



P124 A small-scale study comparing radiation dose of fluoroscopy to radiation free, electromagnetic navigation during the insertion of distal locking screws of intramedullary nails

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Background: Intramedullary nailing is the standard surgical treatment for mid-diaphyseal fractures of long bones; however, is also a high radiation dose procedure. Distal locking is regularly cited as a demanding element of the procedure and there remains a reliance on X-ray fluoroscopy to locate the distal holes. A recently developed electromagnetic navigation (EMN) system allows radiation free distal locking, with a virtual on-screen image.

Objective: To compare operative duration, fluoroscopy time and radiation dose when using EMN over fluoroscopy, for the distal locking of intramedullary nails.

Method: Consecutive patients with mid-diaphyseal fractures of the tibia and femur, treatable with intramedullary nails, were prospectively enrolled during a 9-month period. The sample consisted of 29 individuals, 19 under fluoroscopic guidance and 10 utilising EMN. Participants were allocated depending on the type of intramedullary nail used and surgeon's preference. These were further divided into tibial and femoral subcategories.

Results: EMN reduced fluoroscopy time by 49(p=0.038) and 28 seconds during tibial and femoral nailings. Radiation dose was reduced by 18cGy/cm²(p=0.046) during tibial, and 181cGy/cm² during femoral nailings when utilising EMN. Operative duration was 11 minutes slower during tibial nailings using EMN, but 38 minutes faster in respect of femoral nailings.

Conclusions: We have evidenced statistically significant reductions both in fluoroscopy time and radiation dose when using EMN for the distal locking of intramedullary nails. We expect that overall operative duration would decrease in line with similar studies, with increased usage and a larger sample.

Errors and discrepancies

P125 An audit of reporting of incidental vertebral fractures on CT imaging of the thorax, abdomen and pelvis

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Purpose: Vertebral fractures are often the first sign of osteoporosis to be recognised. It is important that they are identified so that the risk of further fractures can be reduced, by anti-osteoporotic agents e.g. bisphosphonates. Incidental vertebral fractures may be identified on CT performed for unrelated reasons. This audit investigated whether vertebral fractures are being sought on CT, whether fractures are being missed and whether sagittal reformatted images have a role.

Methods: The hospital electronic database was used to audit CT reports of patients aged >50yrs. It was noted whether the report commented on the bones and whether a fracture was unambiguously reported. The images were reviewed to see whether a sagittal reformat had been saved and whether a vertebral fracture had been missed, using Genant criteria.

Results: A pilot audit of 50 reports (January 2014) revealed that 20% of patients had vertebral fractures. Only 10% of these fractures were reported. A single sagittal reformatted image enabled identification of vertebral fractures in 98% of the patients, however this image had only been saved in 4% of cases.

After an educational campaign, 300 reports (April-May 2014) were audited. 11% of patients had vertebral fractures. 35% of these were unambiguously reported.

Conclusion: Incidental vertebral fractures detected by CT are rarely reported. Departmental awareness was raised at meetings and by posters, which slightly improved the percentage of fractures reported. Sagittal reformatted images are now being saved by the radiographers at the time of image acquisition - re-audit is planned in April-May 2015.



P127 Orthopaedic auto reporting and non-medical referral: reporting radiographers can address governance demands

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Aims/objectives: Auto reporting and non-medical referrers are adopted by radiology and orthopaedics to meet increasing demand on imaging services whilst fulfilling IR(ME)R 2000 requirements. Without radiology input a governance risk is possible due to insufficient patient records updating. This study shows operational limitations of this system in two hospitals in one Scottish Healthboard and offers an approach to meet governance demands.

Content: One third of orthopaedic non-medical referrals were retrospectively evaluated between September and December 2013. The patient electronic portal was interrogated to identify if IR(ME)R reporting criteria were met. Physiotherapist, Podiatrist and Orthopaedic Nurse Practitioner comments were separately analysed to establish if practice differences existed.

