospital delays significantly influenced patient numbers qualifying for thrombolysis.

Note: A selection of conference abstracts: RSSA/SASPI Paediatric Imaging Congress, 03–06 November 2016, Spier Estate, Stellenbosch, South Africa. Faculty collaborators: Professor Kassa Darge (Body Imaging, University of Pennsylvania, Philadelphia, USA), Professor Edward Lee (Thoracic Imaging, Harvard University, USA), Professor Beverley Newman (Cardiac Imaging, Stanford University, California, USA), Professor Kimberly Applegate (Image Gently and Body Imaging, Emory University, Atlanta, USA) and Professor Savvas Andronikou (Thoracic Imaging, University of Bristol, UK) supported by South African Paediatric Radiologists, co-ordinated by Dr Jaishree Naidoo, President of the African Society of Paediatric Imaging and Head of Division of Paediatric Radiology, Charlotte Maxeke Johannesburg Academic Hospital.

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Generalised lymphangiomatosis: A diagnostic challenge

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Background: Systemic, generalised lymphangiomatosis is a rare condition usually presenting in childhood or young adulthood. Characterised by proliferation of normal, mature lymphatic tissue, this benign disease may involve multiple organ systems. The brain is unaffected as it is devoid of lymphatic channels. The condition may ultimately result in severe, debilitating symptoms, and its aggressive nature may mimic malignancy. Because of its variable and unpredictable presentation, the evaluation of generalised lymphangiomatosis is a diagnostic challenge. The role of imaging is paramount in the diagnosis and establishing the extent of the disease.

Objectives: We present the case of a 3-year-old male with bleeding diatheses and hepatosplenomegaly clinically and large mediastinal mass on plain chest radiography. With a high index of suspicion for lymphoma, the child underwent multiple imaging modalities including chest and long bone radiography, abdominal ultrasound, contrast-enhanced chest and abdominal computed tomography (CT), with positron emission tomography (PET) and chest and abdominal magnetic resonance imaging (MRI).

Method: Imaging demonstrated a cystic, mediastinal mass encompassing the major vessels, pericardium and trachea. Similar masses were also located within the abdomen encasing the aorta. CT demonstrated splenomegaly with multiple low attenuation foci. There was no focal increase in 18-FDG uptake on PET/CT imaging. MRI confirmed multiple areas of bone marrow involvement.

Results: Histological evaluation of the bone marrow trephine was inconclusive. Biopsy of the mediastinal mass was histopathologically described as cavernous lymphangioma.

Conclusion: This case illustrates the obscure presentation and variable course of generalised lymphangiomatosis. Whole body short tau inversion recovery (STIR) MRI provides an indication of the extent of the disease including bone marrow infiltration. The prime clinical dilemma is exclusion of malignancy. Multi-disciplinary discussion with multi-modality imaging is required to diagnose and manage the condition.

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Surge of subacute sclerosing panencephalitis

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Subacute sclerosing panencephalitis (SSPE) is a poorly understood complication of measles infection, presenting in up to 1 in 2500 infected children, resulting in devastating neurocognitive outcomes and a high mortality rate. The onset is insidious, with patients presenting with seizures and progressive cognitive decline around 6–10 years after measles infection. The diagnosis is frequently delayed due to lack of clinical suspicion, but can be confirmed by typical electroencephalogram (EEG) findings and positive cerebrospinal fluid (CSF) serology. Although imaging is not diagnostic, the vigilant radiologist has a unique opportunity to direct decision-making by identifying the correct clinical context and supportive MRI findings. Five years after the measles outbreak of 2009–2011, a rise in the incidence of SSPE can be expected in South Africa, as has been experienced at our institution. We present a series of seven confirmed SSPE patients that presented to Red Cross War Memorial Children's Hospital between 2014 and 2016 and describe the clinical and radiological features to raise awareness of the condition amongst radiologist and clinicians.

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The yield of pathological findings from routine screening chest X-rays in a military population


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Background: The South African Military Health Services (SAMHS) includes a screening chest X-ray (s-CXR) as part of a yearly medical examination for members over the age of 40. The yield from s-CXR programmes in resource-limited countries, such as South Africa, is mostly unknown. This data is relevant where a high burden of HIV and tuberculosis (TB) leads to significant morbidity and mortality.

Objectives: To evaluate the efficacy of an s-CXR programme for the detection of pulmonary tuberculosis (PTB) and other significant pathology in asymptomatic military patients.

