Clinical: Cardiac and vascular

P-064 Myocardial perfusion scintigraphy (MPS) referral indications: A re-audit of a regional service in South Wales

Ali Ben-Mussa; Martyn Heatley
Abertawe Bro Morgannwg University Health Board

Background: In 2011, the National Institute for Health and Care Excellence (NICE) revised its myocardial perfusion scintigraphy (MPS) guideline TA73 following earlier updates to its coronary artery disease (CAD) management guidelines CG95 and CG126. The revision expanded the role of MPS in the diagnosis and management of CAD.

Aims: This re-audit evaluates our service compliance with NICE and other guideline indications published in the United Kingdom, United States and Europe. Moreover, It ensures compliance with the ionising radiation medical exposure regulations 2000 IR(ME)R.

Methods: Convenient sampling of 70 recently booked referrals for the procedure. CAD indications for MPS were acquired from the updated NICE guidelines TA73, CG95 and CG126. Additional MPS referral indications were obtained from latest guidelines published by the British Nuclear Medicine Society (BNMS), the Society of Nuclear Medicine and Molecular imaging (TSNM), the joint American College of Cardiology Foundation and American Society of Nuclear Cardiology (ACCF/ASNC), and the European Society of Cardiology (ESC).

P-065 Correlation of coronary artery calcification with non alcoholic fatty liver disease

Sze Mun Mak; Sophie Stevens; Kesavans Kandiah
Chelsea and Westminster Hospital NHS Foundation Trust

Recent studies have suggested that coronary artery calcification, an independent prognostic indicator for coroanry heart disease, is associated with non alcoholic fatty liver disease. We retrospectively compare the coronary calcium score, with the ct attenuation value of the liver on non contrast ct, to assess whether there is a linkage in our local population.

P-066 Pictorial review of pre TAVI CT aortogram: How, what and why

Sze Mun Mak; Simon Padley
Chelsea and Westminster Hospital NHS Foundation Trust; Royal Brompton Hospital

Aortic stenosis occurs when the aortic valve is narrowed, reducing the blood flow out of the heart. Surgical aortic valve replacement (SAVR) may not be suitable for high risk patients, and transcatheter aortic valve implantation (TAVI) maybe a safer alternative. Unlike the former, direct visualization of the valve and annulus is lacking during the TAVI procedure. Imaging is hence pivotal to allow for suitable valve sizing. This is vital for some patients, as no suitable valve maybe available. Echocardiographic sizing is almost completely replaced by contrast enhanced CT, which has the advantage of also identify the most suitable peripheral access. It is important to understand the procedure, complications and imaging methods. We present a pictorial review of the anatomy of the aortic root, the measurements we take, and why they matter.

P-067 Clinical validation of Dual Energy CT (DECT) for coronary and valve imaging in patients undergoing Trans-catheter Aortic Valve Implantation (TAVI)

Chris Pavitt; Rachel Mahoney; Dan Gordon; B Park; Mike Rubens; Ed Nicol; Simon Padley
Royal Brompton and Harefield NHS Trust; Royal Marsden Hospital

Introduction: Dual Energy CT (DECT) Virtual Non-Contrast (VNC) reconstructions may negate the requirement for traditional non-enhanced scans. We assessed the clinical validity of VNC reconstructions to perform coronary artery calcium (CACS) and aortic valve calcium scoring (AVCS) from cardiovascular CT scans (CCT) in a clinical cohort of patients undergoing trans-catheter aortic valve implantation (TAVI).

Methods: 24 consecutive patients undergoing TAVI had a 3-step CCT acquisition: 1) traditional CACS; 2) DECT coronary angiogram (CTCA); and 3) DE whole-body angiogram. Linear regression was used to model calcium scores from VNC reconstructed images with traditional scores to derive a conversion factor that was applied to all VNC-derived scores. CT Dose Index (CTDIvol) was used to derive effective radiation dose that was compared to a control group undergoing standard, non-DE TAVI acquisition. Bland-Altman analysis and the weighted kappa-statistic were used to assess inter-method agreement for absolute score and correct MESA-risk centile placement, respectively.

Results: Both CACS and AVCS from VNC reconstructions correlated well with traditional scores (r=0.94; p<0.0001 and r=0.69; p=0.0005, respectively) with excellent risk stratification (k=0.99). The radiation dose for the DECT protocol was 9% higher than standard acquisition even without a dedicated CACS (19.2 vs. 17.6mSv).

