Abstracts

Poster-walk Competition
Ultrasonographic evaluation of the severe hip osteoarthritis: inter-observer agreement and comparison with radiography

Author: Jouni Haverinen, sonographer-radiographer

Co-authors: Mikko Pakanen, Minna Heiskanen, Kyösti Kauppinen, Mika Nevalainen

Department of Diagnostic Radiology, Oulu University Hospital, P.O. Box 50, 90029 Oulu, Finland

Introduction:
The osteoarthritis (OA) of the hip is common disease inflicting remarkable socioeconomical burden worldwide. The purpose of this study was to assess the inter-observer agreement of ultrasonography (US) of the osteoarthritic hip joint, and to compare the US findings to the radiography findings.

Materials & Methods:
Sixty-five consecutive patients suffering from severe OA were recruited for this study during November 2017 to May 2018. The mean patient age was 68 years (range 50 to 88) and 40 % were males. One radiologist (four years of experience) performed routine US evaluation of hip joint on all patients; effusion/synovitis, osteophytes at femoral collum and acetabulum, and deformity of femoral caput were evaluated. Additionally, three independent sonographers (all five years of experience) performed the US evaluation. Radiography was available on every patient; osteophytes at collum and acetabulum, and caput deformity were evaluated by the radiologist.

Results:
The total inter-observer agreement was substantial for effusion/synovitis ($\kappa=0.754$), osteophytes at collum ($\kappa=0.754$) and at acetabulum ($\kappa=0.815$), and moderate for caput deformity ($\kappa=0.538$). The separate inter-observer agreement values for each sonographer are found in the Table 1. When compared to the radiologist, the detection rate of the sonographers for effusion was 100%, for osteophytes at collum 90%, for osteophytes at acetabulum 97%, and for the caput deformity 78%. Ultimately, as US examination was compared to radiography, US found more osteophytes at collum (97% vs. 71%), at acetabulum (97% vs. 82%), and detected more caput deformity (89% vs. 42%).

Table 1. Inter-observer agreement (kappa values) between the three sonographers and the radiologist, respectively.

<table>
<thead>
<tr>
<th></th>
<th>Effusion/synovitis</th>
<th>Osteophytes at collum</th>
<th>Osteophytes at acetabulum</th>
<th>Caput deformity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sonographer 1 (21 cases)</td>
<td>0.810</td>
<td>0.810</td>
<td>0.714</td>
<td>0.619</td>
</tr>
<tr>
<td>Sonographer 2 (22 cases)</td>
<td>0.818</td>
<td>0.909</td>
<td>0.909</td>
<td>0.364</td>
</tr>
<tr>
<td>Sonographer 3 (22 cases)</td>
<td>0.636</td>
<td>0.545</td>
<td>0.818</td>
<td>0.636</td>
</tr>
</tbody>
</table>
Conclusion:
The inter-observer agreement for US of the severe hip OA is substantial for osteophytes and effusion/synovitis. Experienced sonographers can perform the US examination at the same level of confidence as radiologist. US seem to be more sensitive to detect OA of the hip than radiography.
5

Weight-bearing cone beam CT scanning of potential unstable WeberB/SER2 ankle fractures.

Authors:
Yildiz Sainoski (intern radiologist), Daniel Zakarias Nielsen, Mine Benedicte Lange
Hospital of North Zealand, Hilleroed, Department of Radiology

Introduction:
WeberB/SER2 (supination/external rotation) fracture is characterized by fracture of the lateral malleolus at the syndesmosis level. In the acute phase, it may be clinically/radiographically impossible to distinguish a stable SER2 fracture from an unstable surgery-requiring SER4 fracture. Weight-bearing X-ray examination 5-7 days after injury has been shown to be the most precise assessment method (1-4), but is difficult to assess. Multidetector CT (MDCT) scanning doesn’t provide weight-bearing facilities, has limited availability and gives high X-ray dosage (5). Cone Beam CT (CBCT) scans includes the anatomical region in one rotation using cone-shaped X-ray and a two-dimensional detector plate saving time and radiation. pedCAT® (CurveBeam) is a CBCT scanner dedicated to weight-bearing foot/ankle imaging scanning the entire foot length of both feet simultaneously. Evidence for evaluation of hallux valgus and pes planus (6-10) is available, but lacking for ankle fractures. We therefore wanted to evaluate the suitability of pedCAT for potential Weber B/SER fractures.

Material and methods:
A retrospective search in AGFA IMPAX RIS/PACS on pedCAT-scans from March 2018 to December 2018 including possible unstable SER-fracture patients was performed. Fracture/ankle mortise position and secondary pathological findings journal (EPIC) notes, especially choice of treatment, were registered. The quality of referrals was assessed based upon inclusion of side, area and need for weight-bearing scan.

Results:
Fifty-seven patients (mean age 51, SD 19) were included. Mean time of referral was 12 days after injury. Position of lateral malleolus fracture was unchanged in 68 % (< 1 mm). Medial clear space in coronal and axial view were normal (< 4 mm) in 100 %. Surgery was performed on 4 %. Secondary pathology was identified in 40 %, osteoarthritis and hallux valgus being the most common. Additional fractures were found in 22 % and syndesmosis lesion in 4 %. Only 12 % of the referrals met the quality standard.