Method: This retrospective descriptive study analysed s-CXRs reported between May 2011 and October 2015 at 3 Military Hospital, Bloemfontein, South Africa. The findings were categorised as either significant findings that changed patient management or insignificant findings that identified previous or possible underlying pathology.

Results: A total of 4137 s-CXR reports done on 2371 patients were included. Of these, 3696 (89.3%) were male and 441 (10.7%) were female reports, and the sample had a median age of 44.7 years. In total, 304 (7.4%) s-CXRs had significant findings (95% CI; 6.6%–8.2%), 464 (11.2%) had insignificant findings and 76 (1.8%) had both. Furthermore, 38 s-CXRs (0.92%) showed active PTB, 75 (1.8%) showed possible PTB and 241 (5.8%) showed previous PTB. Additional significant findings included solitary pulmonary nodules, pleural effusions, lymphadenopathy, pneumonia, interstitial lung disease, bronchiectasis, chronic obstructive pulmonary disease, pulmonary hypertension and cardiac pathology.

Conclusion: An s-CXR programme is a feasible method of screening asymptomatic patients for PTB and other significant pathology in resource-limited environments with a high burden of disease.

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Venous function after pharmaco-mechanical thrombolysis for extensive ileofemoral deep vein thrombosis: Six-year outcome

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Background: Chronic venous insufficiency is an important complication following ileofemoral deep venous thrombosis. Early thrombus removal may preserve venous function and prevent this complication.

Objective: To evaluate the long-term outcome following pharmaco-mechanical thrombolysis (PMT) for proximal deep venous thrombosis in a private, specialist vascular unit.

Methods: All patients who had undergone PMT for ileofemoral deep venous thrombosis (IFDVT) between August 2009 and January 2016 were invited to return for clinical assessment and venous ultrasound study. Clinical findings were recorded according to the Villalta score and clinical, aetiological, anatomical and pathological (CEAP) classification. Quality of life (QOL) was assessed according to the VEINous INsufficiency Epidemiologic and Economic Study (VEINES) QOL/Sym Questionnaire.

Results: A total of 32 patients (35 legs) were evaluated. There were 25 females and 7 males with a mean age of 33.5 years. The mean follow-up period was 31 months.

Results: Twenty-four patients (75%) were C0, C1 (1), C2 (2), C3 (2) and C4 (3). With the Villalta score, 28 patients had mild or no evidence of venous disease (scores 0, 1 or 2). Four patients had moderate symptoms (scores 3–6). With the VEINES questionnaire, the results were good with the scores for QOL ranging between 0.30 and 0.60 and the Sym range being 0.32–0.61. The venous ultrasound only found four patients to have mild fibrosis with reflux.

Conclusion: Patients who had undergone PMT for extensive IFDVT showed no significant clinical signs of chronic venous insufficiency, had excellent function on venous ultrasound and reported excellent QOL.

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Diagnostic reference levels in low- and middle-income countries: Early 'ALARAm' bells?

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Background: In 1996, the International Commission on Radiological Protection (ICRP) introduced diagnostic reference levels (DRLs) as a quality assurance tool for radiation dose optimisation. Although many countries have published DRLs, available data are largely from high-income countries. There is arguably a greater need for DRLs in low- and middle-income countries (LMICs), where imaging equipment may be older, and trained imaging technicians are scarce. To date, there has been no critical analysis of the published work on DRLs in LMICs. Such work is important to evaluate data deficiencies and stimulate future quality assurance initiatives.

Purpose: To review the published work on DRLs in LMICs and to critically analyse the comprehensiveness of available data.

Material and methods: Medline, Scopus and Web of Science database searches were conducted for English language articles published between 1996 and 2015 documenting DRLs for diagnostic imaging in LMICs. Retrieved articles were analysed and classified by geographical region, country of origin, contributing author, year of publication, imaging modality, body part and patient age.

Results: Fifty-three articles reported DRLs for 28 of 135 LMICs (21%), reflecting data from 26 of 104 (25%) middle-income countries and 2 of 31 (6%) low-income countries. General radiography ($n = 26$, 49%) and computerised tomography ($n = 17$, 32%) data were most commonly reported. Paediatric DRLs ($n = 14$, 26%) constituted approximately one-quarter of published work.

Conclusion: Published DRL data are deficient in the majority of LMICs, with the paucity most striking in low-income countries. DRL initiatives are required in LMICs to enhance dose optimisation.

