18th Congress of the ASEAN Association of Radiology (AAR 2017)

Incorporating
Malaysian Congress of Radiology 2017 (MCOR 2017)
2017 RSNA / AOSR International Visiting Professor (IVP)
AAR-AOSR Conjoint Session
Malaysian Society of Interventional Radiology (MYSIR 2017)

Across Borders, Envisioning the Future

28th – 30th SEPT 2017
Shangri-la Hotel Kuala Lumpur

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## DAY 1 - 28TH SEPTEMBER 2017 (THURSDAY)

### NEURORADIOLOGY

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<td>Dr. Kew Thean Yean</td>
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<td>1020 - 1040</td>
<td>SP 05 Delivering A Quality Paediatric Radiology Service</td>
<td>Prof Dr Bernard F. Laya</td>
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<td>SP 07 Contrast-Enhanced US In Paediatrics: Practical Application And Challenges</td>
<td>Dr Wendy Lam Wai Man</td>
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<td>SP 08 Recent Technical Advancements In Paediatric Coronary CTA And MRA</td>
<td>Adj Assoc Prof Dr Marielle Valerie Fortier</td>
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<td>SP 09 Imaging Polytrauma In Children: Can We Do Better?</td>
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<td>SPL 02 Radiofrequency Ablation Of Malignant Hepatic Tumors: Tips And Tricks</td>
<td>Prof Dr Yi-Hong Chou</td>
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<td>Prof Dr April Camilla Rosiani</td>
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<td>FB 01 Feasibility Of Very Ultra Low Dose CT Guided Lung Biopsy</td>
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<td>FB 02 Histerosalphyngeography Update Future</td>
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<td>Ms. Ravi Chantrigira Etryajulu</td>
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<td>SR 02 Application Ultrasound In Breast Imaging</td>
<td>Dr. Rizuanah Ishtiai Hussain</td>
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<td>SR 03 Digital Breast Tomosynthesis (DBT) In Breast Cancer Detection &amp;</td>
<td>Dato' Dr. Humairah Samad Cheung</td>
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<td>Dr. Nor Aina Emran</td>
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<td>SR 06 Breast Cancer: Understanding Your Pathology Report</td>
<td>Dr. Mohamad Rafie Md Kaslan</td>
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<td>Dr. Zahurin Ismail</td>
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<td>SR 08 A Well Crafted Mammogram Report</td>
<td>Dr. Shantini A. Arasarathnam</td>
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<td>SR 09 Medico-Legal Issues In Breast Imaging</td>
<td>Dr. Vijayakshmi Krishnappillai</td>
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<td>Judges: Assoc Prof Dr. Thajunnisa Hassan; Dr. Vijayakshmi Krishnappillai</td>
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<td>1515 - 1530</td>
<td>FR 01 Multi-Sequence Validation Of A Web Browser-Based Semi-Automated</td>
<td>Dr. Farah Nadrah Mohd Nasir</td>
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<td>Method For MRI Breast Density Measurement</td>
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<td>FR 02 Evaluating Response To Neoadjuvant Chemotherapy In Locally Advanced Breast Cancer Using Diffusion Weighted-MRI (DWI) And IVIM Parameters</td>
<td>Dr. Mohd Fandi Al Khafiz Kamis</td>
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<td>Dr. Nazimah Ab Mumin</td>
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<td>FR 04 Overview Of Early Clinical Implementation Of Digital Breast Tomosynthesis: A Single Centre Experience</td>
<td>Dr. Soo Suet Woon</td>
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<td>0835 - 0855</td>
<td>SA 01 Imaging &amp; Treatment Of The Snapping Hip</td>
<td>Prof Dr Donna G. Blankenbaker</td>
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<td>0855 - 0905</td>
<td>SA 02 Pearls And Pitfalls In Lung Cancer Screening</td>
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<td>SA 03 Paediatric Neurometabolic Imaging: Over-Simplifying A Complicated Problem**</td>
<td>Adj Prof Dr Tchoyoson Lim</td>
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<td>SA 04 Vasculitis Involving Cardiovascular System: Assessment With Cardiac CT And MRI</td>
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<td>SA 05 Imaging Of Femoroacetabular Impingement</td>
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<td>SA 06 Body MRI: General Overview</td>
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<td>SA 07 Outbreaks Of Infectious And Non-Infectious CNS Diseases: How Does MRI Help? **</td>
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<td>Emcee &amp; Introduction</td>
<td>Dr Farhana Fadzil &amp; Dr Aida Widure Mustapha Mohd Mustapha</td>
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** You can use the Live Audience Voting feature
**HANDS ON WORKSHOP SESSION 1**

- Maximum of 80 participants only. First come first serve basis.
- Interested participants for all workshops will need to sign in at the table right outside MYSIR room and collect your workshop participant sticker. This sticker represents the group that you are assigned to for hands-on session. All participants with workshop stickers will have hands-on priority.
- Kindly note that due to time constraint, the organisers hope that workshop participants will be mindful of time and provide opportunities for all to have the chance to experience hands-on.

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<td>SI 01 Welcoming Address</td>
<td>Assoc Prof Dr Anushya Vijayananthan</td>
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<td>SI 02 Pre-Procedural Assessment Of The IR Patient</td>
<td>Dr Jeyaledchumy Mahadevan</td>
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<td>SI 03 Image Guided Puncture &amp; Seldinger Technique - Getting Your Coordinates Right</td>
<td>Assoc Prof Dr Anushya Vijayananthan</td>
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<td>SI 04 Thoracoabdominal Biopsies &amp; Drainages</td>
<td>Dr Izzuzul Hussin</td>
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**TEA BREAK & EXHIBIT VISIT**

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<td>Dr Ch'ng Li Shyan Dr Arvin Rajadurai</td>
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<td>HOW 3: US Guided Drainages</td>
<td>Dr Drival Balakrishnan Dr Sarveer Singh Dhillon</td>
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<td>HOW 4: US Guided RFA</td>
<td>Dr Izzuzul Hussin Dr Ridzuan Abd Rahim</td>
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**GUERBET LUNCH SYMPOSIUM IN SABAH ROOM**

**PLENARY LECTURE BY PRESIDENT OF RSNA IN SABAH ROOM**

**FREE PAPER ORAL PRESENTATIONS**

- Maximum of 80 participants only. First come first serve basis.
- Interested participants for all workshops will need to sign in at the table right outside MYSIR room and collect your workshop participant sticker. This sticker represents the group that you are assigned to for hands-on session. All participants with workshop stickers will have hands-on priority.
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<td>FI 01 Comparison of Blood Stream Infection Rate and Catheter Dwell Time Between Conventional Peripherally Inserted Central Line</td>
<td>Prof Dr Basri Johan Jeet Abdullah</td>
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<td>FI 02 Novel Exchange Technique Of Encrusted Nephrostomy Catheter</td>
<td>Dr Melisa Lim Seer Yee</td>
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<td>1505-1515</td>
<td>FI 03 CT Thermometry During Hepatic Radiofrequency Ablation: Assessing The Correlation Between CT Number Shift And Tissue Temperature</td>
<td>Dr Cheah Peng Loon</td>
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<td>1515-1525</td>
<td>FI 04 Selective Salpingography And Fallopian Tube Recanalisation</td>
<td>Dr Ham Man Chin</td>
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<td>1525-1535</td>
<td>FI 05 Perfusion MR Imaging Role In Predicting The Outcome Of High-Intensity Focused Ultrasound Ablation Of Uterine Fibroids</td>
<td>Dr Nguyen Minh Duc</td>
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<td>FI 06 Image Guided Irreversible Electroporation (IRE) Of Renal Tumours</td>
<td>Prof Dr Wah Tze Min</td>
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**TEA BREAK & EXHIBIT VISIT**

**BACK TO BASICS 2**

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<td>Dr Md Yuzairif Md Yusof</td>
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<td>SI 06 Nephrostomy</td>
<td>Dr Ridzuan Abd Rahim</td>
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<td>HOW 5: Cerebral Angiography Simulation Training</td>
<td>Dr. Murbita Sari Baharuddin</td>
<td>Dr. Zulkifli Zaki Abdul Ghani, Dr. Fadhil Mohamed Sani</td>
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- Limited places for Workshop HOW 5 and HOW 6. First come first serve basis.
- Interested participants for all workshop will need to sign in at the table right outside MYSIR room and collect your workshop participant sticker.
  - HOW 5: Limited to 20 participants only. This workshop runs for the full session.
  - HOW 6: Limited to 40 participants only. This workshop runs for the full session.
  - HOW 7: Limited to 20 participants only. This workshop is designed for nurses and allied health professionals.
  - HOW 8: This workshop is designed for radiographers.

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Spaces of the Head & Neck: Differentiation of Pathology on Imaging

Thean Yean Kew

University Kebangsaan Malaysia, Kuala Lumpur, Malaysia

Excluding the orbits, sinonasal & oral cavities, the extracranial head & neck can be subdivided into two regions by the hyoid bone: the supra- and infrahyoid regions. The hyoid bone is the central fascial attachment for the three layers of the deep cervical fascia that form various distinct & functional neck spaces. As these spaces contain unique contents, a space specific differential diagnostic approach can be applied whenever the radiologist faces a neck mass of initially uncertain provenance.

In this lecture, we will review the contents & extents of the main deep fascial spaces of the neck i.e. the parapharyngeal (PPS), pharyngeal mucosal (PMS), masticator (MS), parotid (PS), carotid (CS) and retropharyngeal (RPS) spaces. Patterns of displacement of surrounding structures pointing to the locality of a particular mass will be shown. Important differential diagnoses in each space will be presented, together with relevant typical imaging findings and potential pitfalls. A short quiz will also be shown to consolidate vital information.
Advanced stroke imaging has generated much excitement for the early diagnosis of acute ischemic stroke (AIS) and facilitation of intervention. Endovascular treatment of acute ischemic stroke in the anterior circulation due to large-vessel occlusion is now the new standard of care as a result of recently published trials with positive outcomes.

With the recently successful endovascular treatment trials it is time to evaluate the optimal imaging protocol for acute disabling stroke. Vascular imaging with CTA is essential to confirm an intracranial LAO and can also provide collateral flow information without further imaging (single phase CTA). Noncontrast brain CT scans can be used to estimate infarct volume with ASPECTS system as well as to exclude patients with hemorrhagic stroke. Additional imaging such as multiphase CTA or CTP can increase confidence estimating infarct core. Multiphase CTA has the advantage of simplicity since it only adds about 20 seconds to the single phase CTA protocol. CTP may not be necessary in the first six hours from onset where the efficacy of endovascular treatment is clearly proven.

It may have a crucial role for more careful patient selection required for wake-up strokes and late window. Multimodal MRI is still an option at highly efficient centres as long as door to reperfusion times rival what can be now accomplished with NCCT/multiphase CTA protocols.
Brain Trauma And Non-traumatic Neurological Emergencies

Norzaini Rose Mohd Zain

Hospital Kuala Lumpur, Malaysia

The role of radiologists when dealing with central nervous system-related disorders in emergency setting is expanding in lieu with increased reliance on imaging in providing accurate diagnosis and assisting therapeutic intervention. Establishing a diagnosis quickly and accurately is necessary in an era when patients view emergency department services as a substitute for routine health care. Concerns about legal liability lead some emergency department physicians to order more radiological tests as a means of avoiding allegations of misdiagnosis or delay in diagnosis and this needs to be balanced with the financial constraints of managing health care.

Traumatic and non-traumatic neurological emergencies encountered by the radiologists will be presented, with an emphasis on clinical features and imaging findings that aid in the diagnosis. As radiologists are often the first individuals to consider these entities, familiarity with the clinical features that suggest the diagnosis is of utmost importance. Moreover, acquaintance with the various imaging findings of these diseases will allow early diagnosis and will help limit the severe complications that follow these neurologic emergency conditions if left untreated. Neurological emergencies are complex and as central nervous system tissue heals poorly which ultimately affects function, successful treatment greatly depends on accurate diagnosis.
Multiple Sclerosis And Demyelinating Disorders – New Update

Professor Jiraporn Laothamatas, MD

Faculty of Medicine Ramathibodi Hospital Mahidol University, Thailand

Multiple sclerosis (MS) is an immune-mediated inflammatory disease attacking myelinated axon in the central nervous system in young population. It shows recurrent attacks in time and space both clinically and subclinically. The definite cause of MS is unknown but it may involves a combination of genetic susceptibility person with exposure to triggering environment. Approximately 2.1 millions people are affected by MS. The prevalence of MS tends to increase with latitude with lower rates in the tropics and higher rates in northern Europe. The diagnosis is based on clinical findings and supporting evidence using 2010 McDonald’s criteria. The criteria consist of a combination of clinical imaging and paraclinical tests. MRI findings serve as an important tool in diagnosis and monitoring disease progression because of its sensitivity in detecting brain (90-95% of MS), optic nerve and spinal cord (75%) lesions.

MRI imaging in multiple sclerosis composed of both conventional structural base such as T2W, FLAIR and T1W with gadolinium to demonstrate the presence of both old and new demyelinating plaques and grey matter lesions in different locations of the brain, optic nerves and spinal cord. It revealed the recurrent nature of the disease. Advanced MR imaging pulse sequences such as SWI, DTI, perfusion, fMRI and MR spectroscopy are able to demonstrate the molecular features of the pathology such as microhemorrhage and parenchymal venules related to the disease, preclinical lesions and use to predict the disability potential of the patients. The MRI protocol and guidelines revised in 2015 by the Consortium of Multiple Sclerosis Centers (CMSC) recommend using higher-resolution 3D imaging over 2D imaging whenever is possible. MRI with gadolinium for diagnosis and follow up study is recommended.

MS is divided into categories such as relapsing-remitting MS (RRMS) composed of 85% of cases, Secondary progressive MS (SPMS), primary progressive MS (PPMS) and progressive-relapsing MS (PRMS). Neuromyelitis optica (NMO) or Devic disease is a special category of the demyelinating disease attacking the spinal cord and optic nerves. Its diagnosis can be confirmed by the presence of antibody against aquaporin 4 (a water channel expressed at major fluid-tissue barriers across the CNS).
Immunocompromised hosts are predisposed to higher incidence of central nervous system (CNS) infection with a wider spectrum of infectious aetiologies. The causes of an acquired immunodeficiency states include infection (human immunodeficiency virus (HIV), medication, malignancy, diabetes etc. The ability to recognize, characterize and giving an accurate diagnosis in CNS infection is rewarding to any radiologist. Various conventional and advance MRI allows valuable information in narrowing down the list of differential diagnosis. However, the wide range of sequence available may be overwhelming and confusing. The classic imaging features and approach to MRI interpretation will be highlighted.
Imaging of Sensorineural Hearing Loss

Thean Yean Kew

University Kebangsaan Malaysia, Malaysia

Sensorineural hearing loss (SNHL) has a variety of causes, and imaging is often employed to ascertain a causative lesion. This lecture will consider this topic in both adults and children. The mainstay of imaging modalities in the investigation of SNHL is cross sectional i.e. temporal HRCT and MRI, though they are used with differing emphases in adults and children.

In adults, vestibular schwannomas constitute 90% of all lesions causing SNHL. This tumour, however, has many mimickers which may also cause SNHL. The imaging findings of various cerebellopontine angle lesions, and other inflammatory conditions (e.g. labyrinthitis ossificans) will be presented together with differentiating features. MRI with administered Gadolinium is the main modality of choice, with HRCT utilised in specific indications.

Children with congenital SNHL are approached differently. In our institution, a combination of temporal HRCT and heavily T2 weighted three dimensional MRI sequences are used for a through inner ear phenotyping. Exquisite neural anatomy is now routinely available by high resolution MR imaging (CISS 3D), providing vital pre-operative planning capabilities to our cochlear implant candidacy programme. The categorisation system of inner ear anomalies used in HCTM will be presented. A short quiz will also be shown.
Neuroimaging of dementia composed of structural based using high resolution volumetric MR imaging and molecular imaging based using advanced MR imaging technique such as DWI, DTI, SWI, MR perfusion, fMRI and MR spectroscopy and metabolic based using nuclear medicine technology such SPECT and PET imaging with varying radioisotopes. Dementia imaging classification usually based on clinical presentations and underlying pathological process. At present, detailed biochemical knowledge of neurodegenerative disease has been improved and the classifications have shift toward this side. For example the group related to “tauopathies” such as Alzheimer’s disease, chronic traumatic encephalopathies (CTE), corticobasal degeneration, frontotemporal lobar degeneration (FTLD), Pick disease and progressive supranuclear palsy. The group related to synucleinopathies such as diseases with Lewy bodies and multiple system atrophy (MSA). The group related to cerebral amyloidosis such as cerebral amyloid angiopathy (CAA), transthyretine-associated cerebral amyloidosis and neuronal intranuclear hyaline inclusion disease (NIHID). The other groups include spinocerebellar ataxia, Huntington disease, hereditary spastic paraplegia, amyotrophic lateral sclerosis (ALS), clinically unclassifiable parkinsonism (CUP), unverricht-Lundborg disease and prion disease which composed of Creutzfeldt-Jakob disease of sporadic, familial and iatrogenic types, etc.

MR Imaging diagnosis of neurodegenerative disease usually depends on both clinical presentations and imaging findings. The main purpose of imaging is to exclude the treatable causes of dementia such as subdural hematoma, hemodynamically significant dural arteriovenous fistula and hydrocephalus. After that confirm and classified the causes of dementia. Imaging is also used to follow up treatment and monitoring the progression of the disease process. Appropriate utilization of imaging in dementia is considered according to socioeconomic and availability of the technology in each country.
Epilepsy And Seizure Disorders: Multimodal Imaging Approach

Dr Kartini Rahmat

University of Malaya, Malaysia

Epilepsy is a chronic disabling neurological condition and comprehensive multidisciplinary management is crucial in establishing the success of epilepsy care. Tremendous progress has been made in the field of epilepsy neuroimaging in the last decade. The advent of improved high field strength MRI and revolutionized functional MR imaging gave rise to essential clinical applications in understanding the anatomic and functional brain disturbances related to complex epilepsy and seizure disorders.

Imaging plays an important role in the locating and defining anatomic epileptogenic abnormalities, particularly in patients with medically refractory epilepsy. Identification of the epileptogenic zone/lesion is of paramount importance in refractory epilepsy as adequate surgical intervention improves the clinical outcome. The aim of this article is to present an overview of the current MRI, fusion SPECT and PET examinations with special emphasis of imaging abnormalities and treatment options. Optimisations of epilepsy imaging protocols are addressed, imaging pitfalls and multi modality approach as seen in our practices are presented.
Advanced Brain Tumour Imaging

CC Tchoyoson Lim

Duke-NUS Medical School Singapore

Brain MRI is the most versatile and useful method to non-invasively study intracranial neoplasm and are helpful for pre-surgical assessment and planning, and follow up. MRI is also very important for differentiating neoplasm from tumor-like lesions that may mimic them. Basic principles to differentiate these are important, and careful analysis of different pulse sequences is needed in order to avoid common pitfalls.

Recently, newer methods of MRI including perfusion and spectroscopic imaging have the potential to not only improve differential diagnosis, but also improve post-treatment surveillance. Neovascularity from tumor angioneogenesis may be studied using dynamic first pass or dynamic contrast-enhanced perfusion methods, whilst metabolic data on tumor cell membrane turnover may be independently imaged using MR spectroscopy.

Diffusion-weighted imaging (DWI) has also been applied to measure tumor cellularity in brain tumors as well as to non-invasively visualize white matter fiber tracts: combined with blood oxygen level dependent (BOLD) functional MRI, diffusion-tensor imaging (DTI) and fiber connectivity images can be useful for pre-treatment planning.

This presentation will describe current and potential new clinical application of MRI methods that radiologists should be familiar with in studying neoplasms. Judicious selection in resource-constrained situations will be discussed.
Discovery, Invention, And The Future Of Radiology

Richard L. Ehman, M.D.

Mayo Clinic, USA

This presentation focuses on the role of discovery and invention in the evolution of Radiology and explores how these factors may define the future of innovation in our field. The importance of interdisciplinary research, spanning biological science, physical science, engineering, and technology is underscored by the fact that radiology as a medical specialty was, in effect, founded on the basis of the singular discovery by Roentgen. The presentation surveys the steady progression of breakthrough inventions that have dramatically expanded the capability of medical imaging. Radiologists have traditionally been avid adopters of new technology. The presentation reviews the results of recent studies that have demonstrated that the return-on-investment for technology-oriented research in medical imaging is extraordinarily high, compared to other areas of medical research. The concept of Pasteur's Quadrant is introduced and implications are explored. The presentation concludes with a survey of projected areas of remarkable opportunity for advancing medical imaging in the 21st Century.
Diffusion Tensor Imaging (DTI) And Morphometric Assessment In Patients With Neuro Cognitive Impairment.

Affendi HP, Kartini R, Norlisah MR, Faizatul Izza R, Farhana F, Tan MP, Tan LK, Nor Izzati S

University Malaya, Malaysia

Purpose:
This study evaluates differences in DTI parameters between patients with MCI and normal age matched healthy patients in the Malaysian population.

Methodology:
Patients were recruited from the UMMC Geriatrics Clinic. Clinical data and cognitive assessments (MMSE, MoCA and VCAT). They were than divided into mild cognitive impairment (MCI) and control matched group. Both group undergone MRI within 6 month after the evaluation done. Imaging sequences of the brain included T1W FSPGR 3D, axial T2W, coronal FLAIR cube and diffusion tensor imaging (DTI), using a 3-Tesla MRI. The DTI parameters: Fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD) and radial diffusivity (RD) scores were obtained from selected white matter tracts using an analytical software.

Results:
There were 10 participants in the MCI groups and 10 age matched controls in normal group (aged 65 to 84 years). The MCI groups had cerebral atrophy predominantly in the temporal and parietal lobes with 6 patients having an MTA score of 2, 2 patients with MTA score of 1 and 2 patients with MTA score of 0. In comparison, only 1 control had an MTA score of 2, 1 control with MTA score 1, and 7 controls with MTA score 0. The DTI parameters MD, AD and RD values were lower in the hippocampal part of bilateral cingulum in the MCI groups when compared to the normal group. There were no significant differences in the FA values between the MCI and normal groups.

Conclusion:
There is white matter tract compromise in patients with MCI involving the hippocampal part of the cingulum. These findings correlates with the hippocampal atrophy often seen later on in Alzheimer's and to a lesser extent MCI patients. DTI is therefore useful in detecting white matter tract compromise seen early on in patients with cognitive impairment, potentially halting the disease.
A Tract-Based Spatial Statistics (TBSS) Study Of Diffusion Tensor Imaging (DTI) On Focal Epilepsy


University Malaya Medical Centre, Malaysia

Purpose:
The aim of this study to investigate the white matter diffusion changes in patients presenting with focal epilepsy in the frontal and temporal regions of the brain and to determine the feasibility of voxel-based analysis with Tract-Based Spatial Statistics (TBSS) in the evaluation of irritative zone in presurgical evaluation.

Methodology:
We prospectively studied on 24 patients with focal epilepsy and 24 normal control subjects. Cross sectional MRI brain was performed using epilepsy protocol and diffusion tensor sequence (B value of 1000 ) on 3T MRI. Interictal electroencephalogram (EEG) findings were available for the 24 focal epileptic patients. A set of diffusion parameters; fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD) and radial diffusivity (RD) were acquired and calculated from the voxel-based analysis using TBSS.

Results:
Study population included 14 patients with unitemporal, 4 patients with unifrontal, 4 patients with bitemporal and 2 patients with bifrontal diffusion changes. The 4 groups showed bilateral and extensive white matter diffusion changes when compared to the normal control subjects. Abnormal diffusion parameters were seen involving the limbic circuit and the major association fibres (superior longitudinal fasciculus, superior and inferior fronto-occipital fasciculi) as well as the corpus callosum and projection fibres. The unitemporal and bitemporal groups demonstrate reduced FA and AD whereas the unifrontal group demonstrates reduced FA and increased RD. The bifrontal group demonstrates reduced in AD only.

Conclusion:
Diffusion MRI is useful in detecting the microstructural and micropathological changes in the brain in patients with epilepsy. In this study, it also shows that the irritative zone (IZ) is slightly more affected than the non irritative zone (NIZ) and that there is a difference between tracts affected in unilateral IZ and bilateral IZ. Different micropathological changes are also seen affecting the four groups.
The Combined Role Of CT And MRI In The Diagnosis Of Cerebral Amyloid Angiopathy

Bibi S, Halimaton Khadijah M, Shahizon Azura MM, Ramesh S, Law ZK

PPUKM, Malaysia

Purpose:

The objective of this study is to evaluate the value of CT and MRI for the diagnosis of Cerebral Amyloid Angiopathy (CAA) in a living patient using Modified Boston Criteria, as the reference standard. Our aim is also to study certain features of Cerebral Amyloid Angiopathy - related intracerebral haemorrhage (CAA-ICH) in comparison to hypertensive - related intracerebral haemorrhage (HTN-ICH) on imaging.

Methodology:

From January 2012 till December 2015, 31 patients admitted to UKMMC for primary intracerebral haemorrhage with both CT and MR imaging done, were investigated retrospectively for the diagnosis of CAA-ICH or HPT-ICH. Interrater agreement was calculated and features of both CAA-ICH and HPT-ICH were recorded for assessment.

Results:

Using Modified Boston criteria as reference standard, good interrater agreement was achieved using Cohen's Kappa coefficient with $\kappa$ of 0.664 in the diagnosis of in vivo CAA-ICH (n=9) and HPT-ICH (n=17). The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were 100%, 77.3%, 64.3% and 100% respectively. Patients in CAA-ICH group were older with range of age between 70-79, compared with the HTN-ICH patients. The bleeds were all superficially located with frontal lobe (44.4%) predominant; majority of the cases (66.7%) have small volume of hemorrhage < 30mls, according to ICH scoring. SAH and IVH extension was seen in 11.1% and 22.2% respectively, in comparison with the HPT-ICH with percentage of 11.8% and 35.8%, respectively. 22.2% had multiple hemorrhages at different lobes and 33.3% had recurrent hemorrhage.

Conclusion:

A modified Boston criteria with combined CT and MR imaging is a reliable, non-invasive method for diagnosis of premortem CAA-ICH with good interrater agreement. There are certain CT and MRI features to some extent that may assist to distinguish CAA-ICH from HTN-ICH.
Application Of Decision Tree For Differentiating High Grade From Low Grade Glioma Using Advanced 3T MRI.

Kartini R, Win MT, Norlisah R, Tan LK, Raja Rizal RA, Mohammad N, Vairavan N

University Malaya Medical Centre, Malaysia

Purpose:
To evaluate the use of diffusion-weighted, perfusion, chemical shift and DTI in an effort to develop a decision tree for classification of high grade gliomas (HGG) and low-grade gliomas (LGG).

Methodology:
Seventeen patients underwent advance neuroimaging protocol at 3T MRI between 2014 and 2017. Eight histologically proven HGG and nine LGG underwent advance imaging at 3T. Mean ADC, rCBV, FA and signal loss ratio (SLR) were calculated.

Results:
Mean tumour ADC ratio of HGG was significantly lower than LGG (1.21 Vs 2.02, p<0.05). ROC analysis shows threshold ADC ratio of 1.44 (87% sensitivity, 88% specificity in determining HGG). Mean tumour FA values of HGG were higher than LGG, the ratio to the NAWM was significantly different (0.397 vs 0.187). With threshold FA ratio of 0.244, the sensitivity and specificity to determine HGG were 87% and 77% respectively. The mean rCBV tumour/NAWM ratio for HGG and LGG were significantly different (8.3 vs 1.57). A cut-off rCBV (tumour/NAWM) ratio of 2.08 provide 100% sensitivity and 88% specificity to determining HGG. The mean rCBV tumour/caudate ratio for HGG and LGG were significantly different (4.93 and 0.72). The SLR (IOP sequence) at solid component for HGG was higher than LGG. Mean solid component SLR for HGG and LGG were 0.1 and 0.06 respectively (p: 0.013). A threshold SLR of 0.075 provide 75% sensitivity and 88% specificity to determining a HGG. Finally, a decision tree provides 100% accuracy to determine HGG using initial cut-off ADC ratio of 1.66 and completed by second cut-off rCBV ratio of 2.01.

Conclusion:
Advanced MR imaging parameters improves diagnostic accuracy in grading gliomas. The combination of ADC and rCBV is most useful in differentiating HGG from LGG. Based on this we formulated a decision tree in differentiating these two entities.
A Comparison Of Neurometabolites Alteration Using In-Vivo Proton Magnetic Resonance Spectroscopy (1H-MRS) In mTBI Patients

Seow PC, Vigneswaran V, Vairavan N, Wong JHD, Aditya TH, Tan LK, Norlisah R

University of Malaya, Malaysia

Purpose:
To determine the neurometabolites changes in mild traumatic brain injury (mTBI) patients using proton magnetic resonance spectroscopy (1-H MRS).

Methodology:
Fifty subjects comprise of 28 complicated mTBI (cmTBI) patients, 7 uncomplicated mTBI (umTBI) patients and 15 controls underwent MRI scan with additional single voxel spectroscopy (SVS) sequence. The brain spectra were processed to obtain the absolute and relative neurometabolite concentrations. The neurometabolites concentrations between the three groups were compared and correlated to the Glasgow Coma Scale (GCS).

Results:
The concentration of glutamine (tGlx) (χ²(2)=6.60, p=0.037) and relative concentration of N-acetylaspartate over creatine (tNAA/tCr) (χ²(2)=6.65, p=0.036) demonstrated significant differences between the groups. tGlx was seen to be elevated while tNAA/tCr was lowered moving from cmTBI to umTBI to control group. The tNAA/tCr had a mild correlation with the injury complexity (r=0.38, p=0.01) and GCS scores.

Conclusion:
The changes in neurometabolite concentrations were apparent at the onset of complicated traumatic brain injury. The tGlx and tNAA/tCr ratio have potentials to serve as biomarkers reflecting injury severity, in terms of complexity and admission GCS in mTBI patients.
Relationship Of MoCA Assessment With Hypometabolic Region Of 18F-FDG PET/CT In Prodromal Alzheimer Disease

Siti Aishah AA, Fathinul Fikri AS, Abdul Jalil N, Normala I, Iqbal Saripan M, Subapriya S

Universiti Putra Malaysia, Malaysia

This study identifies neuropsychological and neuroimaging characteristics between normal and newly diagnosed prodromal Alzheimer disease (Prd-AD) patients. All subjects underwent MoCA assessment with Prd-AD patients showed onset of an episodic memory deficit, and fulfilled the National Institute of Aging-Alzheimer’s Association criteria for probable AD with majority of the subjects (21/22) underwent the 18F-FDG PET/CT brain imaging. The subjects consisted of 6 males and 16 females aged 60 to 79 years old (mean+SD~1.55+0.596) with years of formal education (mean+SD~9.95 +2.734). All subjects provided written consent prior to the inclusion in the study. Normal brain template were spatially normalized and smoothed into the MNI space using the Statistical Parametric Mapping (version SPM12) software and Matlab version 8.1. A voxel-by-voxel statistical analysis of hypometabolic region in Prd-AD were done by comparing one patient’s scan to the normal brain template. The default setting were set at nonlinear basis function: 7 x 8 x 9; number of iterations: 16; bounding box:-78 80, -112 82,-100 90; regularization: medium; voxel sizes 2 x 2 x 2 mm3; smoothed and warped images were done by adding a Gaussian filter of 12 mm FWHM. Chi-square test and analysis of variance found no significant differences in sex, age, years of education with assessment domain in MoCA for normal subjects but there was a significant difference in PrD-AD patients in term of years of education with attention p=0.028, semantic fluency p=0.019, orientation skill p=0.010. In conclusion, 18F-FDG PET/CT brain images showed that majority of the PrD-AD patients had mild cerebral atrophy at bilateral temporal lobes with hypometabolism in frontal, medial and bilateral temporo-parietal lobes. The PrD-AD exhibited hypometabolism in the parietal lobe, lateral temporal cortex and precuneus seen in 18F-FDG PET/CT provide a complementary information to distinguish PrD-AD from mild cognitive impairment clinically diagnosed via MoCA assessment that has overlapped symptoms.
Evaluation Of Non-Coronary Cardiac CT Findings

Yang Faridah Abdul Aziz

University of Malaya, Kuala Lumpur, Malaysia

Computed tomography (CT) is an effective non-invasive imaging tool to image the body and with the advent of multislice CT scanners and ECG-gating, imaging of the heart has been revolutionised. While numerous articles had been written on coronary artery imaging, this talk will focus on advancements made in non-coronary artery imaging.
Low Dose Cardiac CT- Can We Routinely Achieve The Very Low Radiation Doses That Are Reported

John Hoe

Mt Elizabeth Hospital, Singapore

Over the past few years radiation doses associated with cardiac CT have been dramatically reduced and subMSv scans are commonly reported. The reduction in doses is due to several factors but mainly due to use of lower kVp, scanning during very short range of the R-R interval during diastole using prospective ECG gating, availability of Iterative reconstruction (IR) of data by CT scanner vendors. IR, which can be model based or based on hybrid techniques, is a method of computer based reconstruction of acquired scan data that reduces doses by allowing lower mAs to be used, and the resultant noisy images are reconstructed as less noisy images.

However in daily clinical practice, doses vary widely between sites. Very often betablockers are not used and this results in need for larger scanning range in R-R interval and higher doses. Ectopics, arrhythmias and atrial fibrillation are also very common and scans acquired will result in a higher radiation dose. Many sites also have not updated their CT scanners to higher end scanners and do not have IR software installed.

Although radiation doses in routine cardiac CT are not as low as reported in the literature, they are still much lower than previously and usually similar to the general population one years background radiation exposure. Its important however to keep trying to reduce doses by making use of the available technology and ensuring appropriate clinical indications are met prior to scanning.
Abstract Not Available
Plaque Characterisation By Coronary CTA-Should We Get Excited?