Conclusion:
CBCT weight-bearing scan seems to be a valuable method for evaluation of potential unstable WeberB/SER2 fractures compared to X-ray, offering beneficial side features. Study limits are the small number of patients included and the retrospective design. Prospective studies with a longer follow-up are needed.
References:
MR Imaging of Clear cell sarcoma of the Achilles tendon: Case Report

Authors:
Kyung Ah Chun, Jin Soo Suh

The authors' place of employment:
Department of Radiology, Catholic Kwandong University, International St. Mary’s Hospital
Department of Orthopedic Surgery, Inje University Ilsanpaik Hospital

Profession of the presenter:
Radiologist

Background:
Clear cell sarcoma, also known as malignant melanoma of soft tissue, is a very rare tumor with a slight preponderance in young women and in the lower extremities. Its MR findings are rarely described in the literature. We present a rare case of this tumor in a young female, with subsequent review of the literature.

Patient case:
A 30-year-old female presented with an 18 months history of a progressively increasing mass over the left heel. She had no history of obvious trauma to the left heel. She however, claimed the pain started around the same time she went hiking in very tight shoes. Preoperative MRI revealed ill-defined soft tissue mass along the Achilles tendon with iso-intense signal compared with adjacent muscle on T1WI, and high signal on T2WI. Postcontrast image showed heterogeneous enhancement of the mass. The mass bulged out of the tendon and extended under the heel skin. She had excision of the mass with the overlying skin and underlying segment of the Achilles tendon. Postoperative histopathologic findings revealed that the tumor was clear cell sarcoma. The resection margin was free from malignant cell invasion. No additional treatment was performed. She has been scheduled for periodic review to scout for local recurrence and distant metastases.

Conclusion:
MRI plays a significant role in the diagnosis supported by histopathology. So, radiologists should be familiar about this presentation that could guide other personnel for early detection of soft tissue tumors while including clear cell sarcoma into differential diagnosis for evaluation.

References:
Isolated left-sided pulmonary artery agenesis in a 69-year-old never-smoking women with hemoptysis – a case report (poster)

Authors:
Chenxi Huang (radiologist)\(^1\), Ane Sterup-Hansen Prip\(^1\), Jatinder Singh Sidhu\(^2\), Uffe Bodtger\(^{2,3,4}\)
\(^1\)Department of Radiology, Naestved Hospital, DK
\(^2\)Department of Respiratory Medicine, Naestved Hospital, DK
\(^3\)Department of Respiratory Medicine, Zealand University Hospital Roskilde, DK
\(^4\)Institute for Regional Health Research, University of Southern Denmark, DK

Background
Unilateral pulmonary artery agenesis (uPAA) is a rare condition with an estimated prevalence of 1:200,000. In most cases, uPAA is coexists with other and congenital, symptomatic cardiovascular abnormalities such as tetralogy of Fallot, and is thus diagnosed during childhood. Isolated uPAA without cardiovascular abnormalities is very rare, often involves the left artery, and is incidentally found during workup of hemoptysis or mild dyspnea. In addition to absence of the pulmonary artery, chest CT often shows a hypoplastic ipsilateral lung, collateral vessels, mild bronchoectasia and dilatation of the contralateral pulmonary artery. Management of the condition depends on severity of symptoms and may requires surgery (1,2).

Patient case
A 69-year-old never-smoking, Inuit woman (Greenland) was admitted to our clinical unit due to two episodes of monosymptomatic, self-limited hemoptysis during the preceding 6 months. She reported being short of breath since childhood during heavy exercise. She had no other signs of bleeding disorder or anticoagulant medicines usage. Chest x-ray showed reduced bronchovascular structures on left hemithorax. Chest CT and later CT angiography showed no lung tumor but absence of the left lung artery, subtle volume reduction of left hemithorax, two collateral vessels descending from aortic arch and slightly dilated left intercostal arteries. There were normal configurations of left lung veins, bronchial arteries and airways. The right lung was normal with slight compensatory ectasia of the right pulmonary artery. SPECT scintigraphy showed no perfusion of the left lung. Pulmonary function test showed diffusion capacity of 55% of expected value and FEV1/FVC = 0.79. Cardiac examinations were unremarkable. The patient was referred to the Department of Thoracic Surgery for evaluation for coiling.

Conclusion
Isolated uPAA is a very rare condition, and the true prevalence is unknown since the condition may go unnoticed. The patient in current case experienced recurrent hemoptysis. Isolated uPAA can be considered as a differential diagnosis in the workup of hemoptysis. CT Pulmonary angiography can verify this condition.

References
Caption
3D reconstruction of major vessels in the thoracic cavity using CT angiography showing lack of left sided pulmonary artery and two tiny and curved collateral vessels descending from the aortic arch.
Comparison between Gallium68-PSMA PET-CT and Bone scintigraphy for the assessment of skeletal disease burden in the prostate cancer patients.

Authors:
Sukanta Barai, Ajay Suraj, Sanjay Gambhir
Department of Nuclear Medicine, Sanjay Gandhi postgraduate Institute of Medical Science, Lucknow, India226014
Profession of the presenter:
Nuclear Medicine physician

Introduction:
Prostate Specific Membrane Antigen (PSMA) is type II membrane glycoprotein, which over expressed in prostate cancers and the expression increases with tumor aggressiveness. Gallium68 labeled-PSMA is increasingly being used for this ability to evaluate both skeletal and soft tissue component in a single investigation1. We prospectively evaluated the efficacy of 68Ga-PMSA PET/CT for detection of skeletal lesions and compared the results with bone scan.