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A presentation of a recent case series on VACTERL associations

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Background: Vertebral defects, anal atresia, cardiac defects, tracheoesophageal fistula, renal anomalies, and limb abnormalities (VACTERL) association is described as the non-random co-occurrence of congenital malformations. The diagnosis of VACTERL association requires 3 component features of the following: vertebral, anorectal, cardiac, tracheoesophageal, renal or limb abnormalities, in the absence for evidence of another condition. The incidence of VACTERL association is reported as between 1 in 10 000 to 1 in 40 000. The aetiology of VACTERL is still unclear, although the genetic spectrum is becoming somewhat better understood.

Object: This poster is an educational presentation on a case series of VACTERL association patients and the role radiology has in the identification of the associations.

Method: Images presented represents a case series of VACTERL association patients who presented to the Paediatric Surgery Department at the Chris Hani Baragwanath Academic Hospital in April and May 2016.

Conclusion: VACTERL association is reported to be an uncommon disorder. This case series highlights various imaging features of VACTERL association and proves the importance of screening for associated abnormalities in any patient presenting with one of the VACTERL associations.

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Accuracy of non-radiologists and laypeople for identifying children with cerebral cortical atrophy from 'Mercator map' curved reconstructions of the brain



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Background: Communication of cortical brain atrophy in children with term hypoxic-ischaemic injury (HII) to parents and the legal fraternity contesting compensation rights can be very difficult using text and standard cross-sectional images. When demonstrating the cortex in HII, a single image of the brain surface, much like the way a map of the earth is derived from a globe, can be generated from curved reconstruction of coronal magnetic resonance imaging (MRI) scans, that is, a Mercator map. Laypeople's ability to identify abnormal scans from such maps without prior training requires evaluation before routine use.

Aim: To determine the sensitivity and specificity of laypeople in detecting abnormal brain scans through review of Mercator flat-earth maps of the brain, without prior training.

Methods and materials: Ten Mercator map images were provided to 100 participants with a distribution of 5 HII, 1 cortical dysplasia and 4 reported normal. Participants were required to identify abnormal scans. Sensitivity and specificity overall and for sub-groups were derived by averaging true positives and true negatives and false positives and false negatives.

Results and conclusion: The results show a strong ability for laypeople to identify normal versus abnormal MRI brain studies using Mercator maps. The sensitivity and specificity in this group is 67% and 73%, respectively. Non-radiologist physicians and radiographers performed slightly better than laypeople as expected. Radiologists of course, had very high sensitivity and specificity of 86% and 100%. The Mercator map is therefore a viable tool in the communication of complex MR imaging to the layperson.

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An approach to non-radiodense aspirated foreign bodies in the paediatric patient

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Introduction: Foreign body aspiration is a common and often serious problem in paediatric patients. Approximately 80% of paediatric foreign body aspiration episodes occur in children younger than 3 years. Almost 90% of aspirated foreign bodies are non-radiodense and therefore not seen on radiographs. Clinical presentation may be subtle and can become a diagnostic dilemma, particularly if there is no witnessed aspiration.

Aim: An educational poster on a radiological approach to aspirated non-radiodense foreign bodies.

Methods: We present serial chest radiographs of bronchoscopically confirmed non-radiodense foreign bodies.

Conclusion: Knowledge about the different radiological features suspicious for foreign body aspiration is essential and can guide appropriate intervention including bronchoscopic retrieval, which may prevent permanent pulmonary sequelae.

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Assessing the viability of 3D printed brain models derived from MRI scan data in the communication of complex patterns of hypoxic ischaemic injury to lay-people

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Background: Communication of bilateral, symmetric, zonal cortical brain atrophy in children with term hypoxic ischaemic injury (HII) to parents and the legal fraternity contesting compensation rights, using text reports, can be very difficult. 3D printed models, which may be viewed through grasping and rotating, may be useful for conveying such changes to non-radiologists and lay-people. In this report we describe the technical aspects of generating a 3D printed model from a paediatric brain MRI and provide completed examples in children with partial prolonged HII and controls.

Aim: To describe the technical aspects of producing 3D printed models of the brain in children using examples of children with term partial prolonged HII as well as age matched controls and to provide completed models for public consideration.

Methods and materials: The technical method for utilising 3DT1/3D FLAIR images, stripping the skull and converting to STereoLithography (STL) format is described as well as the 3D printing consideration for creating 3D models of the brain. MRI scans of 4 children, who demonstrated atrophy after having sustained partial prolonged HII at term and age matched controls were 3D printed using the described technique. These scans are used for demonstration of the advantages.