Conclusions: CACS and AVCS and be accurately quantified on DECT VNC reconstructions and used to risk stratify patients. However, this is at the expense of a higher radiation burden that is driven by the technical limitation of having to acquire DE CTCA using a retrospective protocol to generate images of sufficient quality for use in clinical practice.

P-068 **Modern cardiac devices: Strictly on a lead to know basis**

Katherine Klimczak; Andy Beale; Paul Foley
Great Western Hospitals NHS Foundation Trust

Background: The introduction of novel implantable cardiac devices and recent developments in the use of other devices has resulted in a new challenge for the Radiologist. Appreciation of their normal appearance and varying lead positions on plain film is imperative when issuing a report. In the last decade there has been a huge increase in the number of patients with cardiac devices in whom radiological identification of misplaced leads is crucial to their care.

Content: This pictorial review focuses on the use of devices encountered at our institution with an emphasis on more modern devices and their correct radiological appearance and lead position. Examples of incorrect placement will be given with the subsequent complications.

Relevance/impact/discussion: In 2007, NICE approved cardiac resynchronisation therapy (CRT). Since then implant rates have increased on a yearly basis. New developments include multi-polar leads and sonar right atrial electrodes. The positioning of the left ventricular lead is crucial in CRT, and in view of the 10% left ventricular lead displacement rate, it is vital to correctly identify the position of the left ventricular leads to avoid future complication.

Conclusion: All Radiologists are responsible for reporting CXRs and therefore knowledge of the new devices that are used and their varying lead positions, along with their potential complications is essential for a meaningful report.

P-069 **Sarcoidosis: A pictorial review of the cardiothoracic imaging findings**

Franchesca Wotton; Tinu Purayil; Vikram Raju; Richard Riordan
Peninsula Radiology Academy, Plymouth

Aims/objectives: Sarcoidosis is a multisystemic, non-caseating, granulomatous disease of unknown aetiology which can affect any tissue throughout the body. Presentation is variable and dependent upon which and to what extent an organ is affected, with pulmonary involvement being the most common (90% of cases). Cardiac involvement is less common but is under-diagnosed, occurring in 25-50% at post mortem. Clinically, cardiac sarcoidosis is often asymptomatic, causing symptoms in around 5% of cases such as heart failure and life threatening conduction abnormalities. The aim of this pictorial review is to demonstrate the range of pulmonary and cardiac imaging findings and manifestations of sarcoidosis.

Content: This is a pictorial review of pulmonary and cardiac manifestations of sarcoidosis. There will be imaging examples to illustrate the spectrum of cardiopulmonary sarcoidosis including the diagnosis, staging and assessment of complications. For pulmonary sarcoidosis, examples will demonstrate the typical and atypical pulmonary findings across modalities such as chest radiograph and CT, and across the stages (0-IV). For cardiac sarcoidosis, examples will include the spectrum of common cardiac MR features of myocardial involvement.

P-070 Applied physics of cardiac MRI - what, why and how?

Madhusudan Paravasthu; Dhivya Murthy Paravasthu; Neena Kalsy; Erica Thwaite
Aintree University Hospital NHS Foundation Trust

Aim: We aim to simplify and summarise the basic principles and applied aspects of physics behind cardiovascular MR imaging.

Content: The basic principles of cardiac MRI is discussed, in particular the basis of image formation, the need for cardiac synchronization, commonly used sequences and their purpose in clinical problem solving. Images of examples of the sequences with relevant pathology will also be described.

Impact/relevance: MRI physics is complex and cardiovascular MRI is a speciality in itself. The complexity of the underlying imaging principles makes this elusive to the trainees and junior radiologists and is often poorly understood. This exhibit is intended to provide a summary of the basics of cardiac MRI, the purpose of the commonly used sequences, demonstrate how it is different from MR imaging of other body parts and illustrate the utility of the imaging with examples of pathology and artefacts. We hope this would serve as an invaluable educational tool and provide a good grasp of applied physics of CMR.

P-071 Cardiac CT dose and Agaston calcium score in male and female patient cohort group

Shahabaz Patil; Sri Iyengar
Birmingham City Hospital

Cardiac CT has come a long way and has become the first line of test for most radiologist and cardiac physicians. There are many new advances in the recent past in regard to maximizing dose reduction of cardiac CT. Our aim was to look at the cardiac radiation dose and calcium score.