Materials and methods:
Total 35 patients with biopsy proven prostate cancer underwent 68Ga-PMSA PET-CT scan and Tc99m-MDP bone scan within 10 days of one another after informed consent. Both 68Ga-PMSA PET-CT scan and Tc99m-MDP were done according to standard procedure guideline. The scan interpretations were done by two experienced nuclear medicine physicians; both were blinded to the clinical and radiological data of the patients. All lesions with focal increased tracer uptake higher than the background were considered as pathological. McNemar test was used to look for concordance between both the modalities. A P value < 0.05 was considered significant.

Results:
The mean age, median PSA level and the mean Gleason score of the tumour was 64.2 year, 13.7 ng/ml and 7 respectively. On 68Ga-PSMA-PET-CT Total 76 bone lesions were detected in the 10 patients, no skeletal lesions were detected in remaining 25 patients. Whereas skeletal scintigraphy detected 99 lesions in 12 patients. Two patients with negative PSMA scan, had bone lesions on MDP bone scan.

Conclusions:
Ga68-PSMA PET-CT tends to underestimate skeletal disease burden in prostate cancer and should be used with caution as a ‘one-stop-shop’ imaging method in prostate cancer. 68Ga-PSMA-PET/CT scan should not entirely replace Tc99m-MDP bone scan for metastatic workup of prostate cancer patients.

References
Lars J. Petersen, Julie B. Nielsen, Katja Dettmann, Rune V. Fisker, Uwe Haberkorn. 68Ga-PSMA PET/CT for the detection of bone metastasis in recurrent prostate cancer and a PSA level <2 ng/ml: Two case reports and a literature review. Mol Clin Oncol. 2017; 7: 67–72.
Minimising radiation dose in computed tomography of kidneys, ureters and bladder (CT-KUB)

Authors:
Dr Almuzamel Khair (Medical Doctor), Dr Aiaaeldin Ginawi (Radiology Registrar), Dr Somaya Taha (Senior Medical House Officer), Dr Uday Bannur (Radiology Consultant)

Institution:
Nottingham University Hospitals, Nottingham, United Kingdom

Background:
CT-KUB is the favoured imaging to confirm the diagnosis of urinary tract calculi, in accordance with the guidelines of the Royal College of Radiologists and British Association of Urological Surgeons \(^1\)\(^2\). CT-KUB should commence cranially to include both kidneys in their entirety but be well collimated thereafter to minimise dose. Radiation dose can be reduced by minimising the scan field with many authors quoting the upper border of T10 as a landmark to commence the examination \(^3\). However, many scans commence above this and thus expose the patient to unnecessary radiation.

Methods:
A retrospective study involving two cycles with 200 CT-KUB’s in each.
1\(^{st}\) audit: 14/03/18 – 14/04/18
2\(^{nd}\) audit: 06/11/18 – 06/12/18
Data collection:
A) Vertebral level at which the kidneys are fully included.
B) Vertebral level at which the scan is commenced.

The findings of the 1\(^{st}\) cycle was presented at a departmental QI meeting leading to a change in the CT-KUB protocol to specifically state “Plain scan from upper T10 to symphysis pubis” instead of “Plain scan from top of kidneys to symphysis pubis”. Radiographers were encouraged to follow this protocol.

Results

<table>
<thead>
<tr>
<th></th>
<th>1(^{st}) audit</th>
<th>2(^{nd}) audit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A)</td>
<td>199 patients T10-12 1 patient had the upper level of their kidneys at L1</td>
<td>197 patients T10-12 3 patients had the upper level of their kidneys at L1</td>
</tr>
<tr>
<td>B)</td>
<td>115 scans commenced at T10-T12 85 commenced above T10</td>
<td>145 scans commenced at T10-T12 55 commenced above T10</td>
</tr>
</tbody>
</table>

Conclusion
Our study demonstrates that after raising radiation awareness, the protocol for CT-KUB had changed, leading to reasonable improvement in the range of scans that commenced at the standard level (T10).
References

Dual-layer spectral CT: Virtual non-contrast facilitates detection of aortic dissection

Authors:
an,c Cathrine Helgestad Kristiansen, a Ajenee Kathirgamanathan, an, d Thien Trung Tran, a, d Jonn Terje Geitung, a c Cecillie Hansen Meyer, a, a Peter Mæhre Lauritzen
a Akershus University Hospital, Norway
b Oslo University Hospital, Norway
c Oslo Metropolitan University, Norway
d University of Oslo, Norway
Presenter: Cathrine Helgestad Kristiansen (radiographer)

Background
Computed tomography angiography (CTA) is valuable in the diagnosis of acute aortic syndrome such as aortic dissection and intramural hematoma (1). Additional unenhanced acquisition (non-contrast images) prior a contrast-enhanced CTA facilitates the detection of intramural hematoma (2, 3). Our hospital installed a novel dual-layer spectral CT (DL-CT) (IQon, Philips Healthcare, The Netherlands) in August 2017. The diagnostic accuracy of virtual non-contrast (VNC) images generated from DL-CT has been reported to be comparable to standard non-contrast images and may reduce radiation exposure when omitting additional native scans (4). In this case report we present the benefit of VNC images generated from our DL-CT in a patient with aortic dissection.

Patient case
A 68-year old man was admitted with chest pain. A non-ECG triggered CTA scan was performed using a DL-CT. The images showed an acute aortic dissection (Stanford type A) involving the ascending, descending aorta and affecting branches of the aortic arch and pericardium. The findings were confirmed by surgery and the patient was treated with a supra-coronary graft. In this case, VNC images provided the radiologist more information that strengthened the diagnostic certainty of aortic dissection.