Results and conclusion: 3D printing, using the described technique, was successful and generated 3D models in patients which could be compared with controls in contour and size for the purposes of diagnosing cortical atrophy in children who sustained peri-natal partial prolonged HII at term.

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Computerised tomography findings in lymphobronchial tuberculosis: A comparison between infants and older children



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Background: Pulmonary tuberculosis (TB) in children is characterised by mediastinal and hilar lymphadenopathy. Lymphobronchial TB (LBTB) describes the situation where tuberculous lymph nodes affect the airways by compression or erosion. Infants may be more susceptible to severe complications because of their specific airway anatomy and immature immune systems.

Objective: The purpose of this study was to compare the computerised tomography (CT) findings of infants and children older than 12 months with LBTB to determine whether infants are more severely affected.

Materials and methods: The CT scan reports of 98 children (< 13 years) with LBTB were reviewed retrospectively by a paediatric radiologist for a previous study. The relevant data were extracted from the existing database and the two age groups were compared with regard to lymphadenopathy, airway narrowing and parenchymal complications.

Results: Of the 98 patients, 51% were infants. There was no statistically significant difference between infants and children (> 12 months) with reference to the frequency and distribution of airway compressions, lymphadenopathy and parenchymal findings. However, there was a statistically significant difference ($p < 0.05$) in the number of infants with complete compressions when compared to the older children.

Conclusion: As opposed to older children, infants' airways are more susceptible to complete airway compression as a result of LBTB. This is probably because of the airway size and anatomic development. We therefore recommend that infants presenting with symptoms of airway compression secondary to LBTB should be imaged urgently using CT scanning to ensure correct management.

Note: A selection of conference abstracts: RSSA/SASPI Paediatric Imaging Congress, 03–06 November 2016, Spier Estate, Stellenbosch, South Africa. Faculty collaborators: Professor Kassa Darge (Body Imaging, University of Pennsylvania, Philadelphia, USA), Professor Edward Lee (Thoracic Imaging, Harvard University, USA), Professor Beverley Newman (Cardiac Imaging, Stanford University, California, USA), Professor Kimberly Applegate (Image Gently and Body Imaging, Emory University, Atlanta, USA) and Professor Savvas Andronikou (Thoracic Imaging, University of Bristol, UK) supported by South African Paediatric Radiologists, co-ordinated by Dr Jaishree Naidoo, President of the African Society of Paediatric Imaging and Head of Division of Paediatric Radiology, Charlotte Maxeke Johannesburg Academic Hospital.

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Curved reformat of the paediatric brain into a 'Mercator/flat-earth map' – A standardised method for demonstrating cortical surface atrophy resulting from hypoxic ischaemic injury

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Magnetic resonance imaging (MRI) in term hypoxic ischaemic injury (HII) demonstrates cortical atrophy in characteristic locations. Communicating bilateral zonal injury to parents and in courtrooms using reports and cross-sectional imaging is challenging. An overview map of the brain surface generated from a curved reconstruction of the MRI is ideal for such scenarios. Freeware was used to derive standardised methods of curved reconstructions of the paediatric brain from three-dimensional MRI in 10 children with cortical atrophy from term HII and 10 age-matched 'controls'. Multiple techniques were tested from various planes, different landmark slices and angles of reconstruction at various depths to the surface. Two images (derived from the coronal and sagittal planes) were identified as giving the best overview of the watershed, perisylvian and peri-rolandic zones. Peri-sylvian, peri-rolandic zones and frontal lobes were better demonstrated on Mercator maps. Scroll maps demonstrated lateral structures poorly but demonstrated central zones, posterior parietal lobes and occipital lobes better. Watershed zones were well demonstrated on both maps. Localised 'bi-convex' interhemispheric fissure widening was present in all HII atrophy patients on both maps, that is, para-sagittal and/or para-falcine watershed atrophy. An intervascular watershed band of atrophy was seen on both maps. Peri-rolandic and peri-sylvian atrophy was better demonstrated on Mercator maps. Ulegyria was identified in 90%. Standardised curved reconstruction of the brain surface from MRI allows visualisation of key cortical features of term HII on the two derived images which can replace multi-slice MRI for communicating cortical findings to legal professionals and parents, and can be embedded within multimedia reports.

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Diagnostic reference levels for paediatric computed tomography

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Objectives: To establish local diagnostic reference levels (LDRLs) for emergency paediatric head computed tomography (CT) scans performed at a South African tertiary-level hospital and to compare these with published data.