John Hoe

Mt Elizabeth Hospital, Singapore

Coronary CTA (CCTA) is now well validated by many studies compared to IVUS, as the best non invasive imaging method for detecting coronary plaque. Quantification of plaque volumes or burden is calculated usually using automated software but can be done semiquantitatively or manually. In prospective studies it has been shown that patients with higher plaque volumes have higher risk of acute coronary syndrome. Currently there is good interplatform reproducibility for quantification of plaque but poor interplatform reproducibility and further software improvements are needed. Coronary plaque characterisation depends on determination of plaque composition by its density on CCTA, even though there are some difficulties related to overlap of plaque densities and need for adequate contrast enhancement in the coronary artery. It is now well established that CCTA can detected vulnerable plaque and patients with low density plaque <30HU and positive remodeling are at higher risk of developing acute coronary syndrome. Other CT features described as associated with high risk plaque now include ring like appearance with central low density area and “napkin-ring” sign. It is therefore important when reporting CCTA studies to try to assess plaque burden and look for high risk plaques as this can change patient management even if there is no significant stenosis present. Prognostic studies, with more than 10 years follow up, are now available confirming ability to use CCTA to risk stratify patients, even in those who are asymptomatic. Follow up studies on patients on statin therapy can be used not only to assess plaque burden reduction but prognostic studies using CCTA confirming reduced mortality following treatment with statin are now available.
CTA Of The Aortic Root And Valve

Sutipong Jongjirasiri, MD

Ramathibodi Hospital, Mahidol University, Thailand

Cardiovascular of the thoracic aorta, especially in the area of aortic root and valve, is a diagnostic challenge. Conventional CT of the chest may not be able to diagnose the disease of this area because of cardiac motion artifact. Although CT of the thoracic aorta is the study of choice to define the severity and extent of the aortic disease, small pathology at the aortic valve could be overlooked with non-gated CT scan of the chest. Bicuspid aortic valves could be visualized with non-gated CT of the chest but with less confident than ECG-gated cardiac CT. When pathology around aortic root or aortic valve is suspected, ECG-gated CT scan should be the imaging of choice.

The protocol for ECG-gated CTA of the aortic root and valve is similar to cardiac CTA after bypass graft surgery, in term of adequate coverage from ascending aorta to apex of the heart. Using at least 64-section CTA with high temporal resolution during rapid IV injection of nonionic contrast material, most of the diseases of aortic root and valve could be confirmed. With this protocol, high quality images, such as coronary anomaly from abnormal position of its sinus of Valsava could be clarify. Aneurysm of sinus of Valsava with or without rupture to adjacent cardiac chamber has been shown with high accuracy, which is for surgical planning. In patients with connective tissue disorders, the disease such as Marfan syndrome, aneurysmal dilatation of the ascending aorta with extension into the sinus of Valsava could be identified. Association of bicuspid valve or complication such as aortic dissection with or without coronary artery dissection could also be easily seen.

The drawback of this technique is high radiation dose exposure.

In this topic, details of various aortic conditions will be discussed, including abnormality of the supraaortic, sinus of Valsava, aortic valve and subaortic valve areas. In addition, preoperative planning or post-operative procedures, such as aortic valve replacement, will be shown.
The T1 relaxation time of any tissue is key in depicting soft tissue contrast and has been showed to be instrumental in demonstrating focal pathology especially when used in conjunction with contrast administration. Given the complex and often times diffuse nature of myocardial disease of the heart, conventional T1 weighted imaging of the heart is not sufficient to display these pathologies.

T1 mapping refers to various magnetic resonance approaches utilising T1 imaging either with or without contrast (native T1). Advancement in cardiac MR imaging has made it possible to quantify T1 of the heart and subsequently depict small variations of these into T1 maps to detect cardiac myocardium pathology. This talk will focus on applications and techniques of T1 mapping of the heart.
Multidetector computed tomography (MDCT) is widely used for cardiac imaging in the clinical setting. Despite promising results, current MDCT has still limitations for cardiac applications in terms of artifacts related with temporal or spatial resolution, radiation dose, and the use of contrast media. Recent advent of cardiac MDCT provides important advantages that can potentially improve the status of these limitations and expand the utility of cardiac MDCT imaging beyond coronary imaging such as viability as well as functional imaging such as perfusion imaging or FFR. Additionally, multi-energy acquisitions offer interesting possibilities of tissue characterization or plaque characterization. In this lecture, I will discuss the current status of cardiac MDCT scanners and their advantages for clinical imaging. I will also discuss emerging complementary non-coronary applications that have been enabled by cutting-edge MDCT technology.
Coronary magnetic resonance angiography (CMRA) is a powerful noninvasive technique with high soft-tissue contrast for the visualization of the coronary anatomy without X-ray exposure. Due to the small dimensions and tortuous nature of the coronary arteries, a high spatial resolution and sufficient volumetric coverage have to be obtained. However, this necessitates scanning times that are typically much longer than one cardiac cycle. By collecting image data during multiple RR intervals, one can successfully acquire coronary MR angiograms. However, constant cardiac contraction and relaxation, as well as respiratory motion, adversely affect image quality. Therefore, sophisticated motion-compensation strategies are needed. Furthermore, a high contrast between the coronary arteries and the surrounding tissue is mandatory. In the present lecture, challenges and solutions of coronary imaging are discussed, and results obtained in both healthy and diseased states are reviewed. This includes preliminary data obtained with state-of-the-art techniques such as steady-state free precession (SSFP), whole-heart imaging, intravascular contrast agents, coronary vessel wall imaging, and high-field imaging. Simultaneously, the utility of cardiac multidetector computed tomography (MDCT) for the visualization of the coronary arteries is discussed.
MR Cardiac Evaluation Of Cardiovascular Disease In Metabolic Syndrome

Noor Badriah O¹,², Norzailin AB²

Hospital Universiti Kebangsaan Malaysia¹,
Hospital Kuala Lumpur, Malaysia²

Purpose:

The major adverse consequence of metabolic syndrome is cardiovascular disease, which often already present without clinical signs or symptoms. Therefore, risk stratification on an individual basis and early detection of cardiovascular disease are essential.

Methodology:

This was a cross sectional study carried out at Department of Radiology, Pusat Perubatan University Kebangsaan Malaysia (PPUKM) using MRI 1.5T. The report, images and patient’s demographic details were obtained and the cardiac findings were interpreted by cardiac radiologist.

Results:

The incidence rate of subclinical myocardial damage among metabolic syndrome in Pusat Perubatan University Kebangsaan Malaysia (PPUKM) by using MRI cardiac as the investigation tool is calculated as 8.7. The association with age, gender and hormonal factor with development of cardiovascular disease are proven in this study. There are evidence of increase pericardial fat thickness, left atrial and left ventricular dilatation in metabolic syndrome patient with duration of diagnosis of the syndrome less than 10 years. There is not enough evidence to support the hypothesis of association between duration of diabetes mellitus and hypertension with incidence of cardiovascular disease in this cohort of metabolic syndrome. Therefore, further study or follow up is needed to find the association between metabolic syndrome risk factor with development of diastolic dysfunction and the outcome of early cardiac intervention.

Conclusion:

We are not able to prove the significant association by using statistical test due to sample size limitation and cost of the study. Therefore, further study is needed to find the association between metabolic syndrome risk factor with development of cardiovascular disease.

Keywords: Metabolic syndrome, cardiovascular disease in metabolic syndrome,
Assessment Of Coronary Artery Stenosis Using Coronary Computed Tomography Angiography And 3D Virtual Intravascular Endoscopy For Patients Population Of Calcium Score > 400

Yang Faridah AA¹, Woo SY², Sun ZH¹, Nor Ashikin MS¹, Ng KH¹, Yeong CH¹, Tan SK¹

University of Malaya, Malaysia¹
Curtin University, Australia²

Purpose:

This study aimed to assess the diagnostic values of coronary computed tomography angiography (CCTA) and 3D virtual intravascular endoscopy (VIE) in comparison to conventional invasive coronary angiogram (ICA) (gold standard) for patients population of calcium score >400.

Methodology:

From January 2013 to June 2016, 64 patients underwent CCTA with coronary calcium score >400 were recruited. 35 patients subsequently underwent ICA for further evaluation and management. Out of these patients, VIE was done for 14 patients. Three main coronary artery branches were assessed and the degrees of stenosis was compared between CCTA and ICA, as well as VIE and ICA to determine if there is any significant difference in the diagnostic performance between CCTA and VIE.

Results:

The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) and accuracy of CCTA and VIE compared to ICA are presented in Tables 1 and 2, respectively. Generally, VIE achieved better accuracy than CCTA however it has a limitation where the more specific locations (i.e. proximal, middle and distal portions) of the arteries could not be identified. Nevertheless, additional information of the coronary wall changes could be obtained via VIE based on the composition of coronary plaques. A smooth intraluminal appearance was usually observed for a simple calcified or non-calcified plaque on VIE, while irregular intraluminal appearance was seen in heavily calcified or mixed plaques.

Conclusion:

A high calcium score of >400 did not significantly reduce the accuracy, sensitivity and specificity of CCTA; however, it decreased the sensitivity of detecting significant stenosis at the distal left circumflex. VIE images clearly demonstrated the coronary wall changes with significantly improved accuracy and sensitivity in assessing coronary artery stenosis. Therefore, VIE could be used as a complementary tool to CCTA for assessment of coronary artery disease.
Radiation Dose And Lifetime Attributable Risk (LAR) Of Cancer Incidence In Prospectively ECG-triggered Coronary Computed Tomography

Yang Faridah AA 1, Tan SK 1, Yeong CH 1, Ng KH 1, Sun ZH 2

University Of Malaya, Malaysia1
Curtin University, Australia2

Purpose:
This study aimed to measure the absorbed doses in organs for prospectively ECG-triggered coronary computed tomography angiography (CCTA) using five different state-of-the-art CT scanners in a female adult anthropomorphic phantom and to estimate the effective dose (HE) and the lifetime attributable risk (LAR) of breast and lung cancer incidence.

Methodology:
Prospectively ECG-triggered CCTA was performed using five commercially available CT scanners: 64-detector-row single source CT (SSCT), 2 32-detector-row dual source CT (DSCT), 2 64-detector-row DSCT and 320-detector-row SSCT scanners. Absorbed doses were measured in 34 organs using optically stimulated luminescence dosimeters (OSLDs) loaded in a standard female adult anthropomorphic phantom. HE was computed using phantom measurement data and the air kerma-length product (PKL)-to- HE conversion factor. LAR for cancers of breast, lung and others were estimated and compared.

Results:
Both breasts and lungs had the highest radiosensitivity and received the highest radiation dose during CCTA examination. The highest HE was received from 2 32-detector-row DSCT scanner (6.06 Â± 0.72 mSv), followed by 64-detector-row SSCT (5.60 Â± 0.68 and 5.02 Â± 0.73 mSv), 2 64-detector-row DSCT (1.88 Â± 0.25 mSv) and 320-detector-row SSCT (1.34 Â± 0.48 mSv) scanners. The LAR for breast cancer is higher than lung cancer (2 to 66 cases per 100000 persons vs. 8 to 47 cases per 100000 persons) in young women who are less than 30-year-old while LAR for lung cancer is higher than breast cancer after 30-year-old. The LAR for lung cancer in men is generally lower than in women.

Conclusion:
The radiation doses and LAR for cancer incidence from a prospectively ECG-triggered CCTA are relatively small and depend on the scanner model and imaging protocol. LAR for breast cancer increases exponentially for younger women hence the use of CCTA examination needs to be considered judiciously.
The objectives of this talk are to discuss MRI imaging evaluation of

a) Rotator cuff injuries particularly tears of the anterior insertion of the supraspinatus which is commonly missed by general radiologists. The technique used to ensure these lesions are not missed will be taught

b) Features of frozen shoulder on MRI are often not recognized and under-reported. Examples of MRI video case of frozen shoulder will be shown with regards to the features that suggest the possibility of adhesive capsulitis such as rotator cuff interval synovitis and intra-articular synovitis and synovitis underlying the subscapularis and anterior aspect of the SSP (between bone and the RC)

c) A simple review of common labral lesions and how to evaluate for labral injury using non arthrographic MRI will be discussed as there is a trend towards not using MRI contrast currently
Imaging Of The Variants Of Osteosarcoma

Ibrahim Lutfi Shuaib

Universiti Sains Malaysia, Malaysia

Osteosarcoma is the most common primary malignant tumour of bone, yet its absolute incidence among malignant tumours is low. Within its strict histologic definition, osteosarcoma comprises a family of lesions with considerable diversity in histologic features and grade. Approximately 75% of all osteosarcomas are of the classic or conventional type, and the remaining 25% comprise the osteosarcoma variants. The variants are a heterogeneous group of osteosarcomas with a range of different imaging and behavioral features. Its prognosis is dependent not only on these parameters but also on its anatomic site. It may occur inside the bones (in the intramedullary or intracortical compartment), on the surfaces of bones, and in extraosseous sites. Preferred modalities for evaluating primary disease are radiography, MRI, and sometimes computed tomography (CT) scanning. Staging is performed by using chest CT scanning to detect pulmonary metastases. Isotope bone scan is generally used to detect skeletal metastases or synchronous tumours, but whole-body MRI is more being used.
Abstract Not Available
Avascular Necrosis: The Mimics And Pitfalls

Prof Dr Suphaneewan Jaovisidha

Ramathibodi Hospital, Mahidol University, Bangkok, Thailand

Osteonecrosis, the necrosis of bone, like infarction in other organs, results from significant reduction or obliteration of affected area's blood supply. Pathogenic mechanisms of osteonecrosis consisted of ischemic changes, direct cellular toxicity, and altered differentiation of mesenchymal stem cells.

Multiple risk factors are described in osteonecrosis, which related to the pathogenic mechanisms. Any patient exposes to more than one risk factors i.e, connective tissue disease treated with corticosteroid, will increase the risk of osteonecrosis.

The recent treatment options of osteonecrosis of the femoral head, which is the well-recognized location involved by osteonecrosis, are different related to the size, location, and symptoms. The proper imaging should provide adequate information for the physicians. Such information consisted of (1) lesion location and size, (2) presence or absence of head collapse, (3) degree of head depression, and (4) acetabular involvement. A number of staging systems have been proposed to date, but unfortunately, no validated classification system has received universal acceptance. The size (extent) of involvement is important for management. Subchondral lesions are concerning because of the high risk of joint collapse, while metaphyseal lesions are less ominous.

While dealing with multiple modalities of imaging of avascular necrosis (AVN); radiologists should be familiar with the classical findings, the mimics, and the pitfalls of this condition. Magnetic resonance imaging (MRI) is considered gold standard for precollapse lesion of AVN when without subchondral bone fracture, or when AVN is considered by clinical setting but plain radiograph looks normal. When subchondral fracture is suspected but not clearly delineated on plain radiograph, further investigation i.e., computed tomography (CT) or MRI should be performed with CT considered the best in this clinical situation. Once collapse or acetabular involvement is present on plain radiograph, no further imaging is needed for treatment decision-making.

This topic will emphasize on the classical findings of AVN in multiple modalities, followed by the mimics and pitfalls, and how to differentiate the pitfalls from the true diagnosis.
Knee: Extensor Mechanism

Donna G. Blankenbaker, MD

University of Wisconsin School of Medicine and Public Health, Madison, WI USA

Objectives:
1. Review the components of the extensor mechanism
2. Discuss extensor tendon/ligament injury
3. Review fat pad syndromes and anterior bursitis
Introduction To The Molecular Basis Of Osteosarcoma

Ibrahim Lutfi Shuaib

Universiti Sains Malaysia, Malaysia

Osteosarcoma is the most common primary malignancy of bone in children. There is distinct correlation between periods of rapid bone growth and development of this disease. It is more commonly affecting males and often arise in the metaphyses of long bones such as the femur or tibia. Osteosarcoma disseminates rapidly throughout the body and 90% of such metastases are found in the lungs. The standard of care generally involves wide surgical resection with either neoadjuvant or adjuvant chemotherapy regimen. It has one of the lowest survival rates among pediatric cancers and imparts a 5-year survivorship of 70% in patients treated for localized disease, but only 30% when metastases are present. The bone remodelling cycle maintains the integrity of the skeleton through the balanced activities of its constituent cell types and defects in osteogenic differentiation leading to osteosarcoma development. Understanding bone development and pathogenesis at cellular is important. More important is also to understand the complex nature of osteosarcoma at molecular and microenvironment. We hope to better understand the interplay between various signaling and differentiation pathways, identifying the most critical molecular targets for the then allow for a bench-to-bedside approach involving potential therapeutics.
Update In Screening Of Synovitis Of The Hands

Professor Dr John George

University of Malaya, Malaysia

Rheumatoid arthritis; Our recent study has shown that the transverse approach of ultrasound at the bare area of the 2nd, 3rd and 4th MCP joints can help to distinguish RA from other arthropathies. RA exhibits significantly more synovitis on the radial aspects of the bare area of the 2nd and 3rd MC joints and ulnar side on the 4th MCP joint. Up to 2mm of synovitis is considered normal in the 2nd and 3rd MCP joints. More than 2mm is pathological. (rough estimates).

Seronegative arthropathies: In these cases there is a more diffuse synovitis in the MCP joint presence of calcification at tendon insertions, periostitis of proximal phalanx cortex, overhanging bone margins or spurs are all features.

Gout: Presence of snowstorm appearance especially under the tibiocalneal ligament of ankle, big toe subarticular erosion on ultrasound and snow storm appearance in thickened synovium may be an indicator. Please note that the serum uric acid is not always raised in patients with gout so sometimes aspiration of the calcified crystals for microscopy may be needed. Dual CT is a more expensive option.

CPPD- presence of chondrocalcinosis is the main sign and calcified TFCC or menisci of the knee may help in this diagnosis. On plain x-rays OA type narrowing of 2nd and 3rd MC joints may be noted.

Reference:
1. Ultrasound Assessment of Synovial Thickness of Some of the Metacarpophalangeal Joints of Hand in Rheumatoid Arthritis Patients and the Normal Population
   Zuhudha Hussain Manik,¹ John George,¹ and Sargunan Sockalingam.
   http://dx.doi.org/10.1155/2016/5609132
Diagnosing Acetabular Labrum Tears & Pitfalls

Donna G. Blankenbaker, MD

University of Wisconsin School of Medicine and Public Health, USA

Objectives:
1. Review imaging techniques
2. Discuss how to diagnose labral tears
3. Review the pitfalls
Abstract Not Available
Bone Metastasis Of Nasopharyngeal Carcinoma Imitating Ewing’s Sarcoma: A Case Report

Ahmad Tarmizi M ¹, Maizatul Jamny M ²

Universiti Sains Malaysia, Malaysia ¹
Hospital Kuala Lumpur, Malaysia ²

Nasopharyngeal carcinoma has predilection for local extension. Bone is the most common for distances metastasis with 5.0% at humerus. Radiologically the lesion were lytic in 66.0%, mixed lytic and sclerotic in 12.8% and sclerotic in 21.2%. This is an unusual bone metastasis case of nasopharyngeal carcinoma to the humerus that mimicking Ewing’s sarcoma. The radiographic features of the osseous lesion were very suggestive of primary bone malignancy, Ewing's sarcoma as the first option, with extraosseous spread to the soft tissues supported by the MRI. Biopsy results demonstrated non-keratinizing squamous cell carcinoma. The clinical, radiologic, and histologic aspects of the disease are discussed.
Musculoskeletal fibromatosis is a soft tissue tumour of mesenchymal cells. Clinically, it is divided into two groups: superficial and deep. The histopathological hallmark of this entity is the proliferation of spindle shaped cells arranged in a fascicular pattern within collagenous stroma which contains blood vessels. Musculoskeletal fibromatosis displays a wide spectrum of radiological characteristics, ranging from benign non-invasive to locally infiltrative. Additionally, fibromatosis tend to recur even after surgical resection. MRI is the imaging of choice. Most fibromatosis demonstrate intermediate signal on T1W, mixed heterogeneous signal on T2W, and heterogeneous, often moderate to marked enhancement. Split fat sign, fascial tail sign and bandlike low signal intensity are some radiological signs infrequently described in literature. Yet, neither the signal intensity nor signs described previously are specific to fibromatosis. Moreover, the aggressive characteristics of deep fibromatosis can mimic malignant soft tissue sarcoma. All these limitations impose a diagnostic challenge to the radiologist. Radiologists should be aware of the variety of radiological presentations of musculoskeletal fibromatoses in order to make a correct diagnosis and guide clinician towards the appropriate management algorithm. Herein, we present a case series of histologically proven musculoskeletal fibromatoses that were encountered in different locations in the body and with varied radiological findings.
Postradiation Changes Of The Cervical Spine

Tan HH 2, Lee AFS 1, Lian FS 1

Hospital Kuala Lumpur, Malaysia 1
Universiti Kebangsaan Malaysia 2

In the management of head and neck squamous cell carcinoma, radiotherapy is mainstay treatment. During the planning and contouring of radiotherapy, radiation oncologist will concentrate to reduce radiation dose of the cervical cord. However, basal skull and cervical spine are still exposed to high dose radiation. The dose is even higher in conventional radiotherapy, as image modulated radiotherapy is not widely available in Malaysia. Osteonecrosis of bone is the main complication of bone secondary to radiotherapy. Radiotherapy is well known to have delay onset on the complication. It is crucial for us to recognize this complication and differentiate it from bone metastases. Here, we would like presents two cases of radiotherapy changes in the cervical spine. The first case, we concentrated on the CT changes. Osteonecrosis had caused atlanto-axial dislocation, C1 bone erosion and basilar impression. The second case, we would discuss the MR changes. In this case, patient developed quadriplegia due to cervical stenosis. There were also cervical discitis and radiation induced dural thickenings.
Brown’s Tumour Of The Hard Palate In Secondary Hyperparathyroidism; A Rare Encounter In Our Current Era

Sangeethambikai M, Nur Haneefa A, Wan Najwa Zaini WM, Siti Zubaidah S

Hospital Queen Elizabeth II, Sabah, Malaysia

Purpose:

Brown tumor of hyperparathyroidism (HPT) is rare and not frequently seen in our current practice due to development of healthcare system. However, in underdeveloped countries, HPT goes untreated. HPT is explained as primary, secondary and tertiary. Brown tumor or osteitis fibrosa cystica is a benign bone lesion that is caused by HPT. A review of the literature over the last 10 years identified a total of 87 patients with 57 cases involving the facial region. Of those, twenty-four cases only had secondary HPT.

Methodology:

We report a case of 15 years old girl with underlying chronic kidney disease (Stage 5) on hemodialysis. She presented with palatal swelling and bone pain for 6 months. Physical examination revealed a large firm mass involving both sides of the palate. CT scan showed changes of secondary HPT with palatal tumor of the hard palate. Histopathology examination (HPE) confirmed the diagnosis of brown tumor. Subsequently, patient underwent total parathyroidectomy.

Results:

Brown tumor is a bone lesion that is caused by osteoclast activity in HPT. Parathyroid glands include chief cell that produce PTH and the final result of increased secretion by the chief cells is HPT. The incidence of skeletal brown tumors in ESRD ranges from 1.5 to 13%, but this complication has been decreased with our recent development in our healthcare system. Extremities are most commonly involved areas with facial bones being rare. Diagnosis is dependent on histopathology with correlation with the clinical and endocrinology status.

Conclusion:

Secondary HPT is a common complication of end-stage renal disease, with majority cases in underdeveloped countries where the disease is untreated or uncontrolled. As radiologist, we should be aware of possible presence of brown tumors in the facial bones to aid the surgeons in treating the patient accordingly either by total parathyroidectomy or resection with reconstruction.
Ultrasonographic Evaluation Of Flexor Tenosynovitis In Early Untreated Rheumatoid Arthritis: A Comparison With Magnetic Resonance Imaging

Sonal S, Sunil M, Meenu B

Subharti Medical College, India
Sawai Man Singh Medical College, India

Purpose:
To evaluate flexor tenosynovitis in untreated early rheumatoid arthritis (RA) using high frequency gray scale and power doppler Ultrasonography and to compare Ultrasonographic findings with that of magnetic resonance imaging (MRI).

Methodology:
Forty patients of rheumatoid arthritis underwent high frequency Ultrasonography and MRI of 2nd to 5th flexor tendon sheaths (FTS) of both hands whereas 25 healthy controls underwent only high frequency Ultrasonography. Normal anatomy and inflammatory changes in the FTS were recorded on both the modalities by two radiologists specialized in doing musculoskeletal imaging. No patient had received prior steroid or disease-modifying agents (DMARD).

Results:
Flexor tenosynovitis was found in 102 (31%) of 320 FTS in 22 (55%) of 40 patients on ultrasound compared with 210 (65.6%) of 320 FTS in 32 (80%) of 40 patients on MRI. FTS were completely normal in control subjects on ultrasound. Considering MRI as the gold standard, the sensitivity, specificity, negative and positive predictive values for ultrasound were 0.52, 0.83, 0.69, and 0.70, respectively, for detecting flexor tenosynovitis. The most frequently involved FTS on both the modalities were the second and third.

Conclusion:
Both ultrasound and MRI can be used for detection of flexor tenosynovitis in patients with early untreated RA. MRI is more sensitive for detecting flexor tenosynovitis for obvious reasons. A negative ultrasound scan does not exclude inflammation and an MRI should be considered. In developing countries like India, where MRI is limited in availability, ultrasound can become the imaging modality of choice specially to evaluate soft tissue changes in early RA.
Assessment Of Lumbosacral Plexus In Diabetic Neuropathy With Advanced MRI Technique


University Malaya, Malaysia

Purpose:
Our goal is to investigate if MRI can classify neuropathy and muscle atrophy severity in diabetics.

Methodology:
Total of 30 diabetic patients and 8 age-matched healthy controls, who are non-diabetic and not having any neuropathy were prospectively recruited. Patients were pre-classified into 3 neuropathy severity groups that were ascertain through the Toronto Clinical Scoring System (TCSS). MRI 3-Tesla with Diffusion Tensor Imaging (DTI) was performed on the dominant lower limb to evaluate sciatic and peroneal nerves. Post processing images were done to obtain DTI values for each nerve. Axial in-out phase of the calf were used to classify muscle atrophy into severity by using Goutallier classification on the medial gastrocnemius muscle. Patients glycemic control (HbA1c) level were also collected.

Results:
MRI DTI was able to detect neuropathy in diabetic patients and it corresponds with chronic degenerative nerve changes (p=0.001-0.022). However, it is less sensitive in distinguishing disease severity. We found a significant correlation in muscle atrophy grading in normal and increasing neuropathy severity (p<0.05).

Conclusion:
MRI DTI can demonstrate peripheral neuropathy in diabetic patients and corresponds with chronic degenerative nerve disease. MRI also supports that there is significant muscle atrophy in diabetic neuropathy patients as compared to normal patients. However, both DTI and muscle atrophy assessment technique that we used could not differentiate between the different neuropathy severity groups.
PET-CT In Oncology – The Best Techniques Exploiting Molecular Imaging Modalities

Assoc Prof Dr Fathinul Fikri Ahmad Saad

Centre for Diagnostic Nuclear Imaging, Universiti Putra Malaysia

Molecular imaging utilizing dual markers approach is now being accepted by many physicians as an important platform in translating genetic defect through aberrant protein function and cellular transformation and development. Nevertheless, the sensitivity of molecular imaging techniques are varied depending the type of radiopharmaceutical marker used in signaling the biological processes. In particular, the use of FDG as a ligand PET-CT has many limitations. The most obvious example of this is in the brain where high glucose utilisation by the normal cerebral cortex can mask brain tumours, particularly those of well differentiated. In addition, some tumours with high metastatic potential can have relatively low FDG-uptake. Similarly, the specificity of FDG–PET is also imperfect with some benign conditions, particularly granulomatous lesions i.e. tuberculosis, having high FDG uptake. These very real limitations of FDG used in the molecular imaging technique have enticed the search for alternative radiotracers which signal different biological disease process. Several alternative PET-radiopharmaceuticals are currently being investigated, which have the potential to reveal the proliferation rate, oxygen utilization, drug resistance properties and the viability of the tumours. Examples of new PET tracers include fluoroethyltyrosine (FET) for brain tumour imaging; the proliferation marker 18F-fluorothymidine (FLT) to assess bone marrow reserves and the exploitation of dual tracer strategy i.e. FDG and 68 Ga DOTA–octreotate for staging and therapeutic response in neuroendocrine tumour would promise a more specific signaling that reflect the inert cellular alteration. The choline analogue 18F-fluorocholine (FCH) for patients with rising prostate specific antigen levels have been found effective in the management strategy and thus improve the overall patient survival. The molecular imaging technique employing integration of structural and functional imaging modalities denotes the new era in molecular imaging whereby the advancement in science technology has impacted the way physicians personalizing treatment plan in a more effective strategy and cost effective manners for the patient.
Quantifying Glucose Hypometabolism In Alzheimer's Disease: An 18F-FDG PET/CT Study; With fMRI Updates On The Assessment Of Cognitive Impairment

Subapriya Suppiah

Universiti Putra Malaysia, Malaysia

Dementia is a clinicopathological diagnosis, which consists of several different clinical subtypes, the commonest one being Alzheimer’s disease (AD). Clinically, the patients present with a progressive decline in cognitive function and the hallmark of AD is the histological detection of beta amyloid plaques (Aβ) by brain biopsy or at autopsy. Diagnostic imaging can play a role in the management of dementia by providing structural and functional information to exclude possible secondary causes and offer additional information to differentiate the subtypes, especially in atypical cases. The utility of functional imaging in clinical practice, such as Tc99m-HMPAO SPECT and 18F-FDG PET/CT as well as Amyloid imaging PET/CT, is gaining momentum as a non-invasive biomarker to provide better diagnostic accuracy. Although Amyloid PET/CT imaging has not been widely used in Asian countries, it is useful to know about this type of advances in imaging that have been utilized in Europe and the United Kingdom to aid in improved specificity for detecting Aβ plaques. Emphasis will be given on clinical indications, limitations and image interpretation techniques. A brief introduction to the role of functional magnetic resonance imaging (fMRI) for assessment of cognitive function will also be provided.
A brief outline with illustrations of the commonly encountered artefacts during routine PET-CT scanning with pearls and tips of avoiding them, including measures of reducing these potential artefacts.
Prostate specific membrane antigen (PSMA) PET CT has proven to be a highly sensitive and specific imaging modality for prostate cancer, both in the settings of recurrence and staging. It shows high sensitivity, even with low PSA values less than 1.0 ng/ml. In centers where it is available, it has rapidly supplanted choline-based tracers as the PET agent of choice in evaluating prostate cancer. However, despite its name, uptake in both benign and malignant non-prostatic lesions occurs, which readers need to be aware of to avoid error. As PSMA PET is a relatively new imaging modality, its clinical role has yet to be fully defined. As more data emerges, we foresee its future integration into clinical guidelines for staging, recurrence, response evaluation and pre-therapy evaluation for PSMA therapy.
Challenges in Hybrid PET / CT Practice

Kardinah

Dharmais Hospital / National Cancer Center Jakarta, Indonesia

PET / CT in oncology provides a new direction for lesion characteristics, staging, evaluation of treatment and recurrences. The challenges circumstances using PET / CT scan in cancer hospital are:

1. Previous diagnostic imaging results (CT scan or MRI) are indeterminate, and clinicians require information of non-malignant or malignant lesion and staging.
2. Cytological examination with malignant cell findings to confirm the presence of a primary tumor.
3. Post-therapy evaluation (surgery, chemotherapy, radiation and hormonal) and recurrence evaluation, or examination from other hospitals with previous imaging not PET / CT scan.

For the first point, evaluation of lesion morphology from diagnostic CT or MRI is important, and diagnostic imaging examination is recommended with contrast and standardized techniques. Oncoanatomy can help characterize the lesion and TNM staging information should be provided.

In the second point, the determination of primary tumor is highlighted on oncoanatomy morphology according to TNM. If there are lesions with secondary infections mimics to cancer spreading, we should be careful to identify and decide primary tumor. To overcome this matter details data of patient with complete disease pathogenesis and imaging series are required.

The third point, is more difficult challenge, because based on the results of the PET / CT scan the clinician will determine further treatment. We should required patient data in details and timeline previous treatment as well as the entire series of imaging. PET / CT in the case of malignant lymphoma requires accurate results for the determination of responder or non-responder post chemotherapy, cautious interpretation of PET / CT scan results is required.

Conclusion: The optimization and justification using PET / CT should not only known by radiologist and nuclear medicine physician but also oncologist, to achieve optimal result for patient management.
Abstract Not Available
Uterine neoplasms refers to different types of cancers occur in the uterus: (1) epithelial carcinoma (such as, endometrioid cancer, papillary serous carcinoma, clear cell carcinoma, or carcinosarcoma, which is also known as malignant mixed Müllerian tumors [MMMT]); or (2) stromal/mesenchymal tumors (such as, low-grade endometrial stromal sarcoma, high-grade undifferentiated sarcoma, or leiomyosarcoma). Among them, endometrial cancer is the most common malignancy of the female genital tract in the developed countries. Uterine sarcomas are far less common and account for approximately 1 in 12 of all uterine cancer patients.
Robust imaging armamentarium has continuously been developed since inaccuracy exists by using preoperative tumor grade and intra-operative gross examination of the uterus to evaluate the myometrial invasion depth. Magnetic resonance (MR) imaging substantially better than ultrasonography, computed tomography, and non-enhanced MR imaging, and is further refined by using dynamic contrast enhancement technique for detecting the myometrial invasion. Diffusion-weighted MR imaging is recently proven able to differentiate normal and endometrial pathology. The use of high b value makes images more sensitive to water diffusion hence increases contrast between normal and cancerous tissue.
In this talk I will review the common imaging presentation of uterine benign and malignant tumors originating from various cell types. Imaging features corresponding to the TNM system will be demonstrated, with pearls and pitfalls particularly emphasized. Finally, we will discuss the clinical impact of MR for disease prevention, diagnosis, response evaluation and follow up.
Role Of MR Guided Biopsy In Pca

Chan Kyo Kim

Samsung Medical Center, South Korea

Systemic transrectal ultrasound-guided biopsy (TRUS-GB) is the standard procedure for diagnosing prostate cancer (Pca), but reveals a limited accuracy for the detection of cancer, with up to 30% false negative findings. Currently, with improved accuracy of multiparametric MR imaging (mpMRI), the role of mpMRI has been shifted from tumor staging to detection, characterization and guidance for biopsy. MR guided biopsy (MR-GB) in patients with suspected Pca has better sensitivity for clinically significant cancer (91% versus 76%), and less significant cancer detection (about two-fold) compared with TRUS-GB. MR-GB has three different techniques: cognitive fusion, MRI-TRUS fusion and in-bore fusion. These diagnostic advances using MR-GB has improved patient risk stratifications and management strategies. This presentation introduces the MRGB technique for Pca detection and discusses its current issues and further directions.
Prostate cancer has become the 5th common cancer in Korea as of 2010, showing a sharp annual increase of 12.6%. Although localized prostate cancers are well treated and their prognoses are excellent, some of them eventually progress within 2 years from the initiation of the treatment. This progression is known as castration-resistant prostate cancer (CRPC), and it is defined by tumor growth in spite of a testosterone level of less than 50 ng/dL.

Prostate-specific membrane antigen (PSMA) is primarily expressed in normal human prostate epithelium, and overexpressed in prostate cancer. PSMA is further increased in poorly differentiated, metastatic and CRPC. In this regard, PSMA has been developed as a good target for both diagnostics and therapeutics in CRPC patients.