Conclusion
As far as we know, this is the first case report/study that has focused on the clinical application of VNC generated from DL-CT in the diagnosis of aortic dissection. At our hospital, VNC images are now added routinely to our CTA protocol of the aorta. VNC displays images as if iodine contrast medium was not administered and with attenuation-values as if no iodine was present. Additional VNC images may replace standard unenhanced (non-contrast) CT acquisitions. We believe that the ALARA principle (As Low As Reasonably Archivable) should be followed to reduce the radiation exposure to the patient.
Clinical application of VNC images in our patient is demonstrated in figure 1.
Figure 1. Left column: VNC images generated from a DL-CT. Right column: contrast enhanced CTA in the same patient.

VNC images show higher attenuation in the dissection lumen (intramural hematoma) than the adjacent aortic lumen in the ascending aorta, aortic arch, proximal descending aorta and pericardium.

References
Sigmoid diverticulitis in an inguinoscrotal hernia

Authors:
Haleh Tabatabaei Adl Radiology Student, Yousef W. Nielsen Department of Radiology, Herlev and Gentofte Hospital

Case:
A 80-year-old man was admitted due to increasing pain and tenderness in the left inguinal region. The patient had a left inguinal hernia for several years. Contrast-enhanced CT scan was performed. The scan showed herniation of the sigmoid colon into a left-sided inguinoscrotal hernia. Signs of diverticulitis were present within the herniated bowel.

Background:
Sigmoid colon diverticulitis and inguinal hernias are common entities. However, diverticulitis within a hernia is rarely seen. We present a case of sigmoid diverticulitis within a partially-reducible inguino-scrotal hernia. The CT scan showed typical signs of diverticulitis with wall thickening and fat stranding of the sigmoid colon. There was no abscess formation. The patient was treated with antibiotics. [5]. [2]. Subsequent endoscopy showed no signs of malignancy in the sigmoid colon and further control was planned. The hernia was not operated. [4].

Conclusion:
This case helps to point out that bowel loops within hernias may be complicated with inflammatory changes. Appendicitis within inguinal hernia is well known. Sigmoid diverticulitis is however a rare entity. [4].

References
Coronal contrast-enhanced CT showing inflammatory changes in the sigmoid colon within the left-sided inguinoscrotal hernia. A diverticulum (arrows) is present in the inflamed area.
Cryoablation of a solitary, soft tissue metastasis from renal cell carcinoma – a new local minimal invasive curative treatment

Authors:
Theresa Junker¹,², Benjamin S. Rasmussen¹,², Anja Toft³, Ole Graumann¹,².
¹Dept. of Radiology, Odense University Hospital, Denmark,
²Dept. of Clinical Research, University of Southern Denmark,
³Dept. of Urology, Odense University Hospital, Denmark,
Profession of presenter: RN, PhD student.

Background
Treatment of metastases from renal cell carcinoma (RCC) depends on severity and varies from surgical to oncological treatment, surgical treatment being the gold standard for solitary tumours (1). Percutaneous ablation is a minimal invasive alternative to surgery, where cryoablation is a well-established treatment for primary RCC and operable in various tissues (2). We present a case of curative intended Computed-Tomography (CT)-guided percutaneous cryoablation of a solitary soft tissue metastasis from RCC.

Patient Case
A 54-year-old male underwent radical left nephrectomy due to a 35 mm RCC, stadium 1, in 2004. The patient went through the recommended follow up routine without signs of recurrence. 13 years later the patient was referred with a solitary process of 25 x 25 mm in the intercostal muscles lateral in the left lower hemithorax. A biopsy showed metastasis from clear cell RCC. The patient was discussed at a multidisciplinary conference and was recommended curative intended cryoablation. The cryo procedure was performed under sedation and in local anaesthesia in a Somatom flash system CT-scanner (Siemens Healthineers, Forchheim, Germany). Three IcePearl® 2.1 CX cryo needles (Galil Medical, a BTG International group company, Arden Hills, MN, USA) was placed in the metastasis under CT guidance. A hydro dissection was preformed to push the skin away from the ice ball. A biphasic freeze cycle of 10 minutes on 100 % was performed with an 8 minute thawing period in between. To ensure that the tumour was covered with ice, control scans was performed after 4 and 8 minutes during the treatment session. The whole procedure took 1 hour and 30 minutes and was completed without any complications. The patient went home 2 hours after the cryo needles were removed and was able to resume his normal daily routines the day after treatment. He did not experience any side effects. Follow-up CT scans 3, 8 and 12 months after treatment reported sufficient cryoablation and no sign of recurrence or other metastases.

Conclusion
Cryoablation is a minimal invasive procedure and could be considered a curative intended treatment option of solitary soft tissue metastasis from RCC, and properly also other solitary metastasis.
References
Contrast medium volume optimization in liver CT based on body composition

Authors:
Mette Karen Henning, Audun Berstad, Trond Mogens Aaløkken

The authors’ place of employment:
Oslo University Hospital

Profession of the presenter:
Radiographer, PhD student

Introduction
Liver contrast enhancement in CT should be 50 HU or more to be deemed as successful (1-3). The main objective of this study was to verify that the volume of intravenous contrast medium in abdominal CT categorized in relation to body composition allows good liver enhancement. Contrast medium enhancement in portal venous phase was compared with non-enhanced images.