Materials and methods: A retrospective analysis was conducted of volume-based CT dose index (CTDI_{vol}) and dose length product (DLP) data from uncontrasted paediatric head CT scans performed in the Trauma and Emergency Unit of a tertiary-level South African hospital from January 2013 to June 2013. A random sample of 30 patients in each of three age groups (0 years – 2 years, > 2 years – 5 years and > 5 years – 10 years) was used. LDRL values were compared with several national DRLs from Europe and Australia.

Results: Mean CTDI_{vol} and DLP values were 30 mGy and 488 mGy.cm for the 0 years – 2 years age group, 31 mGy and 508 mGy.cm for the > 2 years – 5 years group and 32 mGy and 563 mGy.cm for the > 5 years – 10 years group, respectively. The mean DLP for 0-year olds – 2-year olds was the only parameter outside the range of corresponding published reference data. Stratification into narrower age groupings showed an increase in DLP values with age.

Conclusion: An institutional review of the head CT scanning technique for emergency studies performed on children less than 2 years of age is recommended. This study highlights the role of LDRLs in establishing institutional dosimetry baselines, in refining local imaging practice and in enhancing patient safety. Standard age stratification for DRL and LDRL reporting is recommended.

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Technical report: 'Flat earth lung' a curved multiplanar reconstruction for demonstration and follow-up of scattered metastatic lung nodules in children


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Background: Lung metastases from paediatric Wilms tumour and osteosarcoma are currently diagnosed and presented to multidisciplinary medical teams using cross-sectional computer tomography (CT) slices. Clear demonstration of the extent, distribution and progression of lesions can direct medical and surgical interventions. For non-radiologists, viewing and appreciating the state of the multifocal metastatic disease in a plethora of on-screen images and from text reports can be very difficult. Innovative thinking to condense multiple cross-sectional slices into visually comprehensible images is crucial to ensure important information is accurately communicated and further aid clinical decision-making.

Aim: To describe a novel CT curved reformatting technique to generate a standardised single image of the lungs that demonstrates pulmonary metastases.

Methods: We describe a simple reconstruction technique using the curved reformatting function on OsiriX freeware, to flatten out the peripheral lung parenchyma into a single image much like a map of the world represents the outer surface of the earth. We provide examples that demonstrate multifocal peripheral lesions and the normal anatomy simultaneously in one image. In addition, we demonstrate the use of minimum intensity projection (MinIP) views for higher accuracy, pitfalls and future applications.

Conclusion: Generating curved multiplanar reconstructions of the lung can aid clinical decision-making and disease progression by accurately representing pulmonary metastases in children via a single image. This quick, easy and systematic technique, aptly named 'flat earth lung', negates the need to scroll through cross-sectional CT scans and can be utilised in multidisciplinary team meetings and multimedia reports. Further uses extend to case note illustration for communication between colleagues.

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Juvenile xanthogranuloma: Awakening of the other histiocytosis?

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Juvenile xanthogranuloma is the lesser known and less innocuous of the histiocytic disorders. This non-Langerhans cell histiocytic disorder, as we know it, is a benign proliferative disorder manifesting as cutaneous lesions in young children. Extracutaneous lesions are less common with most systemic lesions reported in the liver, spleen, lung, eye, central nervous system and bones. These lesions usually spontaneously regress, or if not, treatment is based on severity and includes resection, chemotherapy and radiation. Mortality is rare. We present a case series of three patients presenting to Red Cross Children's Hospital over a 2-year period. We discuss the variable clinical presentation, the diverse imaging findings and the confirmatory histopathological diagnoses and treatment. We describe a cutaneous thigh lesion with visceral involvement. This poster highlights the first reported solitary bone lesion in the ulna. It also emphasises the aggressive and lethal nature of a cervical spine lesion. We demonstrate the difficulty in radiologically distinguishing these lesions from other tumours.

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Krabbe disease: An unusual presentation of optic nerve enlargement

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Krabbe disease is an autosomal recessive leukodystrophy that presents clinically with regression of milestones, excessive irritability and inconsolable crying. The pathologic basis of the disease is abnormal myelin metabolism resulting from a deficiency in the galactocerebrosidase enzyme with subsequent white matter destruction. Although optic atrophy is a classic presentation of Krabbe disease, we report on two patients who are biological brothers presenting with optic nerve enlargement in addition to other typical magnetic resonance imaging features of Krabbe disease, thereby confounding the initial diagnosis.