Recently, several clinical trials using PSMA targeting probes labeled with therapeutic radionuclides such as Lu-177 have been conducted for patients with CRPC in Germany and the USA. Promising results are expected based on preliminary clinical studies that were retrospectively performed. To implement PSMA targeted therapy in clinical practice, it is necessary for nuclear medicine physicians and clinicians cooperate closely.
Utility Of 18 F-Flurocholine (FCH) PET-CT As Predictor For Breast Cancer Aggressiveness: An Initial Result.

Mohd Hazeman Z ¹, Shazreen S ², Shaharun Niza S ³, Fathinul Fikri AS ²

Centre for Diagnostic Nuclear Imaging, Malaysia ¹
PPDN ²
UKM ³

Purpose:
To determine the potential of 18 FCH PET-CT as a predictor of breast cancer aggressiveness.

Methodology:
Seventeen consecutive patients with a primary or recurrent breast carcinoma underwent 18 F- FCH PET-CT imaging prior to biopsy. All patients had Birads 4/5 breast lesions on mammogram. Biopsy results were recorded and the patients were dichotomised into malignant and benign groups and HER-ve and HER +ve genotype. Semiquantitative analysis utilising the standardised uptake value (SUVmax/g/dl) was used to predict the two groups of variables for cellular breast cancer aggressiveness.

Results:
There were 17 females with mean age of 52.82 Â± 10.71 years. Fourteen patients had malignant disease (14/17; 82.35%) on histology with eight (47.1%) with HER â€“ve genotype. There was a significant different between 18F-FCH SUVmax of the HER-ve and the HER +ve positive group (1.99 g/dl vs 0.2g/dl; p

Conclusion:
The SUVmax 18F-FCH PET-CT of more than 0.75 is a good predictor in signalling cellular reprogramming of an aggressive breast carcinoma.
Abstract Not Available
Updates In Neonatal Abdominal Emergencies

Hamzaini Abdul Hamid

University Kebangsaan Malaysia Medical Centre, Malaysia

It is a common scenario to see a child or infant presented to Emergency Department with gastrointestinal symptoms such as abdominal pain, vomiting and abdominal distension. These symptoms are rather non-specific and urgency of the situation sometime may be left unnoticed.

There are a few surgical emergencies need to be considered when dealing with child who presented with gastrointestinal tract symptoms. This lecture will highlight the presenting symptoms, physical examination of common surgical emergencies. The appropriate imaging modalities will be discussed in each diagnosis/condition with special attention being made to the ionizing radiation concern which is important in this age group.
TB the Great Mimicker

Prof Dr Bernard F. Laya

St. Luke’s Medical Center, Philippines.

Tuberculosis (TB) is a global health concern, particularly in Asia, Africa, Latin America and Eastern Europe. In 2015 alone, an estimated 10.4 million people developed TB worldwide, 11% of whom have human immunodeficiency virus (HIV) co-infection. At least 1 million children fall ill with TB each year representing about 11% of all TB cases. An estimated 1.4 million died from tuberculosis in 2015, approximately 210,000 are children, making tuberculosis one of the top 10 causes of death worldwide.

Intrathoracic TB, including lung and lymph node disease are common manifestation of the disease in children. Other forms affect the central nervous system, gastrointestinal, hepatobiliary tree, urinary and musculoskeletal systems. Although there are certain imaging features, which are likely representative of TB disease, it is not uncommon that TB can mimic other disease entities, particularly other infections and neoplastic processes, which can prolong or even complicate diagnoses. In this short presentation, imaging manifestations of TB in various organ systems will be presented, with special emphasis on findings that may mimic other disease entities.
Imaging in pediatric central nervous system (CNS) infection has been challenging since the spectrum of neuroimaging findings are wide, from being normal findings to complicated imaging pattern. Nevertheless, neuroimaging plays an important and has growing role in the diagnosis and therapeutic management of pediatric CNS infections.

This lecture will describes the spectrum of imaging findings associated with major pediatric viral and bacterial brain infections, dividing the type of pediatric CNS infection to congenital and non-congenital. The spectrum of neuroimaging findings will be discussed based on the major intracranial compartments that are leptomeninges, intraparenchyma, major vessels and ventricular system. The role of different imaging techniques particularly ultrasound, CT and MRI will also be discussed highlighting on MRI as the tool of choice in the evaluation of brain infections with regards to the role of advanced MRI technique such as diffusion-weighted imaging. This lecture also considers mimics of CNS infection as well as pitfalls in diagnosis of CNS infection.

The lecture will ends by introducing IRIS, a disease entity known as immune reconstitution inflammatory syndrome which shows paradoxical infectious or inflammatory condition in patient who is recovering from severe immune deficiency such as HIV. Little is known regarding IRIS in children. We will go through the epidemiology of this disease and the neuroimaging findings that can be associated with this disease, which should be alerted in certain clinical condition that will also be discussed.

At the end of this lecture, it is hoped to provide a practical approach in dealing with CNS infection in pediatric age group emphasizing on recognizing certain neuroimaging pattern together with clinical history and biochemical information.
Delivering a Quality Pediatric Radiology Service

Prof Dr Bernard F. Laya

St. Luke’s Medical Center, Philippines.

The presentations of certain disease entities, including its pathophysiology, and imaging manifestations are generally different in children compared to that of adults. In addition, the approach to therapy and the care of an ailing child also differ from an adult. In childhood radiologic imaging, it is important to gain the cooperation of the child to obtain an adequate imaging test of diagnostic value. To deliver a quality pediatric radiology service, it is also important to consider not only to the needs of the child but also engage the parents and / or caregivers in their child's imaging needs, making sure it is indicated and appropriately done.

For a successful pediatric radiology service, the proper infrastructure has to be in place including: human resources, equipment, process, and workflow. Radiologists, radiologic technologists, nurses, and other healthcare personnel providing the imaging needs of children must have proper training in order to provide the most optimal imaging care. Facilities and equipment specific for children of various age groups (from infants to teenagers), which are often different from those used for adults, must be available. Additionally, processes and procedures being done must follow established standards that had been validated for use in children. In this short presentation, the main elements that make for a successful pediatric radiology service shall be discussed with special emphasis on delivering a quality and safe service.
Training and Education for Pediatric Imaging Workforce

Prof Dr Bernard F. Laya

St. Luke’s Medical Center, Philippines.

The goal of training is to equip the trainee with the general knowledge of childhood diseases as it relates to various medical imaging modalities. Training shall include both didactic and clinical experience that fosters proficiency in radiologic skills and interpretation of imaging studies in neonates, children and young adults. It must be emphasized that pediatric radiology practitioners does not only deal with patients, but they also deal with the parents as well as the pediatricians or primary care providers. Furthermore, training and education is continuous and is not limited to radiologists and other physicians, but is also extended to the radiographers, nurses, and other radiology personnel. Educating the referring clinicians also play a role in ensuring that imaging tests are done with appropriate indications.

For an effective and successful training program, it is important that institutional and personnel requirements are set. A standard curriculum and learning strategies should be drafted that matches the expected learning output. Finally, a systematic way of monitoring and evaluation shall be in place to ensure that the learning objectives are met. In this lecture, basic elements of pediatric radiology training including: basic requirements, standard curriculum, and assessment shall be presented.
Contrast-Enhanced US In Paediatrics: Practical Application And Challenges

Wendy WM Lam

Queen Mary Hospital, Hong Kong

In pediatrics ultrasound has long been viewed more favorably than imaging that exposes patients to radiation and iodinated contrast or requires sedation. It is child-friendly and diagnostic capabilities have been improved with the advent of contrast-enhanced ultrasound (CEUS). Off-label use of drug is of the utmost importance in paediatrics because many drugs have not been evaluated in randomized trials in children. This is true for CEUS and the application of CEUS is promising. The contrast agent SonoVue® (Bracco Imaging, Milan, Italy) has recently been approved by the FDA to be used in hepatic investigations in adults and children, and for use in ultrasonography of the urinary tract (voiding ultrasonography) for the evaluation of suspected or known vesicoureteral reflux (VUR). In addition to these approved indications, CEUS is safe and effective for the examination of many organs, as recently highlighted by the European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB). The usual indications of CEUS are parenchymal injuries in blunt abdominal trauma, focal liver lesions, solid tumours and voiding cystogram.

The challenge of off-label use of CEUS in paediatric patients is balancing between the need to deal with unresolved legal issues with the need for high diagnostic performance in daily clinical routine. The other challenges are the lack of procedure standardization, and no approved official written recommendation of the dose for different intravenous application related to the child’s weight.

The aim of this lecture is to present basic knowledge about the use, the findings and the limitations of contrast-enhanced ultrasound (CEUS), and the role of off-label use of US contrast agents in paediatric patients. Tips and tricks about “how to perform the exam” in some cases will be presented. In conclusion, when restrictions are respected, CEUS holds promising perspectives and may help reduce radiation exposure and use of iodinated contrast agents in pediatrics, thereby potentially reducing complications in routine imaging.
Abstract Not Available
Pediatric trauma is the number one cause of death in children, exceeding all other causes of death combined. Caring for pediatric trauma requires an understanding of the distinct anatomy and pathophysiology of pediatric population compared to adult trauma patients. Body size of children allows for greater distribution of traumatic injuries and multiple trauma injuries are common. Body of child has higher elasticity, even severe internal injuries may occur without any recognizable external signs.

The sensitivity of a radiological investigation for polytrauma is more important than its specificity with the primary aim of not missing any critical finding which is life-threatening. X-ray is the first important modality in primary survey. Focused assessment with sonography in trauma (FAST) and extended FAST (e-FAST) have crucial role in hemodynamically unstable patients. In the hemodynamically stable patients whole-body CT scanning is the most immediate radiological procedure. Although the exposure to ionizing radiation could increase the risk of developing cancer in future life, its immediate and detailed diagnostic accuracy outweighs potential damage.

Head injury severity is the principle determinant of outcome and mortality in polytraumatized children. CT brain is essential for acute management. Pulmonary contusions remain the most common form of pediatric thoracic trauma. Diagnosis is made by CXR in about 90% of cases. Abdominal injury is second common site of injury. It rarely requires surgery in contrast to adults, but need to be detected. CT scanning is diagnostic in only 60% of bowel perforation cases and may reveal free fluid without evidence of solid organ injuries. Contrast US (CEUS) is used in low energy abdominal trauma. Spine and pelvic injuries as well as injuries of extremities require age-adapted surgical procedures. CT and MRI are usual imaging modalities. MRI plays a pivotal role in patients with diffuse axonal injury and spinal trauma.

This lecture aims to discuss role of different kinds of imaging in pediatric polytrauma with some cases demonstration.
Radiofrequency Ablation Of Malignant Hepatic Tumors: Tips And Tricks

Yi-Hong Chou\textsuperscript{1,2}, Chui-Mei Tiu\textsuperscript{1,3}

Taipei Veterans General Hospital and School of Medicine, National Yang Ming University, Taiwan \textsuperscript{1}
Yuanpei University of Medical Technology, Hsinchu, Taiwan \textsuperscript{2}
Lo-Hsu Medical Foundation Lotung Poh-Ai Hospital, Yilan, and Yee Zen General Hospital, Taoyuan, Taiwan \textsuperscript{3}

Percutaneous radiofrequency ablation (RFA) has demonstrated significant advantages in the treatment of primary or metastatic malignancies confined to the liver. However, the relatively high recurrence and complication rates associated with RFA, especially for the treatment of tumors larger than 3 cm, restricted its application. Local tumor progression and major complications are closely related to tumor size, tumor number, and tumor locations. In this review, we propose some tips and tricks in RFA of hepatic tumor to enhance the therapeutic efficacy. Recent advances in the radiofrequency (RF) devices and technology have enabled the possible radical treatment of patients with difficult-to-resect liver tumors; however, some technical tips should be kept in mind. Choice of proper device, planning for a more effective therapeutic thermal zone, planning for a safe approach, and avoidance of adjacent extrahepatic organ injuries are some of the most important factors to achieve higher therapeutic efficacy, lower complication rate, and better overall survival rates. From technical point of view, an interventionalist should be aware of the difficult areas and the solutions or alternatives of approaching or treating the target lesions in these areas. Difficult areas can be locations difficult to access or locations in which interventional procedures carry relatively high risk of complications. Some areas such as caudate lobe, subphrenic regions (S8, S7 and sometimes S2) or juxtagastric regions, can be difficult to approach. Lesions located in the regions adjacent to the bowel loops, gallbladder, especially lesions abutting the large bowel or duodenum/small bowel, carry higher risk of complications such as gallbladder rupture or bowel perforation. Centrally located lesions may about the portal vein and bile duct, and RFA procedure may induce portal vein thrombosis or bile duct injury due to thermal or mechanical damage as well as alternations in blood supply of the biliary tract. To avoid these complications, various methods can be used, chemical ablation using local ethanol injection in addition to RFA may be helpful for treating lesions adjacent to the gallbladder. Artificial ascites with dextrose water can be effectively used to displace the bowel loops from the abutting tumors and reduce the risk of bowel perforation. When treating the centrally located lesions, combined therapy is preferred to avoid biliary injury, however, chemical-induced sclerosing cholangitis or partial obstruction of biliary tree can occasionally seen weeks after the procedure. If it occurs, conservative therapy can be helpful in most cases. Careful pre-RFA imaging reading may avoid vascular injury. The needle tract should be treated with well controlled needle temperature and slow retraction of the needle after the ablation procedure for the target tumor; this may reduce the risk of needle-tract seeding or bleeding. With appropriate caution and techniques, ultrasound-guided RFA can be a safe and effective minimally invasive treatment of choice for malignant hepatic tumors.
Whole Body MRI In Paediatric Oncology: Pictorial Review

Emilia Rosniza MR, Hamzaini, Faizah MZ

UKM, Malaysia

Purpose:
Whole body MRI (WB MRI) has been increasingly used in paediatric population due to its robust soft tissue resolution and with no radiation exposure risk. The latter is very much relevant in cases of paediatric oncology since repeated imaging is always important for follow-up at end of treatment. Therefore, our objective is to discuss the value of WB MRI in paediatric oncology in pictorial review.

Methodology:
We studied WB MRI performed for various cases of paediatric oncology including lymphoma, neuroblastoma and Langerhans Histiocytosis (LCH). We performed the WB MRI using coronal STIR sequences whereby the technique will also be discussed.

Results:
The cases will demonstrate different findings that can be found in WB MRI which includes abnormal lymph nodes, focal mass lesion in the organ and bony abnormalities among others. Cases that have follow-up WB MRI will also be presented for better understanding on the value of WB MRI in follow-up cases.

Conclusion:
This review is hoped to be an interesting guide for those who want to be familiar with the method and also adds special attention to technical aspects together with various findings that can be seen in paediatric oncology population. Particularly in paediatrics, MRI should be considered as comparable as PET CT in the assessment of abnormal morphology in the absence of ionizing radiation.
MDCT Presentation Of Neuroblastoma: A Multisystem Pictorial Review Of Imaging Features

Mariaem MA, Jose Maria Javier VF

St. Luke's Medical Center, Philippines

Purpose:
Neuroblastoma is the most common extracranial solid tumor of childhood and comprises up to 50% of malignancies among infants. It may originate anywhere along the sympathetic ganglion chain. The most common site of origin is within the abdomen, either in an adrenal gland (40%) or in a paraspinal ganglion (25%). Other sites are the paraspinal area of the thorax (15%), the neck (5%) and the pelvis (5%) [1]. This pictorial review of multidetector computed tomography images of patients diagnosed with neuroblastoma shall provide multisystem imaging features that depict and aid in the diagnosis of this condition.

Methodology:
Multidetector computed tomographic (MDCT) imaging of different organ systems of children with neuroblastoma identified in a pediatric radiology and pathology database were included, totalling 6 patients. Imaging features were reviewed, analysed and set in this pictorial review.

Results:
MDCT allows comprehensive evaluation of neuroblastoma in terms of morphologic features and extent as well as presence of metastasis. On MDCT, a neuroblastoma would commonly present as large, lobulated, heterogeneous solid mass that displaces adjacent organs, like the kidneys, being inferiorly displaced. Calcifications are commonly seen 80% of the time. Bone remains the most common site of metastasis then the liver, lungs, and central nervous system [2].

Conclusion:
MDCT imaging features of neuroblastoma affects multiple systems of the pediatric body. The mass is beyond abdominal imaging and sites of affectation also involve bones, liver, lungs, and central nervous system.
Case Series Of Atypical Enhancement Pattern In Meningoencephalitis In Children

Noor Hazwani AW¹, Norafida B¹, Suraini MS¹, Mohamad Syafeeq Faeez MN¹, Rositaa MI², Laila Mastura¹

UPM, Seri Kembangan, Selangor, Malaysia¹
Hospital Serdang, Malaysia²

Meningoencephalitis is not an uncommon hospital admission. We presented case series of children who presented with clinical history and findings of meningoencephalitis. However, MRI shows atypical and unique enhancement patterns. Each case will be provided with clinical history, clinical examination, laboratory investigations results, CT scan images as well as different selected sequences of MRI brain. The pattern of enhancement of each case will be discuss in details. The progress of subjects and final diagnosis will be provided.
Purpose:
Hypoxic ischemic encephalopathy (HIE) is the most common cause of neonatal deaths and morbidity in children. With the advancement of magnetic resonance imaging (MRI), the ability to localize and describe the severity of the brain injury has expanded tremendously. In this review, we describe the patterns of MRI following hypoxic ischemic brain injury and the outcome of these changes in the neurodevelopment.

Methodology:
This was a retrospective study in the Department of Radiology, Tengku Ampuan Afzan Hospital from 1st March 2016 to 31st March 2017. The study included all the paediatric patients (from birth to 12 years old) who were referred for MRI Brain with clinical signs of perinatal hypoxia. Children with developmental delay, cerebral palsy and neurological deficit were also included. Children with brain infection and malignancy were excluded. Patterns of MRI Brain and outcome of the patients were described.

Results:
A total of 26 cases were included. Seventy three percent (73%) of the cases had abnormal MRI findings. Eighty percent (80%) of the patients had term delivery. The findings of MRI were T2 hyperintensities, periventricular leukomalacia, brain atrophy, cystic encephalomalacia, thinning of corpus callosum, infarctions and intracranial bleeds. The most common finding was intracranial bleeds (42.3%), followed by T2 hyperintensities (27%) and thinning of corpus callosum (27%). The rest were periventricular leukomalacia (23.1%), cystic encephalomalacia (11.5%), infarction (7.7%) and brain atrophy (3.8%). Normal neurodevelopment and neurological examination were seen in 41.2% of the patients. In 47% of the cases, patients had delayed neurodevelopment while 11.7% of the patients had cerebral palsy.

Conclusion:
MRI is the definitive diagnostic modality for perinatal hypoxia. Patterns of MRI brain are determined by the timing and the severity of the insult. Thus it is an important tool for prognostication for HIE.
The Accuracy Of Ultrasound Features In The Diagnosis Of Biliary Atresia

Sim SK ¹, Juhara Haron ², Nik Fatimah Salwati NM ³

Hospital Universiti Sains Malaysia, Malaysia ¹
Universiti Sains Malaysia, Malaysia ²
Hospital Sultanah Bahiyah, Malaysia ³

Purpose:
To assess the role of ultrasound (US) in the diagnosis of biliary atresia.

Methodology:
Fasting infants with conjugated hyperbilirubinemia were subjected for US examination in Hospital Sultanah Bahiyah, Kedah. The patients were grouped into biliary atresia (BA) and non-biliary atresia (non-BA) based on the surgical findings and clinical follow up. Tri-angular cord (TC) sign, gall bladder (GB) morphology, liver size, and echotexture, splenic size, hepatic artery size, hepatic artery to portal vein ratio, presence of a common bile duct, and presence of subcapsular flow on colour Doppler were recorded. Sensitivity, specificity, positive and negative predictive values were calculated for each US variable. BA and non-BA groups were compared by using the Fisher exact test for categorical variables and an unpaired t test for continues variable.

Results:
A total of 82 infants were included in the study; 42 had surgically confirmed BA and 40 had other documented causes of neonatal jaundice. Nine US features namely TC sign, GB morphology, liver size, liver echotexture, splenic size, hepatic artery size, hepatic artery to portal vein ratio, presence of a common bile duct, and presence of subcapsular flow on colour Doppler showed a significant different between BA and non-BA group. Ultrasound able to correctly classified 82 infants into BA and non-BA group with 98% accuracy.

Conclusion:
BA can be diagnosed with US from other cause of conjugated hyperbilirubinemia in 98% of patients if multiple US features are carefully evaluated. These ultrasound variables may serve as independent predictors of BA.
Pattern of Tuberculosis in Malaysia

Dato’ Dr Hj Abdul Razak

Institute of Respiratory Medicine, Hospital Kuala Lumpur

In 2015, the WHO reported that there were an estimated 10.4 million new TB cases worldwide, of which 5.9 million (56%) were among men, 3.5 million (34%) among women and 1.0 million (10%) among children. People living with HIV accounted for 1.2 million (11%) of all new TB cases. About one-third of the world’s population has latent TB, which means people have been infected by TB bacteria but are not (yet) ill with the disease and cannot transmit the disease. These people with latent TB can get active TB disease if their immune system is low or if they are taking any treatment that can suppress their immune system.

Malaysia is classified as a country with an intermediate TB burden, that is, notification rate for TB of 81 cases per 100,000 populations in 2016. Number of TB cases notified in 2016 is around 24,000. Of these cases, 62% were sputum positive, 21% smear negative and 13% extra-pulmonary TB cases. TB lymph node and pleural effusion are common extra-pulmonary presentations. Three states with high TB cases are Sabah, Selangor and Sarawak, making up a total of almost 50% of all new cases in Malaysia.

In Malaysia and many other countries, sputum smear microscopy is still used to diagnose TB. Trained laboratory technicians look at sputum samples under a microscope to see if TB bacteria are present. Microscopy detects only half the number of TB cases and it depends on the quality of the sputum produced by the patients. Up to 40% of active TB cases can be missed if the sputum is used alone to diagnose. To compliment this, a chest x ray may be required for all patients with symptoms of active TB. New technologies like fluorescent microscopy and a rapid test called Gene Xpert MTB/RIF®, been recommended by WHO.

In 2016 there were 1,696 TB deaths reported (excluding TB/HIV mortality), giving rise to 5.56 TB deaths per 100,000 populations. This TB death rate is the highest among all infectious diseases, including dengue, HIV and malaria. The age group commonly affected are above 35 years (62%) and it’s always high in the elderly with other co morbid diseases like diabetes, smoking and kidney diseases.

TB is a treatable and curable disease. Active, drug-susceptible TB disease is treated with a standard 6 month course of 4 antimicrobial drugs. Without treatment adherence, the disease cannot be cured and can spread to the others and may even develop into MDR-TB. The vast majority of TB cases can be cured when medicines are provided and taken properly. Thus early detection and effective treatment can prevent TB deaths in Malaysia and all over the world.
Pulmonary Tuberculosis Imaging In HIV Patient

Aziza G Icksan

University Of Indonesia, Indonesia

Pulmonary Tuberculosis (PTB) is still considered as a major health problem in the world. The risk of developing PTB is estimated to be between 26 and 31 times greater in people living with HIV than among those without HIV infection. PTB is one of the most common opportunistic infection in HIV and often times the diagnosis precedes the diagnosis of HIV itself. TB and HIV could also be diagnosed in the same time. Chest Radiograph and CT remain the most useful tools and have an important role in evaluating PTB, especially smear-negative patients. Chest radiograph has sensitivity of 72%, specificity of 57 % and positive predictive value of 21% and negative predictive value of 93% in diagnosing PTB. Chest CT scan has an even higher specificity and sensitivity compared to chest radiograph, thus complementing screening and detection of PTB. The radiologic manifestation of PTB in HIV patients will depend on the immunologic status of the patient, usually evaluated by the CD4 value.
Basic Approach To Interstitial Lung Disease Imaging Findings

Zuhanis Abdul Hamid

National Cancer Institute Putrajaya, Malaysia

Under the umbrella of interstitial lung disease, there are more than 200 diseases listed. This topic will briefly cover the pattern on HRCT that are commonly found in interstitial lung disease. Main glossary of the lung imaging findings will be elaborated for simple understanding. Approach in HRCT reading will be discussed in greater detail. The idiopathic interstitial pneumonias will be touched since they are the main component of the idiopathic component of ILDs. Brief discussion on a few common connective tissue diseases imaging findings in HRCT will be included.
Imaging Of Hematuria

Musturay Karcaaltincaba

Hacettepe University Hospitals, Turkey

Hematuria is a very common symptom. CT Urography allows diagnosis of a variety of pathologies causing hematuria. Technical tips and pitfalls will be briefly reviewed including dual-energy CT. CT Urography is the reference standard for ruling out upper urinary tract transitional cell cancers. Common and rare (but diagnosable by imaging) causes of hematuria will be discussed. Complimentary role of MR Urography will be outlined.
Abstract Not Available
MRI Of Rectal Cancer

Musturay Karcaaltincaba

Hacettepe University Hospitals, Turkey

MRI is becoming an useful tool for staging, restaging and assessment of treatment response for rectal cancer. Technical tips and pitfalls will be briefly reviewed. MRI allows evaluation of T staging, mesorectal fascia involvement, extramural venous invasion and lymph node imaging. Use of MRI will be illustrated by interesting cases. Upper abdomen MRI can be easily incorporated to rectal MRI when needed. Future directions for rectal MRI will be discussed.
Abstract Not Available
Imaging Of The Lung From A Forensic Radiology Perspective

Associate Professor Dr Saiful Nizam bin Abdul Rashid

*Park City Medical Center (Ramsay Sime Darby Medical Group), Malaysia*
*Universiti Putra Malaysia, Malaysia*
*Hospital Kuala Lumpur, Malaysia*

Forensic radiology is a specialized area of medical imaging utilizing radiological techniques to assist physicians and pathologists in matters pertaining to the law. Imaging acts as an adjunct to autopsy in formulation of the cause of death (COD) by the forensic pathologist. Conventional radiograph is still widely used despite its limitation in 2D projection and poor image quality. Post mortem computed tomography (PMCT) was later introduced into the world of forensic with superior image quality compared to conventional radiograph and 3D reconstruction capability. Based on previous studies, PMCT is well established in the diagnosis of bony pathology and hidden area of autopsy with limitation in vascular and organ parenchyma opacification. Post mortem computed tomography angiogram (PMCTA) was recently introduced to overcome these limitations and has shown excellent results. However, lungs remain as one of the most challenging areas for forensic radiologist in term of image interpretation and pathology due to underlying decomposition artefacts that started immediately after death. Interpretation of lung findings on PMCT and PMCTA has to be done with caution as they are different from clinical radiology or imaging of the living. In this session, we will discuss the important decomposition artefacts, infection, malignancy, vascular and traumatic causes of death in relation to the lungs utilizing PMCT/PMCTA and their correlation to autopsy. The latest scanning technique, innovation and realm in the imaging of the lungs of the dead will also be described.
Radiological Imaging Of Renal Cell Carcinoma: An Update

Datin Dr Malinda Abd Majid

General Hospital Kuala Lumpur, Malaysia

The rapid growth in the use of cross-sectional imaging has resulted in the increased detection of small asymptomatic renal masses. Renal cell carcinoma is the most common primary malignant neoplasm of the kidney. Renal cell carcinoma constitutes 85–90% of all renal tumours; up to 60% might be serendipitously discovered on cross-sectional imaging. These tumours are generally smaller and with an earlier tumour stage, and therefore a better prognosis.

In turn, this has led to the increased use of minimally invasive techniques, e.g. partial nephrectomy, laparoscopic resection, robotic surgery, radiofrequency ablation and cryotherapy. Increasing sophistication of surgical approach has been mirrored with advances in radiological imaging.

To enable the surgeon to make appropriate preoperative decisions and to operate with confidence in an environment with a restricted field of view, imaging must now offer more accurate detection, localization and characterization of smaller masses, and an exquisite depiction of the arterial, venous and lymphatic anatomy. The role of radiological imaging is also important for surveillance and post treatment follow up especially in detecting tumour recurrence. In this lecture, we will discuss the radiological imaging for renal cell carcinoma and its update.
Feasibility Of Very Ultra Low Dose CT Guided Lung Biopsy.

Ezamin AR, Noor Hazwani AW

University Putra Malaysia, Malaysia

The newly proposed ultra low dose (ULD) protocol for CT guided lung biopsy is proven to lower the radiation dose. The question is “how low the exposure feasible for CT guided lung biopsy”. In this pilot study, we postulate that the dose protocol can be lower than 100kv, 7.5MAs for lesions more than 3 cm in size. We are planning to use 90Kv, or lower with 7.5 MAs or lower. The objectives are to determine the feasibility of the CT guided lung biopsy of a large lung lesion with size >3cm using this new protocol, to measure effective dose exposure to the patients; to evaluate the image quality, length of procedure, and success rate, CT guided procedure will be done on a 128-DECT scanner (Somatom Sensation Flash, Siemens Medical Solutions). Computer generated analysis of the CT Dose Index (CTDI), dose length product will be reviewed. For entrance surface dose, We will use Optically stimulated luminescence (OSL) dosimeter and or TLD detectors. These detectors will be placed that all organs within the primary beam were covered. The entrance surface dose will be calculated accordingly. Image quality, length of procedures, technical success, size of the lesion, location and complications will be evaluated in each patient. We anticipate that the very low dose CT guided lung biopsy is feasible in lesions larger than 3cm.
Histerosalphyngography Update Future

Hendra Ferdinan S
Santa Maria Hospital, Indonesia

**Purpose:**
Histerosalphyngography is very important to detect patient of infertile. With suction catheter can be used for this infertile case. We can detect spilled and no spilled indication. We evaluated the safety and efficacy of technique HSG using suction catheter number 8F. This examination is very simple and practice.

**Methodology:**
Since 2009 until 2014. The total patient is 200 (two hundred) women (Mean AG: 25-35 year). 180 patients diagnosed with polyp with infertile and 20 patients diagnosed with only infertile. This radiology examination within the patient use suction catheter number 8F.

**Results:**
The technical success rate was 100%. There were no procedure-related complications. If compared to acorn tip meta cannula catheter HSG and folley balloon catheter there is no bleeding from uterus and no relief pain post-HSG with suction catheter. We can diagnose from the Hysterosalphyngography result are recurrent spontaneous abortion, recurrent pre-term delivery, evaluation of the uterus and fallopian tubes post tubal surgery, and preoperative evaluation of the uterus prior to surgery.

**Conclusion:**
We can detect spilled and non-spilled indication. This examination is very simple and practice because that is not expensive, no bleeding, and no pain. HSG examination using suction catheter number 8F considered as a new updated instrument and effectively detect infertile and other cases.
Comparison Between Virtual Non-Enhanced And True Non-Enhanced Images In The Evaluation Of Suspected Renal Lesions

Nadia Fareeda MG 1, Yeong CH, Chan WY 2, Caroline Judy W 2, Gnana Kumar G 2

University Malaya, Malaysia 1
Department of Biomedical Imaging, Faculty of Medicine 2

This study compared the diagnostic value of virtual non-enhanced (VNE) images generated from dual-energy four-phase renal computed tomography (CT) with true non-enhanced images (TNE) and calculate the potential radiation dose reduction if VNE replaced TNE. Ninety-five patients (59 male, 36 female; aged 60.5 ± 12.6 years) underwent four-phase renal CT using a first generation dual-energy dual-source scanner with dual-energy acquisition of nephrographic phase images. Two nonblinded readers independently compared TNE and VNE images in terms of noise, quality, exclusion of lesion and contralateral kidney, artefacts and overall acceptability. Mean CT numbers in renal lesions, renal parenchyma, liver, aorta, psoas muscle and retroperitoneal fat were compared and contrast enhancement was evaluated. Using a five-point scale (1 to 5; none to severe), mean image noise was 2.0 Å± 0.3 and 2.3 Å± 0.6 for TNE and VNE, respectively. On a five-point scale (1 to 5; excellent to not interpretable), overall image quality was 1.1 Å± 0.4 and 2.0 Å± 0.9 for TNE and VNE, respectively. Exclusion of contralateral kidney and partial exclusion of lesion was seen in 12.6% and 15.8% of patients. On a three-point scale (1 to 3; acceptable to not acceptable), mean acceptance score of VNE images was 1.3 Å± 0.5. The mean CT numbers on TNE and VNE images for renal lesions were 10.4 Å± 25.5 and 3.7 Å± 24.2 Hounsfield Units respectively. Statistically significant difference (p < 0.05) was observed between TNE and VNE CT numbers in all regions except segment VI of the liver. In conclusion, VNE images were visually comparable to TNE images despite significant differences in CT numbers and was of diagnostic quality. Replacement of TNE with VNE images conferred a 21.9 Å± 4.5% dose reduction.
Implementation Of Split-Bolus CT Protocol To Reduce Radiation Dose In Trauma Patients

Phuar AP, Ch’ng LS, Yun SI

Sungai Buloh Hospital, Malaysia

Purpose:
Split bolus protocol is a contrast medium injection technique divided into two boluses that provides both arterial and portal venous enhancement with a single pass of the Computed Tomography (CT) gantry. This technique would reduce CT dose to trauma patients who are mostly in the young age group compared to multiphase scans acquired sequentially.

Methodology:
A prospective study carried out on adult trauma patients who were randomly selected for multiphase or split bolus CT protocol since January 2017. There were 14 patients (9 men, mean age 32 years) scanned using split bolus protocol and 29 patients (26 men, mean age 34 years) were scanned using multiphase protocol. The CT image quality were evaluated using Likert Scale (1-5) and enhancement of the abdominal organs, portal vein and abdominal aorta were measured in Hounsfield units. CT dose were measured by dose length product (mGy.cm) and effective dose (mSv).

Results:
There was significant reduction in radiation dose using split bolus protocol (p=0.05) with 45% reduction compared to multiphase scan. The average dose using split bolus protocol was 12 mSv and average dose for multiphase scan was 22mSv. No significant difference in enhancement of the abdominal organs, portal vein and abdominal organs noted. Image quality score for split bolus protocol was 4 and multiphase scan was 4.4.

Conclusion:
Split bolus CT protocol would be an alternative CT protocol for trauma patients with comparable arterial and venous enhancement and significant reduction in dose compared to multiphase scan.
Non-Contrast CT Urogram: An Audit On Patient’s Radiation Dose

Tan YS, Ng WL, Tan S

Hospital Taiping, Malaysia

Purpose:
Non-contrast CT urogram (CTU) is fast becoming the imaging of choice in urolithiasis. Repeated CTs raise concerns of excessive radiation exposure and potential radiation-related cancer risk. The American College of Radiology (ACR) Appropriateness Criteria considers low-dose CTU as

Methodology:
36 patients between 17-75 years were scanned in May 2017, with a 16 slice MSCT scanner using 120 kVp tube potential, automated tube current modulation, slice width of 1mm and iterative reconstruction algorithm. Dose Length Product (DLP) was recorded and Effective Dose (ED) was computed using a conversion factor of 0.015mSv(mGycm)-1. The results were then compared with established standards. The National Diagnostic Reference Level (DRL) of abdominal CT is 450mGy.cm. Low dose scans were taken as 10mSv.