Methods and results: A single center retrospective study of cardiac CT over a period of 6 months from April to September 2013. All the scans have been performed on 256-slice scanner. A total of 88 patients with 36 females and 52 males. Prospective gating was done in all our patients. Beta-blocker was used in intravenous form. The median KV and mA was 100 and 330 respectively. Coronary calcium was graded as per the Agaston score.

	Male	Female
Age	24-77(mean 50)	34-74 (mean 51)
BMI	20-34.9 (mean 27)	20-51 (mean 26)
Baseline heart rate	46-107 (mean 67)	60-126 (mean 65)
Beta blocker	0-50 mg (mean 13)	0-65 mg (mean 16)
Acquisition heart rate	46-75 (mean 53)	45-70 (mean 55)
Agaston score	0-346 (mean 73)	0-315 (mean 9.5)
Radiation dose DLP	27-376mGycm (Mean 162 mGycm)	42-393 mGycm (Mean 195 mGycm)

Conclusion: The p value is 0.11 for the cardiac CT radiation dose among male versus female patients, stating there is no significant difference between the two data sets. But there is significant difference in the coronary calcium score (p value 0.035)

P-072 Cardiac MRI: Enhancement patterns demystified

Tinu Puthen Purayil; Franchesca Wotton; Vikram Raju; Ajay Sahu
Plymouth Hospitals NHS Trust

Aims: To demonstrate different Cardiac MRI Gadolinium enhancement patterns and its significance.

Content: Cardiac MRI is a non-invasive imaging tool used to look at cardiac morphology, function, blood flow, and myocardial perfusion in a single setting. Post gadolinium series are part of these studies and gives valuable information for differentiating various pathologies. Delayed myocardial enhancement is not specific for myocardial infarction and can occur in a variety of other disorders, such as inflammatory or infectious diseases of the myocardium, cardiomyopathy, cardiac neoplasms, and congenital or genetic cardiac pathologic conditions.

Discussion: Hyperintense areas will appear in the myocardium where necrosis, scar, fibrosis, or infections occur because they retain the contrast agent longer than healthy myocardium. Hyper-enhancement patterns can be found

with different types of pathology. Ischemic heart disease typically manifests as a sub-endocardial region of hyper-enhancement, which if extensive, may become transmural.

But the enhancement patterns in acute vs. chronic myocardial infarction, myocarditis, sarcoidosis , hypertrophic and dilated cardiomyopathy, vasculitis, cardiac tumors, arrythmogenic right ventricle and in mytonic dystrophies are all different. We believe this poster with representative images will help Radiologist to recognise common and uncommon patterns of cardiac gadolinium enhancement.

P-073 **Incidental pulmonary emboli (PE) on non CTPA (CT pulmonary angiogram) computed tomography (CT) scans: The signs that work and the confusers to recognise**

Sarah Iddles; Alison Kilburn; Bernadette Carrington
The Christie NHS Foundation Trust

Aims and objectives: To review the pathophysiology of PE, CT (computed tomography) pulmonary vascular anatomy, the CT signs of pulmonary emboli and potential mimics when screening non CTPA scans for incidental pumonary emboli. To improve the identification of PE, (which is found in 4 to 6% of routine CT scans) and increase reporting accuracy.

Content: Pathophysiology of pulmonary embolism.
Pulmonary vascular anatomy.
CT signs of pulmonary emboli and their identification on routine, non CTPA examinations.
CT mimics of pulmonary emboli.

Relevance/impact: An educational resource to inform both radiographers and radiologists in detecting PE and help differentiate PE from other pathology.

Outcomes: This exhibit will help increase awareness of incidental PE and improve confidence in diagnosis by reviewing relevant anatomy and CT signs. There will be heightened awareness of the mimics of pulmonary emboli and how to differentiate between the two. Recognition of incidental PE is an important component of improving patient outcomes from venous thromboembolic disease in accordance with national aims and guidelines.

P-074 **Comparison and predictive significance of pre test probability and calcium score in computed tomography coronary angiography**

Robert Parry; Clare Hammond; Jonathan Wide; Nabil Mohsin; Donagh Whyte
St Helens and Knowsley Teaching Hospitals NHS Trust

Aim: A retrospective analysis of predicting the likelihood of coronary artery disease (CAD) based on a combination of the pre test probability (PTP) and CT calcium score (CTCS).

Method: NICE guidelines suggest patients with a PTP of below 30% have CTCS as a first investigation PTP between 30 and 60% have functional testing by stress echo or myocardial perfusion imaging and over 60% PTP go straight to invasive coronary angiography. To meet 3 weeks targets we used CTCS for patients in all PTP categories.