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Patterns of the cortical watershed continuum of term gestation hypoxic ischaemic injury – The ‘wish-bone sign’


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Background: Partial prolonged-term hypoxic ischaemic injury (HII) involves the cortical and subcortical watershed zones of the brain, which are visually difficult to conceive. New innovative methods of demonstrating watershed cortical atrophy using flattened maps of the brain surface give added insight into distribution of the watershed zone by demonstrating the entire brain surface.

Aim: To determine and validate patterns of HII sustained at birth in term infants using cross-sectional magnetic resonance imaging (MRI) and the innovative Mercator and scroll map views of cortical surface anatomy, to define the distribution of the watershed zones in children with partial prolonged injury.

Materials and methods: A total of 100 paediatric MRI brain scan reports with an MRI and clinical diagnosis of chronic term hypoxic injury were read by three radiologists independently. All sites of abnormality were recorded and patterns were classified. Patients with partial prolonged and combined patterns were evaluated using Mercator and scroll map reconstructions, generating schematics of the watershed zone.

Results: Predominant patterns of disease were partial prolonged and acute profound types. The watershed zone was demonstrated, on the derived maps, representing a continuum of involvement in the shape of a ‘wish-bone’ extending bilateral from frontal lobes to posterior parietal lobes in band-like fashion along the para-falcine cortex and intersected by another band of atrophy in the peri-rolandic regions extending along peri-sylvian cortices. This is defined in schematics as a visual aid.

Conclusion: Predominant patterns of injury in term hypoxic ischaemic injury are described and quantified, with the ‘wish-bone sign’ introduced to describe the typical distribution pattern of partial prolonged HII in the watershed zone.

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Pulmonary agenesis, pulmonary aplasia and pulmonary hypoplasia: Can you differentiate them?

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Background: Pulmonary underdevelopment is categorised into three groups: pulmonary agenesis, pulmonary aplasia and pulmonary hypoplasia. Pulmonary agenesis is the complete absence of the lung parenchyma, bronchus and lung vasculature. Pulmonary aplasia is characterised by the absence of the lung parenchyma and pulmonary vasculature; however, there is a rudimentary blind-ending bronchus present. Pulmonary hypoplasia is defined by the presence of a bronchus and rudimentary lung parenchyma with a reduction in number and size of airways, alveoli and pulmonary vasculature.

Objective: This is an educational poster in the form of a quiz to identify and differentiate the type of pulmonary underdevelopment according to imaging features, associations and aetiology.

Method: Radiological images of patients with pulmonary underdevelopment, who presented to the Paediatric Department of Chris Hani Baragwanath Academic Hospital, were selected.

Conclusion: It is reported that up to 50% of patients with pulmonary agenesis and pulmonary aplasia have at least one other systemic congenital abnormality. Secondary pulmonary hypoplasia is more common than primary pulmonary hypoplasia and the aetiology is often evident on the imaging series. Radiological imaging is essential in differentiating the type of pulmonary underdevelopment.

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The role of *post-mortem* computed tomography in assault victims with head trauma in central South Africa

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Background: The role of *post-mortem* computed tomography (PMCT) has been studied extensively, though not in South Africa. In many countries, it has become an important adjunct to the routine forensic examination.

Objectives: The study compared the findings of PMCT and conventional autopsy in victims of assault who presented with head injuries. The outcomes were compared to similar studies published internationally.

Method: A non-randomised prospective analytical study method was utilised. Victims of assault who presented with head injuries underwent PMCT, followed by a conventional autopsy. The findings were compared.

Results: PMCT proved superior for detecting bony injuries. Autopsy was more effective in detecting subdural haemorrhages. No major statistical difference was found in detecting intra-axial injuries. More injuries were detected in total by combining the findings of PMCT and autopsy. Several ethical and logistical problems were identified, mainly resulting from the computed tomography (CT) scanner not being in the same facility as the forensic laboratory. Our findings were similar to those of other published studies.

Conclusion: PMCT is an important augmentation to conventional autopsy of trauma victims and could add valuable diagnostic information to the forensic examination. A CT scanner on site would eliminate the logistical and ethical problems identified during the study.

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The sensitivity and specificity of radiological features of Hirschsprung's disease in a cohort of South African children


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Background: Hirschsprung's disease (HD) is classically defined as the absence of ganglion cells of the myenteric plexus of the bowel. Patients typically present with delayed passage of meconium and specific features on plain radiograph and contrasted enema supporting the diagnosis. Rectal biopsy remains the gold standard.