Results:
The mean effective dose is 7.2mSv, ranging from 3.8 to 18.4mSv. No patient received low dose (10mSv). The mean DLP is 418mGy.cm, ranging from 250 to 1226mGy.cm. Thirteen cases (36%) exceeded the national DRL of 450mGy.cm.

Conclusion:
From our audit, CTU is a high dose study with more than a third exceeding the national DRL of CT abdomen. There is an urgent need for a standardized low dose protocol nationwide with justification of this increasingly used study.
Breast cancer is the commonest cause of cancer death in women worldwide. Early detection of breast cancer depends on high quality breast imaging technology. Mammography remains the gold standard in breast imaging and offers an effective means to detect breast cancer early.

Key Result Areas (KRA) in mammography enables radiographers to have clearly defined and achievable goals in producing high quality mammograms. This topic will cover two factors that are still radiographer dependent and shall affect image quality, which are positioning and compression.

The aim of mammography is to obtain an optimum image along with maximum breast tissue visualisation. However, there are a number of factors that affect the clinical image quality of a mammogram, namely positioning of the breast, compression, optimum exposure, sharpness, noise, and contrast. With the advent of the digital mammography system, the hardware and software has remarkably improved the management of factors affecting image quality such as exposure, sharpness, noise, and contrast.

Breast positioning is a key factor affecting the resultant mammographic image. During mammography, improper positioning shall lead to various artefacts and breast pathology being missed, thus leading to an inconclusive procedure. Optimal positioning maximises the amount of breast tissue seen on image.

In addition to positioning, the benefits of applying optimal compression during the procedure are:

- reduction of internal X-ray beam scatter
- improved contrast
- reduce geometric / movement un-sharpness
- reduce radiation dose to breast
- more homogeneous film density
- spreading of breast tissues, thus reducing superimposition and clearer demonstration of lesions

During mammography, due to the different body habitus of each patient, the examination has to be tailored as per specific needs of the individual patient. The radiographer plays an important role in the assessment and adjustments made to positioning for maximum tissue visualisation.

Compromising with borderline mistakes in positioning and inadequate compression increases the likelihood of missing breast cancer and reduces sensitivity of mammography. Therefore, this topic, Key Results Area in mammography will cover common faults in mammography that needs to be eliminated, thus enabling Radiographers to produce high quality mammograms.
Abstract Not Available
Digital Breast Tomosynthesis (DBT) In Breast Cancer Detection & Screening

Humairah Samad Cheung

KPJ Tawakkal Specialist Hospital & National Cancer Society, Malaysia

DBT, first approved for use by FDA in 2011, produces a series of thin images of the breast acquired by multiple low dose X-Ray exposures along an arc. This stack of thin images can be displayed individually or in cine mode. DBT is rapidly becoming the new standard of care for X-Ray breast imaging in both the diagnostic and screening settings.

DBT leads to improved visualization and characterization in terms of better definition of lesion shape, margin and size, and in the detection of multifocal and multicentric cancer. DBT has higher sensitivity and specificity in breast cancer detection compared to the use of digital mammography (DM) alone. The false positive recalls in screening, and false negative rates are reduced, with a trend in reduced interval cancer detection compared to DM use alone. These improvements are especially seen in the heterogeneously dense breasts.

DBT improves the efficiency of a breast center as additional 2D views (e.g. rolled or localized compression views) are no longer necessary. It has resulted in an approximately 50% reduction in the proportion of lesions assigned to the BIRADS 3 probably benign assessment category, and improved the positive predictive values of diagnostic biopsies by >50%. This in turn has led to less follow-ups and cost savings, and reduced patient inconvenience and anxiety.

Concerns regarding higher radiation dose from DM/DBT imaging is addressed by the introduction of the reconstructed synthetic 2D (s2D) view to replace the 2D portion of the DM/DBT study. This s2D view (or C-view on Hologic system), was FDA-approved in 2013, and reduced the dose by 45% to ~1.2 times that of the standard DM. Increased storage requirement is currently solved by improved data compression techniques. The longer time for radiologists’ interpretation is countered by overall improved outcome with DBT.
Abstract Not Available
Breast Lesions: What Remains, What Needs To Be Out And Why?

Nor Aina Emran

Hospital Kuala Lumpur, Malaysia

Imaging has played very important role in diagnosis of breast diseases especially in breast cancers. Mammogram and ultrasound are the most frequently used modalities. Mammogram role in screening and diagnosis of breast cancer is well established. Other modalities usually play supporting roles and complementary to diagnosis of breast cancer.

With the advent of digital mammogram, more and more lesions are detected in the breast. This making the diagnosis of breast cancer becoming more difficult and sometimes delayed due to detection of other suspicious lesions. Screening for breast cancers also becoming more tedious as more and more non-malignant lesions are being detected and need to be investigated further to rule out malignancy.

The findings in these breast images resulting more diagnostic procedures being done and subsequently surgery to remove these non-palpable lesions. The report given by radiologist is very crucial and will determine the decision for further surgical treatment. The decision to remove the lesions found is based on many reasons, and will be presented and discussed in this lecture.
Breast Cancer: Understanding Your Pathology Report

Mohamad Rafie Md Kaslan

Hospital Putrajaya, Malaysia

Surgical pathology by its very nature depends heavily on the input of clinicians and surgeons who are fully aware on the potentials and limitations of the specialty. The microscopic diagnosis is a subjective evaluation that acquires full meaning only when the pathologist is fully cognizant of the essential clinical data, surgical findings and type of surgery. The surgical pathology report is an important medical document that should describe, as thoroughly and concisely as possible, all the relevant gross and microscopic features and also interpret their significance for the clinicians. The usual surgical pathology report composed of five major fields. The first, designated as “History” contains relevant clinical data which includes patient demographic, surgical findings and type of surgery. The second, designated as “Gross” contains the gross descriptions of the specimen: this should be precise and thorough, because once the gross specimen is discarded, this description remains the only document by which the gross features of the case can be evaluated. The third field “Microscopic” should be short and concise. The fourth and most important is the “Diagnosis/Interpretation”. Each specimen received should have a separated diagnosis or diagnoses. The fifth field “Note” or “Comment” is applicable when pathologists may mention differential diagnosis; make some prognostic and therapeutic considerations. It is medically and legally important that the diagnosis and comments made by the pathologist on a given case be documented and as clearly as possible in a written form in the clinical chart via the pathology report. It is important that the timing of surgical pathology report to keep time at a minimum. It is also important for the surgical pathologists to know the limitations of his specialty and aware of its strength and potential contributions.

“Understanding Your Pathology Report” pertaining to Breast Cancer is essential for the management of breast cancer patients and will be discussed in details especially on diagnostic, therapeutic and prognostic indicators.
BIRADS: 5th Edition

Dr Zahurin Ismail

National Cancer Institute, Malaysia

A good and comprehensive breast imaging report is a key component in breast cancer diagnosis. It is the duty of the radiologist to assess the findings and guide the clinician for appropriate management. Hence, a need for a clear, concise and standardized report to the clinicians.

The initial American College of Radiology Breast Imaging Reporting and Data System (BI-RADS) is developed in 1993. The system is culmination years of collaborative efforts between the health groups. It is designed for everyday practice to avoid ambiguous breast imaging reports. It also facilitates outcome monitoring and quality assessment. Hence, we are able improve our practices and compare with other breast imaging facilities worldwide.

The ACR BI-RADS 5th edition (2013) is the updated version of the 4th edition (2003). The 5th Edition of the BI-RADS edition consolidates, improves, and expands the lexicon for mammography, breast ultrasonography (US), and breast magnetic resonance (MR) imaging. It provides a standardized breast imaging findings terminology, assessment structure, report organization, and a classification system for mammography, ultrasound, and MRI of the breast which enables radiologists to provide a succinct review of mammography, ultrasound, and MRI findings and to communicate the results to the referring physician in a clear and consistent fashion with a final assessment and recommendation for a specific course of action.

This presentation is to highlights changes to the BI-RADS lexicon and provides readers with a general overview to familiarize them with the fifth edition.
A Well Crafted Mammogram Report

Dr Shantini A Arasaratnam

Hospital Kuala Lumpur, Malaysia

A mammography report is the key component of a breast cancer diagnostic process. The radiologist must assess the findings present on the mammogram and guide the clinician for appropriate management. The report must be clear, concise and standardized for clinicians to understand.

Sections of a Mammogram Report

The format of a Mammogram report should consists of:

A. Patient Information and Clinical History

B. Standard Reporting
   • indication – screening / diagnostic or follow-up
   • description of breast composition or density pattern
   • masses - description and location
   • calcifications – description and location
   • architectural distortion
   • asymmetry
   • associated features
   • comparison with old films or examinations
   • correlation of clinical information and findings

   • Ultrasound Breast - is an important adjunct imaging
     Description of lesion and location based on clockface notation and distance from the nipple are important.

★ IMPRESSION : based on BIRADS 5th edition
   Following the ACR - to have a standardized and uniformity in mammography practice reporting

★ RECOMMENDATION - follow-up, short term follow up or biopsy

C. Information & Advise to Patient
   Inform patient the results or discuss with the referring clinicians if further management required and document in the report
Medico-Legal Issues In Breast Imaging

Dr Vijayalakshmi Krishnapillai

Hospital Tengku Ampuan Rahimah Klang, Malaysia

The most common cause of medical malpractice lawsuits filed against breast radiologists and physicians in most countries is allegations of a missed or delayed diagnosis of breast cancer.

Medical malpractice occurs when a hospital, doctor or any health care professional, through a negligent act or omission, provide treatment that falls below the accepted standard of practice and caused an injury or death to a patient. The negligence might be the result of errors in diagnosis, treatment, aftercare or health management. Medical negligence is one type of tort law. Tort law is the body of laws that enables people to seek compensation for wrongs committed against them. To be considered malpractice under the law, the claim must prove there was a violation of the standard of professional conduct and that the negligence caused a negative legal outcome resulting in significant damages. The claimant must demonstrate the following elements:

• Duty: that the defendant owed the claimant a duty of care.
• Breach: that the defendant breached the duty of care.
• Injury: that the claimant suffered an injury.
• Causation: that the defendant’s breach of duty caused the injury.

All major hospitals provide services in line with a common policy or Client Charter as patients have the right to professional treatment and fair service standards. In Malaysia there is a Memorandum of Understanding dated 21st. August, 1995 which is between The Federation of Malaysian Consumers Associations, Malaysian Medical Association, Malaysian Dental Association and the Malaysian Pharmaceutical Society.

The parties hereto adopt this charter on patient’s right and responsibilities and call upon its observance by all concerned. The Patient’s Right include the right to health care and humane treatment, right of choice of care and acceptable safety, right to adequate information consent, participation and representation, right to redress of grievances, right to health education and a healthy environment.

The MSQH 3rd edition 2008 Hospital Accreditation, Patient and Family Rights state that “Healthcare facilities and services providers need to establish confidence, trust and clear communication with patients and to understand and protect each patient’s cultural, psychosocial and spiritual beliefs/religion”

Knowledge of the common allegations or malpractice suit filed for failure to diagnose breast cancer can provide insight into the risk management and minimize errors in patient care. Medical professionals may obtain professional liability insurances to offset the risk and costs of lawsuits. To pursue a malpractice claim, the patient must show that the injury resulted in disability, loss of income, suffering, hardship, or significant medical bills.

Patients' rights, standards and regulations for medical malpractice vary by countries, often depending upon prevailing cultural and social norms. In comparison to the United Kingdom, United States and Australia, Malaysia is not experiencing a similar kind of “malpractice crisis”, however there is certainly a rise in number of negligence claims and the indemnification payments resulting from jury verdicts or out-of-court settlements malpractise lawsuits. The severity of lawsuits arising will hopefully abate through better awareness and education.

The safety of the people must be the highest law

Marcus Tullius Cicero
Multi-Sequence Validation Of A Web Browser-Based Semi-Automated Method For MRI Breast Density Measurement

Farah Nadrah MN ¹, Git HKA ², Kartini R ³, Marlina Tanty RM ⁴

¹Hospital Sungai Buloh, Malaysia
²Selayang Hospital, Malaysia
³University Malaya, Malaysia
⁴University Teknologi Mara, Malaysia

Purpose:
Breast density, defined as the ratio of fibroglandular tissue to fatty tissue, can be estimated from mammograms and MRIs. High breast densities have increased risk of breast malignancy. A web browser-based semi-automated method (mcdcmViewer) has been shown to be useful in measuring breast density using T1-weighted sequences. To validate a web browser-based semi-automated method for determination of breast density from MRI studies on VIBRANT, T2 and STIR sequences.

Methodology:
Patients who underwent breast MRI in Universiti Malaya Medical Centre from August 2015 to February 2016, who had at least 1 normal breast MRI, were included. VIBRANT, T2 and STIR MRI images were loaded into mcdcmViewer. Separation of the chest wall was performed manually on at least 2 slices, with the software performing the interpolation of the in-between slices. Signal intensities for fibroglandular tissue, fat and air were determined manually. Subsequently, the software would automatically segment the relevant tissues and calculate the breast density for all the slices within the defined range (Figure 1). The densities of five slices per breast were compared to the reference standard, which was determined via blinded manual segmentation of those 5 slices by a single radiologist using commercial software (Adobe Photoshop).

Results:
A total of 13 normal breasts (65 slices) were included. The semi-automated method shows excellent correlation for VIBRANT (r=0.97, p<0.001), T2 (r=0.88, p<0.001) and STIR (r=0.96, p<0.001) (Figure 2). There was a statistically significant overestimation of breast density on VIBRANT (reference: 23.3%, measured: 29.5%, t=9.27, p<0.001). No statistically significant over- or under-estimation was noted on T2 and STIR.

Conclusion:
The tested semi-automated method shows excellent correlation with manual segmentation for all the tested sequences. However, STIR was found to have a combination of excellent correlation with no significant over- or under-estimation.
Evaluating Response To Neoadjuvant Chemotherapy In Locally Advanced Breast Cancer Using Diffusion Weighted-MRI (DWI) And IVIM Parameters

Mohd Fandi Al Khafiz K, Kartini R, Marlina Tanty RH, Wong JHD

University Malaya Medical Center, Malaysia

Purpose:
To investigate diffusion weighted MRI (DWI) and changes in random pseudodiffusion (D*) of invasive breast carcinoma in patients undergoing neoadjuvant chemotherapy (NACT). Additionally, we aim to evaluate tumour response towards NACT and the baseline MRI imaging phenotypes of tumour mass versus normal breast tissue (using ADC and IVIM parameters). DWI sequence is a useful adjunct to dynamic contrast enhanced (DCE) to characterize hypercellularity of breast lesions. Malignant lesions demonstrate lower ADC values which reflects the hypercellularity of cancer cells restricting the random diffusion of water molecules. Cells breakdown after chemotherapy will show increase in ADC values as compared to baseline pre-treatment.

Methodology:
A prospective study involving women with invasive breast carcinoma (n=15) age between 29 to 66 years (mean age=46) who are planned for 6 cycles of NACT prior to surgery. DCE MRI were performed at 3 different intervals (Pre-NACT, post first and third cycles of chemotherapy). The radiomics and DWI data of the target lesions were obtained using volumetric and single ROI measurements. The IVIM parameters (from multiple b values) were also calculated and compared.

Results:
The mean volume of breast mass is 148.6 cm³. Mean ADC values for malignant tumour is (0.76 x 10^-3 mm²/s) as compared to normal contralateral breast tissue (1.90 x 10^-3 mm²/s). Following first cycle of NACT, quantitative findings showed 69% reduction of tumour mean volume to 45.7 cm³ and 22% increase in mean ADC values (0.96 x 10^-3 mm²/s)

Conclusion:
ADC values showed significant increase as early as first cycle of NACT. IVIM parameters provides noninvasive sensitivity to microperfusion properties of breast tumors without need of contrast agent thus it is useful to patient who is contraindicated to gadolinium. These tools are expected to enhance the role of MRI in monitoring treatment response of cancerous lesions in the breast.
Comparison Between Synthesized 2D Images And Full Field Digital Mammography In BI-RADS Categorisation And Density Assessment

Nazimah AM ¹, Kartini R ¹, Farhana F ¹, Marlina Tanty RH ², Caroline Judy W ¹, Norlisah R ¹, Faizatul Izza R ¹, Ng KH ¹

University of Malaya Medical Centre, Malaysia ¹
University Teknologi MARA, Malaysia ²

Purpose:
To determine whether C-View images are comparable to FFDM in BI-RADS categorization. We hypothesized that C-view are equivalent to FFDM and can replace it in routine clinical practice.

Methodology:
380 patients were included and underwent FFDM and tomosynthesis of both breasts. The tomosynthesis images were synthesized to 2D images (C-View). Three readers evaluated the FFDM and C-View images independently. BI-RADS category were assessed. Histopathology findings (n=40) were compared with both FFDM and C-View. Statistical analysis was done comparing sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of C-View with FFDM as standard of reference, and both C-View and FFDM with histopathology as gold standard. Agreement for BI-RADS categories between C-View and FFDM in readers were assessed.

Results:
Strong agreement in all readers in BI-RADS category between C-View and FFDM (κ: 0.811, 0.888, 0.934, p<0.001). When taking FFDM as standard of reference, C-View yielded >94% sensitivity, >98% specificity with >88% PPV and >99.4% NPV, with comparable sensitivity, specificity, PPV and NPV between C-View and FFDM with histopathology as gold standard. High level of reliability between readers in BIRADS category for FFDM and C-View (ICC of 0.911 (95% CI 0.894 – 0.925, p< 0.001) and 0.898 (95% CI 0.879 – 0.915, p< 0.001) respectively). Lower radiation dose to the breasts when using C-View instead of FFDM by 52%.

Conclusion:
Synthesized 2D images are comparable to FFDM in BI-RADS category assessment. The sensitivity, specificity, PPV and NPV of synthesized 2D images were also comparable to FFDM.
Overview Of Early Clinical Implementation Of Digital Breast Tomosynthesis: A Single Centre Experience

Soo SW, Kartini R, Marlina Tanty RH, Shamsiah AH, Yeong CH, Farhana F, Ouzreiah N, Anushya V, Ng KH

University Malaya Medical Centre, Malaysia

Purpose:
This study aimed to evaluate the impact of performance of mammographic study before and after the introduction of digital breast tomosynthesis (DBT) into the clinical practice in University of Malaya Medical Centre (UMMC).

Methodology:
A retrospective study was conducted on patients who underwent breast biopsy in UMMC 6 months before and after the introduction of DBT. The patients were divided into two groups: FFDM (n = 1250) and FFDM + DBT (n = 2174). Histopathological examination results were the gold standard of the study. The patient’s flow was demonstrated in Figure 1. The biopsy rate, cancer detection rate, sensitivity and positive prediction values (PPV) were calculated and compared between the groups. All the analysis was done using SPSS version 22.0 and a p-value <0.05 was considered as statistical significant different.

Results:
The combination of FFDM and DBT resulted in significant reduction of biopsy rate from 9.8% to 7.7% (p = 0.03). The cancer detection rates were not statistically significant different between FFDM and FFDM + DBT groups (43% versus 36%, p = 0.275). Not significant difference (p = 0.326) was found between BIRADS scoring (1-3 considered as benign; 4-5 considered as malignant) and histopathological results for the FFDM + DBT group. However, statistical significant difference (p = 0.001) was found between BIRADS scoring and histopathological results for the FFDM group. The sensitivity and PPV were 90% and 36% for FFDM group; and 92% and 38% for FFDM + DBT group, respectively.

Conclusion:
The combination of FFDM and DBT significantly reduced biopsy rate compared to FFDM alone. The sensitivity and PPV were also increased from 90% to 92% and 36% to 38%, respectively, indicating that incorporation of DBT in mammographic examinations increased the number of true positive cases. A larger cohort study is needed to verify these findings.
Imaging & Treatment Of The Snapping Hip

Donna G. Blankenbaker, MD

University of Wisconsin School of Medicine and Public Health, WI USA

Objectives:
1. Review the causes of a snapping hip
2. Review imaging in making the diagnosis
3. Discuss treatment options for the patient with a painful snapping hip
Abstract Not Available
Paediatric Neurometabolic Imaging: Over-Simplifying A Complicated Problem

CC Tchoyoson Lim

Duke-NUS Medical School Singapore

Previously, neuroimaging in pediatric patients with metabolic disease often revealed non-specific late-stage generalized atrophy in chronic situations. However, with better access to MRI, diagnosis in the early stages may be possible in infants and young children. Clinicians and radiologists are often confronted with long and bewildering lists of possible diagnosis in metabolic disease, complex classifications and pattern recognition. This presentation will attempt to simplify (and over-simplify) a complex problem we face, sometimes in specialized pediatric hospital imaging departments but rarely in most general hospitals. It will focus on typical examples of white and gray matter and mixed patterns of metabolic diseases, but will not cover CT, ultrasound, PET/SPECT imaging, or leukodystrophies (e.g., Canavan's) or demyelination/inflammation.

The genetic or chemical causes need to be matched with an imaging pattern recognition approach, and detect features of selective anatomical vulnerability: MRI findings may predominantly affect gray or white matter, or both. Preferential involvement of globus pallidus, striatum or thalamus in gray matter, subcortical U-fiber sparing or not, may offer clues in some conditions. The presence of other clinical data such as bony lesions, skin and ophthalmic findings is often helpful.

In addition to inherited or inborn errors of metabolism – acquired metabolic disease may be encountered especially among older children, including hypoxia, near drowning, posterior reversible encephalopathic syndrome (PRES), and drug induced/iatrogenic causes etc, which overlap with adult pattern of metabolic disease.

Newer MRI techniques that may be helpful in research and clinical imaging include diffusion-weighted MR imaging (DWI) and MR spectroscopy (MRS). Nevertheless, radiologists should be aware that these pattern recognition schema are not exclusive, are greatly simplified, with high complexity and overlap of syndromes and causes: clinical diagnosis is challenging.
Vasculitis, characterized by inflammation of vessel walls, is comprised of heterogeneous clinicopathological entities, and thus poses diagnostic challenge. The most widely used approach for classifying vasculitides is based on the International Chapel Hill Consensus Conference (CHCC) nomenclature system. On the basis of the recently revised CHCC 2012, we propose a CT-based step-by-step approach for vasculitis as the following: 1) approach based on size and type of affected vessels, 2) approach based on specific location and morphologic characteristics, 3) approach based on the presence of etiology or associated systemic disease. Finally, vasculitis mimics should be differentiated, because erroneous application of immunosuppressive drugs on vasculitis mimics may be ineffective or even deteriorating. This article presents an overview of the revised CHCC 2012, and a CT-based step-by-step approach for vasculitis and vasculitis mimics. The utility of computed tomography (CT) in the diagnosis of vasculitis lies in the fact that both lumen and vascular wall can be evaluated with this non-invasive imaging modality.
Imaging Of Femoroacetabular Impingement

Donna G. Blankenbaker, MD

University of Wisconsin School of Medicine and Public Health, Madison, WI USA

Objectives
1. Review the mechanisms of impingement
2. Discuss the imaging features of FAI
3. Review other causes for impingement
Body MRI has become an indispensable diagnostic tool for abdominal and pelvic pathologies. MRI allows seeing the unseen pathologies by CT and US. Current and future applications of body MRI including liver, pancreas, spleen, renal, prostate and gynecologic pathologies will be reviewed with emphasis on problem solving approach. Functional and practical quantitative techniques will be discussed. In the future, MRI fingerprinting technology would enable easy quantitative imaging. Instead of hyper/iso/hypointense terminology, we will use T1, T2, T2*, T1rho, stiffness, diffusion, iron and fat maps.
Outbreaks Of Infectious And Non-Infectious CNS Diseases: How Does MRI Help?

CC Tchoyoson Lim

Duke-NUS Medical School Singapore

Singapore is a small tropical island at the crossroads of large people movement, and therefore, potential spread of disease. In today's globalized and hyperconnected world, the spread of diseases such as influenza and the Zika virus represents a potential public health hazard.

This presentation will focus on outbreaks of Nipah virus, group B streptococcus agalactiae infection. MRI is helpful for initial diagnosis, delineating the anatomical extent of CNS involvement, narrowing the differential diagnosis, anticipating complications, and improving follow up comparison. MRI patterns may be divided into those predominantly affecting the subarachnoid/ventricular, leptomeningeal and/or pachymeningeal, encephalopathic and mass-like ring-enhancing lesions. Each of these patterns may have features that can be helpful for detection and differential diagnosis, for example the presence of cysts, calcification, hemorrhage and aggregating associated non-imaging investigations.

Diffusion-weighted imaging (DWI), especially, is useful in improving lesion conspicuity, and delineating active disease in cerebral abscess, empyema, ventriculitis and detecting the presence of pus in the subarachnoid space. MR perfusion and MR spectroscopy (MRS), can help in differentiating neoplastic from infectious diseases. Radiologists should be aware that MRI findings are often non-specific, but adds value to multi-disciplinary consultations with infectious disease specialists, neurologist and neurosurgeon.

Conclusion
Radiologists should be familiar with typical MRI findings of common tropical diseases affecting the CNS; the limitations of neuroimaging in differential diagnosis can be overcome by multi-disciplinary conferences to add value to patient management. Newer techniques, especially DWI, may also be helpful for differential diagnosis.
Abstract Not Available
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Image Guided Puncture & Seldinger Technique – Getting Your Coordinates Right

Anushya Vijayanathan

University of Malaya, Malaysia

Radiologists have been dealing with images since the discovery of X-rays in 1895. From then, imaging has evolved in leaps and bounds leading to the advent of the CT scan. There were also many other imaging modalities that were introduced in the 20th century that do not involve radiation like ultrasound and MRI. At the turn of the century Imaging became the driver of Medicine.

In recent years, the practice of Medicine has been revolutionized by the practice of Interventional Radiology. Using image guidance, catheters were inserted, biopsies were done and vessels were imaged like never before. Nowadays many other clinicians are realizing the importance of moving from “blind” procedures to image guided procedures. Anaesthetists and Chest physicians are increasingly referring patients for insertions of jugular catheters and drainage catheters done under image guidance. In fact recently they are also learning the art of image guided procedures.

The Seldinger technique, also known as Seldinger wire technique, is a medical procedure to obtain safe access to blood vessels and other hollow organs. It is named after Dr. Sven Ivar Seldinger (1921–1998), a Swedish radiologist who introduced the procedure in 1953. This technique is the basis of all angiograms done in medical practice today. The combination of image guided punctures and the Seldinger technique is the basis of Interventional Radiology.
Biopsies:
Image-guided percutaneous needle biopsy has been a mainstay of oncologic diagnosis for more than two decades, since the advent of ultrasound and Computed Tomography (CT). The basic principles of needle biopsy can be applied to almost any site in the body, with subtle differences in technique depending on the organ being investigated and the imaging modality utilized. Most patients are referred to an interventional radiologist for percutaneous biopsy as a standard of care in the diagnosis of most tumors throughout the body. Needle biopsy also is used to diagnose non-cancerous conditions such as infection. Advances in imaging techniques have led to greater precision in targeting tumors and allowing for minimally invasive percutaneous biopsy of tissue inaccessible to minor surgery, such as lung lesions. The indications, patient preparation, the best imaging modality, technique and several tricks and tips on how to avoid dangerous complications will be discussed.

Drainages:
Thoracic and abdominal fluid collections are frequently encountered. It can be as simple as transudates effusion or exudates collection such as in abscess form or hematoma. The fluid collections can occur either in the solid organs or can accumulate in the free space for example in pleural cavity, intra-peritoneal space and retro-peritoneal space. The clinical manifestations are varies from shortness of breath, abdominal distension, pain, fever and sepsis. Once it causing symptoms to the patient, these fluid collections need to be drained out. Image-guided percutaneous drainage or catheter insertion is a minimally invasive procedure that is simple, safe, and effective technique, avoiding patient from massive open surgery. Before that, the best imaging modality must be correctly chosen in order not to delay treatment process, for making correct diagnosis and finally for proper percutaneous drainage plan. The indication, preparation, equipment and technique, several tips and some pitfalls during doing the procedure will be discussed based on presenter owned experienced. Although it looks simple and can be performed by any Radiologist, the procedure must be done in correct technique and effective way to achieve both high technical success and clinical success rate, and the most important not to worsen patients’ clinical condition.
Comparison Of Blood Stream Infection Rate And Catheter Dwell Time Between Conventional Peripherally Inserted Central Line

Basri Johan Jeet A, Anushya V, Ouzreiah N

University of Malaya, Malaysia

Purpose:
This study aimed to compare the infection rate and catheter dwell time of a newly proposed tunnelled peripherally inserted central catheter (PICC) method with the conventional PICC method.

Methodology:
We prospectively performed conventional PICC and tunneled PICC on two separate groups of 50 patients each. Informed consent was obtained from all the patients before enrollment. The types of PICCs used in this study are given in Table 1. The tunneled catheters were placed by interventional radiologists using a standardized technique (Figure 1). All patients were reviewed until either the occurrence of PICC-related complication necessitated removal, completion of therapy, death or till the end of the study. CLABSI was confirmed in each case by demonstrating concordance between isolates colonizing the PICC at the time of infection and from blood cultures. Statistical analysis was done using SPSS 20.0. Kaplan-Meier analysis was used to study differences in time to infection and independent t-test was used to compare the catheter dwell time.

Results:
The infection rate significantly decreased from 34% to 16% in tunnelled PICC patients (p<0.05). The mean catheter dwell time was increased from 27 days in conventional PICC to 47 days in tunnelled PICC.

Conclusion:
Tunnelling a PICC has the potential to reduce the infection rate while increase the catheter dwell time compared to conventional PICC.
Novel Exchange Technique Of Encrusted Nephrostomy Catheter

Lim MSY ¹, Lee CC ¹, Izazul H², Mohd Rizal R²

Hospital Kuala Lumpur, Malaysia ¹
Hospital Selayang, Malaysia ²

Purpose:
Percutaneous nephrostomy is mainly performed when there is outflow obstruction from the kidneys, the usual causes being stricture, stone or tumour. Infrequently, it is also done to divert urine in cases of ureteric fistula or leak. Patients that require long-term indwelling nephrostomy catheter require regular catheter exchange to prevent stone encrustation within and along the catheter. In most cases, the exchange can be done over guidewire. Rarely, encrustation occurs within the catheter making over guidewire exchange technique impossible. This report describes a novel technique in cases when basic over guidewire exchange technique has failed.

Methodology:
Patient is placed in the prone position and the procedure is done under aseptic technique. A 3/0 non-absorbable suture is threaded across the two walls of the catheter at about 3cm-5cm from the skin insertion site. The suture needle is then removed to prevent injury. The catheter is then cut just distal to the suture. Both ends of the suture are then threaded through the distal lumen of a sheath to exit through the septum of the sheath. The sheath should be about 2Fr larger than the catheter. The septum can be trimmed with a scalpel if it is non-removable to allow the suture to pass through. The sheath is advanced until the renal collecting system using the old catheter as a guidewire. Generous analgesia should be given at this point as patient would experience severe pain. The old catheter can be removed. A guidewire is inserted though the sheath, the sheath is removed and a new catheter can be inserted.

Result and Conclusion:
This novel technique is simple and can be carried out with basic instruments readily available in the angiographic suite for exchange of encrusted nephrostomy catheter.
CT Thermometry During Hepatic Radiofrequency Ablation: Assessing The Correlation Between CT Number Shift And Tissue Temperature

Cheah PL, Yeong CH, Norshazriman S, Lim KS, Wong YH, Basri Johan Jeet A

University of Malaya, Malaysia

Purpose:
Radiofrequency ablation (RFA) is commonly used for ablation of small primary or metastatic liver tumours. Post-ablative evaluation is normally done by visual inspection of the appearances of ablated tissues on computed tomography (CT) images. This study aimed to explore the correlation between CT number shift and tissue temperature in order to create CT thermal maps for more objective assessment of ablation adequacy.

Methodology:
RFA was performed on ex-vivo bovine livers (n=15) containing embedded fibre optic temperature sensors. Multiple CT scans were performed at approximately 3 min intervals throughout the ablation and cooling process. CT numbers were measured on the ablated tissues adjacent to the temperature sensors. The correlation between CT number shift and tissue temperature was analyzed using Microsoft Excel program. Further, CT thermal map for real time monitoring of the tissue temperature was developed using Matlab program.

Results:
A negative linear correlation was found between CT number and tissue temperature (y = -1.7086 x+ 1.8212, r^2 = 0.61; where y = HU change and x = temperature change). CT number decreased as tissue temperature increased during RFA, and subsequently increased as tissue temperature decreased during the cooling period, with a rate of 1.7 HU per degree Celsius.

Conclusion:
There was a strong correlation between CT number shift and tissue temperature during RFA. Using the equation developed from this study and the aid of 3D thermal map algorithms, it is possible to estimate tissue temperature based on the CT number measured during real-time CT guided RFA. This approach will help the interventionalists in determining the ablation efficacy.
Selective Salpingography And Fallopian Tube Recanalisation

Ham MC, Anushya V, Ouzreiah N, Yeong CH, Kartini R

Universiti Malaya, Malaysia

Purpose: To evaluate the feasibility of selective salpingography (SSG) and fallopian tube recanalisation (FTR) as an alternative treatment for proximal tubal obstruction (PTO) in University Malaya Medical Centre (UMMC) by studying the technical and clinical effectiveness, complication and radiation dose of SSG and FTR. Evaluation of pain intensity during procedure and investigation of the presence of infection was also conducted.

Methodology: We conducted a prospective study on 9 patients aged 33.6 ± 3.17 years with the diagnosis of PTO by prior hysterosalpingography between October 2014 to December 2016 in UMMC. FTR under fluoroscopic guidance performed by an experienced interventional radiologist using dedicated FTR kits. Demographic data and procedural details were obtained. Recanalisation rate, post-procedure complication, pregnancy outcomes, pain score, radiation dose and culture and sensitivity results were analysed. Patients were followed up for a period of 4-122 weeks.

Results: A total of 11 procedures including 2 repeated cases (4 unilateral and 7 bilateral) performed. 14/18 tubes were successfully recanalised providing technical success rate per tube of 77.8% and success rate per procedure of 90.9%. Post FTR pregnancy rate was 50%, 2 pregnancy occurred after the procedure was repeated. One live birth was reported. One case of tubal perforation occurred which required no treatment. Seven patients experienced mild discomfort during the procedure. Mean procedure time was 20.3 ± 13.6 minutes and the mean fluoroscopic time was 8.6 ± 9.2 minutes. The range of dose area product recorded was 0.11-2.92 mGym2. The mean estimated effective dose was 2.63 ± 2.42 mSv. No significant bacterial growth found.