Relevance/impact: An understanding of what is being appended to patient notes by non-medical, non-radiology reporters is necessary to ensure safe governance. Without this radiology may be held liable for errors.

Outcomes: From a total of 534 records examined 335 (63.7%) met IR(ME)R reporting requirements with the remainder either not documented or using one word reports such as 'satisfactory'. Comments provision varied between professions and focused only on the area of interest, with little or no radiological descriptive terminology featuring.

Discussion: This form of practice demonstrates significant clinical governance risk and fails the expectations of IR(ME)R or RCR. As ultimate responsibility can rest with the radiology department an opinion sanctioned by radiology should be provided. Reporting radiographers can meet this support role thus reducing impact on radiologists and address clinical governance issues.

P128 Assessing the technical quality of postero-anterior plain chest radiographs based on American College of Radiology (ACR) and European guidelines

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Aims/objectives: Trust wide retrospective audit conducted for assessment of technical quality of postero-anterior (PA) plain chest radiographs (CXR) based on established guidelines adopted by Royal College of Radiologists.

Content: There were 10 standards mentioned in guidelines, 5 technical (full inspiration, symmetrical reproduction of thorax, medial borders of scapula outside lung fields, no annotations obscuring lung fields, appropriate collimation) and 5 anatomical (visualization of both apices, whole supra-diaphragmatic ribcage, both costo-phrenic angles, retrocardiac lung shadows, spine through mediastinum). Each criterion required $\geq 95\%$ fulfillment.

All (A&E, OPD, IP, GP referred) adult chest PA films were included, no exclusions. Data collected from PACS and CRIS.

There were 1924 CXRs done over seven days, 924 in our four-day sample of which 418 were PA films. These were individually assessed for technical quality to confirm diagnostic validity for interpretation.

Relevance/impact: CXR is commonly requested investigation capable of yielding valuable information influencing patient management, provided it is of optimal diagnostic standard. This is dictated by the technical quality of the radiograph, which is dependent on multitude of factors.

Outcomes: 9 out of 10 criteria met standards. Breach of 'Medial borders of scapula' criterion - fulfilled in 53% of cases.

Discussion: Of 197 breaches, 57% were women, and average age was 57 years. Weekend films breached, when majority were A&E/inpatient referrals who were acutely unwell; possibly with poor positioning compliance.



Audit results were presented at trust-wide audit meeting, with recommendations - demonstrate positions to patients, patients to practice maneuvers and document reasons for non-compliance.

P129 Chest X-ray agreement: Comparative analysis between consultant radiologists, reporting radiographers and expert chest radiologists

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Purpose: Research evidence related to chest X-ray (CXR) interpretation by appropriately trained radiographers is limited to diagnostic accuracy studies undertaken in a controlled environment. The aim of this study was to examine agreement between expert radiologists and reports provided by radiographers and radiologists in clinical practice.

Methods and materials: Adult CXRs (n=193) from a single site were included; 83% randomly selected from CXRs performed over one year, and 17% selected from the discrepancy meeting. CXRs were independently interpreted by two expert chest radiologists (CC1/2). Clinical history, previous and follow-up imaging was available, but not the original clinical report. Expert and clinical reports were compared independently by two arbiters. Kappa (K) and McNemar tests were performed to determine inter-observer agreement. Ethical approval was obtained.

Results: CC1 interpreted 187 (97%) and CC2 186 (96%) CXRs, with 162 cases interpreted by both experts. Radiologists and reporting radiographers provided 96 and 97 of the original clinical reports respectively. Consensus between both experts and the radiographer clinical report was 71 (CC1; K=0.64) and 68 (CC2; K=0.61), and comparable to agreement between experts and the radiologist clinical report (CC1=72, K=0.68; CC2=68, K=0.64). Expert radiologists agreed in 124 cases (K=0.52). There was no difference in agreement between either expert radiologist, when the clinical report was provided by radiographers ($p>0.4$; $p>0.9$) or radiologists ($p>0.9$; $p>0.9$) or for the selected difficult cases from the discrepancy meeting ($p>0.17$; $p>0.9$).