Hypothesis: The radiological features of HD in South African children are distinct from those described in other parts of the world and may be influenced by a number of factors, including delayed diagnosis in a resource-limited setting, higher proportion of cases with total colonic aganglionosis and higher prevalence of allied disorders.

Aims and objectives: To assess the diagnostic accuracy of the radiological features of HD in a cohort of South African (SA) children and to compare and contrast these findings with published international works in order to facilitate the early diagnosis of HD disease in our setting.

Methods: A retrospective audit of the radiological features on abdominal radiograph and contrasted enema of all the patients who received suction rectal biopsies after presenting with clinical features of HD at Tygerberg Children's Hospital, Cape Town, South Africa, from January 2007 through March 2015 was performed, with prospective component leading up to May 2016.

Conclusion: Pathology results have been revealed, and the sensitivity and specificity of the radiological findings was calculated, compared with those in the literature and presented at the SASPI Paediatric Imaging Congress in November 2016.

Note: A selection of conference abstracts: RSSA/SASPI Paediatric Imaging Congress, 03–06 November 2016, Spier Estate, Stellenbosch, South Africa. Faculty collaborators: Professor Kassa Darge (Body Imaging, University of Pennsylvania, Philadelphia, USA), Professor Edward Lee (Thoracic Imaging, Harvard University, USA), Professor Beverley Newman (Cardiac Imaging, Stanford University, California, USA), Professor Kimberly Applegate (Image Gently and Body Imaging, Emory University, Atlanta, USA) and Professor Savvas Andronikou (Thoracic Imaging, University of Bristol, UK) supported by South African Paediatric Radiologists, co-ordinated by Dr Jaishree Naidoo, President of the African Society of Paediatric Imaging and Head of Division of Paediatric Radiology, Charlotte Maxeke Johannesburg Academic Hospital.

Are cranial ultrasound requests and reports adequate at two academic hospitals in Johannesburg?


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Background: Cranial ultrasound is a cheap, effective and easy to use modality for the evaluation of cranial pathology in very sick paediatric populations. It can be performed as a portable imaging investigation and repeated as many times as possible. New improvements in sonography equipment and technique make it possible for cranial ultrasound to compete with CT scanners in terms of identifying pathology.

Aim: To determine the adequacy of cranial ultrasound requests and reports at Charlotte Maxeke Johannesburg Academic (CMJAH) and Rahima Moosa Mother and Child Hospitals (RMMCH) with regards to their completeness, accuracy and clinical relevance.

Method: A retrospective review of 191 cranial ultrasound requests and reports was performed at two academic centres. A data collection sheet was developed by the principal investigator and supervisor guided by literature with regards to the information required within the cranial ultrasound report. A scoring method was then developed with a maximum score of 3 given for the request adequacy and of 14 for report adequacy.

Results: Only 49.74% of the requests met the criteria for an adequate request. The mean report adequacy score was 7.03 with a SD of (2.02). Fifty (50%) of the reports had a maximum score of 7. Overall 50.26% of the requests scored average and below average scores. The most commonly reported variable was the presence or absence of hydrocephalus and the least reported was resistive index. Results show that reports and requests are inadequate.

Note: A selection of conference abstracts: RSSA/SASPI Paediatric Imaging Congress, 03–06 November 2016, Spier Estate, Stellenbosch, South Africa. Faculty collaborators: Professor Kassa Darge (Body Imaging, University of Pennsylvania, Philadelphia, USA), Professor Edward Lee (Thoracic Imaging, Harvard University, USA), Professor Beverley Newman (Cardiac Imaging, Stanford University, California, USA), Professor Kimberly Applegate (Image Gently and Body Imaging, Emory University, Atlanta, USA) and Professor Savvas Andronikou (Thoracic Imaging, University of Bristol, UK) supported by South African Paediatric Radiologists, co-ordinated by Dr Jaishree Naidoo, President of the African Society of Paediatric Imaging and Head of Division of Paediatric Radiology, Charlotte Maxeke Johannesburg Academic Hospital.

A radiation dose review for paediatric fluoroscopy in an academic South African referral hospital

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mrtzventer@hotmail.co.za**How to cite this article:**Venter M. A radiation dose review for paediatric fluoroscopy in an academic South African referral hospital. *S Afr J Rad.* 2017;21(1), a1141. <https://doi.org/10.4102/sajr.v21i1.1141>**Copyright:**© 2017. The Authors.
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Background: It is important to reduce radiation exposure in children. There are no published South African paediatric fluoroscopic dosage references.