Methods and Materials
A total of 100 consecutive patients (mean age 59 years, 43 women) examined at a tertiary center for hepatic-pancreatic-biliary surgery were included. Body compositions of patients were categorized subjectively as obese, normal, or muscular. The volume of contrast medium (350 mg I/ml) was 1.5, 2.0 and 2.5 ml/kg body weight in each category, respectively. Mean amount of contrast medium injected was 155 ml. Injection rate was 5 ml/s and scan delay 40 s after termination of the contrast medium injection. The degree of contrast enhancement was expressed as change in CT number (ΔHU), where CT numbers on unenhanced was subtracted from those on contrast-enhanced images. A ΔHU of ≥ 50 HU was defined as a successful study.

Results
Mean contrast liver enhancement was 71 HU (range 38 - 106 HU). A successful study was achieved in 86% of the patients. 9 of 15 (60%), 68 of 75 (91%) and 9 of 10 (90%) of examination were deemed successful in the obese, normal, and muscular category of patients, respectively. Females had in general 12% (p=0.004) higher contrast enhancement, and more successful liver studies than men (91 vs 83%).

Conclusion
Contrast medium volume based on body composition gave satisfactory examinations in most patients. However, contrast volume in a subset of obese and male patients was underestimated.
References


Few associations exist between ultrasonographic and clinical findings on severe knee osteoarthritis

Authors:
Kyösti Kauppinen\textsuperscript{a,c}, Juho Pylväsäinen\textsuperscript{d}, Konsta Pamilo\textsuperscript{e}, Olli Helminen\textsuperscript{e}, Marianne Haa pea\textsuperscript{b,c}, Simo Saarakkala\textsuperscript{b,c}, Mika Nevalainen\textsuperscript{b,c}

\textsuperscript{a}Department of Radiology, Turku University Hospital, Finland
\textsuperscript{b}Department of Diagnostic Radiology, Oulu University Hospital, Finland
\textsuperscript{c}Medical Research Center Oulu, Oulu University Hospital and University of Oulu, Finland
\textsuperscript{d}Department of Radiology, Helsinki University Hospital, Finland
\textsuperscript{e}Department of Surgery, Central Finland Central Hospital, Jyväskylä, Finland

Presenting author:
Kyösti Kauppinen, MD, radiology resident

Introduction
Ultrasonography is an emerging technique to evaluate the osteoarthritis (OA) of the knee joint. Purpose of this study was to assess whether US findings associate with clinical findings in severe knee OA. Moreover, association of US findings to the side of knee, and the inter-observer agreement of knee US were evaluated.

Materials and Methods
One-hundred-two patients (123 knees in total) with severe knee OA were recruited for this cross-sectional study. US was performed on all knees by a single observer, and on 53 knees by two independent observers to assess the inter-reader reliability. Pre-operative clinical data (Knee Society Score) was available on 69 knees. Cut-offs were applied to dichotomize both US and clinical findings. Chi square and Mann-Whitney tests were applied to test associations and prevalence-and-bias-adjusted kappa (PABAK) for inter-reader agreement.

Results
Only six out of 110 associations tested were found statistically significant (Table 1): extension deficit on medial tibial osteophytes, range of flexion on lateral tibial and femoral osteophytes, mediolateral instability on lateral femoral cartilage damage, and alignment on femoral lateral cartilage damage and lateral meniscus damage. Strong association on medial-sided pain and same-sided cartilage damage and osteophytes was also observed (p<0.001). Excellent inter-reader agreement on the medial aspect of the knee joint was perceived (PABAK=0.811-0.887).
Table 1. Statistically significant associations between clinical parameters of The Knee Society Score and US findings.

<table>
<thead>
<tr>
<th>Association</th>
<th>Symptomatic</th>
<th>Asymptomatic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of flexion vs. lateral tibial osteophytes</td>
<td>29/49 (59.2%)</td>
<td>4/20 (20.0%)</td>
<td>0.004</td>
</tr>
<tr>
<td>Mediolateral instability vs. lateral femoral cartilage damage</td>
<td>12/18 (66.7%)</td>
<td>18/51 (35.3%)</td>
<td>0.028</td>
</tr>
<tr>
<td>Extension deficit vs. medial tibial osteophytes</td>
<td>32/39 (82.1%)</td>
<td>18/30 (60.0)</td>
<td>0.042</td>
</tr>
<tr>
<td>Range of flexion vs. lateral femoral osteophytes</td>
<td>47/49 (95.9%)</td>
<td>16/20 (80.0%)</td>
<td>0.033</td>
</tr>
<tr>
<td>Alignment vs. femoral lateral cartilage damage</td>
<td>13/32 (40.6%)</td>
<td>6/26 (23.1%)</td>
<td>11/11 (100%)</td>
</tr>
<tr>
<td>Alignment vs. lateral meniscus damage</td>
<td>11/32 (34.4%)</td>
<td>10/26 (38.5%)</td>
<td>11/11 (100%)</td>
</tr>
</tbody>
</table>

**Conclusion**

US shows a rather poor association with clinical OA findings. Only the side of pain reflects strong association with ipsilateral US findings. The inter-reader agreement of knee US is excellent on the medial side.
The effect of tissue attenuation on count rate in Cadmium-Zinc-Telluride SPECT gated radionuclide angiography

Authors:
Maria Normand Hansen, Bent Kristensen, Christian Haarmark, Bo Zerahn
Department of Clinical Physiology and Nuclear Medicine, Herlev Gentofte University Hospital, Herlev, Denmark
Profession of the presenter: Nuclear medicine physician

Introduction:
It has previously been shown that patient height, weight, gender and age have significant impact on count rate when performing Cadmium-Zinc-Telluride (CZT) SPECT gated radionuclide angiography (1, 2), explaining up to 75% of the variation in count rate. The aim of this study is to determine the influence of tissue attenuation and distance from the heart to the thoracic surface, on count rate.