Conclusion: No statistically significant difference was found in agreement between expert radiologists and radiographer or radiologist CXR reports in clinical practice at a single centre.

P130 Spontaneous cholecystocutaneous fistula masquerading as a soft tissue sarcoma: A pictorial review

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Cholecystocutaneous fistulas are rare and usually occur as a complication of post-cholecystectomy. Gallstone empyemas with subsequent perforation carry a high mortality and morbidity. Perforations cause peritonitis, small bowel (gallstone ileus), pericholecystic and hepatic abscesses and where chronic, fistula formation.

This 90 year old lady presented with intermittent rigors and acute confusion with initial observations depicting sepsis with a low blood pressure and tachycardia. The clinical examination was normal, apart from a 12 cm by 13 cm hard, erythematous, non-fluctuant tender mass overlying the right costal margin. This incidental right upper quadrant mass posed a surgical conundrum in this age group.

A CT abdomen and pelvic to identify the underlying cause of site of sepsis was performed. This revealed a small infra hepatic pocket of fluid and air extending to the anterior abdominal wall suspicious for a necrotic soft tissue tumour requiring a staging CT.

A pre-operative review suggested perforation of a non radio-opaque gallstone, rather than a necrotic soft tissue sarcoma. An ultrasound abdomen revealed a cholecystocutaneous fistula and abscess formation with a single migrated large gallstone.

Incision and drainage of the abscess was performed and the gallstone was retrieved under local anaesthetic. The lady had a full recovery.

The pictorial review demonstrates the diagnostic challenges in assessment of gallbladder disease by CT and highlights the importance of better resolution with ultrasound assessment.

P131 Pitfalls in gynaecological ultrasound scanning: - a pictorial review



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Aims: Gynaecological ultrasound is one of the more common procedures performed in the radiology department. The normal findings of the gynaecological organs can vary considerably, particularly in premenopausal women. In addition, the appearance of pathology can be variable. Because of these and other factors, errors in scanning and interpretation of gynaecological ultrasound are encountered. Through this poster the authors aim to present some common discrepancies which may occur in gynaecological ultrasound with the aim that the reader will become aware of these and can avoid them in their future practice.

Content: The authors present several potential discrepancy cases using ultrasound images and cross sectional imaging correlation. These cases include:

- Corpus luteum interpreted as other more sinister pathology
- Misinterpreted haemorrhagic cysts
- Adenomyosis misinterpreted as a uterine fibroid
- Dermoid cyst where the fat component is poorly visualised due to intrapelvic fat
- Missed vaginal and cervical pathology on ultrasound.

Relevance/discussion: Through awareness of common pitfalls in gynaecological ultrasound the practitioner can ensure they avoid making similar errors.

P132 Inside out

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In any Emergency Department (ED) where there are frequent trauma patients there should be an efficient process in place to ensure optimal care and balanced resources. In our ED a routine trauma involves decubitus chest and pelvis radiographs as part of assessment and triage.

Our institution receives battlefield casualties many times a day, and as a result there are many opportunities to learn from where care was sub-optimal. We will present a case where a patient was admitted to the ED having sustained a gunshot wound to the chest. A decubitus chest X-ray showed a right haemothorax and a bullet projected over the midline of the neck. This was recognised as probable extrinsic artefact by the radiologist but when the patient's necklace was removed there was no bullet attached.

The patient required a thoracotomy to control his thoracic bleeding, which was extended to a right neck exploration to retrieve the bullet and assess the damage. No bullet was found intraoperatively; it was later found underneath the patient, where it had lain trapped as the necklace was removed. This patient had been too unstable to undergo axial imaging which would have demonstrated the true three dimensional location of the bullet.