Aim: This study aims to determine the dose area product (DAP) values in children undergoing common fluoroscopic examinations and comparing the values to international standards. Commonly used examinations are contrasted swallows, contrasted enemas and vesicourethrograms (VCUs). The primary endpoint of this study will be the comparison of the median and third quartile DAP values for the four specified age groups to the values of the National UK Radiological Protection Board.

Method: We adhere to the Radiological Society of South Africa (RSSA)/South African Society of Paediatric Imaging's (SASPI) guidelines. The third quartile and mean DAP values were collected between March 2013 and March 2016 for each study performed, categorised into four age groups (0 year – 1 year, 2 years – 5 years, 6 years – 10 years and 11 years – 16 years) and stratified by our three major examinations. The data were compared to literature from the National UK Radiological Protection Board.

Results: DAP values for contrasted swallows were significantly lower in the three youngest age groups. There was no significant difference in the oldest age group. DAP values for VCUs were significantly lower in the youngest age group. There was no significant difference in the other three age groups. For our contrasted enemas, there were no data to compare with.

Conclusion: By following the SASPI guidelines, our overall DAP values compared better than the UK National Patient Dose Database values in the younger age groups and no worse in the older age groups.

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Patient related factors influencing the quality of paediatric chest radiographs

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ebenstrasheim@gmail.com**How to cite this article:**Strasheim EA. Patient related factors influencing the quality of paediatric chest radiographs. *S Afr J Rad*. 2017;21(1), a1161. <https://doi.org/10.4102/sajr.v21i1.1161>**Copyright:**© 2017. The Authors.
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Background: The chest X-ray is the most common radiographic examination performed worldwide due to its versatility. By improving the quality of chest radiographs and avoiding repeat X-rays, the collective radiation dose to children can be decreased.

Aim: To identify patient related factors that influence the quality of paediatric chest radiographs by assessing the quality of chest radiographs and to compare the quality of chest radiographs in 'radiologically' sick patients to those of 'radiologically' normal patients.

Method: A retrospective study was performed to determine the quality of paediatric chest radiographs forming part of an existing database. The sample size of 280 radiographs, included radiographs of children aged 3 days to 13 years. Radiographic errors were captured on an electronic tick-sheet, consisting of 12 specific radiographic errors commonly made in practice and included the presence or absence of respiratory pathology. Data was extracted with regards to each of the 12 errors, patient demographics and presence of respiratory pathology to identify associations.

Results: There was a statistically significant, low correlation present between the radiographic error count and the presence of respiratory pathology ($p < 0.001$). There was a statistically significant difference in the quality of chest radiographs of children aged 0 months – 18 months and those aged 37 months – 156 months ($p < 0.05$).

Conclusions: The results of this study have demonstrated that there is a correlation between the presence of respiratory disease on a paediatric chest radiograph and the quality of the chest radiograph. The number of errors detected were higher in patients with respiratory pathology on the chest radiograph.

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Paediatric doctors' error rate in detection of paediatric elbow injuries in Rahima Moosa Mother and Child Hospital

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Introduction: Elbow fractures are common paediatric injuries that are often misdiagnosed. Quality imaging and accurate interpretation are essential to avoid complications which can result in growth disturbance.

Aim: This study aimed to determine error rates of elbow injuries by medical doctors in the paediatric department in Rahima Moosa Mother and Child Hospital.

Method: A total of 28 doctors participated in the study. Twenty preselected radiographs (10 normal and 10 abnormal) were projected in a PowerPoint slide show, and the doctors completed a tick sheet to assess whether the X-ray was normal or not. This was followed by a 20-minute tutorial on the approach to paediatric elbow X-rays. Then the same images were projected in a different sequence and with a more detailed tick sheet for the readers to evaluate.

Results: The detection rate of elbow fractures by paediatric doctors is poor. Although there was an improvement in the detection of fractures before (50.7%) and after (53.9%) the tutorial, the difference was not statistically significant (paired *t*-test; *p* = 0.16).

Conclusion: The paediatric elbow is a common site where pathology is missed on X-rays. The study showed that the detection rate of elbow fractures by the paediatric doctors is poor, even after a tutorial on the radiological features. We recommend ongoing in-service training of clinicians to maximise the detection of fractures.

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