Materials and Methods:
A total of 77 eligible breast cancer patients (aged 33 to 82; 76 female and 1 male) referred for routine assessment of left ventricular ejection fraction were registered from November 2018 to December 2018. Data were recorded on count rate, heart rate, age, gender, height, weight, left side mastectomy/lumpectomy, and measures of heart depth (anterior depth, right and left oblique and left sided depth) from computed tomography (CT) scan of the thorax. All radionuclide angiographies were performed on a dedicated cardiac CZT SPECT camera, GE Discovery 530c. An individual dose of $^{99m}$Tc-labeled human serum albumin, based on weight, height, gender and age, was administered to each patient.

Results:
Of the 77 patients, 18 had undergone left side mastectomy and 19 had undergone left side lumpectomy. A CT scan of the thorax was available for 67 of the patients. Three of the four depth measures were significantly associated to count rate (p<0.05). The strongest association was found between ‘left anterior oblique’ and count rate. Multivariable linear models adjusted for the administered dose of $^{99m}$Tc-labeled human serum albumin show that ‘left anterior oblique’ explains variation in count rate with an adjusted $R^2$ of 0.46 (Table 1).

Conclusion:
Heart depth measured on a CT scan of the thorax is significantly associated with variations in count rate when performing CZT radionuclide angiography, and may, therefore, contribute to explaining the variations in count rate not yet accounted for by present models (1, 2).
Table 1: Multivariable linear models adjusted for administered dose of $^{99m}$Tc-labeled human serum albumin

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables</th>
<th>Coefficient</th>
<th>Std.error</th>
<th>P-value</th>
<th>95% Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>Right anterior oblique</td>
<td>-0.0784</td>
<td>0.0306</td>
<td>0.0126*</td>
<td>-0.1395 -0.0174</td>
</tr>
<tr>
<td></td>
<td>Dose of tracer</td>
<td>0.0028</td>
<td>0.0005</td>
<td>&lt;0.0001*</td>
<td>0.0018 0.0038</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R$^2$ 0.35 Adjusted R$^2$ 0.33</td>
</tr>
<tr>
<td>Model 2</td>
<td>Anterior</td>
<td>-0.0729</td>
<td>0.0425</td>
<td>0.0916</td>
<td>-0.1578 0.0121</td>
</tr>
<tr>
<td></td>
<td>Dose of tracer</td>
<td>0.0029</td>
<td>0.0006</td>
<td>&lt;0.0001*</td>
<td>0.0016 0.0042</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R$^2$ 0.32 Adjusted R$^2$ 0.29</td>
</tr>
<tr>
<td>Model 3</td>
<td>Left anterior oblique</td>
<td>-0.1200</td>
<td>0.02496</td>
<td>&lt;0.0001*</td>
<td>-0.1699 -0.0702</td>
</tr>
<tr>
<td></td>
<td>Dose of tracer</td>
<td>0.0035</td>
<td>0.0005</td>
<td>&lt;0.0001*</td>
<td>0.0026 0.0044</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R$^2$ 0.48 Adjusted R$^2$ 0.46</td>
</tr>
<tr>
<td>Model 4</td>
<td>Left</td>
<td>-0.0727</td>
<td>0.02264</td>
<td>0.0021*</td>
<td>-0.1180 -0.0275</td>
</tr>
<tr>
<td></td>
<td>Dose of tracer</td>
<td>0.0031</td>
<td>0.0005</td>
<td>&lt;0.0001*</td>
<td>0.0021 0.0041</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R$^2$ 0.39 Adjusted R$^2$ 0.37</td>
</tr>
</tbody>
</table>

References
Intrapancreatic accessory spleen mimicking malignant tumor: Three case reports

Authors:
Maria Zurek Munk-Madsen1, Kristine Zakarian2, Peter Sandor Oturai3, Carsten Palnæs4, Birgitte Federspiel5, Eva Fallentin1, Gro Linno Willemoe.5

Authors’ place of employment:
1Department of Radiology, Copenhagen University Hospital, Rigshospitalet
2Department of Pathology, Aalborg University Hospital, Aalborg Universitetshospital
3Department of Clinical Physiology, Nuclear Medicine & PET, Copenhagen University Hospital, Rigshospitalet
4Department of Surgical Gastroenterology, Copenhagen University Hospital, Rigshospitalet
5Department of Pathology, Copenhagen University Hospital, Rigshospitalet

Profession of presenter: Radiologist, before specialization.

Background
Intrapancreatic hypervascular lesions may have different etiologies, including metastasis, neuroendocrine tumor (NET) or intrapancreatic accessory spleen (IPAS). Accessory spleens are common, benign congenital or acquired anomalies, found in 10 % of the population, and in up to 20 % of cases they are located in the tail of the pancreas (i, ii) and typically they are below 3 cm in size. (iii) IPAS represents a clinical challenge, radiologically mimicking malignant tumor, which can lead to surgical interventions and surgery related risks.