Conclusion: SSG and FTR are relatively safe and effective in treating the carefully selected patient diagnosed with PTO with high technical success rate and pregnancy rate at a relatively low cost compared to other invasive and costly reproductive treatment. Radiation dose is within the safe limit.
Perfusion MR Imaging Role In Predicting The Outcome Of High-Intensity Focused Ultrasound Ablation Of Uterine Fibroids

Nguyen MD, Bilgin K, Huynh QH, Pham NH

Pham Ngoc Thach University Of Medicine, Vietnam

Purpose:
We investigated the role of Magnetic Resonance (MR) T1 perfusion based time-signal intensity (SI) curves of fibroid tissue compared to the myometrium in predicting the treatment outcome of MR-guided high intensity focused ultrasound (HIFU) ablation of uterine fibroids.

Methodology:
40 women (39.9 ± 5.4 years with a range of 27-50 years) who underwent MRgHIFU ablation were divided into 2 groups based on the DCE-MRI at screening: group A (n = 20) if the time-intensity curves of fibroid is lower than that of myometrium (Fig. 1A, B) and group B (n= 20) if the time-intensity curves of fibroid is equal or higher than that of myometrium (Fig. 2A, B). The immediate non-perfused volume (NPV) ratio and fibroid volume reduction ratio at 6 months follow-up were assessed.

Results:
The mean diameter and volume of all fibroids were 71.1 mm ± 27.8 (29.0-137.0 mm) and 208.9 ml ± 161.6 (34.0-603.0 ml) for group A and 66.9 mm ± 23.0 (30.0-118.0 mm) and 154.7 ml ± 110.6 (12-478 ml) for group B, respectively. On immediate post MRgHIFU, NPV ratio was 96.5 % ± 4.9 (81.1-100 %) for group A and 60.5 % ± 20.6 (9.2-81.6%) for group B. The fibroid volume reduction ratio at 6 months was 52.9 % ± 13.8 (21.9%-72.3%) for group A and 5.4 % ± 11.8 (-20.9%-19.7%) for group B (p<0.001).

Conclusion:
Our findings suggest that novel T1 perfusion based classification in the screening phase could be served as the MRI classification parameter not only for classifying the fibroids but also predicting the treatment outcome of MRgHIFU ablation.
Image Guided Irreversible Electroporation (IRE) Of Renal Tumours

Wah TM

Leeds Teaching Hospitals Trust, United Kingdom

Purpose:
This aims to present our early experience of CT-guided IRE of renal tumours at a university institution in the United Kingdom.

Methodology:
CT-guided IRE under general anaesthesia was performed on 18 renal tumours in 17 patients from 2015 to 2017, with no contraindications for IRE e.g. epilepsy, atrial fibrillation and cardiac pacemaker. Prospective documentation of the patient’s demographic, renal function, treatment details and outcomes were reviewed.

Results:
Eighteen renal tumours with a mean size of 2.7cm in 17 patients were treated. The mean patient’s age was 67.1 years (age range 48.8 to 81.2 years). The primary technical success rate with CT guided IRE was 78%. Four renal tumours had residual disease requiring repeated treatment with CT-guided cryoablation yielding overall successful treatment outcome of 94%. The pre- and post-IRE eGFR were 63.9 +/- SD 18.2 ml/min/1.73m2 vs. 59.4 +/- SD 17.9 ml/min/1.73m2 with no significant eGFR change (p=0.46). There is no major complication within the series. There was one minor complication related to contrast extravasation from the pelvi-calyceal system due to the IRE electrode traversing the collecting system during treatment and this was treated with conservative management. One patient died at 4 months post-IRE due to underlying progression of lymphoma. At our early-term follow up, we have no local disease progression or distant metastasis.

Conclusion:
CT-guided IRE of renal tumours is safe, offers preservation of renal function for central renal tumour sited close to the renal vessels and also offers a safe treatment for tumours in close relationship with other vital structures such as colon and ureter without the need for hydro-/pneumo-dissection. The early treatment outcome is acceptable at this stage of the experience. Overall, our early experience suggests CT-guided IRE has a promising role in the treatment of renal cancers that are sited close to vital structures.
Mastering Diagnostic Cerebral Angiography

Md Yuzairif Bin Md Yusof MBBS (Mal), FINR (Switzerland)
Regency Specialist Hospital Johor, Malaysia

Cerebral angiography has remain the gold standard investigation in the evaluation of intracranial pathology e.g. aneurysm, arteriovenous malformation (AVM) and dural arteriovenous fistula (DAVF). This is mainly due to the ability to deliver a good bolus of contrast via catheter placed in already an arterial system via manual hand injection or automated injector. Thus there is no issue of contrast dilution, venous contamination, false registration and other limitation associated with the use of computed tomography (CT) and magnetic resonance imaging (MRI) to study the intra or extracranial vessels.

Understanding the normal neurovascular anatomy and its variant, sound knowledge of materials used e.g types of diagnostic catheter and guidewires, awareness of the complication that might arise and how to manage them are some of the ingredients in becoming a master to perform cerebral angiography.

Challenges and tips on how to overcome them, complications and how to manage them will be discussed highlighting access, device choice and outcome.
Abstract Not Available
Haemodialysis Access : Which To Choose?

Nik Azuan Nik Ismail

Universiti Kebangsaan Malaysia, Malaysia

Over the years most of us thought very little about dialysis access. Surgeons made arteriovenous (AV) access circuits and placed peritoneal dialysis catheters. Surgeons and interventional radiologists maintained AV circuits with surgical revision or angioplasty, respectively. Venous catheters were placed and exchanged when necessary but most of us suspected that we really did not know much about the optimal way to manage our patients’ dialysis access needs. But what are we missing? Do we know how to select the right dialysis modality for each patient? How good are our training programs? Do we understand the biology of AV access venous stenosis and if therapy can be individualised?
Dialysis access is an important part in the daily life of hemodialysis patients. Significant stenosis or thrombosis is a major cause of dialysis dysfunction. The most common stenotic site of AVG and AVF are venous anastomosis and juxta-anastomosis, respectively. Intimal hyperplasia is a major cause of stenosis.

Endovascular treatment with balloon angioplasty is the first line option. The recommendation of the DOQI guideline (2006) for angioplasty should be a 50% patency rate at 6 months based on less than 30% residual stenosis. Several articles reported 6- and 12-month primary patency rates ranging from 38% to 79% and 10% to 50%, respectively, using plain balloon angioplasty. However, in the case of resistant or refractory stenosis, the patency rate of plain balloon angioplasty decreases. Currently, there are many types of balloon devices for angioplasty in the case of resistant or refractory stenosis, including high pressure balloon, cutting balloon and paclitaxel-coated balloon. High pressure and cutting balloons have a benefit in cases of resistant stenosis that failed angioplasty with plain balloon. However, some articles reported that the primary patency of the target lesion was not significantly better than plain balloon angioplasty. The reported 6-month patency of cutting balloon ranged from 30% to 66%.

Paclitaxel-coated balloon has proved to provide good outcomes with significant reduction in the stenotic rate of peripheral arterial disease. Additionally, a recent randomized controlled clinical trial showed good outcomes from drug-coated balloon for stenoses in dialysis access. The 6-month target lesion primary patency rate was 70%. Other recent non-randomized studies also reported good outcomes of a drug-coated balloon for the treatment of in-stent stenosis in dialysis fistula, in which the freedom from target lesion revascularization was 69%.

In summary, endovascular treatment with balloon angioplasty is the first option for treatment. In the case of resistant or early re-stenosis or both in dialysis access, the advanced devices have proven to improve the outcome.
Abstract Not Available
Interventional Radiology plays an important role in management of gastrointestinal bleed (GIB) especially in patients who failed medical and endoscopic therapy. Diagnostic imaging with computed tomography angiography (CTA) and nuclear scintigraphy help to localise the site of bleeding and provide essential information for the Interventional Radiologist to guide therapeutic management. Endovascular embolisation is a safe and effective alternative to surgical intervention in patients refractory to medical and endoscopic therapy as well as those who are not suitable for surgery. Using case examples, the technical considerations of performing embolisation will be discussed.
Interventional Radiology (IR) provides endovascular approach for traumatic or iatrogenic bleeding. Endovascular approach can be a resuscitative method to uncontrolled bleeding for example in multiple arterial bleeds, solid organ injuries, bleeding points in inaccessible areas or bleeding after external fixation in pelvic traumas. In this lecture, we go over some cases and examples on how IR can support resuscitative measures in traumatic and iatrogenic bleeds.
Pre-Op & Tumour Embolization

Khairul Azmi Abd Kadir

University of Malaya, Malaysia

The aim of pre-operative embolization of the tumour is to devascularize the tumor bed by filling intratumoral vascularization as deep as possible into the precapillary level to initiate tumor necrosis, decrease blood loss during surgery and thus make it easier and possibly, more radical, and in tumor of nasal cavity to stop epistaxis . The procedure is angiographically guided. Embolization of a tumor is performed by either an intraarterial catheterization approach or direct puncture of the tumor artery. Selection of one of these approaches depends on the location, and number of arterial feeders of the tumor.

There are basically three main indications for head and neck vascularized tumor embolization: pre-operative embolization, palliative treatment, and to stop epistaxis. Pre-operative embolization is believed to reduce blood loss, shorten the operative procedure time and potentially increase the chances of radical surgical resection as well as decrease the incidence of tumor recurrence. Palliative treatment may led to a decrease in tumor mass with improvement of neurological symptoms due to intracranial expansion. In some cases, shrinkage of tumor may alleviate intractable pain.

Pre-operative embolization for hypervascular tumors is a well-established method. First of all, familiarity with the arterial anatomy of this region is fundamental for safe and successful treatment. Appropriate imaging work up and periprocedural detailed angiographic studies as well as careful selection of embolic agents help to decrease the ischemic complications.
Hybrid CT-Angiography system provides cross-sectional imaging as an adjunct to angiography. Many interventional procedures can be conducted precisely using these current technologies especially interventional oncology procedures.

Hospital Selayang as a tertiary center and center for hepatobiliary diseases in Malaysia plays an important role in establishing this current system in the interventional oncology procedures.

This system improves workflow and time, allowing patients to receive quicker diagnosis, treatment, patient's comfort as well as helping the interventional radiologists to perform more accurate and faster procedures.
Radioembolization of HCC in 2017

A/Professor Lourens Bester.

University of Notre Dame, Australia.

Hepatocellular carcinoma (HCC) is the most common type of liver cancer and is the second cause of death due to malignancy in the world. Radioembolization has shown a promising efficacy in terms of disease control and is associated with a good safety profile. Accurate diagnosis and staging using BCLC allows practitioners to apply the most appropriate treatment of which SIRT is one. The workup and implantation procedure will be discussed taking into consideration that there are two types of microspheres being used to treat HCC. The recently prospective studies SARAH and SIRveNIB will be eluded to and their impact on management will be highlighted.
Liver Ablation Wars: RFA Versus MWA Versus CRYO

BJJ Abdullah

University of Malaya Medical Centre, Kuala Lumpur, Malaysia

Over the past decade, especially radiofrequency ablation (RFA) and microwave ablation (MWA) as well as cryotherapy have evolved into important therapeutic tools for the treatment of both potentially resectable and non-resectable primary and secondary liver tumors. The clinical benefit of thermal ablation is represented in several clinical studies and nowadays the techniques are widely adopted in international guidelines for the radical treatment of relatively small lesions.

These reports underline the safety, feasibility and efficacy of this new and modern concept in treating liver tumors. Ablation has proven its clinical impact in hepatocellular carcinoma and replaced surgery for the majority of patients with very-early and early stage disease with nowadays even higher evidence grades compared to surgery.

With the continuous technological development in the ablative technologies both in terms of the efficiency of the ablation as well the use of multiple probes, the capabilities of the each of the ablative therapies has improved tremendously. Thus the data available is outdated in some ways. These ablative therapies must also be considered in the context of the use and advancements of other synergistic treatments, e.g. surgical resection, chemoembolization (TACE, TAE) as well as radioembolization which potentiate the effectiveness of thermal ablation. The adoption of thermal ablation for colorectal liver metastases has also shown that 8-year progression free survival 2.0% versus 22.3%, for the chemotherapy alone versus the RFA plus chemotherapy group.

Thus question should not be which monotherapy is the best i.e. “one or the other” but rather to personalize the treatment modalities taking into consideration disease stage, affordability as well as availability of technologies.
Hepatocellular carcinoma (HCC) is a primary liver cancer with many etiologies that is often associated with hepatitis B and C in Asia and Alcohol in the Western world. Accurate diagnosis and staging using BCLC allows practitioners to apply the most appropriate treatments including resection, ablation, embolization, systemic therapy, and transplantation. The impact of Cirrhosis on survival and other management issues will be discussed. The recently prospective studies SARAH and SIRveNIB will be discussed and their impact on management will be highlighted. The talk will not include drugs in the pipeline or genetic testing. The SORAMIC trial will be eluded to. Reaching a unified reporting standard like LIRADS is important and will be discussed.
An Endovascular Solution for Aorto-Iliac Occlusive Disease

Sorracha Rookkapan

Prince of Songkla University, Thailand

The current standard of care of aorto-iliac occlusive disease is still in surgical repair with high 5-year patency rate of 87-91% while complication rate of 8-12% and mortality rate of 4%. However, there is feasibility of endovascular treatment for TASC II C&D lesion in case of not good candidate for surgical repair with promising regarding in safety, mid-term durability, technical success and lower morbidity. STAG RCT trial confirms that primary stenting improved technical success and reduced major procedural complication rate comparing with PTA alone in iliac occlusion. However, there is no significant difference in 1\textsuperscript{st} or 2\textsuperscript{nd} patency at 1 year or 2 years. To compared the technique of stenting, DUTCH iliac stent trial shows similar result in term of patency rate, ABI and quality of life between primary stenting and provisional stenting. However, this trial does not include more complex lesion; >10cm or CTO > 5cm. About more complex lesions, meta-analysis of stent data shows promising result with high technical success rate of 90%, 5 year 1\textsuperscript{st} patency rate of 60-86%, 2\textsuperscript{nd} patency rate of 80-89% and limb salvage rate of 98%. The update ACC/AHA guideline 2011 also supports to 1\textsuperscript{st} stenting of CIA and EIA with class I recommendation.

To compare between metallic balloon expandable stent and self expandable stent, there is no clinically available to support the difference in clinical outcome. However, there is superior patency in covered stent compared to bare metal stent about 92% vs 62% at 1 year when kissing stenting was performed. The COBEST trial confirms restenosis rate is significant lower in the cover stent, especially in the more complex TASC II C&D lesions. It may reduce the risk of distal embolization, prevention of in-stent re-stenosis and risk of rupture. Disadvantages of cover stent are requiring bigger vascular sheath and possible coverage major side branches. Other options for more complex lesions are CERAB or using aortic device. With CERB configuration may reduce the radial mismatch or dead space with high conformation ratio. Endologic AFX II is the aortic device which can preserve the aortic bifurcation and not limit the future contralateral intervention.
An Endovascular Treatment Of SFA And BTK Lesions

Sorracha Rookkapan

*Prince of Songkla University, Thailand*

Over the past decades major advancement have been made in treatment of PAD. The “tool box” has expanded with several devices: cutting/scoring balloons, wires, stents, atherectomy devices, and now accompanies by the drug-eluting therapies. The “leave nothing behind” strategy has gained in popularity, with the aim of leave the treated vessel without stent and intact for potential future treatment and avoid potential stent-related problem. In long SFA lesion, there are now increasingly being handle using and endovascular approach. Many DCBs offer a significant clinical benefit in term of primary patency, cd-TLR, and quality of life. However, in case of suboptimal result; recoil or flow limited dissection, or limited drug penetration in calcified segment, we can use focal stenting or debulking device with better result. DCB vs DES RCT shows no significant difference in primary patency at 1 year, however significant better 2 year primary patency of the DES and also in mid and long lesions. Latest result from the RAPID trial showed high efficacy of using DCB plus SUPERA stent in long SFA/popliteal artery occlusion rather than DES. ZEPHYR investigated 3-year real-world outcomes of Zilver PTX treatment for FP long lesions. The restenosis occurred in half of cases, whereas MALE occurred in one third. Viabahn registry in the long lesion in Japan shows excellent result with 88% 12 month and 78% 24 month primary patency without acute limb ischemia or amputation. The early DCB-BTK evidence from Leipzig and DEBATE study showed high promise for IN.PACT Amphirion to reduce restenosis and reintervention rate vs standard PTA. DEEP IN.PACT trial is the latest RCT of DCB which failed to showed benefit of IN.PACT. Amphirion over plain balloon due to higher major amputation rate in DCB arm. However, there is good evidence for the treatment of short BTK lesion with conventional metallic DES. Lately, BVS shows similar efficacy with excellent 12-month patency and also added benefit of no permanent implant, even in long lesions, some of which are calcified. So, case selection, lesion preparation is key. For the no option CLI patient, early experience with LimFlow shows good result at 1 year.
Abstract Not Available
Feasibility Of Cardiac Function Analysis In 3 Tesla Magnetic Resonance Imaging As Compare To 1.5 Tesla

Norzailin AB, Chew CK

University Kebangsaan Malaysia Medical Centre, Malaysia

Purpose- This study is pilot study in our center (PPUKM) to evaluate the feasibility of cardiac imaging study in MRI 3.0 tesla as compare to MRI 1.5 tesla, whether images quality produced by MRI 3.0 tesla have diagnostic value.

Material and method- 20 patients underwent cardiac magnetic resonance (CMR) imaging study at both 1.5 tesla and 3.0 tesla on same day in PPUKM. Images were assesed quantitatively (signal to noise ratio, contrast to noise ratio) by using Osirix software, cardiac ejection fraction measurement by using Argus software, qualitative assessment in blinded manner by single observer for cardiac valve visibility, image contrast, endocardium, pericardium, extracardiac structures and muscle contractility.

Results- CMR in 3.0 tesla produced images with higher (nearly triple) signal to noise ratio and contrast to noise ratio as compare to 1.5tesla. Cardiac ejection fraction measurement in both CMR 1.5 and 3.0tesla have linear correlation. In qualitative assessment, endocardium and pericardium is better delineate in CMR 3.0 tesla due to susceptibility artefact; while cardiac valve visibility is better in CMR 1.5 tesla due to lesser flow related artefact in CMR 1.5tesla.

Conclusion- Overall results showed that CMR is feasible in MRI 3.0 T PPUKM.
Asymptomatic Supracardiac Total Anomalous Pulmonary Venous Return (TAPVR) In An Adult Patient: A Case Report

Khairil Amir S, Norain T, Mohd Rizal MZ, Noor Syarida Ayu MS

Universiti Sains Malaysia, Malaysia

Total anomalous pulmonary venous return (TAPVR) is a rare symptomatic congenital heart defect. Survival to adulthood without surgical correction is extremely rare. We report a 33-year-old lady with a heart murmur and history of a successful pregnancy. Echocardiogram revealed a large atrial septal defect (ASD). Chest radiograph demonstrated classical "snowman" appearance. Cardiac catheterization was favourable of TAPVR. Cardiac CT confirmed TAPVR whereby all the pulmonary veins are unobstructed and drain into the anomalous vein and finally to the superior vena cava. She remains asymptomatic and is planned for surgical correction.
Investigation Of The Effects Of Different Imaging Parameters On The CT Number Of Coronary Plaques In Coronary Computed Tomography Angiography: A Phantom Study

Yang Faridah AA, Yeong CH, Tan WS, Tan SK, Ng KH

University of Malaya, Malaysia

Purpose: This study aimed to investigate the effects of different scanning parameters and reconstruction algorithms on the CT number for both calcified and non-calcified plaques in coronary computed tomography angiography (CCTA).

Materials and Methods: Nine phantoms with different material densities mimicking the calcified and non-calcified plaques were constructed. The phantoms were imaged using a dual-energy multislice CT scanner (Somatom Definition AS, Siemens, Germany) with different scanning modes (single-energy CT (SECT) versus dual-energy CT (DECT)), tube voltages and reconstruction methods. The CT numbers of the phantoms were measured and compared statistically using ANOVA and paired-sample t-test.

Results: The CT numbers were statistically significant difference (p<0.05) was found between different reconstruction kernels, except when compared to the sharp kernel (B 46f). For calcified plaques, significant differences (p<0.05) was found between the CT numbers of different reconstructed slice thicknesses/increments for both calcified and non-calcified plaques.
Pseudoaneurysm Of Cystic Artery Associated With Ruptured Gall Bladder Empyema

Chua SY, Norhafizah E, Khoshala K

Hospital Sultanah Aminah, Malaysia

Pseudoaneurysm of cystic artery is rare complication in the setting of infection. We present a case of pseudoaneurysm of cystic artery in a 64 years old gentleman who presented with right hypochondriac pain with loss of appetite for 2 weeks. Initial ultrasound showed features of ruptured gall bladder empyema. Computed tomography liver protocol showed saccular pseudoaneurysm arising from branch of left hepatic artery in gall bladder bed. Further angiogram confirmed the findings of pseudoaneurysm arising from cystic artery branch of right hepatic artery and embolisation of the pseudoaneurysm was successfully performed.
Predictive Factors Of Trans-Arterial Chemoembolization (TACE) Efficacy For Hepatocellular Carcinoma In Arterial Phase Computed Tomographic Scan

Dahlia M, Mohd Shafie A
Hospital Universiti Sains Malaysia, Malaysia

Objective: The aim of this study was (1) to evaluate demographic factors of patient with hepatocellular carcinoma who underwent TACE procedure (2) to identify the correlation between predictive factors (tumour attenuation, size and site of tumour) and response of tumour (volume of residual viable tumour) to TACE procedure (3) to determine which predictive factor contribute more to better tumor response to TACE.

Methodology: Patients diagnosed with Hepatocellular carcinoma who underwent TACE procedure using drug eluting microparticles as the embolized material recruited from PACS system at Radiology Department Hospital USM and Hospital Selayang. CT findings (pre and post TACE) of 144 tumors were analysed using several parameters (attenuation, size and site of tumour). Response of tumour to TACE was assessed based on reduction of size of tumour volume.

Results: A total of 144 nodules of HCC were analysed from pre- and post-TACE CT scan in arterial phase. Simple linear regression analysis revealed that tumour attenuation and size have significant association with the tumour response to TACE (P<0.001). There were no significant association found between the site of tumour [central or peripheral (p=0.453) and right lobe or left lobe (P=0.705)] with tumour response to TACE. Out of the two statistically significant variables, we found that the strongest predictive factor for better TACE response based on multiple linear regression analysis was the tumour size.

Conclusions: Smaller tumor and higher tumour attenuation (measured in Hounsfield unit) were the significant predictive factors for better tumour response to TACE. Location of the tumour showed no statistical significant association with better TACE response.
Persistent Left SVC Versus Central Vein Collaterals - The Differentiation

Ezamin AR, Noor Hazwani AW, Suraini MS, Norafida B, Ahmad Sobri M

Universiti Putra Malaysia, Malaysia

Abstract

The aim of this manuscript is to determine the incidence of double SVC (also known as persistent left SVC) and to highlight the differences between giant collaterals and true double SVC variant. We retrospectively reviewed central venography cases done from 2010 till May 2017 in our institution. The images were retrieved and analysed. There were at least 2 cases of true SVC and 1 mimics found to date from our study. The first case; the left superior vena cava draining directly to the left atrium, the 2nd case the left SVC drains to the right atrium. The study is still ongoing and the result is still pending.
Transarterial Chemotherapy Infusion On Medulloblastoma

I Made Dwijaputra A, Made W

*Sanglah Hospital, Indonesia*

Introduction:
Medulloblastoma is a common malignant brain tumor of childhood which characterized as an infratentorial mass in the roof of the fourth ventricle, causing mass effect and non-communicating hydrocephalus.

Case Report:
Patient a boy 16 months old with major complaints limp, do not want to eat, vomiting and often choke. Performed MRI of head with contrast, obtained medulloblastoma tumor in right cerebelli hemispheres extending to the pons, medulla oblongata and right lower midbrain with non communicating hydrocephalus. No tumor excision or radiation was done considering the extension to the brain stem. Arteriography and transarterial chemotherapy infusion with carboplatin 200 mg through the basilar artery in an effort to control tumor growth. A week later an evaluation was performed with a CT scan, the result was a smaller size of the tumor.

Discussion:
Medulloblastoma is the most common primary brain tumor in children, with occasionally standard surgical therapy not possible because of large tumor mass and difficult tumor positions. Similarly, intravenous chemotherapy will only provide a large systemic toxicity effect. This tumor has a tendency to spread along the neural axis, following the path of cerebrospinal fluid, which can perform metastases to tissues outside the nerve. Transarterial chemotherapy infusion can be a safer treatment option.

Conclusion:
In this case the role of radiological intervention in the form of transarterial chemotherapy infusion is needed as an effort to control tumor growth.
Venous Anomalies Causing Malpositioned Dialysis Catheters: Case Series

Lim MSY, Ang LN, Lee CC, Mohd Khairul A, Lau JH

Hospital Kuala Lumpur, Malaysia

Purpose of study:
Dialysis catheter placement is a common procedure performed in our interventional radiology unit. Detailed anatomical knowledge of the great vessels of the thorax is prerequisite for safe interventional radiology practice. However, rare occurrences of thoracic venous anomalies may cause malpositioned central venous catheters and its subsequent sequelae i.e. venous thrombosis and malfunctioning catheter.

Material and method:
We reported two cases of malpositioned dialysis catheters due to presence of thoracic venous anomalies which was undetected prior to catheter placement in two patients with end stage renal failure.

Results:
Case 1:
A 48 year-old man had accidental placement of left internal jugular non-cuffed catheter into the left lower lobe pulmonary vein due to presence of partial anomalous pulmonary venous return to the left brachiocephalic vein, confirmed by computed tomography (CT) and venogram. The catheter was successfully adjusted by the interventional radiology (IR) team.

Case 2:
A 34 year-old man with difficult vascular access was referred to the IR team for temporary dialysis catheter placement due to fluid overload. The guidewire position was noted to be abnormal from the left internal jugular vein cannulation. Venogram showed left-sided superior vena cava draining into the left coronary sinus. However, the team decided to continue with placement of the catheter via this access with the catheter tip within the coronary sinus as the patient was breathless and required urgent dialysis. The patient was brought back a week later and a new non-cuffed catheter was inserted via the right internal jugular vein.

Conclusion:
Knowledge of normal and anomalous thoracic venous anatomy is important to identify malpositioned catheters.
Stent Placement In The Treatment Of Pulmonary Artery Stenosis Secondary To Mediastinal Mass

Mohd Naim MY, Nik Azuan NI, Lau JH

National University of Malaysia, Malaysia

A 45-year-old gentleman with neuroendocrine tumor grade II of the mediastinum encasing the superior vena cava, azygous vein, right pulmonary artery and right main bronchus causing significant luminal narrowing. Pulmonary angiogram showed more than 90% stenosis of the right main pulmonary artery. Endovascular stent placement was performed followed by intra-arterial tissue plasminogen activator. Pulmonary angiogram post stenting showed opening up right main pulmonary artery with improvement of the right lung perfusion. The SVC is also stented to assist venous return and further improved lung perfusion. Stent remains patent until patient expired due to complication of cancer 2 weeks later.
63 year old, lady alleged MVA developed traumatic brain injury with polytrauma. 1 week later, she developed bilateral red eyes with proptosis. She was then referred to Ophthalmologist and neurosurgery. Diagnosis of post traumatic carotico-cavernous fistula was raised and confirmed with CTA brain. Cerebral angio shows bilateral direct carotico-cavernous fistula (CCF). CCF was embolized using detachable balloon occlusion and discharged 3 days later. 1 week post treatment, she developed syncopal attack. MRI brain confirmed evidence of recurrent CCF with left temporo-parietal venous infarct possibly due to dislodged detachable balloon. Cerebral angiogram shows evidence of recurrent CCF with reflux into the left cerebral veins over the left temporo-parietal region. Detachable balloon is seen in situ. Patient underwent CCF embolization using transvenous coiling. Post coiling run shows resolved CCF. This case demonstrates the complication of recurrent CCF post detachable balloon embolization causing left temporo-parietal venous infarct. Apart from learning on the complication of CCF embolization, this case also shows dynamicity of the venous system which is crucial in the treatment of CCF.
Catheter Directed Endovascular Thrombolysis In A Patient With Popliteal Artery Entrapment Syndrome

Muhamad Fariz AA, Arvin Raj R, Maizatul Jamny M, Lau JH, Mohd Khairul A

Hospital Kuala Lumpur, Malaysia

Introduction:
Popliteal artery entrapment syndrome (PAES) is an uncommon congenital anomaly in young adults causing ischemic symptoms in the lower extremities. Abnormal embryological development of the popliteal fossa causes various types of anomalous relationships between the popliteal artery and the neighboring muscular structures leading to arterial insufficiency. Young individuals present with symptoms ranging from exercise induced pain to more severe acute lower limb thrombosis.

Aims and objective:
We report a case of a young male presented with acute left lower limb ischemia that developed after a history of trivial sports injury.

Results:
CT angiogram and pre-procedural conventional Digital Subtraction Angiography (DSA) of lower limbs showed thrombosis within the popliteal artery. No flow demonstrated in the leg or foot. Catheter directed thrombolysis was performed with Tissue Plasminogen Activator (rTPA). 24 hours post rTPA infusion, left lower limb angiogram showed recanalization of the thrombosed segment with good distal run-off in the foot. Subsequent MRI of left popliteal fossa showed the tendon of medial head of gastrocnemius slings around lateral aspect of the popliteal artery before inserting superiorly onto the femoral intercondylar notch, confirming findings of type II left popliteal artery entrapment syndrome.

Conclusions:
Acute ischemia of the lower limb is an extreme result of popliteal artery entrapment syndrome in the young individual. Endovascular catheter directed thrombolysis is a favorable mode of treatment prior to surgical intervention to correct the anatomical variation causing the entrapment.
Pulmonary Tuberculosis And Haemoptysis; A Common Condition Presenting With A Rare Sequelae

Nasibah M, Khairil Amir S, Anis Shafina M, Ganeshwara L

Hospital Universiti Sains Malaysia, Malaysia

Haemoptysis is the clinical features of pulmonary tuberculosis (PTB) (32.5%) in Malaysia, in which if massive and left untreated it carries out mortality risk of more than 50%. In the majority of cases, the main bleeder arises from the bronchial artery, with the pulmonary arterial circulation as a rare cause of bleeding, accounting for less than 2% of cases. Rasmussen aneurysm is a rare phenomenon following weakening of the pulmonary artery wall resulting from adjacent cavitary tuberculosis. The sequelae which follows includes pseudoaneurysm formation and subsequent rupture.

A 60 years old Chinese male, underlying diabetes mellitus (DM) and newly diagnosed PTB on treatment for 20 days (on tablet AKURIT 3tablet OD), presented with pleuritic chest pain, shortness of breath (SOB) and haemoptysis. Upon admission, patient was clinically pink with haemoglobin (HB) level of 10.4g/dl. A day after admission, patient complained of worsening SOB and haemoptysis. Clinically patient was pale with dropped HB level to 8.3g/dl. Computed tomography angiography (CTA) of thorax noted multiple cavities at left upper lobe with active contrast extravasation from anterior segmental branch of left pulmonary artery (Figure 1). Pulmonary arterial angiography done 1 day later confirmed the presence of the left upper lobe pulmonary artery pseudoaneurysm which was seen on the previous CTA (Figure 2). Percutaneous embolisation was performed using gelfoam slurry infusion and 0.018” coil 2mm x 2mm. No residual contrast seen on the post coiling angiographic runs, indicating successful procedure (Figure 3a, 3b). Patient was symptoms-free afterwards and discharged the next day.

This case illustrates that pulmonary artery pseudoaneurysm is a rare cause of haemoptysis. However due to the high risk of mortality associated with it, its early recognition and prompt management is of vital importance. Percutaneous pulmonary arterial embolization is a minimally invasive and offers a better alternative to surgical treatment.
Prevalence Of Prostate Carcinoma In Patients With PSA Level >4ng/ml That Undergone Biopsy In Year 2015

Ng YD, Chong AK, Lee MC

Hospital Melaka, Malaysia

Introduction:
Prostate cancer is the fourth most common cancer in Malaysian males. TRUS biopsy is the gold standard for diagnosis of prostate cancer. PSA level of > 4ng/ml is widely accepted as one of the indication for TRUS biopsy. The objective of this study is to analyse the prevalence of prostatic carcinoma in patients with PSA level>4ng/ml that had undergone TRUS guided biopsy in radiology department, Hospital Melaka during year 2015.

Methods:
Retrospective and cross sectional data collection from 1/1/2015 to 31/12/2015. Total of 101 cases were performed in this period. Patients data, PSA level and histopathology examination (HPE) results were reviewed and data computed.
Inclusion criteria: Patients that had undergone TRUS biopsy of prostate gland from 1/1/2015 to 31/12/2015 with PSA level >4ng/ml at the time of biopsy.
Exclusion criteria: Patients that had undergone TRUS biopsy of prostate gland from 1/1/2015 to 31/12/2015 with PSA level <4ng/ml at the time of biopsy. Total of 7 patients were excluded from the total number of 101.
Diagnostic criteria: HPE proven prostatic carcinoma.

Results:
Out of 94 patients that had undergone TRUS guided biopsy of prostate gland with PSA level >4ng/ml, 29 (30.9%) is diagnosed to have prostate carcinoma. The prevalence of prostatic carcinoma in different age group in this study is 33.3% in age 50-59, 27.27% in age 60-69, 32.56% in age 70-79 and 50.0% in age 80-89.

Conclusion:
Prevalence of prostate carcinoma in this study is 30.9%, which is comparable with other larger scale study which was 21%. Increasing age group has increased prevalence as shown in the results, especially in patient age > 50 years old. Our study showed similar trend of increase in the prevalence of prostate cancer in the more elderly patients, as observed in another larger study.
MRgHIFU Ablation Of Uterine Fibroids: The Treatment Outcome Between The Transverse And Longitudinal Abdominal Scar Patients

Nguyen MD, Bilgin K, Huynh QH, Pham NH

Pham Ngoc Thach University of Medicine, Vietnam

PURPOSE OF STUDY
Our aim in this study was to compare the immediate non perfused volume (NPV) ratio, the fibroid volume reduction ratio the transformed symptom severity score (tSSS) improvement at follow-up between two groups transverse and longitudinal scar patients using scar patch for Magnetic resonance guided high intensity focused ultrasound.