Patients with a CTCS of 1 or greater proceeded to CT coronary angiography (CTCA).

Results: 273 patients had CTCA post CTCS, 169 had a PTP of below 30%, 99 fell between 30 and 60% and 5 had a PTP of over 60%. We evaluated all the patients in the PTP under 30% to correlate their CACS with findings at CTCA. We found that no patient with a CACS below 13 and a PTP below 30% had any CAD.

Conclusion: If our ongoing study bears out these results then in our population demographics patients in the PTP group below 30% who have a CACS below 10 can be reassured without the need for CTCA. This reduces the radiation burden allowing CT resources to be directed elsewhere. A CTCS of 0 in isolation does not exclude significant CAD.

P-075 **Constrictive pericarditis - imaging review**

Madhusudan Paravasthu; Dhivya Murthy Paravasthu; John Curtis; Aleem Khand; Erica Thwaite
Aintree University Hospital NHS Foundation Trust

Aim: We aim to review all the imaging findings of constrictive pericarditis in various modalities.

Content: The imaging features of constrictive pericarditis is reviewed in all modalities including plain radiography, CT, MRI.

Relevance: Constrictive pericarditis is a clinical entity and is poorly understood by clinical radiologists as imaging features are only a supplement to the presenting signs. A variety of imaging features can help in making diagnosis of constrictive pericarditis or indicate the possibility of the diagnosis in the unsuspected cases. The review of imaging features on plain radiography, CT and MRI is intended to help the radiologists and trainees to reinforce their knowledge and to stress the importance of assessing the pericardium and heart routinely in reporting cross sectional imaging.

P-076 **Morbidity and mortality associated with contrast venography proven distal deep vein thrombosis - a cause for concern?**

Gordon Cowell; Stephanie King; John Reid; Edwin van Beek; John Murchison
Victoria Infirmary, NHS Greater Glasgow and Clyde; Royal Infirmary of Edinburgh; Borders General Hospital, Melrose

Aims: To assess the effect of the presence and locality of deep vein thrombosis (DVT) on mortality and morbidity in a cohort of symptomatic patients investigated by contrast venography, particularly with a view to prevalence of post-thrombotic syndrome (PTS).

Methods: By retrospective case note evaluation and examination of mortality data, 347 patients with venography proven DVT were matched with venography negative controls. Long term complications including recurrent thromboembolic events and post-thrombotic syndrome were recorded, as well as mortality data.

Results: Of the DVT proven patients, 179 (51.6%) were deceased, with 8.5% a consequence of DVT or pulmonary embolism (PE). 23.3% of patients with proximal DVT suffered recurrent DVT as opposed to 12.6% in those with isolated below knee DVT. The 5 year survival of the below knee group was 64%, whilst the above knee survival was 74%. The relative risk for developing definite PTS was 0.544 for below knee DVT versus the above knee group.

Conclusion: As expected, morbidity is greater in the form of PTS in those patients with proximal DVT, however a smaller but significant proportion of patients with distal DVT also develop PTS, demonstrating the need for vigilance for this condition in order to correctly manage patients.

Clinical: Uroradiology; gynaecology; obstetrics

P-077 **An audit of ultrasound scanning using the Foetal Anomaly Screening Programme (FASP) Image Assessment Tool 2012**

Penelope Bell; Emily Weiner
University Campus Suffolk; Royal London Hospital

Introduction: Accurate measurement of the foetal ultrasound components Nuchal Translucency (NT) and Crown Rump Length (CRL) are of great importance. Precise dating is required using CRL so that NT thickness can be compared to a reference range. Increased NT is linked to the presence of Down Syndrome. An audit standard, the Foetal Anomaly Screening Programme (FASP) Image Assessment Tool 2012, sets out the required scan criteria. It was used to measure ultrasound scans performed in a busy ultrasound department before and after ultrasound in service training.

Method: A retrospective audit of 100 nuchal scans, pre and post-training was performed. Component parts and overall images were scored against set criteria in FASP.

Results: The mean for meeting the audit standard across the 6 CRL criteria was 80% and, across the 4 NT criteria 82%, before training. After training the mean for CRL was 84% and NT 89%.

Conclusion: The percentage meeting the audit standard improved after training demonstrating the effectiveness of training. The two components which were difficult to scan correctly may warrant a discussion on their importance.