Patient case
We report three cases of pancreatic lesions that underwent pancreatic surgery due to suspicion of malignancy on imaging. The first patient was suspected to have an asymptomatic PNET (case 1), the second patient a symptomatic PNET (case 3) and the third patient was suspected to have a metastasis from a renal cell carcinoma (case 2). All cases were histologically found to be intrapancreatic accessory spleens.

Conclusion
Our three cases point to the importance of considering IPAS as a potential diagnosis when detecting an asymptomatic lesion in the pancreatic tail in order to avoid unnecessary surgery. (iv) To diagnose an IPAS, a single-photon emission computed tomography with heat-damaged Tc-99m-pertechnetate labelled erythrocytes (spleen-SPECT) should be performed. Unfortunately, there is a size-related threshold for the detection of splenic tissue with spleen-SPECT. In general, if a small pancreatic tail tumor shows matching characteristics to the spleen, a biopsy to rule out IPAS is recommended before surgery, despite a negative spleen-SPECT.
Figure from case 2:
2A to the left showing a T2 fatsat MRI sequence with the intrapancreatic process of similar intensity to that of the spleen.
2B to the right showing the negative scintigraphy of the intrapancreatic process due to its small size.
Preliminary report of a prospective study of consequences of preoperative contrast enhanced MRI of breast in all new breast cancers.

Authors:
Magnus Rosenborg¹ radiologist, Åsa Haglund Rosenborg¹, Louise Öwall², Ingvar Mars¹. Depts. Of radiology¹ and surgery² at Zealand’s Breast Center, Ringsted Hospital, Denmark.

Introduction:
In order to get a better preoperative diagnosis in breast cancer we introduced MR of the breast in all new breast cancers. As has been proposed in other studies we hoped this would lead to a better strategy for treatment and a reduction in number of reoperations.

Material and methods:
From mid November 2017 forthworth we have performed preoperative MR of the breasts in all newly presented breast cancers at the Zealand breastcenter at the Ringsted Hospital, Denmark. To date (1st March 2019) 280 was operated and has been analyzed from 101117 to 010418.

Results:
This preliminary report comprises 284 newly diagnosed breast cancers. Of these MR-studies, a change in strategy of therapy occurred in 54,5% due to unexpected multifocality, bilaterality or a bigger extent than indicated at the primary radiology. We compare the frequency of re-operation after the introduction of preoperative MR, to the same period prior year. The frequency of repeated surgical procedures in full anesthesia is after the introduction of preoperative MR reduced by 46% to 9,5%. The year before the reoperation frequency was 17,6%. The relation between mastectomy and lumpectomy the year before was 24,8% and in our present study 31,8%, an increase by 28%.

Conclusion:
By performing MR of the breast preoperatively on patients with carcinoma of the breast the therapy strategy will be altered in about half of the cases and the need for a reoperation in full anesthesia is reduced by half. There was also an increase in the number of mastectomies which should be compared to the amount of mastectomy in a reoperation. This has not been analyzed yet.

References:
MRI of the breast (POMB) influences primary treatment in breast cancer: a prospective, randomized, multicenter study.
Preoperative Breast MRI for Early-Stage Breast Cancer: Effect on Surgical and Long-Term Outcomes Janice S. Sung¹, Jie Li², Glenys Da Costa¹, Sujata Patil¹
Preoperative breast MRI-examination for all patients with histologically proven breast cancer? A concept for a prospective multicenter trial.
Kaiser C¹, Kehrer C¹, Keyver-Paik MD², Hecking T², Ayub TH², Leutner C³, Schild H³, Kuhn W².
Preoperative breast MR imaging in patients with primary breast cancer has the potential to decrease the rate of repeated surgeries.


Reoperation costs in attempted breast-conserving surgery: a decision analysis

R.E. Pataky, MSc* and C.R. Baliski, MD†‡

Reoperation rates after breast conserving surgery for breast cancer among women in England: retrospective study of hospital episode statistics

BMJ 2012; R Jeevan, research fellow, D A Cromwell, senior lecturer, M Trivella, lecturer, G Lawrence, director, O Kearins, regional deputy director of breast screening quality assurance, J Pereira, consultant breast surgeon, C Sheppard, consultant breast care nurse, C M Caddy, consultant plastic surgeon, J H P van der Meulen, professor of clinical epidemiology

Reoperations after primary breast conserving surgery in women with invasive breast cancer in Catalonia, Spain: a retrospective study

Article in Clinical and Translational Oncology 19(4):1-9 · September 2016 reoperation rates of 29% in The Netherlands, 23% in the US, and 21.5% in Germany – again with significant variations in the rates reported by different hospitals. October 2017

Trends in Reoperation After Initial Lumpectomy for Breast Cancer Addressing Overtreatment in Surgical Management

Monica Morrow, MD; Paul Abrahamse, MA; Timothy P. Hofer, MD; et al


Although BCS is a less morbid surgical approach, an important downside to its use is the historically high rate of additional operations (reexcision lumpectomy and/or mastectomy) after initial lumpectomy, ranging from 23% to 38% in published reports. Variability in reexcision following breast conservation surgery. JAMA. 2012;307(5):467-475. Article PubMed Google Scholar CrossRef

McCahill LE, Single RM, Aiello Bowles EJ, et al.