MATERIALS AND METHODS
17 women (39.5±6.1 years with a range of 29-53 years) who underwent MR-HIFU ablation were divided into 2 groups: the transverse scar group (N=11) (Figure 1) and longitudinal scars group (N=6) (Figure 2). The immediate post HIFU NPV ratio, the fibroid volume reduction ratio and tSSS at 6 month follow-up were accessed.

RESULTS
The volume of fibroid was 113.1 ml ± 61.0 (37.0-199.0 ml) for the transverse scar group and 301 ml ± 253.7 (111-794 ml) for the longitudinal scar group, respectively. The transverse and longitudinal scar size in length were 136.5 mm ± 59.1 (26.0-232.0 mm) and 84.8 mm ± 39.8 (32.0-148.0 mm), respectively. The NPV ratio was 82.7% ± 16.2 (57.5-100 %) in the transverse scar group and 92.6% ± 12.2 (68.5-100%) in the longitudinal scar group (p>0.05). The fibroid volume reduction ratio at 6 months was 44.0% ± 29.1 (-3.5%-79.8%) for transverse scar group and 48.1% ± 23.6 (2.1%-65.7%) for longitudinal scar group (p>0.05). The tSSS improvement at 6 months follow-up was 62.7% ± 45.9 (-20-100%) for the transverse scar group and 83.4% ± 20.7 (42.9-100%) for the longitudinal scar group (p>0.05).

CONCLUSION
Our findings revealed that there are not different in treatment outcome between transverse and longitudinal abdominal scar patients. Therefore, we suggest that the scar patch could be used efficiently in the MR-HIFU treatment of fibroid patients with transverse and longitudinal abdominal scars.
Patient Radiation Doses In AV Access Interventions: A Comparison Between Transradial And Transvenous Approaches

Teo NSZH, Tan CH, Pua U, Quek LHH, Hui T

Yong Loo Lin School of Medicine, National University of Singapore, Singapore

Purpose of Study - Our study seeks to compare the correlation between the approach of an arteriovenous intervention and patient radiation doses.

Method - We conducted a retrospective study in our institution from January 2016 and February 2017. During the study period a total of 471 fistuloplasties were performed. Exclusion criteria include: incomplete data, central vein interventions, AV grafts, infected or thrombosed accesses. A total of 244 procedures were performed. Patients were further divided into two groups - patients whose AV fistulae had a single lesion (n=155, 63.5%), and patients whose AV fistulae had more than one lesion (n=89, 36.5%). The approach for the AV intervention, either transradial (TR) or transvenous (TV), was compared against multiple variables to identify a possible correlation.

Results - In the group with multiple lesions, a TR approach (n=15, 16.9%) resulted in a lower fluoroscopy time (mean: 380s vs. 480s; p = 0.04) vs. a TV approach (n=74, 83.1%). Furthermore, a TR approach yielded a lower air kerma (mean: 28 mGy vs. 59 mGy; p = 0.007) and a lower dose area product (mean: 1018 µGym² vs. 1923 µGym²; p = 0.049). TR approaches used to treat a single lesion in the AV fistula also resulted in lower fluoroscopy times (mean: 262s vs. 321s ; p = 0.29). Conversely, our study showed that TV approaches used to treat a single lesion in the AV fistula yielded a lower air kerma (mean: 32 mGy vs. 38 mGy; p = 0.39) and a lower dose area product (mean: 1110 µGym² vs. 1315 µGym²; p = 0.049).

Conclusion - A transradial fistuloplasty has demonstrated that lower fluoroscopy times and radiation doses can be achieved if the patient has multiple lesions in the AV fistula. However, both transradial and transvenous approaches are appropriate for patients with single lesions.
Prostate Size And Dimensions Of 600 Malaysian Aged 40-70 Years Old

Nik Azuan Ni, Taranjit Kaur SS, Tan GH, Nur Yazmin Y, Rozman Z

University Kebangsaan Malaysia Medical Centre, Malaysia

The objective of this study was to determine the average prostate size of men aged between 40-70 years old, due to lack of local data. The aim is to learn about the way the prostate gland enlarges with age, and the proportion of men with significantly large prostates that might require specialised treatment strategy.

Material and methods
Ethics approval was obtained. CT scans of men within the target age group were randomly chosen from the hospital database. We divided the cohort into three groups representing the three decades of life between 40 and 70 years old. Patients who had previous surgical or radiation therapy to the prostate, had treatment with 5-alpha reductase inhibitor, history of prostate or rectal cancer, or insufficient patient data were excluded. The prostate gland dimensions were measured.

Result
We included 600 patients who underwent CT scan of the pelvis for various reasons between January 2010 and December 2014. The average prostate size of this cohort was 25.16 mL. The prostate of this cohort was projected to grow at about 0.3 mL per year. The average prostate width of men in their 6th decade of life was 7.87% greater than men 10 years younger, and it contributed the most to the overall gland growth. After 60 years old, the anteroposterior (AP) dimension increased most significantly and the mean AP measurement was 6.27% greater than men in their fifties.

Conclusion
The average prostate size of this cohort is similar to published Korean and Japanese series. The prostate seems to grow most rapidly in width earlier on and followed by greater enlargement in the AP dimension, as men get older. About 1 in 10 men have significantly larger prostates that might necessitate more complex medical or surgical treatment if they caused lower urinary tract symptoms.
Non-Missile Penetrating Intracranial Anterior Cerebral Artery Pseudoaneurysm- A Case Report With Reviewed Of Previous Literature

Aida Widure Mustapha MM, Wong SN, Loh KB, Lau JH

University Kebangsaan Malaysia Medical Centre, Malaysia

Non-missile penetrating intracranial injuries are rare form of presentation in our daily life. The common intracranial trajectories sites are orbit, skull base foramina or thin bone area such as temporal squama. This group of patients who survived will seek medical attention for foreign body removal ultimately. They may suffer from neurovascular damage ranging from neurological deterioration, life-threatening intracranial hemorrhages or death. Delayed complications such as traumatic pseudoaneurysms, arteriovenous fistula, vasospasm, cerebrospinal fluid leak and infection can have significant impact on patient recovery status. Pseudoaneurysm needs to be suspected whenever a penetrating intracranial injury occurred. High index of suspicion of vascular injury is crucial for better prognosis or reversible outcome. In this case report, we highlighted an uncommon case of pseudoaneurysm secondary to nonmissile penetrating intracranial injuries in a 36 years old gentleman who presented with penetrating right eye injury by a tree twig. Initial non-contrasted CT head showed no intracranial bleed. On day 5 post-trauma, patient developed multiple episodes of fitting and a repeated non-contrasted CT head was performed showed right fronto-temporal bleed. CTA and serial of DSA were performed shows right ACA and right ICA pseudoaneurysms, which were treated with Leo stent and FRED flow-diverter stent respectively. We will discuss the importance of recognizing vascular injury such as pseudoaneurysm in this case, which needs to be suspected as one of the differentials to avoid devastating complications, supported by review of previous literatures.
18F FCH PET-CT And 18F FDG-PET In The Evaluation Of Breast Carcinoma: A Pilot Study

Fathinul Fikri AS, Razinul Aiman FF, Shazreen S, Shahrun Niza S, Malini K

*Universiti Putra Malaysia, Malaysia*

To determine the superiority of FDG and FCH positron emission tomography (PET)/CT in localising and predicting an aggressive breast carcinoma.

Methods: 17 patients with a primary or recurrent breast carcinoma underwent dual tracer PET-CT imaging utilising FCH and FDH prior to biopsy. All patients had Birads 4/5 breast lesions on mammogram. Biopsy results were recorded and the patients were dichotomised into malignant and benign groups and triple + (OE-PG-HER) or non-triple -ve (OE-PG-HER). Direct qualitative and semiquantitative analysis were done by experienced nuclear radiologist using the biopsy findings as a gold standard.

Results: Fourteen patients with mean age of 52.82±10.71 years had malignant disease (14/17; 82.35%) with thirteen (9/17, 52.9%) with HER–ve phenotype. Mean FDG SUVmax (g/dl) and FCH SUVmax (g/dl) were 1.49±1.40 and 1.15±1.42 respectively. On per patient basis, the sensitivity and specificity for FDG PET-CT (8/8; 100%) and (3/4; 75%) respectively as compared to FCH PET-CT (3/3; 100%) and (3/3; 100%). There was a significant different between FCH SUVmax of the HER-ve and HER+ve group (1.99±1.52 vs 0.20±0.22; p

Conclusion:
Higher SUVmax of 18F-FDG-FCH PET and HER-ve phenotypes are potentially strong markers for an aggressive breast cancer which are important in stratifying patients undergoing endocrine treatment.
Comparison Of 18F-FDG Standardized Uptake Values (SUV) Of Paired PET/CT Centre

Fathinul Fikri AS, Muhammad Hafiz H, Noramaliza MN, Md Sohel R

Universiti Putra Malaysia, Malaysia

Objective: This study purposed to compare the variation of standardized uptake values (SUV) among PET/CT centres in order to standardize the PET image quality.

Materials and methods: Two independent dedicated PET/CT systems were involved in this standardization. The experimental procedure was combining of technical study of phantom experiments and image quality evaluation of patients (n=20). We measured and analysed the mean of SUVmax of the lungs (left, right), the brain (left, right) and the liver. The correlations of phantom SUV calibration with the variation SUV of the patient were analysed using linear regression analysis.

Results: Linear regression analysis of phantom SUV calibration with the variation SUV of the patient’s lungs (left, right), brain (left, right) and liver shown the correlation coefficients were 0.994 (P<0.001), 0.995 (P<0.001), 0.995 (P<0.001), 0.995 (P<0.001) and 0.997(P<0.001) respectively.

Conclusion: We can conclude that the variation of quantification of SUV was insignificance difference for two independent PET/CT system by comparing the technical study and clinical study. Perhaps, further research might be required by involving various independent PET/CT systems in Malaysia to standardize the quantification of SUV.

Keywords: SUV; PET; Quantification; Paired Centre; Standardization; FDG
Body Composition In Parkinson Disease


University of Malaya, Malaysia

Background
Unintentional weight loss is a common problem among patients with Parkinson’s Disease (PD). Reduced skeletal muscle mass has been associated with functional impairment and physical disability in elderly persons, and the incidence of osteoporosis is also higher in elderly persons who are at risk of falls and fractures. However, the literature regarding body composition in PD patients remains limited.

Purpose of study
To compare body composition in PD patients and non-PD controls.

Materials and Method
One hundred PD patients and 78 non-PD spousal/sibling controls were recruited and underwent body composition assessment using dual-energy X-ray absorptiometry (DEXA).

Results
PD patients were older (66.7±8.3 vs 63.0±8.3 years, p=0.004) but there was no significant between-group difference in gender. Mean body mass index was lower in patients (24.2±3.9 vs. 25.5±4.3 kg/m2, p=0.044). The prevalence of underweight was 7.0 vs. 2.6% in patients versus controls, respectively, but this difference was not significant. Interestingly, the amount of whole body fat in terms of both the absolute value (18.7±7.8 vs. 23.5±7.8 kg, p<0.001).

Conclusion
We found reduced fat mass and preserved lean muscle mass in PD patients, suggesting that weight loss in PD may be due to loss of fat. Further studies are needed to understand the mechanisms underlying weight loss in PD.
REPORT ON RARE RIGHT GLUTEAL HIBERNOMA MAQUERADES A METASTATIC NON SMALL CELL LUNG CARCINOMA; A POTENTIAL 18F-FDG PET-CT PITFALL.

ABSTRACT
Pitfalls on FDG PET-CT could lead PET-CT readers to misperception of a metachronous lesion of a disease in question. This report documents a patient with a Non-Small Cell Lung Carcinoma (NSCLCC) who underwent 18F- FDG PET CT Scan for restaging following completion of chemoradiation. Results showed good partial response to treatment as evidenced by partial resolution of the FDG uptake at right upper lobe primary lesion and superior right hilar and subcarinal nodal metastases with unfortunate progression of pulmonary metastases in the left upper lobe and right lower lobes, and also nodal metastases in the right inferior pulmonary hilar, left pulmonary hilar and left prevascular lymph nodes with new bone metastases. Apart from that, there is an incidental findings of a FDG-avid fatty configuration embedded in the right gluteal region suggesting a hibernoma (biopsy-proven) which maquerares as metatastatic NSCLCC.

TEACHING POINTS
Hibernoma is a rare benign fatty tumours which arises from vestiges of fetal brown fat, maquarades the mestastatic lesion like in this case. Advanced imaging modality such as 18F- FDG PET CT Scan will play rules diagnosing this rare diseases. Education the radiologist and clinician for this such case will help in promoting for utilization of advanced imaging technology for rare disease.

TABLE OF CONTENTS / OUTLINES
This reports will include in following sections : Introduction, case report, conclusion and discussion. These will emphasise findings of hibernoma in cancer background patient which maquarades the underlying diseases. Details discussion on hibernoma is explored for teaching and sharing knowledge resulting in clinical diagnosis appreciation in worldwide future healthcare.
This Abstract Was Not Given Permission To Be Published By The Author.
Comparing Computer Generated SUV Normalized For Lean Body Mass Vs. Predictive Equations Derived SUL Using The Liver

Subapriya S, Nur Hafizah MA, Chang WL, Noramaliza MN, Salmiah MS, Fathinul Fikri AS

Universiti Putra Malaysia, Malaysia

Purpose of Study: Standardised uptake value (SUV) is the accepted method for quantification of lesions detected on PET/CT. It is dependent on several factors, namely the patient’s body habitus and dose of injected radioisotope. The limitation is that this value becomes falsely reduced in overweight and obese patients. Thus, SUV normalized to lean body mass (SUL) has been recommended as a more reliable measurement method. We aimed to determine the effects of using predictive equations for lean body mass (LBM) to measure corrected SUV in contrast-enhanced 18F-FDG PET/CT (ce PET/CT) vs. low dose PET/CT (ld PET/CT) using the liver as a reference organ.

Materials and Method: A retrospective cohort study of all patients who underwent 18F-FDG PET/CT scan at the Centre for Diagnostic Nuclear Imaging, Universiti Putra Malaysia from January 2014 to January 2017 was conducted. A 30mm-diameter oval-shaped VOI was placed in the right liver lobe and computer generated SUL (SUL-CG) was compared with SUL derived from James (SUL-PE1) and Janmahasatian (SUL-PE2) predictive equations for LBM and comparison was made among the values based on three BMI groups (low, normal & high).

Results: A total of 341 PET/CT scans were analyzed. The subjects (mean age: 51.55 years) weight ranged from 28 - 128kg (mean 62.47 +/- 13.74) and BMI 12.96 - 39.95 (24.37 +/- 87.02). One way ANNOVA noted that there was no statistically significant different of all types of SUV among BMI groups in ld PET/CT but there was significant in ce PET/CT. Post hoc test using Bonferroni and Tukey tests detected that there was significant difference between low BMI with high BMI groups.

Conclusion: Predictive equations have good agreement with computer generated SUL, however, caution needs to be exercised when analyzing contrast-enhanced PET/CT scans as extremes of BMI can lead to erroneous measurements.
Radiological Pattern Recognition Of Alzheimer’s Disease Using 18F-FDG PET/CT: A Pilot Study

Subapriya S, Siti Aishah AA, Normala I, Fathinul Fikri AS, M. Iqbal S, Abdul Jalil N

Universiti Putra Malaysia, Malaysia

Purpose of Study: Alzheimer’s disease (AD) is a spectrum of neurocognitive disorders which can be difficult to diagnose at its prodromal stages. Various AD subtypes can lead to delay in clinical diagnosis especially if there is atypical presentation.

Materials and Method: A retrospective cohort study of all patients who underwent 18F-FDG PET/CT scan at the Centre for Diagnostic Nuclear Imaging, Universiti Putra Malaysia from January 2014 to January 2017 was conducted. Using a neurodiagnostic software, standardized uptake values (SUV) were documented in 9 segments of the brain, namely right and left frontal, bilateral temporal, bilateral parietal, bilateral occipital and insula of the brain and correlated with clinical diagnosis of subjects suspected with AD and compared with healthy controls.

Results: A total of 19 subjects who underwent PET/CT scans were assessed. Significant patterns of low SUV uptake were noted in the temporo-parietal lobes, consistent with the diagnosis of AD.

Conclusion: 18F-FDG PET/CT can be a feasible non-invasive biomarker to signal the pattern of cerebral glucose metabolism and help to diagnose Alzheimer’s disease.
Feasibility Of FDG PET/CT To Characterize Suspicious Adnexal Masses Correlated With Histopathological Indices: A Pilot Study

Subapriya S, Hasyma AH, Andi Anggeriana AA, Nor Hafizah M, Zainab Y, Rozi M, Fathinul Fikri AS, Abdul Jalil N

Universiti Putra Malaysia, Malaysia

Purpose of Study: Ovarian cancer are the most lethal of suspicious adnexal masses. Diagnosis is made with high index of clinical suspicion coupled with raised CA-125 levels and aided by conventional diagnostic imaging. Functional imaging using 18F-FDG PET/CT can aid in distinguishing benign from malignant suspicious adnexal masses. Standardised uptake value (SUV) for quantification of lesions detected on PET/CT may aid in differentiating ovarian cancers from benign masses. Ki67 is one of the histopathological indices to assess cell proliferative ability. We aimed to determine the correlation of SUV and ki67 levels in determining malignant adnexal masses.

Materials and Method: A retrospective cohort study of all patients who underwent 18F-FDG PET/CT scan at the Centre for Diagnostic Nuclear Imaging, Universiti Putra Malaysia from January 2014 to January 2016 was conducted and their post-operative histopathological indices were examined including ki67 percentage.

Results: A total of 16 PET/CT scans were analyzed. The majority of cases were high grade epithelial ovarian cancers. High ki67 percentage was not significantly correlated with raised SUV values and diagnosis of ovarian cancer.

Conclusion: Diagnosis of ovarian cancer cannot be made purely on observing elevated SUV values on PET/CT and with raised ki67 histopathological indices but correlation has to be made on morphological changes noted on cross sectional imaging and exploring other protein biomarkers.
The group of muscles responsible for the multi-directional thumb movements consist of nine muscles. They can be divided into 2 subgroups: four belong to the intrinsic group (abductor pollicis brevis, abductor pollicis, first dorsal interosseous, flexor pollicis brevis and opponens pollicis) while the other five belong to the extrinsic group (abductor pollicis longus, extensor pollicis brevis, extensor pollicis longus and flexor pollicis longus). The role and demand of ultrasound of the thumb is progressively growing with the advancement of hand and microsurgery subspecialty in orthopaedic surgery. Hence, the knowledge of the normal ultrasound features of the thumb muscles are increasingly become important to the radiologists, particularly to the Musculoskeletal radiologists.

Keywords: ultrasonography, thumb muscles, anatomy
Comparison Between Two Weightlifter Type Of Training Methods On Rotator Cuff Using MR Diffusion

Nur Asma S, Juhara H, Mohd Ezane A

Hospital Universiti Sains Malaysia, Malaysia

Purpose of Study: To compare the rotator cuff muscles changes on MRI Diffusion study between state-level weightlifter who underwent fast isokinetic training (FIT) and traditional isotonic training (TOT).

Materials and Methods: Gender and weight matched subjects were grouped into two types of trainings; FIT and TOT. Both groups underwent 24 sessions of training consisted of 3 distinct lifting positions within 8 weeks. The Fractional anisotropy (FA), Apparent Diffusion Coefficient (ADC) values and eigenvalues between two groups were evaluated.

Results: A total of 22 subjects were enrolled but only 16 subjects completed the training programmes. Equal number of subjects (n=8) for each training programme. There were significant changes of the λ1 in supraspinatous muscle (SSM), infraspinatous muscle (ISM) and subscapularis muscle (SCM) in FIT indicate increased in muscles elongation almost in similar pattern. FA values increased in both training methods for all the muscles except supraspinatous muscle (SSM) in TOT. Among these, only FA of Subscapularis muscle (SCM) in FIT was statistically significant.

Conclusions: Both FIT and TOT have a potential to be proposed as an additional mode of training among the experienced weightlifters to improve their performance. DTI is a good technique to evaluate muscle diffusion changes.
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DTI Of Median Nerve And Its Efficacy To Diagnose Carpal Tunnel Syndrome In Malaysian Population

Vikneswary P, John G, Goh KJ, Tan LK

University of Malaya, Malaysia

PURPOSE OF STUDY
This study evaluates the feasibility of diffusion tensor imaging (DTI) in assessing median nerve by measuring diffusion parameters such as fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD) and radial diffusivity (RD) at different sites of median nerve and investigating their differences in patients with and without carpal tunnel syndrome.

METHOD AND MATERIAL
A prospective cross-sectional study was performed with 9 female patients diagnosed with carpal tunnel syndrome by clinical evaluation and nerve conduction study. MRI wrist was performed with preset axial PD and DTI protocol on a 3T MRI. 8 normal subjects of comparative age group and sex were evaluated similarly. The images were post-processed using 3D SLICER software and diffusion parameters FA, MD, AD and RD were obtained.

RESULTS
The FA values were found to be lower in patients with carpal tunnel, 0.448 ± 0.065 than the control group 0.528 ± 0.067 (p< 0.002) and demonstrates negative correlation with disease severity, p = 0.057.
The mean MD (1.086 ± 0.178) and mean RD (0.8636 ± 0.128) values were noted to increase in carpal tunnel patients, p = 0.04 and p = 0.014 respectively. They show an increasing trend with increasing disease severity.
The AD value show no significant difference between the patients and control group.

CONCLUSION
MR neurography using DTI can be utilised to detect presence of carpal tunnel syndrome. It is shown from this study that patients with carpal tunnel demonstrate lower FA and higher MD and RD values.
A Rare Case Of Spontaneously Thrombosed Cerebral Arteriovenous Malformation And How SWI Sequence Facilitate Diagnosis

Bibi Sadaqat R, Mathan Raj N, Shahizon Azura MM

University Kebangsaan Malaysia Medical Centre, Malaysia

Purpose of Study
In majority of cases, angiography is the gold standard imaging for cerebral arteriovenous malformations (AVMs) with characteristic feature of nidus for definitive diagnosis. The exception is thrombosed AVM as in our case. MR imaging, particularly susceptibility weighted imaging (SWI), has higher diagnostic accuracy as compared to digital subtraction angiography (DSA) in detection of thrombosed cerebral AVM.

Materials and Method
We share a case of 49 years old lady presented with seizures. Initial CT brain revealed a left temporal lobe lesion suspicious of hemorrhagic tumor. MRI demonstrated hemorrhagic lesion with perilesional edema and adjacent thrombosed dilated cortical vein. However, MRA and cerebral angiogram did not demonstrate any nidus. Differential diagnosis of dural arteriovenous fistula was considered. She was referred to our hospital for second opinion and further treatment.

Results
Repeat MRI brain 4 days later revealed a peripheral T1WI- and T2WI-hyperintense signals at left temporal lobe representing subarachnoid hemorrhage causing perilesional edema surrounding a suspicious nidus. SWI confirmed conglomerate of serpiginous vessels at left temporal lobe which shows blooming artefacts confirming the nidus. Presence of dilated and tortuous vessels radiating from the nidus which blooms on SWI, with loss of flow void on T1WI and T2WI and non-enhancing in post Gadolinium sequences. These supports thrombosis of the feeder artery, nidus and draining veins. Follow-up DSA shows no nidus at the corresponding left temporal region. Her seizures improved with Sodium Valproate and was discharged home with annual MRI surveillance.

Conclusion
DSA is not reliable in the case of spontaneously thrombosed AVM. Therefore, MR imaging plays important role in diagnosing thrombosed cerebral AVM. SWI sequence improves detection of cerebral AVM where conglomerate of serpiginous small vessels are displayed exquisitely, enabling definitive diagnosis.
Review On MR Perfusion As A Diagnostic Tool For Radiation Necrosis In Brain

Bibi Sadaqat R, Shahizon Azura MM

University Kebangsaan Malaysia Medical Centre, Malaysia

Purpose of Study
Radiation necrosis occurs in approximately 3 to 24% of cases of brain tumour treated with radiotherapy and increase by 3-fold with concurrent chemotherapy. Clinical manifestations vary, from asymptomatic to severe neurological deficit. Traditionally, conventional MR imaging has been utilized in differentiating between these two entities. Unfortunately, due to considerable overlap of findings in structural MRI, this remains a challenge. Discovery of MR perfusion as a technique to further discriminate these entities has led to higher level of confidence in diagnosis. Relative cerebral blood volume (rCBV), a component of MR perfusion particularly plays important role.

Materials and Method
We share several cases of patients who received radiotherapy for various underlying brain lesions like astrocytoma, metastasis, and arteriovenous malformation (AVM). They presented with new neurological symptoms. Conventional MRI findings shows area of enhancement in the region of previously excised lesion with associated vasogenic white matter edema and mass effect. In MR perfusion, all the cases show reduced relative cerebral blood volume in the region of mass/enhancement as well as surrounding edema. In the patient with history of AVM, diagnostic cerebral angiogram was negative for AVM.

Results
Conventional MRI findings of enhancement, vasogenic edema and mass effect are shared between tumour recurrence as well as radiation necrosis. A conventional way of approach is via serial follow up of imaging which may show resolution or stability. Evaluation with MR perfusion with rCBV gives prompt information. In tumour recurrence, the rCBV is high due to hyperperfusion from angiogenesis around tumour site. On the other hand, in radiation necrosis, the rCBV is low due to endothelial damage and necrosis.

Conclusion
As application of MR perfusion is diagnostically efficacious in radiation necrosis, it shall be routinely performed as an adjunct to structural MRI.
Investigation Of Posterior Cortical Atrophy In Patients With Primary Open Angle Glaucoma Using Koedam Visual Analysis

Bushra J, Basri S, Mohammad Hanafiah

Universiti Teknologi MARA, Malaysia

OBJECTIVE: Posterior cortical atrophy is seen in association with Alzheimer’s disease, particularly the early onset type. Given that there are increasing evidences to suggest Alzheimer’s disease and primary open angle glaucoma (POAG) share the same disease pathogenesis, we would like to investigate whether posterior cortical atrophy is present among patients with POAG.

METHODS: Fifty one (51) patients with POAG and fifty three (53) healthy control subjects underwent a comprehensive evaluation. The visual acuity measurement, frequency doubling technology (FDT) for visual field test, Goldman applanation tonometer for measurement of IOP, gonoscopy for anterior chamber assessment, optical Coherence Tomography (OCT Scan) for optic nerve head (ONH) and retinal nerve fiber layer (RNFL) thickness and slit lamp test for visual evaluation were used to evaluate POAG. High resolution MR images acquired using T1 MPRAGE sequence and reconstructed into 3 different orientations for further measurement. A visual analysis approach using Koedam’s visual score was used on reconstructed images to measure atrophy of the gray matter structures on posterior parietal lobe, posterior cingulate sulcus, parieto-occipital sulcus and precuneus.

RESULTS: Mean value of posterior cortical atrophy was higher in both male and female of the POAG group (1.11 Â± 0.81; 0.72 Â± 0.74) than in healthy control group (0.80 Â± 0.88; 0.52 Â± 0.73). Insignificant differences between POAG and healthy control groups were observed with regard to posterior cortical atrophy (p = 0.242).

CONCLUSION: There is no evidence of posterior cortical atrophy among patients with POAG when compared to control using Koedam’s visual scoring analysis.
Assessment Of Optic Nerve Atrophy In Patients With Primary Open-Angle Glaucoma Using T1-MPRAGE

Bushra J, Basri S, Mohammad Hanafiah

Universiti Teknologi MARA, Malaysia

OBJECTIVE: To examine atrophy of optic nerve in patients with primary open angle glaucoma (POAG) using T1-MPRAGE Sequence and cross sectional measurement technique.

METHODS: In this prospective cross sectional study, fifty (50) patients with POAG and fifty three (53) healthy control subjects underwent a comprehensive evaluation. Each subject underwent visual acuity measurement, frequency doubling technology (FDT) test, Goldman applanation tonometry, gonoscopy and optical Coherence Tomography (OCT) scan to evaluate POAG. High resolution MR images acquired using T1 MPRAGE sequence. Cross-sectional area measurement of optic nerve was done on Siemens Syngo.via viewer, from axial images perpendicular to the optic nerve through the middle point along the line between the retrobulbar optic nerve and annulus tendineus of Zinn.

RESULTS: Mean value of optic nerve cross-sectional area size was lower in both male and female of the POAG group (4.92 ± 1.64; 5.33 ± 1.55) than in healthy control group (5.79 ± 1.39; 5.78 ± 1.46). The difference between male and female in each group is not significant (p= 0.365 for POAG and 0.987 for control). Irrespective of gender, significant lower mean value (5.12 ± 1.59; 5.79 ± 1.41) of both right and left optic nerve was observed in POAG compared to healthy control group (p = 0.025).

CONCLUSION: Atrophy of the optic nerve is observed in patients with POAG signifying degenerative involvement of the optic nerve. Our findings are consistent with previous studies.
Background & Objectives:
To correlate the association of white matter tracts abnormality (as determined by diffusion tensor imaging i.e. fractional anisotropy, mean diffusivity, axial diffusivity and radial diffusivity values) with cognitive function parameters (as determined by MMSE, MoCA and VCAT cognitive tests) in older individuals with history of falls compared to non-faller controls.

Methods:
10 participants, aged 65 to 84 years, were recruited from the Malaysian Falls Assessment and Intervention Trial (MyFAIT) cohort. T1-weighted FSPGR 3D, axial T2-weighted, coronal FLAIR cube and diffusion tensor imaging (DTI) of the brain were obtained using a 3-Tesla MRI. Fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD) and radial diffusivity (RD) scores were obtained from selected white matter tracts using the software.
MMSE, MoCA and VCAT cognitive tests were performed to evaluate the relationship of this score with DTI parameters.

Results:
10 subjects (2 normal controls, 8 previous fallers) were recruited.
Controls group had an average score of 29.5 for MMSE, 24.5 for MoCA and 22.5 for VCAT
Fallers group had an average score of 24.25 for MMSE, 21.5 for MoCA and 23.3 for VCAT

Following white matter tracts;
- Corona radiata
- Anterior limb of internal capsule
- Genu of corpus callosum
demonstrate lower FA value and higher MD values among fallers compared to normal controls.
These tracts also demonstrate lower FA value in latest MRI as compared to previous MRI scan; and this is evident in both fallers and controls group.

Conclusion
Lower FA values and higher MD values indicate loss of integrity in white matter tract.
MRI DTI parameters are able to evaluate the loss of integrity of white matter tracts which corresponds to reduce in cognitive function in fallers group.
Controls group shows normal average score for MMSE and MoCA tests meanwhile fallers show evidence of cognitive impairment.
Diffusion Tensor Imaging And Apparent Diffusion Coefficient Values Of Hippocampal Formation In Medically Intractable Temporal Lobe

Farouk HJ, Win Mar Salmah J

Hospital Universiti Sains Malaysia, Malaysia

Objective: The purpose of this study is to determine whether interictal DTI and apparent diffusion coefficients (ADC) provide a robust means for detecting hippocampal formation abnormalities in patients with medically intractable temporal lobe epilepsy (TLE).

Methodology: Fourteen patients and 14 controls were studied with hippocampal formation ADC maps, fractional anisotropy and Trace D values. MR images were evaluated for loss of volume and/or high signal intensity on T2-weighted images and compared with DTI and ADC maps. Mean and SDs were obtained for each measurement, and level of significance was determined (P < .05). The relationship between EEG lateralization and MR imaging and DTI/ADCs were studied.

Results: Ten patients had right-sided lateralization and 4 had left-sided lateralization on EEG. Patients demonstrated higher ADC within the diseased hippocampus (0.54 x 10-3 s/mm2) in comparison with the contralateral side and that of controls (0.39 x10^-3 s/mm2 and 0.40 x 10-3s/mm2, respectively) (P < .05). Positive correlations were seen between hippocampal apparent diffusion coefficients and fractional anisotropy (P < .05).

Conclusion: ADC and DTI have the capabilities to detect changes in the hippocampal formation and to lateralize the seizure focus in patients with TLE despite absence of morphological changes on conventional MRI sequence. Keywords: temporal lobe epilepsy (TLE); diffusion tensor imaging (DTI); Apparent diffusion coefficients (ADC), hippocampal sclerosis (HS)
Imaging Features In The Differentiation Of Tumour Progression In High-Grade Glioma During Post-Treatment

Hairuddin AS, Norlisah MR, Kartini R, Faizatul Izza R, Farhana F

University Malaya Medical Centre, Malaysia

Purpose of study:
This study aimed to highlight the imaging features between progressive disease (PD) and stable disease (SD) in high-grade glioma (HGG) by using conventional MRI, diffusion weighted imaging (DWI), dynamic susceptibility contrast (DSC) perfusion imaging and in-opposed phase (IOP) chemical shift sequence during post-treatment period.

Materials and methods:
Sixteen patients with HGG who had completed radiotherapy or chemotherapy were enrolled prospectively between November 2014 and December 2016 at the Department of Biomedical Imaging, University Malaya Medical Centre. Using conventional and advanced MRI sequences i.e. DWI, DSC perfusion MRI and IOP chemical shift sequences; and based on Macdonald criteria, twelve patients were grouped under PD and four patients were SD. The mean ADC of the lesion, mean ADC of perilesional oedema, mean rCBV lesion/mean rCBV normal-appearing white matter (NAWM) ratio, mean rCBV lesion/mean rCBV normal-appearing grey matter (NAGM) ratio, mean rCBV oedema/mean rCBV NAWM ratio, mean rCBV oedema/mean rCBV NAGM ratio, and signal loss ratios were measured. Mann-Whitney U statistical test was used to compare between PD and SD groups.

Results:
Significant difference was obtained between the rCBV ratio of lesion to NAWM and NAGM in the SD and PD groups (p = 0.030 and p = 0.004 respectively). However, there was no significant difference between rCBV ratio of the perilesional oedema to NAWM and NAGM in both SD and PD groups (p>0.05). There was also no significant difference between the mean ADC values of the lesion, mean ADC values of the perilesional oedema and IOP signal loss ratio of the lesions in both SD and PD groups (p>0.05).

Conclusion:
DSC perfusion MRI is a useful sequence in differentiating PD from SD in HGG. In contrast, quantitative ADC and IOP sequences did not provide additional functional information to distinguish between PD and SD.
Case Series On Schizencephaly: A Rare Congenital Brain Malformation

Izzat Asyraf K, Hanim MT, Farhana F

Hospital Bintulu, Malaysia

Introduction
Schizencephaly is a rare congenital brain defect characterized by abnormal full-thickness cleft within the cerebral hemisphere. The cleft is lined by grey matter; frequently accompanied by other defect such as corpus callosum dysgenesis, absence of septum pellucidum, focal cortical dysplasia and hydrocephalus. It can occur as unilateral, bilateral, closed-lip or open-lip variety. This malformation presents clinically with varying degree of motor deficits, psychomotor retardation and epilepsy.

Case Report
3 patients presented with global developmental delay, visual disturbance of contralateral homonymous inferior quadrantanopia and left hemiplegia. Hemiparesis and global developmental delay presented early in infancy; whereas the older patient who is a known case of cerebral palsy presented with homonymous inferior quadrantanopia. We present a case series of schizencephaly with characteristic MRI findings of unilateral open-lip type II schizencephaly.

Discussion
Schizencephaly is a rare congenital brain defect that is grouped under malformations of cortical development. The cause of schizencephaly is unknown, although a few genetic cases have been described and in-utero insult such as ischemia or infection may be a risk factor. Schizencephaly is diagnosed during antenatal ultrasound scan, postnatal cranial ultrasound, computed tomography (CT) or magnetic resonance imaging (MRI). MRI is more superior for gray matter and white matter differentiation to demonstrate the pathognomonic finding of gray matter lined cleft. Other brain anomalies associated with schizencephaly such as absent or hypoplasia of corpus callosum and absent septum pellucidum may be demonstrated.

Conclusion
In patients presenting with cerebral palsy, neurological deficit, developmental delay and mental retardation; schizencephaly may be considered as one of the differential diagnosis. Although schizencephaly is rare, diagnostic MRI should be performed because early surgical intervention and rehabilitation may
Yakovlevian Torque: A Case Of A Brain Asymmetry In A Patient With Chronic Cephalgia, With No Neurological Deficit

Junus Asiu BB, Melita

Hasanuddin University, Indonesia

BACKGROUND
Brain asymmetry occurs as a neuroanatomical difference of the brain, starting from changes in neuronal densities, to torsion of the human brain. Yakovlevian torque is described as protrusion of the right hemisphere anteriorly beyond the left, and the left hemispheres extends posteriorly beyond the right. The two hemispheres are similar in weight and volume. Asymmetry is part of the anatomical variant of the human brain, extreme brain torque, however, remains unexplained.

CASE REPORT
This is a case of a 19-year-old female with chronic headache. Preliminary neurological and physical examinations were within normal limits, and diagnosed as vascular headache. MRI scan shows asymmetry of the brain, with prominent enlargement of the right occipital lobe to the left. Enlargement of the right occipital bone is noted. There is right midline shift of the superior part of the left cerebral hemisphere. No abnormal lesions seen. Ventricular systems are symmetrical. Stenosis of the left sigmoid and transversus sinuses are noted.

DISCUSSION
Brain asymmetry is often described as either hypertrophy or atrophy of one of the cerebral hemispheres. In this case, even though the left cerebral hemisphere appears enlarged at a glance, further inspection proves that the volume of both hemispheres are almost identical (Â±1.2% difference). Normal neurological examinations further ascertain the diagnosis.

CONCLUSION
Detailed evaluation for patients with brain asymmetry should be considered, especially the ones with no significant abnormalities on neurological examinations. Brain volume approximation is useful to differentiate brain torque to the significantly more severe hypertrophy or atrophy of the cerebral hemispheres.

Keywords: Yakovlevian torque, brain asymmetry.
Significance Of Hippocampal Tail Involvement In MRI Of Patients With Mesial Temporal Sclerosis

Kartini R, Liew XC, Lim KS, Farhana F, Norlisah R, Vairavan N

University of Malaya, Malaysia

Introduction:
Mesial temporal sclerosis is defined as seizure associated neuronal loss and gliosis in hippocampus and adjacent structure. It is still an unresolved question whether hippocampal sclerosis is the disease of hippocampal head and body only, or a disease of the whole hippocampus.

Purpose:
This study aimed to assess for hippocampal tail sclerosis in MRI brain of patients, in order to determine the epileptogenicity of hippocampal tail.

Materials and methods:
This is a prospective cross-sectional study on 51 patients with temporal lobe epilepsy and mesial temporal sclerosis using standard epilepsy MRI protocol on 3 Tesla (Axial T2 FSE, Coronal FSPGR BRAVO, Coronal T2 FRFSE, Coronal FSEIR, Coronal T2 FLAIR CUBE, Coronal GRE T2*) in University Malaya Medical Centre. Hippocampal tail involvement, inter-ictal EEG and clinical dataset variables were acquired and analysed.

Results:
Total of 29(56.9%) patients have tail involvement. 18(35.3%) patients are female and 27(52.9%) patients are Chinese. No difference were noted between 2 groups of patients (with and without tail involvement) in gender, race, history of febrile seizure and family history of seizure. In the group with hippocampal tail involvement, the age of onset is younger (mean=15.5 years, SD=16.5, p value=0.054) and epilepsy duration is longer (mean=29.6 years, SD=13.6, p value=0.177) than the group without hippocampal tail involvement, but these are not statistically significant.

Conclusion:
Earlier age of onset and longer epilepsy duration are demonstrated in patients with hippocampal tail sclerosis. However, the demographic and clinical variables examined in these patients are not statistically significant. Currently, surgery is only performed for head and body of hippocampus up to 4cm from the temporal pole, due to the surgical risk involved. The implication of preserving the hippocampal tail during surgery should be investigated as it would change the management and prognosis of the patients.
Association Between Indication Of Urgent Non-Trauma Computed Tomography (CT) Of Brain And CT Findings

Mohamad Aizuddin MN, Zarifa Z, Zainun AR

Hospital Tengku Ampuan Afzan, Malaysia

ASSOCIATION BETWEEN INDICATION OF URGENT NON-TRAUMA COMPUTED TOMOGRAPHY (CT) OF BRAIN AND CT FINDINGS IN ACCIDENT AND EMERGENCY DEPARTMENT AT HOSPITAL TENGKU AMPUAN AFZAN, KUANTAN.

Purpose of study: To determine association between indications of urgent non-trauma CT brain in our center with the CT findings.

Method: This was a cross-sectional study on urgent non-traumatic CT brain performed at our center A total of 6000 urgent CT brains reported by radiologists in our center and registered in radiology information system (RIS) from January 2014 until December 2015 were reviewed. Exclusion criteria were cases with no clinical history, non-trauma cases, cases that were referred other than from Accident and Emergency department and patients whom were less than 18 years old. Total number of CT studies that were finally included were 1365 and the indications of were categorized into 13 groups. The CT brain findings were divided into normal findings, recent infarction, intracranial bleed, intracranial mass and others (meningitis, abscess, cerebritis, etc). In multivariate analysis, Logistic regression was used to determine the predictors of abnormal CT brain findings. The strength of each indication as predictors is stated by adjusted Odds ratio (aOR) and 95% confident interval (95%CI).

Result: A total of 792 cases demonstrated abnormal CT findings. As many as 198 cases revealed intracranial bleed, 525 cases had recent infarction, 27 cases with intracranial masses and 51 with other findings. Significant predictors of abnormal CT brain findings which are altered mental status (aOR=3.97, 95% CI [2.27, 6.94], P<0.05), focal neurological deficit, (aOR=3.69, 95% CI [2.27, 6.94], P<0.05), post fossa symptom (aOR=2.56, 95% CI [1.21, 5.40], P<0.05) and derangement of blood pressure (aOR=4.53, 95% CI [2.46, 8.35], P<0.05).

Conclusions: Significant clinical predictors of non-traumatic urgent CT brain were altered mental status, focal neurological deficit, post fossa symptom and derangement of BP.
Atypical Clinical Presentations Of Cryptococcal Meningitis In A Normal Healthy Human: A Illustrative Case Report

Mohd Hazeman Z, Laila Mastura AA, Idris I

Universiti Putra Malaysia, Malaysia

ABSTRACT
The incidence of cryptococcal infection is high in developing countries. This disease considered as an rare disease in immunocompetent patients but very seldom to find in normal healthy individual. We report a normal healthy patient with no known medical illness presented with short history of cerebellar symptoms associated with giddiness and increased intracranial pressure (ICP) symptoms. On examination, the patient found to have positive cerebellar signs and increased ICP signs. Biochemically, the patient is positive for of cryptococcal organisms and high protein contents from cerebrospinal fluid (CSF). MRI brain showed abnormal signal of proteinase CSF content, with pacchymeningeal and leptomeningeal enhancement and choroid plexitis. The patient being treated with Amphotericin B and antifungal agents.

TEACHING POINTS
Most cases of cryptococcal meningitis occur in immunocompromised patients, such as acquired immunodeficiency syndrome (AIDS), seldom occur in in normal healthy. Occasionally, no obvious underlying cause can be detected. It cause can contribute to various unusual clinical presentations. Advanced imaging invasive modality such as Magnetic Resonance Imaging (MRI) with different kinds of sequences help to diagnose this kind of this case. Determining the disease patterns from MRI findings is important subjected to causative agents in the meningitis.

TABLE OF OUTLINE / CONTENTS
This reports will include in following sections: Introduction, case report, conclusion and discussion. Unique pictures from MRI from different sequences is showed and discussed in details for educating the clinicians and radiologists in diagnosing the disease efficiently. Details discussion on cryptococcal meningitis is explored for teaching and sharing knowledge resulting in clinical diagnosis appreciation in worldwide future healthcare.
Urgent CT Brain In A District Hospital: Snapshot Of Cases In A Month

Norlia O, Ng WL, Tan S

Hospital Taiping, Malaysia

Purpose of study:
The use of Computed Tomography of Brain (CTB) in suspected acute brain cases for both traumatic and non-traumatic cases has increased exponentially as more scanners are installed nationwide. Its wide availability, simple technique and fast imaging make it the preferred choice for acute brain cases. This audit provides an important snapshot of the type of indications and findings in a district hospital in Malaysia where there is a good mix of urban and rural population.

Material and methods:
An audit was done on all urgent CTB performed by Radiology Department, Hospital Taiping from inpatients, district hospitals and health clinics in April 2017. Patients demographics, indication, Glasgow Coma Scale (GCS) and CT findings were analyzed. Existing chronic pathology were excluded from the positive findings.

Results:
410 patients were scanned in 30 days, averaging 14 cases per day. Majority were elderly between 61 to 80 years (38.3%). Positive findings were seen in 38.5% and of these, the overwhelming findings were either acute infarcts (45.9%) or acute intracranial bleed (37.1%). A small but significant number of acute infarcts (5.5%) occurred in the 21-40 year olds. For cases of acute bleed, the younger the patient, the more likely cause was trauma (mainly motor vehicle accidents) and this correlation was statistically significant. Up to 37.9% of those in the mild GCS impaired and normal GCS group had positive results. For those with GCS of less than 9, slightly more than half (54%) showed acute pathology.

Conclusion:
This audit highlights the high prevalence of acute infarcts and acute bleeds afflicting the semi-rural community. Patient with mildly impaired GCS should have a CTB as there is high positive predictive value. CTB services should be made available in the district community as a vital imaging tool to detect acute brain pathology.
Recurrent Cerebral Abcess In Patient With Congenital Heart Disease

Rachmi Fauziah R, Yuyun Y

Moewardi Hospital – Sebelas Maret University, Indonesia

A cerebral abscess is a focal intracerebral infection that begins as local cerebritis and evolved into a collection of pus surrounded by a capsule, caused by a wide variety of bacteria, fungus and protozoa. Here, we have described an 8-years-old boy who presented with the sign and symptoms of a cerebral abcess. He had a ventriculo peritoneal shunt surgery because of hemiparese sinistra. He also showed sign and symptoms of symptomatic generalized epilepsy, and also past history of ventricular septal defect and double outlet right ventricle (already had a bidirecctonalcavo-pulmonary shunt). The clinical examination and computerized tomography revealed the diagnosis of a cerebral abscess. The treatment included administration of antibiotic and other symptomatic management.

Keywords:
Cerebral Abscess, computerized tomography of a cerebral abscess.
Lipids Quantification Using IOP Sequence And 1H-MRS As Prognostic Markers For Predicting Survival Outcome Of Gliomas


University of Malaya, Malaysia

Purpose of Study
To evaluate the potential of lipids as prognostic markers in gliomas stratification using magnetic resonance imaging (MRI) chemical shift gradient echo in-and opposed-phase (IOP) sequence and magnetic resonance spectroscopy.

Materials and Method
Histologically proven glioma patients (n=27) underwent a standard MRI tumour protocol with the addition of IOP sequence and single voxel spectroscopy (SVS). Lipid concentrations acquired from the brain spectra of SVS and signal loss ratio (SLR) obtained from IOP imaging were analyzed using a three-group analysis approach based on volume under surface (VUS) of receiver operating characteristics. The prognostic factors were then stratified into three groups based on the optimal cut-points followed by survival analysis using Kaplan-Meier survival method and Cox regression model.

Results
The SLR of solid portion of the tumour have moderate VUS (0.48) with optimal cut-points (OCP) of 0.068 and 0.084. The overall survival of the SLR of solid portion demonstrated significant difference between the three groups stratified by the OCP (p

Conclusion
Lipid quantification using IOP is a feasible prognostic tool for monitoring gliomas. SLR values have implications on survival outcomes and prognostification of gliomas patients.
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Mapping The Brain Functional Network In Young Adults With Smartphone Addiction Using fMRI

Subapriya S, Aida AR, Hanani AM, Laila Mastura AA, Salasiah M, Siti Irma FI, Ching SM, Hoo FK, Ezamin AR

Universiti Putra Malaysia, Malaysia

Purpose of Study: Smartphone usage among young Malaysian adults has increased exponentially in the past decade leading to smartphone addiction (SPA), which implicates upon societal well-being. SPA prevalence has been noted to be as high as 47% among medical students in a Malaysian university. Little is known regarding its effect on mental health, the pattern of addiction and mood changes in young adults. We aimed to explore the role of functional Magnetic Resonance Imaging (fMRI) in providing non-invasive objective evidence of addiction pattern in subjects having SPA. Materials and Method: A prospective case-control study of 30 Universiti Putra Malaysia postgraduate students was conducted. Subjects were required to answer two questionnaires involving the Smartphone Addiction Scale in Malay language (SAS-M) and 21-item Depression Anxiety Stress Scale (DASS-21) that assessed for mood disorders. The results of the scores were correlated with the fMRI pattern acquired during resting state.

Results: Subjects with smartphone addiction, had high SAS-M scores > 98 and this correlated well with high fMRI signal in the hypothalamus and other areas in the limbic system.

Conclusion: fMRI can be a potential tool to be utilised as a surrogate biomarker of smartphone addiction.
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Differentiation Between Glioblastoma Multiforme And Single Brain Metastasis: How Conventional MRI Aids In The Diagnosis


University Kebangsaan Malaysia Medical Centre & Universiti Malaysia Sabah, Malaysia

PURPOSE OF STUDY:
Findings on conventional MR imaging may not be sufficient to differentiate the different types of brain tumours accurately before surgery. We believe that certain features on conventional MRI especially T2WI and T1 post contrast sequences either alone or in combination are able to discriminate between a solitary metastasis (mets) from glioblastoma multiforme (GBM). The assessment is based on the differences in morphology of the lesion focusing on the margin of the lesion on certain sequence compared to the neighbouring structures.

MATERIAL/METHOD:
The MRI findings of 52 patients (n=23 mets, n=29 GBM) were reviewed emphasizing on the morphology and enhancement pattern on T2W and T1 post contrast image respectively. The margin of the lesion was evaluated based on its distinction from the surrounding brain parenchyma on both T2W and T1post gadolinium data. In cases where there were mixed distinct/indistinct features, further categorization into 50%, 75% of indistinct/distinct margin were made. Standard statistical analysis was performed using SPSS. P value of < 0.05 was considered statistically significant.

RESULTS:
Indistinct margin on both T2W and T1 post contrast showed significant difference (p < 0.05).

CONCLUSION:
Conventional MRI is useful to differentiate between GBM and metastases with evaluation of the lesion border on T2W and T1 post contrast. The distinct T2WI margin and T1WI post contrast margin are characteristic of metastatic brain lesion.
MRI Assessment Of Peripheral Nerve In Charcot Marie Tooth


University Malaya Medical Centre, Malaysia

Objective: Charcot Marie Tooth is inherited neurological disorder affects both motor and sensory nerves. The neuropathy is graded clinically and based on nerve conductive study or occasionally sural nerve biopsy. Our goal is to investigate if MRI can evaluate cellular level of involvement in Charcot Marie Tooth (CMT) can classify and muscle atrophy severity in Charcot Marie Tooth (CMT).

Methods: Total of 9 Charcot Marie Tooth patients and 9 age-matched healthy controls, were prospectively recruited. MRI 3-Tesla with Diffusion Tensor Imaging (DTI) were performed on the dominant lower limb to evaluate sciatic and peroneal nerves. Post processing images was done to obtain DTI values for each nerves. Axial in-out phase of the calf were used to classify muscle atrophy into severity by using Goutallier classification on the medial gastrocnemius muscle.

Results: MRI DTI able to detect significant neuropathy in Charcot Marie Tooth patients and it corresponds with nerve changes.

Conclusion: MRI DTI can demonstrate peripheral neuropathy in Charcot Marie Tooth patients and involvement of sciatic nerve. MRI also supports that there is significant muscle atrophy in Charcot Marie Tooth patients as compared to normal patients.
Moyamoya Disease: A Case Report

Chong VXD, Ang LN, Amali A, Shamina MS, Sarawana C, Arvin R, Ng WYL

University Kebangsaan Malaysia Medical Centre, Malaysia

Purpose of study:
Stroke in young patient is not common. Clinicians should raise the suspicious of secondary pathologies causing young stroke. Investigations and imaging are required to rule out secondary causes. Moyamoya disease should be taken into account as one of the possible cause.

Materials and method:
We reported a rare case of moyamoya disease in a 15 year-old boy with left middle cerebral artery territory infarct with multiple imaging performed to look for secondary causes.

Results:
A 15 year-old boy with no underlying comorbidities, was admitted to ward for two episodes of right focal seizure, right sided body weakness and expressive aphasia. Plain CT brain was done, showed left middle cerebral artery territory infarct. CT angiography brain was performed three days later with findings of extensive collateral vessels around the circle of Willis, suggestive of moyamoya disease. MRI/MRA brain and diagnostic cerebral angiography were performed the subsequent day. MRI/ MRA brain findings demonstrated acute left MCA territory infarct in the distal left MCA territory and highly suggestive of underlying moyamoya disease. Whereas, diagnostic cerebral angiography findings are consistent with progressive intracranial occlusive disease, likely representing moyamoya disease. Patient was started Tab. Aspirin 150mg OD and Tab. Carbamazepine 200mg BD. He was discharged from ward the next day and planned for bypass surgery later by neurosurgery team.

Conclusion:
Secondary causes must be considered in young stroke. Moyamoya disease should be taken into account as one of the possible rare causes.
Penetrating Spinal Cord Injury By Needlefish

Yeat NW, Arvin R

Hospital Lahad Datu, Malaysia

Introduction: Penetrating injuries are an important cause of spinal cord injury in trauma with the most common cause being gunshot wounds, followed by non-missile penetrating injuries by sharp objects like knife or glass. Spinal cord injury by fish attacks are extremely rare.

Case Description: A 55-year-old man with no prior medical illness, presented with posterior neck pain and right sided body weakness after a night of commercial fishing. His Glasgow Coma Scale was full with vital signs within normal limits. Physical examination revealed a penetrating wound at right posterior neck with clear fluid dripping out and right sided hemiplegia. However, sensation, muscular tone, reflexes and anal tone were all intact. Biochemical investigations were unremarkable.

Radiological Results: A Contrast-Enhanced Computed Tomography (CECT) scan of the neck revealed a bone dense object resembling a fish beak in the right C2 posterior para vertebral soft tissue with fragmented bone at the posterior C1-C2 interspinous space. There was one bony fragment measuring 5mm in length that had entered the spinal canal. Imaging findings confirmed needlefish impalement to the right posterior neck with cervical cord injury and CSF leakage. Patient was immediately transferred to a Neurosurgical centre for urgent surgical exploration and removal of foreign bodies.

Conclusion: Needlefish attacks on humans are extremely rare, but still a relatively common occupational hazard in particular to fisherman. Imaging remains an essential tool in diagnosis and patient management for penetrating spinal cord injury. CT and MRI are complementary to each other in the assessment of injury. CT should be used to assess the bony anatomy of the spine in patients with penetrating spinal cord injury while MRI depicting the changes within the injured spinal cord and graded the severity before further surgical management.
Pseudo-Lung Appearance Of The Liver On Post-Mortem Computed Tomography (PMCT) In A Case Of Liver Cirrhosis

Saiful Nizam AR, Anthony CK, Nurhidayah MY, Nurliza A

Universiti Putra Malaysia, Malaysia

Introduction:
CT imaging has developed into a vital adjunct to conventional autopsy over the past decades by assisting pathologists in concluding a cause of death. We present an atypical ‘pseudo-lung’ appearance of the liver on PMCT in a case of liver cirrhosis. The findings suggest moderate to advanced stages of decomposition of the liver contrary to the other internal organs, which merely showed mild to moderate stages of decomposition.

Case study:
A 46 year old, male individual was found dead in his premises and brought to the National Institute of Forensic Medicine (IPFN), HKL for autopsy.

Radiological and autopsy findings:
In the abdominal window setting the liver was not visualized due to loss of the native density and consistency of the liver tissue. When applying the pulmonary window, however, the liver was better appreciated. The liver appeared shrunken with hypertrophy of the quadrate lobe. Generalized irregular and nodular margin was noted. Overall 'honeycomb' appearance of the entire liver parenchyma with preservation of liver architecture. Splenomegaly with ascitic fluid and oesophageal varices was noted. The findings of the autopsy and histopathological examination correlated well with the radiological findings.

Discussion and Conclusion:
This case report shows that interpretation of forensic radiological findings on PMCT must be done with caution. The respective stage of decomposition of all intra-abdominal organs including liver parenchyma is highly susceptible to underlying disease such as liver cirrhosis. Categorisation into a specific stage of decomposition may be skewed by such underlying disease.
Giant Tonsilolith Exceptionally Rare Cause Of Chronic Recurrent Tonsillitis

Azura Sharena Y, Loh ST, Fazil I, Roslina R

Universiti Pertahanan Nasional Malaysia, Malaysia

Background:
Tonsiloliths are calcification that forms within the palatal tonsil crypts. Tonsiloliths with size of 2 to 5 mm commonly will not produce symptoms and may be an incidental imaging finding during CT examination. However, giant tonsilolith is rare, may cause prolonged recurrent tonsillitis and scarcely reported in the literature.

Clinical case:
A 30-year-old woman, with underlying diabetes mellitus, hypertension, bronchial asthma and gastritis presented with history of slight dysphagia, pain in swallowing with having foreign body sensation in her throat. For 9 years, she was treated repeatedly as recurrent tonsillitis and ulcers by several doctors with no improvement. Physical examination revealed a hard submucosal mass arising from the right tonsillar region with erythematous mucosa. There were no palpable enlarged lymph nodes or other neck masses. Her blood test parameters were normal.

Radiological findings:
Head and neck computed tomography revealed a large lobulated calcified lesion in the right palatine tonsil measuring 1.4 cm (AP) x 1.8 cm (W) x 4.0 cm (H) [Figure 1 and 2]. Sub centimeter adjacent cervical lymph nodes seen. Surgical removal of the tonsilolith was carried out successfully under local anaesthesia [Figure 3].

Conclusion:
Giant tonsilolith is a rare presentation of a large and hard mass in the tonsillar fossa, especially in the case of unresolved recurrent tonsillitis. The clinical appearance may also raise a suspicion of malignancy or calcified granulomatous disease. Computed tomography is the best imaging modality to assess the anatomical location, extent of a pathological lesion and for definite diagnosis. The radiologist awareness of this rare calcification is important to avoid overlooking of this pathology.
Huge Leiomyoma Of Round Ligament Of Uterus: Unusual Mimicker Of Small Bowel Gastrointestinal Tumour

Bibi Sadaqat R, Shahizon Azura MM, Maizatul Jamny M, Malinda AM, Ithnin H
University Kebangsaan Malaysia Medical Centre, Malaysia

Purpose of Study

To familiarize oneself with unusual pattern of growth of an uncommon entity of round ligament of uterus leiomyoma with intraperitoneal extension, mimicking bowel or mesentery related tumours.

Materials and Method

A case of a lady with acute right iliac fossa pain radiating to right lumbar region associated with fever, tenderness at right iliac fossa and mass palpable at right lumbar region. A provisional diagnosis of acute appendicitis was made, with differentials of appendicular mass, ovarian or retroperitoneal lesion. Further imaging required ultrasonography and CT abdomen.

Results

Ultrasound confirmed predominantly solid right lumbar mass with cystic component. However, no continuity of the mass with the right ovary or adnexa. CT abdomen shows intraperitoneal hypodense mass which appears to communicate with small bowel inferiorly and possible adjacent small bowel and mesenteric infiltration. Overall findings steered the diagnosis towards gastrointestinal stromal tumour (GIST). Other findings include multiple uterine fibroids. Exploratory laparotomy revealed the right lumbar mass originated from right round ligament of uterus, connected via thick stalk. Minimal mesenteric adhesion with normal small and large bowels. Tumour was resected along with myomectomy. Uterus, bilateral ovaries and Fallopian tubes were preserved. Histopathological examination(HPE) was consistent with round ligament leiomyoma.

Conclusion

A more common pattern of growth of round ligament leiomyoma is extraperitoneal, along the inguinal ligament, mimicking inguinal lymphadenopathy or hernia. In our case, it presented as right lumbar mass and therefore, it should be included in differential diagnosis of a mass in the lower abdomen in a woman of reproductive age. A careful assessment of location and origin of the mass via imaging with pre-operative image-guided biopsy is crucial because misdiagnosis may lead to unnecessary visceral resection. A considerable overlap between radiologic and HPE findings between leiomyoma and GIST requires immunohistochemical staining for definitive diagnosis.
Diagnostic Value Of D Dimer In Pulmonary Embolism - A Case Control Study

Cheng AKC

Queen Mary Hospital, China

PURPOSE OF STUDY: Diagnosis of pulmonary embolism (PE) remains difficult in routine clinical practice. High plasmatic levels of D dimer (DD), a specific fibrin derivate, have been reported in PE cases. The purpose of study is to retrospectively evaluate the diagnostic value of plasmatic DD level in PE cases.

MATERIALS and METHODS: We retrospectively studied 75 patients with urgent CTPA performed within six months period in Queen Mary Hospital Hong Kong (July 2016- January 2017). PE was diagnosed with contrast filling defects in pulmonary arteries by CT pulmonary angiogram (CTPA). DD levels were measured before the CTPA. DD levels between two groups whom diagnosed with PE and without PE (control) were compared by one-tailed t test. A statistically significant difference was set at p-value< 0.05. Cut off of DD level was set as 0.5mg/L FEU.

RESULTS: 13 and 62 patients were diagnosed with PE and without PE respectively. The mean DD level of patient diagnosed with PE and without PE was 8.54+-8.28 mg/L FEU and 5.98+-9.19 mg/L FEU respectively. Plasmatic DD levels were not statistically significantly higher in PE group compared to control group (p =0.83). Sensitivity and specificity of plasmatic DD in diagnosis of PE were 100% and 12.9% respectively. Negative predictive value and positive predictive value of plasmatic DD were 100% and 19.4% respectively.

CONCLUSION: There was no statistically significant difference in DD level in PE group compared to control group. Plasmatic DD has low positive predictive value and low specificity. An elevated DD level warrants clinical correlation and further investigations including CTPA to rule out PE and other similar presenting differentials. On the other hand, it has high sensitivity and high negative predictive value. A below cut-off DD level would confidently exclude pulmonary embolism and CTPA may not be indicated in the appropriate clinical setting.
Isomerism is a form of heterotaxy that is rarely seen, in association with congenital heart defects. We present a case which has classical radiological findings of right isomerism that is rarely seen, in view of the associated high mortality rates.

This is a case of a young lady with underlying cyanotic congenital heart disease presenting with incidental finding of hypertension. On investigation, urine Norepinephrine was elevated. CT scan showed a heterogeneously enhancing left para-aortic mass, which corresponding to the elevated Norepinephrine likely represented an extra-adrenal pheochromocytoma at the organ of Zuckerkandl. The mass encased the ostium and proximal left renal artery with poor fat plane, raising suspicions of possible malignancy. CT features of the thoracic and abdominal organs were classical radiological manifestations of right isomerism. A multidisciplinary team effort was recruited for the management of this patient.

The purpose for this case report is to identify the classical radiological findings of right isomerism, which is important in further management of patient and for prognostic reasons. This case report is also to highlight the possible association between pheochromocytoma and cyanotic heart disease, which should be included in the differential diagnosis of a hypertensive patient with cyanotic heart disease.
A Case Report Of Budd-Chiari Syndrome Mimicking Hepatocellular Carcinoma; Pitfalls In Diagnostic Imaging

Gupita N, Sahat Basana Romanti EM

Mayapada Hospital, Indonesia

Budd-Chiari Syndrome (BCS) is an uncommon condition that still represents a challenge for radiologist regarding its variable appearance. Budd-Chiari syndrome characterised by obstruction of the hepatic venous outflow tract. It is a rare entity disease with spectrum of imaging findings. It can mimicking others disease. Imaging plays an important role to diagnose BCS. We present a case of Budd-Chiari Syndrome that was misdiagnosed and mistreatment for HepatoCellular Carcinoma (HCC) in months. In this report, we aimed to emphasize the pitfalls in diagnostic imaging, how to recognize and differentiate it.
Lung Carcinoma Presenting With Enteric Intussusception

Hanim MT, Izzat Asyraf K

Hospital Bintulu, Malaysia

Introduction:
Intussusception are rare in adults. In adult patients presenting with bowel obstruction, only 1%-5% are due to intussusception

Case Report:
A 38 years-old gentleman presented with vomiting and abdominal pain. Computed tomography (CT) abdomen examination was performed and showed small bowel obstruction secondary to small bowel intussusception. Pneumoperitoneum was noted with pneumomediastinum and subcutaneous emphysema. There was incidental findings of a lung mass.

CT guided biopsy of the right upper lobe lung mass was done on the same day. Patient underwent exploratory laparotomy and the intussuscepted small bowel was resected with primary anastomosis done. Resected intussuscepted bowel were reduced with findings of an intraluminal fungating small bowel mass.

Discussion:
Intussusception in adults are rare. Causes include benign or malignant enteric causes. In our patient, histopathology of the right upper lobe mass is poorly differentiated carcinoma, probably of squamous cell type. The small bowel mass which was the lead point of intussusception was a malignant enteric cause.
Enteric Intussusception In Adults: Case Reports On Acute And Chronic Presentation

Hanim MT, Mohamad Izzat Arslan CR, Izzat Asyraf K

Hospital Bintulu, Malaysia

Introduction:
Intussusception are rare in adults, and may present in acute, intermittent or chronic symptoms. 1%-5% of bowel obstruction may be attributed to intussusception, in which the patients will present with acute symptoms. 70%-90% of adult intussusception has an organic lesion, with 20%-50% are malignant.

Case Report:
A 63 years-old gentleman presented with lower gastrointestinal bleed and anaemia. Colonoscopy and oesophagastroduodenoscopy (OGDS) were normal and he was suspected to have small bowel bleed. A Computed tomography (CT) angiogram of mesentery was done with no evidence of active gastrointestinal bleed. Contrast enhanced CT abdomen examination was done 3 months later and showed jejunum intussusception.

A 38 years-old gentleman presented with vomiting and abdominal pain, contrast enhanced CT abdomen examination was done revealing ileum intussusception with pneumoperitoneum. Incidental findings of pneumomediastinum and right lung mass.

Both patients underwent surgery. Intussuscepted small bowel were resected with primary anastomosis. Resected intussuscepted bowel were reduced with findings of intraluminal small bowel masses.

Discussion:
Benign causes of enteric intussusception include postoperative, Meckel's diverticulum, lipoma, Peutz-Jeghers syndrome, neurofibroma, scleroderma, idiopathic; or malignant enteric causes such as metastatic melanoma, metastatic lymphoma, metastatic sarcoma, metastatic squamous cell carcinoma, undifferentiated carcinoma, adenocarcinoma.

Both patients had different presentation, of chronic and acute symptoms respectively with different aetiology of enteric intussusception.
Lost In The Dark? Look For The Lines; Sonographic Bright Band Sign In Splenic Infarction

Leong YY, Hamzaini AH

University Kebangsaan Malaysia Medical Centre, Malaysia

The largest lymphatic organ in the body, the spleen is involved in many systemic pathological processes, and splenic infarction may be one of the, or even the only presenting sign. It may also serve as the only clue to a preexisting, but undiagnosed illness, which early detection may contribute to greater clinical benefits to the patients. The presenting morphology of splenic infarction may also be variable. Thus there is a need to be able to identify an infarction in better precision. Sonographic bright band sign is a potential sign to be sought for when assessing a splenic lesion as it is seen only in cases of splenic infarction. We reported a case where there was an incidental finding of multiple splenic lesions, with both typical and atypical sonographic morphology of splenic infarctions. Sonographic bright band sign was present in one of the lesions, and all the lesions were confirmed to be infarctions on a subsequent contrast enhanced CT abdomen. Contrast enhanced CT abdomen also showed presence of portal and splenic vein thrombosis. Blood investigations including full blood picture and JAK 2 V617 F mutation analysis subsequently proved that the patient had a newly diagnosed polycythemia vera.
Thoracic Ultrasonography Versus Chest Radiography For Accurate Diagnosis Of Acute Heart Failure: A Mini Systematic Review

Luths MM, Adam P

Moewardi Hospital – Sebelas Maret University, Indonesia

Purpose of Study
Dyspnea is a common sign of presentation in emergency situations, and among all possible underlying diseases, acute heart failure (AHF) is a great risk of mortality and recurrences. Missed or delayed diagnosis of AHF is associated with increasing cost and higher mortality. Chest radiography (CXR) is one of routine initial diagnostic workup for AHF which is often unreliable. Meanwhile, thoracic ultrasonography is rapid, noninvasive, and promising instrument for diagnosing heart diseases. The aim of this study is for knowing accuracy of thoracic ultrasonography in diagnosing AHF and whether it can replace CXR as initial workup.

Methods
We conducted structured research on several databases including Pubmed, Proquest, Sciencedirect, and EBSCOHost. The selected studies would underwent critical appraisal based on Oxford CEEBM diagnostic studies clinical appraisal.

Results
Three diagnostic studies comprising of 1393 subjects met inclusion criteria were critically appraised. Sensitivity of thoracic ultrasound in diagnosing AHF is better than CXR (57.73%-97% vs. 69.5%-78%) and thoracic ultrasound’s specificity is also better than CXR (79%-93.5% vs. 50%-86.26%). Positive predictive value (PPV) and negative predictive value (NPV) of thoracic ultrasound in diagnosing AHF are also better than CXR. Two of three studies showed thoracic ultrasonography is better and statistically significant.