Optimisation of patellofemoral joint measurements in radiological cross-sectional imaging

Assessment of reproducibility and variation of patellofemoral measurement methods focusing on TT-TG distance

Authors:
Signe Brinch, Niels Egund, Peter Lavard, Mikael Ploug Boesen, Philip Hansen

Presenting author:
Signe Brinch, Medical student
Department of Radiology, Musculoskeletal Imaging Research Unit, Bispebjerg-Frederiksberg Hospital

Introduction:
The distance between the tibial tuberosity and the trochlear groove (TT-TG) is crucial in planning the surgical treatment of patellar instability. The distance is commonly measured on 2D axial MRI sequences (HOROS software), which may be inaccurate due to bias from valgus-varus positioning variation in a 3D scanning environment (1). Potentially, this could be accounted for by adjusting imaging planes to the longitudinal axis of the tibia (TAA) and by performing measurements in 3D. We evaluated the TAA TT-TG measurements in a 3D measurement software (“3D Med”). We hypothesised that the TT-TG distance in 3D tibial axis adjusted (TAA) measurements would differ from conventional 2D measurements.

Materials and method:
2D and 3D TAA TT-TG measurements were performed in conventional 3 Tesla knee MRI scans (2D axial and 3D isotropic sequences, respectively) (n=40). Cartilaginous contours of the patellofemoral joint were used for anatomical landmarks. We measured both the tibial axis unadjusted (TAU) TT-TG and TAA TT-TG measurements using “3D Med” as well as the conventional 2D measurements using HOROS. Measurements were repeated in a subset of scans (n=15) by two observers in a blinded fashion. Reproducibility was assessed by calculation of intraclass correlation coefficient (ICC) and 95% Bland Altman limits of agreement (LOA95%).

Results:
The TT-TG distance differed significantly between 3D and 2D (TT-TG: 13.22 mm vs. 10.27 mm; mean difference 2.94 mm; CI95%: 2.2-3.8 mm; p < 0.001)(figure 1). Intraobserver reliability was "good" to "excellent" for 2D (ICC: 0.834-0.965); LOA95%: 1.46-3.37mm), and 3D TAA (ICC: 0.891- 0.892); LOA95%: 2.47-3.27mm). Interobserver reliability was "moderate" to "good" for 2D (ICC: 0.680-0.861); LOA95%: 2.90-4.22mm) and 3D TAA (ICC: 0.578-0.794; LOA95%: 3.83-5.53mm).

Conclusion:
3D TAA measurements yielded larger TT-TG distances compared to conventional 2D measurements in most knees due to slight varus position during scanning. There is a need for a renewed MRI protocol concerning the measurement of the TT-TG distance, which should focus on both scanning environment in relation to valgus vs. varus positioning and consensus on measurement techniques.
Metronidazole induced encephalopathy: case report and discussion on the differential diagnosis, Wernicke's encephalopathy

Authors:
Wenlu Hou, Raphael Shih Zhu Yiin, Chin Kong Goh
Department of Radiology, Changi General Hospital, Singapore
Profession of the presenter: radiologist

INTRODUCTION
Metronidazole induced encephalopathy (MIE) is a rare central nervous system toxicity that was first described in 1995 (1). Its incidence and aetiology remain unknown. Patients can present with cerebellar dysfunction, altered mental status or seizure. Most have good prognosis after discontinuation of metronidazole (2). However, irreversible adverse outcome has been reported (3,4). We present a case of MIE in a 59-year-old man. The characteristic neuroimaging features and its main differential diagnosis, Wernicke’s encephalopathy, are discussed.

PATIENT CASE
A 59-year-old man presented with sudden onset slurring of speech and difficulty in swallowing. He had Whipple’s procedure for pancreatic tumour and was treated with metronidazole and ciprofloxacin for the past six weeks for post-operative infection. Neurological examination was remarkable for nystagmus, dysmetria, and ataxic gait. A magnetic resonant imaging (MRI) brain stroke protocol was performed. It showed bilateral symmetrical T2 hyperintensities in dentate nuclei, dorsal medulla, vestibular nuclei, superior olivary nuclei, abducens nuclei, and tectum. The diagnosis of MIE was made based on neuroimaging and relevant history. The offending drug was stopped and the patient’s symptoms improved subsequently.

There are a few characteristic radiological features in MIE. Bilateral symmetric signal abnormalities are often seen, which typically involves the dentate nuclei. If the dorsal pons is involved, it tends to involve the abducens nuclei, vestibular nuclei, and superior olivary nuclei (5).

The main differential diagnosis is Wernicke’s encephalopathy. Typical imaging findings of Wernicke’s encephalopathy in alcoholics are bilateral symmetric T2 hyperintensities in mammillary bodies, medial thalami, and periaqueductal gray matter (6), which are specific and not seen in MIE. However, atypical findings similar to MIE can be present in non-alcoholic Wernicke’s encephalopathy, including abnormalities in dentate nuclei and cranial nerve nuclei (6,7). Fortunately, the atypical findings in non-alcoholic Wernicke’s encephalopathy are usually associated with the more specific typical findings (8,9). Our case showed no involvement of mammillary bodies, medial thalami, or periaqueductal grey matter.

CONCLUSION
MIE is a rare central nervous system toxicity which has characteristic MRI features. Prompt cessation of the medication often leads to disease reversal. The main differential consideration is Wernicke’s encephalopathy, especially non-alcoholic Wernicke’s encephalopathy with atypical findings.
Fig. The MRI brain showed bilateral symmetrical T2 hyperintensities in the dentate nuclei (A, long arrows), dorsal medulla (A, short arrows), vestibular nuclei (B, long arrows), superior olivary nuclei (B, short arrows), abducens nuclei (B, arrowheads), and tectum (C, arrowheads). The medial thalamus was unremarkable (D).
References