Conclusion
Our study has shown that thoracic ultrasonography is better and more accurate than CXR for diagnosing AHF. It can become routine examination, especially in emergency situations, with further research.

Keywords: lung ultrasonography, chest radiography, acute heart failure
Rare Cause Of Small Bowel Obstruction In An Elderly Male

Mawaddah AM, Noor Azman S

KPJ University College, Malaysia

We reported a case of small bowel obstruction in an elderly male. It is a rare condition in which the small bowel obstruction is secondary to incarcerated obturator hernia occurred in an elderly male patient instead of elderly, emaciated women as it oftenly seen. Most common hernias are external abdominal hernias such as inguinal and femoral hernias. However there are also rare pelvic hernias such as obturator hernias which have the highest mortality rate of all hernia between 13-40%. The high mortality rate is related to delayed in diagnosis and treatment of obturator hernia due to nonspecific clinical signs and symptoms. The main diagnostic challenge in this case are lack of obvious external manifestations, the symptoms and signs are nonspecific as patient failed to complaint of obturator neuralgia lead to lack of clinical suspicion. However with the use of CT imaging, this case of incarcerated obturator hernia was diagnosed accurately before the operation. In conclusion, obturator hernia is a rare hernia but carries significant morbidity and mortality rates. It is a diagnostic challenge for clinicians therefore clinical and radiological diagnosis followed by early surgical intervention are essential in improving clinical outcomes. The role of CT abdomen and pelvis has proven to be the most useful imaging tool with high sensitivity and specificity for early preoperative diagnosis of obturator hernia. The most common diagnostic clue for obturator hernia based on CT imaging finding is bowel herniating through the obturator foramen and lying between the pectineus and obturator muscle. However hernia between the superior and middle fasciculi of the obturator externus muscle, and hernia between the external and internal obturator membranes are less common CT findings in obturator hernia. In our case, CT scan has proved to establish the early diagnosis of obturator hernia. This will reduce significantly the rate of complications.
A Confusing Target Sign Mimicker

Nor Asnani MR, Ng CG, Khatrulnada MS

Hospital Sultan Haji Ahmad Shah, Malaysia

We reported a case of small bowel obstruction in an elderly male. It is a rare condition in which the small bowel obstruction is secondary to incarcerated obturator hernia occurred in an elderly male patient instead of elderly, emaciated women as it oftenly seen. Most common hernias are external abdominal hernias such as inguinal and femoral hernias. However there are also rare pelvic hernias such as obturator hernias which have the highest mortality rate of all hernia between 13-40%. The high mortality rate is related to delayed in diagnosis and treatment of obturator hernia due to nonspecific clinical signs and symptoms. The main diagnostic challenge in this case are lack of obvious external manifestations, the symptoms and signs are nonspecific as patient failed to complaint of obturator neuralgia lead to lack of clinical suspicion. However with the use of CT imaging, this case of incarcerated obturator hernia was diagnosed accurately before the operation. In conclusion, obturator hernia is a rare hernia but carries significant morbidity and mortality rates. It is a diagnostic challenge for clinicians therefore clinical and radiological diagnosis followed by early surgical intervention are essential in improving clinical outcomes. The role of CT abdomen and pelvis has proven to be the most useful imaging tool with high sensitivity and specificity for early preoperative diagnosis of obturator hernia. The most common diagnostic clue for obturator hernia based on CT imaging finding is bowel herniating through the obturator foramen and lying between the pectineus and obturator muscle. However hernia between the superior and middle fasciculi of the obturator externus muscle, and hernia between the external and internal obturator membranes are less common CT findings in obturator hernia. In our case, CT scan has proved to establish the early diagnosis of obturator hernia. This will reduce significantly the rate of complications.
Solitary Liver Mass In An Immunocompetent Young Patient

Nurul Akhmar O, Masnun M, Mahedzan MR, Ling SR, Sharmila A

Hospital Seberang Jaya, Malaysia

INTRODUCTION
Melioidosis caused by Burkholderia pseudomallei usually occur in diabetic patients and other predisposing factors such as renal failure, renal calculi, retroviral infections, malignancy, steroid therapy, alcoholism, occupational exposure, trauma and parenteral drug abuse. Patients with liver or splenic involvement will usually have microabscesses, and very uncommon to have solitary large liver mass. We discussed an immunocompetent young patient with solitary liver mass with involvement of adrenal and kidney.

CASE PRESENTATION
A 28 year old gentleman presented with history of prolonged fever for six months associated with marked loss of weight which was 20 kg. This patient works as an engineer in a factory and did not have predisposing risks for melioidosis. The investigations showed mildly increased white cell (11 100/uL), raised ESR (86mm/hr) and C-reactive protein (81.5 mg/L). Screening for Hep B Ag, anti HCV, HIV Ag-Ab and VDRL were non-reactive. Ultrasound abdomen revealed an isoechoic heterogenous mass at segment VI liver, with no area of liquefaction or necrosis. CT abdomen showed the mass at segment VI extending to the lateral limb of right adrenal gland and the upper pole of right kidney. No splenic lesion noted in this CT and the 1st ultrasound. Follow up ultrasound showed increment in size of the mass with new small hypoechoic lesions in the spleen. Biopsy performed twice with HPE showed caseous like material of infective in origin with no suspicious malignant cell. The blood C&S in the first admission showed no growth, however the blood C&S in the 2nd admission grew Burkholderia pseudomallei. The serology for melioidosis Ig M was positive, 1:320. Patient’s fever resolved after started on i.v ceftazidime.

CONCLUSION
No predisposing risks, uncommon presentation of solitary liver mass, very late positive blood C&S and inconclusive HPE made the diagnosis of melioidosis difficult.
Introduction: Wandering spleen is a rare birth condition with only 238 cases described from 1895 to 2005. Torsion of the wandering spleen around the vascular pedicle, which leads to ischemia and infarction is even rare with an incident of less than 0.2 %. The first clinical description of wandering spleen is attributed to Van Horne, a Dutch physician, in 1667 with the first successful splenectomy done in 1878 by Martin and marked the beginning of surgical treatment for this condition. This condition is caused by laxity of gastrosplenic and splenorenal ligaments with long vascular pedicle, which allows migration of the spleen. Untreated cases can result in torsion or even infarction.

Case reports: We report a case of 16 years old male with no known medical illness, presented with lower abdominal pain for two weeks associated with few episodes of vomiting, diarrhea and fever for two day duration. Physical examination revealed a tender pelvic mass. Ultrasound abdomen showed a splenic like mass at the pelvic region with absent normal spleen at the left hypochondriac region. There is also lack of Doppler flow within the spleen which raise a suspicious of infarcted wandering spleen. Urgent laparotomy was performed with splenectomy due to the infarcted spleen with torsion of the splenic vessels.

Discussion: Wandering spleen is an uncommon diagnosis in a patient presented with acute abdominal or pelvic pain. The presenting symptoms are usually non-specific and mostly related to the complications of wandering spleen, which is torsion. Therefore, prompt diagnosis is important, as the ultimate treatment is splenectomy.

Conclusion: This report highlights the importance of clinical findings, ultrasound assessment and its imaging finding that plays an important role in clinching the diagnosis and further facilitates in prompt management of these cases.
This Abstract Was Not Given Permission To Be Published By The Author.
Comparing The Accuracy Of PRESS And STEAM Sequences In Magnetic Resonance Spectroscopy To Assess For Non-Alcoholic Fatty Liver Disease (NAFLD)

Subapriya S, Tuan Aaina Syafiqah TA, Tengku Nur Syahirah TATM, Soh EI, Tong SW, Mohd Faisal J, Fathinul Fikri AS

Universiti Putra Malaysia, Malaysia

Purpose of Study: Non-Alcoholic Fatty Liver Disease (NAFLD) is a progressive complex of liver diseases which start with fat accumulation in the liver that can lead to liver cirrhosis and ultimately liver cancer. The diagnosis is usually made by ultrasound but findings are variable as it is operator dependent. Thus, magnetic resonance spectroscopy (MRS) of the abdomen is gaining popularity as a sensitive tool to diagnose NAFLD. There are two common sequences used in MRS that are PRESS and STEAM, however, studies are lacking in assessment of the diagnostic accuracy of each method.

Objective: To determine the diagnostic accuracy of MR PRESS vs. STEAM sequence to detect NAFLD and to determine the prevalence of NAFLD in healthy subjects of different ethnicity in Selangor.

Materials and Method: A retrospective cross sectional study conducted on the MRS Abdomen scans performed at the Centre for Diagnostic Nuclear Imaging, UPM from January 2016 to December 2016 correlated with ultrasound abdomen findings as the gold standard. Both PRESS and STEAM MRS sequences were analysed and ROIs were placed in segment IV and V of the liver and readings were taken regarding the lactate peak.

Conclusion: Both PRESS and STEAM can be used for accurate detection of non-alcoholic fatty liver disease.
The Use Of MRI Perfusion In Analysis Of Radiation Necrosis

Zaharudin H, Zahurin I, Norzaini Rose MZ

National University of Malaysia, Malaysia

Radiation necrosis is one of the dilemmas in managing neuro-oncology patient post radiation. Differentiation with residual tumour will alter management, where both will enhance post gadolinium, in view of blood brain barrier disruption. MR perfusion plays an important role to differentiate between these pathology bases on the present of angiogenesis in tumour. We present 2 cases of radiation necrosis post radiation in brain tumour patient using MR perfusion. Based on these two cases, MR perfusion clearly demonstrates absent of blood pool on flow and volume, in the respective treatment area in favour of radiation necrosis, in view of absent of angiogenesis.
Atypical Presentations Of Thyroid Carcinoma: Case Series

Zaidatul Syeila ZA, Lim MSY

Hospital Selayang, Malaysia

Introduction
Thyroid carcinoma is the most common endocrine malignancy and the incidence has been increasing worldwide, representing approximately 1% of new cancer diagnosed annually. It is more commonly found in women, with peak age of incidence in the third and fourth decade of life. The most common symptoms include neck swelling, dysphagia and dyspnoea.

Purpose of Study
We report two cases of thyroid carcinoma with atypical presentations: a rare case of papillary thyroid carcinoma with distant metastasis in an adolescent boy and a case of medullary thyroid carcinoma that manifested with raised tumour markers.

Results
Case 1:
A 15-year old boy was found to have calcified thyroid nodules and diffuse lung nodules on imaging following vague abdominal symptoms. Fine needle aspiration cytology of the thyroid nodules confirmed it to be papillary thyroid carcinoma. He underwent total thyroidectomy and bilateral lymph node resection followed by radioactive ablative therapy. Follow-up CT showed no local recurrence with stable lung metastases.

Case 2:
A 48-year old man with 3-month history of chronic diarrhoea and weight loss was found to have raised cancer antigen 19-9 (CA 19-9). Computed tomography of the thorax and abdomen showed multiple calcified liver nodules, calcified cervical lymph nodes and small calcified thyroid nodule. Biopsy of the thyroid nodule confirmed it to be medullary thyroid carcinoma.

Conclusion
Atypical presentations of thyroid carcinoma involving the paediatric age group and raised serum tumour markers are rare. The key imaging feature in the two cases presented is calcified thyroid nodules in both patients which lead to the appropriate management and correct diagnoses.
Mammographic Breast Density And Its Attributing Factors

Husbani MAR, Norhasiza MJ, Elinah A, Fatimah S, Wan Rohani WT

Universiti Sultan Zainal Abidin, Malaysia

Introduction and purpose of study
Breast density can be a determinant risk in breast carcinoma development. The development of breast density is attributed from genetic and demographic factors. Transforming growth factor-beta (TGF-β) gene is involved in cell proliferation and regulation and in a development of mammary epithelial cells. The study was aimed to correlate breast density with the level of transforming growth factor-beta (TGF-β).

Materials and Method
This is a prospective cross sectional study. A total of 100 patients aged between 40 to 65 years-old that underwent mammogram screening at Radiology Department in HSNZ were recruited in this study. Two radiologists assessed the breast parenchymal pattern on mammogram independently using Breast Imaging Reporting and Data Systems (BI-RADS). This system uses pattern 1 to 4 and classified into group A (BI-RADS 1 & 2 - not dense) and group B (BI-RADS 3 & 4 - dense breast). Simple logistic regression was applied to determine the associated factors (age, body mass index (BMI) and parity status) with breast parenchymal patterns. In an attempt to evaluate genetic factor contribution to breast density, three variants of TGF-β1 were genotyped using PCR-RFLP technique. Genotype distribution were analysed for association analysis using SHEsis software.

Results
The study result showed that age (p = 0.023) and number of children (p =0.009) were inversely related to density of breast. However the BMI value did not demonstrate association with breast density status (p = 0.375). Genotype distribution for three variants was observed in all BI-RADS patterns. In relation to genetic analysis, BI-RADS 2 represents the most predominant genotypes from three polymorphisms of TGF-β1.

Conclusion
This study suggested age and parity status revealed as a significant attribute factor in determining breast density development. In accordance with genetic determinant factor, this pilot data unravelled the role of predominant genotype in attributing.
Can Ultrasound Staging Of The Axilla Replace Sentinel Node Biopsy In The Post-Z0011 Era?

Lai ALCY, Vidya U, Lim GH, Leong L

SingHealth Diagnostic Radiology, Singapore

Purpose of Study
To evaluate the diagnostic accuracy of ultrasound and its ability to predict metastatic nodal burden, and hence determine if ultrasound can replace sentinel lymph node biopsy as one of the Z0011 trial criteria for determining if axillary clearance can be spared.

Materials and Methods
Axillary US studies performed in patients with newly diagnosed invasive breast cancer from 2009-2016 were retrospectively reviewed and correlated with nodal histology. Cases with histology obtained following neoadjuvant chemotherapy were excluded. Sensitivity, specificity and false negative rates (FNR) were assessed for a subgroup of patients who could potentially qualify for the Z0011 criteria (breast tumour size ≤ 50 mm with no palpable axillary nodes).

US-detected positive and false negative cases were evaluated for metastatic nodal burden. A high tumour burden was defined as >2 positive nodes found on histology, which would require axillary clearance based on Z0011 findings.

Results
620 cases were reviewed. 247 (39.8%) had nodal metastases. Overall US sensitivity, specificity and FNR were 72.2%, 93.5% and 27.8% respectively. For the 468 women who could qualify for Z0011, 111 (23.7%) had nodal metastases and US sensitivity, specificity and FNR were 41.4%, 95.0% and 58.6% respectively. For US-detected positive nodes, only 26.7% (12/45) had a high tumour burden. For false negative cases, 15.4% (10/65) had a high tumour burden and 63.9% had macrometastases.

Conclusion
In US-positive nodal cases, US was not predictive of a high nodal metastatic burden and it cannot be used as an exclusion criteria from Z0011. Several false negative cases had a high tumour burden which would preclude a negative US examination from being used as a Z0011 inclusion criteria. Hence, axillary US staging is not diagnostically accurate to predict tumour burden and cannot replace SLNB in the Z0011 criteria to decide if axillary clearance can be spared.
This Abstract Was Not Given Permission To Be Published By The Author.
Quantitative MRI Radiomics Of Breast Cancer


University Malaya Medical Centre, Malaysia

Purpose:
This study aims to evaluate selected quantitative radiomic parameters of breast carcinoma in patients undergoing neoadjuvant chemotherapy (NACT) based on diffusion weighted- (DW) MRI.

Material & methods:
Four women with invasive breast carcinoma undergoing NACT were included. MRIs were performed at pre-NACT, post- 1st- and 3rd-cycles of chemotherapy. The radiomics and DWI data of the lesions and contralateral normal tissues were obtained using volumetric and single region of interest (ROI) methods.

Results:
There were slight differences in diffusion parameters obtained via ROI and volumetric method. Mean volumetric ADC value for breast lesions were (1.033 ± 0.23) x 10^{-3}mm^2/s and (1.502 ± 0.43) x 10^{-3}mm^2/s for the normal breast tissue. The ROI methods rendered a lower mean ADC value of (0.998 ± 0.232) x 10^{-3}mm^2/s. For IVIM parameters, the mean tissue diffusivity, Dt were 1.10 x 10^{-3}mm^2/s and 1.27 x 10^{-3}mm^2/s for tumour and normal breast tissues, respectively. Mean volumetric pseudo-diffusivity, dp were 1.887 x 10^{-3}mm^2/s and 2.707 x 10^{-3}mm^2/s and mean perfusion fraction fp were 16.3% and 34.3% for the tumour and breast tissues, respectively. DW signals increased following chemotherapy indicating effective treatment.

Conclusion:
3D volume averaging in volumetric measurements showed slightly lower diffusion values compared to ROI method. DW-MRI is useful to characterize breast cellularity with malignant breast lesion showing lower ADC values reflecting hypercellularity of cancer cells and restricted water diffusion. Chemotherapy reduces cellularity, showing increase in ADC values.

(232 words)
Role Of Digital Breast Tomosynthesis In Cancer Detection
Specificity And Reduction Of Additional Imaging

Lee NYY, Ching BC

Singapore General Hospital, Singapore

IMPORTANCE
As a relatively novel technique, digital breast tomosynthesis (DBT) is quickly finding favour as an effective evaluation method with well-established advantages in detecting breast cancer.

DBT has been implemented as a standard tool in many breast-screening programs in the United States. However, this is not presently the norm in Singapore despite breast cancer being the commonest malignancy and leading cause of cancer-related mortality in the female population. Introduced in 2013 at Singapore General Hospital (SGH), DBT is currently utilized only for further characterization of potential lesions identified on conventional mammography or ultrasound. Our aim is to determine if DBT allows for accurate detection of cancerous lesions that cannot be conclusively characterized on conventional imaging and reduction in avoidable additional imaging of normal breast tissue.

DESIGN
This is a retrospective analysis of 123 individual DBT examinations performed from 2013 to 2016 at Singapore General Hospital. A descriptive statistical analysis was performed to analyze the results of DBT assessments.

RESULTS AND INTERPRETATION
Of the 123 DBT studies, 99 (80.5%) were demonstrated to be normal. The remaining 24 patients (19.5%) underwent further ultrasound imaging, of which eight (6.5%) were deemed benign. One patient had two separate irregular masses on ultrasound but was lost to follow up. 14 (11.4%) were deemed suspicious after further ultrasound imaging and recalled for biopsy, of which 12 proved malignant while the remaining two were benign.

The use of DBT in the evaluation of equivocal lesions seen on conventional imaging significantly reduced the number of false positive recalls and enabled increased specificity in the detection of cancer. There is potential to reduce the need for additional mammographic and sonographic views with the implementation of DBT as a standard tool in both initial screening and evaluation of potential breast lesions.
Occult Breast Carcinoma: A Case Report

Nik Farhan NF, Sharifah Majedah IA

University Kebangsaan Malaysia Medical Centre, Malaysia

A 54-year-old lady presented with a 5-month history of right axillary swelling with no palpable breast mass. Mammogram, ultrasound and MRI breast were negative for any focal breast parenchyma lesion. Histopathology result of the right axillary lymphadenopathy was consistent with ductal carcinoma. Right axillary dissection was performed and histology revealed metastatic carcinoma with possible primary from breast, with positive immunohistochemistry for estrogen receptor and focal positivity towards progesterone receptor and mammaglobin antibody. The patient subsequently underwent chemotherapy and is currently undergoing ipsilateral breast radiation therapy. This case highlights the clinical dilemma of occult primary breast cancer, which remains a diagnostic and therapeutic challenge.
Sensitivity, Specificity, And Accuracy Of Stereotactic Vacuum Assisted Breast Biopsy: 5 Years UKM Experience

Nik Farhan NF, Sharifah Majedah IA

University Kebangsaan Malaysia Medical Centre, Malaysia

Background: Mammographic screening has led to increased detection of non-palpable suspicious microcalcification. One of the methods used to confirm the diagnosis is vacuum-assisted core biopsy (VACB) with prone table system. The aim for this study was to determine the sensitivity, specificity and accuracy of this technique. Final histopathology results from surgery were used for gold standard.

Methods: Files were retrospectively reviewed for patients who underwent stereotactic VACB at Department of Radiology, Universiti Kebangsaan Malaysia Medical Centre between 2009 to 2016. All biopsy cases were done with 12 G Suros Atec vacuum assisted Biopsy device with Hologic prone table. Statistical analysis was carried out using Pearson’s Chi-square.

Results: Forty-three patients were finally enrolled for this study. The mean age was 53 years (range: 38-70). Twenty-seven (63%) lesions were categorized as BIRADS 4 and 16 (37%) lesions were categorized as BIRADS 3. Subsequently, 25 cases underwent hookwire localization excision biopsy or wide local excision, where by 18 cases were confirmed malignant and the rest of the seven cases were confirmed benign. Histopathology results revealed malignant lesions in 18 patients (41%) and benign lesions in 25 patients (58%). The sensitivity, specificity, accuracy, positive and negative predictive value for stereotactic biopsy were 100%, 88%, 95%, 94% and 100%. There was only one false positive case and there was no false negative case.

Conclusions: Stereotactic vacuum-assisted breast biopsy performed on a prone table is a reliable & provides an accurate histopathologic diagnosis for suspicious cluster of microcalcification thus preventing a significant number of patients undergoing unnecessary surgical procedures.
Analysis Of Calcifications On Mammography After Neoadjuvant Chemotherapy In Breast Cancer Patients

Tae HK, Sun YP, Doo KK

Ajou University Medical Center, Korea

Purpose: The purposes of our study were to analyze the pattern of changes in microcalcifications on mammography after neoadjuvant chemotherapy (NAC) and to evaluate the accuracy of residual microcalcifications in predicting the extent of residual cancer.

Material and Methods: Between January 2012 and December 2014, we included 80 patients who performed NAC before surgery and who performed both initial and preoperative mammography and magnetic resonance imaging (MRI) after completion of NAC. We classified the location of microcalcifications into two types, inside the mass and outside the mass.

Results: Of 19 patients with complete response (CR), microcalcifications were decreased in 10 patients (52.6%). All 2 (100%) patients with progression of disease showed increased calcifications. Increase of microcalcification was noted in 3 (30%) of 10 patients with Miller-Payne grade 1, 3 (26.7%) of 18 patients with grade 2 and 5 (26.7%) of 30 patients with grade 3. Change of microcalcifications after NAC was significantly different according to the RECIST criteria and Miller-Payne grade.

Conclusion: Change of microcalcifications after NAC was correlated with tumor response to NAC. The discrepancy was higher in a group showing CR with outside calcifications compared to a group showing CR with inside calcifications. The discrepancy was relatively low and acceptable in most cases except CR with outside calcification and therefore, residual calcifications should be excised regardless of MRI findings.
Ultrasound Appearances Of Hepatic Extravasation Of Total Parenteral Nutrition (TPN)

Azian AA, Nyin LY, Chin CN

International Islamic University Malaysia, Malaysia

We illustrate the sonographic appearances of hepatic extravasation of total parenteral nutrition (TPN) solution in three (3) paediatric patients admitted to our hospital. These patients were all admitted to NICU for observation and treatment for various problems during different periods of time. All patients had umbilical vein catheters (UVC) inserted which were used for infusion of TPN. Bedside ultrasound when performed by the paediatricians in view of deranged liver enzyme revealed liver lesions which required reassessment by radiologists since the paediatricians were not familiar with the appearances. Sonographic examination showed intraparenchymal multiseptated liver lesions with echogenic rim and hypoechoic center.

In the first patient, since there was no clinical evidence of infection or sepsis, a hepatic tumour rather than abscess was considered. In view of unavailability of MRI, CT of the liver was performed for further evaluation. This patient was transferred to the Paediatric Institute, Hospital Kuala Lumpur for further management. As the Paediatricians in the Paediatric Institute were familiar with the appearances of the liver lesions from previous patients that they had; a diagnosis of hepatic extravasation of TPN were made and patient was transferred back to us for follow up, which showed that the liver lesion subsequently resolved after several weeks. With the familiarity of the sonographic findings in this patient; similar diagnosis were made in two (2) different patients admitted at different periods later whom both had their UVCs used for TPN infusion. In these 2 patients, the liver lesions also resolved several weeks later with ultrasound follow-up. Hence we would like to illustrate the sonographic appearances of hepatic extravasation of TPN so that radiologists are aware of these appearances particularly when patients are or had UVC inserted. This will be helpful to distinguish from liver abscess or tumours. entricular dilatation.
Background: Gastric volvulus is a rare entity but potentially life-threatening cause of upper gastrointestinal obstruction.

Aim: A high index of suspicion is important in patients who present with signs and symptoms suggestive of gastric outlet obstruction. The correct choice of imaging modality is crucial to prevent delay in giving the ultimate management. The clinical symptoms, predisposing factors, various types of gastric volvulus, radiological findings and management of gastric volvulus related to the patients are discussed in the case reports.

Conclusion: Though rare, gastric volvulus must be always considered in the differential diagnosis when a patient with the Borchardt triad is admitted to the hospital. A missed or delayed diagnosis may result in unfavorable outcomes as discussed above. The most important factor in diagnosing gastric volvulus is the awareness of its possibility. The diagnosis is suspected mainly by the symptoms and aim to exclude other pathologies. Correct choice of the imaging modality is crucial to prevent delay in giving the ultimate management. Dynamic study like barium meal is less important as the CECT scan can also demonstrate the gastric abnormality with addition of its complication. CECT scan is also less time consuming. Surgical intervention is the optimal treatment. Gastric volvulus is potentially life-threatening, if not treated in time or adequately managed.

Keywords:
Acute and chronic gastric volvulus, gastric outlet obstruction, diaphragmatic hernia, gastropexy.
The Principle Of Radiological Assessment Of Spondyloepiphyseal Dysplasia

Noor Badriah O, Norzailin AB, Fazalina MF

University Kebangsaan Malaysia Medical Centre, Malaysia

Background - Spondyloepiphyseal (SPE) dysplasia is a type of skeletal dysplasia which involves the spine and epiphyseal long bone.

Aims - Although this skeletal disorder is a rare entity, a systematic approach to recognize the clinical and radiological manifestation of skeletal dysplasia is important to achieve the accurate diagnosis and may help in its management. Disproportionate short stature is a clinical and radiological manifestation of skeletal dysplasia which require further evaluation of the spine. Approach of diagnosis, inheritance pattern and various type of skeletal dysplasia will be discussed in this case report.

Conclusion - It is important to recognize the clinical and radiological manifestation of skeletal dysplasia. Although it is a rare entity, the accurate diagnosis may help in its management. Involvement of specific part of the long bone; epiphysis, metaphysis and diaphysis with combination of the spine deformity may help in narrow down the list of differential diagnosis. Juvenile idiopathic arthritis especially involved the hip joint is important to be excluded as the management is totally different. Systemic illness like sickle cell disease and chronic steroid used are another straight forward differential diagnoses. Another entity of short trunk such as mucopolysaccharidoses, is another important differential diagnosis. This case is presented to highlight the approach for the diagnosis and exclude the differential diagnosis to the accurate management.

KEYWORDS
Skeletal dysplasia, spondyloepiphyseal dysplasia, disproportionate short stature, avascular necrosis of femoral head evaluation.
Crystal Jelly Ball Ingestion Causing Small Bowel Obstruction

Nor Saadah I, Bushra J, Teo YS

Hospital Selayang / Hospital UITM, Malaysia

Foreign objects ingestion is a common problem in the paediatric population; as it is part of their learning experience to explore the environment with their senses, one way is by putting objects in their mouth. The ingestion of crystal gel balls, which are often used for home decoration, has many detrimental effects. Due to its high absorbent capacity, it can swell up in liquid solutions. When ingested by children, it can slowly occlude the bowel lumen as it swells in the digestive fluid, which will manifest clinically in form of intestinal obstruction or even bowel perforation. In this case report, we will discuss about our ultrasound findings of an intraluminal cystic-like object in a 2-year old Down Syndrome girl who presented with symptoms of intestinal obstructions. Intraoperative findings confirmed our provisional suspicion of crystal jelly ball ingestion.
Sequestrated Or Non-Sequestrated Lung? Suspected Systemic Artery-Pulmonary Vein Fistula With Primary Presentation Of Lung Sequestration

Norafida B, Ezamin AR, Yusri M, Husna MZ, Suraini MS

Universiti Putra Malaysia, Malaysia

Arteriovenous fistula between the systemic artery and a pulmonary vein is rare. We report the case of a toddler who presented initially as bilateral bronchopneumonia with suspicious right bronchus agenesis. Subsequent follow-up CT scan demonstrate abnormal communication between a branch of abnormal artery arising from common channel from coeliac trunk with right pulmonary vein. There is associated absence of a branch of the pulmonary artery, but without anomalies of the bronchial tree to this segment. Associated right upper lobe hypoplasia is also seen. These abnormal communications are clearly visible only after the consolidation has resolved.
Zika virus (ZIKV) was first discovered in Uganda in 1947 and the Asian lineage first documented in Malaysia in 1966. The disease steals the international limelight in 2015 after an explosive outbreak in Brazil which causes major health concern. Malaysia reported its first confirmed case in September 2016. However, it is believed that ZIKV infection in Malaysia is underreported mostly attributed to eighty percent of ZIKV infection is asymptomatic, usually mild and self limiting symptoms, confusion with Dengue virus infection and difficulty in getting laboratory confirmation. We report a case of microcephaly in a 7 months old baby boy. Mother couldn't recall of being sick during pregnancy and no history of travelling internationally for both parents. The boy has no syndromic features and investigation for TORCHES, genetic study and inborn error of metabolism were normal. Zika immunochemistry investigation is not available for testing. CT scan followed by MRI brain show parenchymal volume loss, cortical and corpus callosal abnormalities, cortical calcifications and ventriculomegaly. This case highlights the similarity of neuroimaging findings with the reported confirmed ZIKV congenital infection.
Transient Neurological Deficit With Reversible Biparietal White Matter, Genu And Splenium Of Corpus Callosum Lesions

Nurul Akhmar O, Tan PP, Mahedzan MR, Jegdiswary

Hospital Seberang Jaya, Malaysia

INTRODUCTION
Reversible symmetrical white matter and corpus callosum hyperintensities in paediatric age group offers a few differentials which need to be tailored to the clinical and imaging findings, and response to treatment.

CASE PRESENTATION
A 9-year-old girl presented with two episodes of weakness and numbness of bilateral hands and legs associated with slurred speech, which showed recovery within 30 minutes. She also had URTI symptoms for four days prior to admission. Physical examination revealed the patient was febrile, with facial asymmetry, positive cerebellar signs (more on the left) and staccato speech. However, all the neurological deficits resolved completely eight hours after admission and remained normal till discharge. There was slight raised in ESR, 41 mm/hr. The rest of blood investigations and nerve conduction study were normal. MRI brain showed symmetrical hyperintense lesions with restricted diffusion involving bilateral parietal deep white matter, genu and splenium and of corpus callosum. No enhancement on post contrast study. Patient was treated with antibiotics only. Repeated MRI Brain after three 3 months demonstrated normal study.

CONCLUSION
The transient neurological deficit and reversible MRI changes in this patient could be caused by various infective agents including influenza. However, this patient did not have the usually reported reversible isolated splenial lesion (MERS) as there were also involvement of genu of corpus callosum and biparietal white matter. The other possible differential for MRI features was acute disseminated encephalomyelitis (ADEM). Nevertheless, the symptoms in ADEM usually will recover within weeks and with steroid and immunoglobulin treatment.
**Stomach In My Baby’s Thorax: A Case Of Hiatal Hernia In Infant**

**Teo HL, Lee AFS, Yee EH**

*University Kebangsaan Malaysia Medical Centre, Malaysia*

**Introduction:**
Hiatus hernia is a rarely diagnosed in paediatric age group, with incidence increasing with age. We report a case of hiatus hernia in a 9 months old girl, which was detected during her presentation with lower respiratory tract infection.

**Case presentation:**
9-month-old girl, was admitted for acute bronchiolitis in our centre. Incidental finding of right posterior mediastinal mass in chest X-ray during initial investigation. Complimentary ultrasound thorax was performed with the impression of diaphragmatic hernia or congenital cyst. Further evaluation of CT examination however concluded as hiatal hernia.

**Conclusion:**
Hiatus hernia should be considered as differential diagnosis for posterior mediastinal mass in paediatric age group. Various procedure (barium study, computed tomography, upper endoscopy) can be used to diagnosed hiatal hernia. Ultrasound is useful for initial evaluation for hiatal hernia. Differentiating between hiatal hernia and diaphragmatic hernia is important for management approach.
Epignathus Teratoma In A Case Of Facial Duplication. A Case Report

Chong VXD, Nurdillah I, Normawati MD, Che Zubaidah CD, Zaleha AM, Rohazly I, Syazarina Sharis O, Zakaria Z, Asiah K

Hospital Kuala Lumpur, Malaysia

Epignathus teratomas are rare congenital malformations giving rise to oropharyngeal tumors that result in life-threatening early neonatal asphyxia. It is extremely rare head and neck teratomas, which are not known to be malignant but do cause therapeutic problems, particularly since they are often associated with malformations such as bifid tongues, bifid noses, cleft palate, duplication of the pituitary glands, and double tongues. We report here the imaging findings of a newborn girl with congenital nasopharyngeal teratoma (epignathus that arise from the midline mandible) causing respiratory distress after birth and difficult intubation due to intraoral mass obstructing the airway, with malformed oral cavity and association with rare multiple midline malformations. Although association with midline malformation like cleft palate, bifid tongue, duplication of pituitary gland and stalk, partial duplication mandible and cervical spine has been observed before, a unique combination of cleft palate, bifid tongue, partial duplication mandible, duplication of pituitary gland and stalk, vomer, midbrain and vertebrae has never been reported. There is also no reported case of midbrain duplication found so far in literature, either as isolated case or association with epignathus teratoma.
Usage of contrast media for radiologic study in a pregnant patient has always been a concern for medical practitioners. It has been an intricate balance between maternal benefit from the study versus possible detrimental effects to the fetus. Numerous papers and research have been carried out to study potential effects from administration of radiologic contrast media to fetuses. The possible route of transfer of the contrast media to the fetus have also been investigated. Case reports have documented transplacental passage of non-ionic monomers such as iohexol and iobitridol. We illustrate a case of presence of iopamidol in the bowel of a preterm infant, which was found incidentally on abdominal radiograph. Opacification of the colon was demonstrated 3 days after intravenous administration of the contrast to the mother. This was presumed to be due to transplacental passage causing bowel opacification in the fetus. Our report revisits both possible route of passage of contrast causing this phenomenon and the side effects towards fetus whose mother received intravenous iodinated contrast media. Hence, the perinatal utilization of non-ionic contrast in radiology may indeed cross the placenta and be retained in different fetal tissues. Therefore, contrasted radiologic studies should be performed with caution after substantial consideration of risks or tumours. Ventricular dilatation.