We will present further examples of projected foreign bodies with CT correlation to the plain film findings, demonstrate the myriad of potential radiographic pitfalls, and present the lessons learned to minimise error in the acute setting.

P133 Creating an educational/peer review tool for non-accidental injury

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Missing fractures in young infants can have devastating consequences. This presentation describes the development of an educational tool to help radiologists interpret skeletal surveys and explores the role of a mentor in this process.

A separate submission describes the results of a peer review exercise for skeletal survey reporting in our department (8 surveys). This submission explores how we have exported these images to radiologists in other NHS trusts.

Following discussion with our local Risk Management service, anonymised skeletal surveys were exported to radiologists in 4 other trusts (arranged via PACS managers). Using the workbook devised for the peer review



exercise, these were then reviewed and reported on the local reporting workstations (not powerpoint or a web-site). A teleconference was arranged for discussion of results, during which the images were reviewed.

Participants described their interaction with the cases and their concerns about the possibility of "scoring" - as it was felt that this might deter people from wanting to participate in such a process. At the same time there was keen support for a timely discussion of results (rather than just being sent a set of "correct answers"). This has significant implications for cost as the review process took an average of 45 minutes (including set-up time as well as the discussion itself). There would also be a place for introduction of other anonymised case material during the discussion.

Creating relevant and challenging educational material will take time and effort. We present one example of how such an exercise might run.

P134 What are the medico-legal implications of anatomical side marker errors and discrepancies in radiology?

[Kerri Shortt](#)

Diagnostic Radiographer

Aims/objectives: To explore the medico-legal themes that impact the use of anatomical side markers (ASM) and their relevance in image interpretation and radiographic reporting.

Content: A presentation of the key themes (professionalism in practice; accuracy; negligence; errors and omissions; liability; legally admissible) identifying why it is imperative to accurately and consistently use ASM. Imaging examples demonstrating bad practice and best practice are examined.

Relevance/impact: As imaging evolves into the digital arena and teleradiology becomes more widely used, there are emerging implications for image interpretation and the importance of correct use of ASM remains; vigilance on the part of the technician and imaging team is therefore critical. The consequences of improper ASM use are discussed along with patient, Trust and employee repercussions and potential legal action.

Outcomes/conclusion: Forensic radiography and general radiography are not dissimilar in that ASM use should be consistently applied conforming to HCPC (2013) Standards of Proficiency and the Society of Radiographers (2013) Code of Conduct requirements. In practice, experience shows this does not occur 100% of the time due to a number of limiting factors.

Discussion: Constraints to correct ASM use are identified (tight collimation for radiation protection; primary beam awareness with direct digital radiography; infection control in newborn intensive care units and ITU; and human error) and potential remedies are suggested to overcome these issues.

P135 Improving patient safety using WHO inspired radiographic PAUSED acronym

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Have you PAUSED recently?

Patient Safety Drive

In response to incidents reported within the radiology department, a poster using the acronym 'PAUSED' has been developed to implement the concept of the WHO surgical pause into daily practice and encourage staff to take a pause before proceeding with an examination or procedure. The information contained within the acronym is has been developed as a result of incidents where there has been a failure to comply with procedures, resulting in incidents.

Incident examples used to develop the poster included patient identification errors, equipment parameter selection faults, duplication of referral instances and referral errors. The poster steps through a standard process expected of Radiographers and Assistant Practitioners when assessing a request and performing an examination, from beginning to end.



Discussions within management groups, clinical governance groups and with the CQC have also driven the development of this poster and patient safety drive. Staff have been reviewed the document and fed back their thoughts and comments in regards to implementing the system into their daily practice. Other departments within the Trust have also taken on the format of the poster to apply to their own practice; the acronym is easily adapted to other specialities systems of work.

The department is sharing the poster amongst the wider profession to raise awareness of patient safety and will be reviewing incident trends in future to assess its impact.

P136 To 'err is human': Assessing pitfalls in contemporary radiography

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This poster will discuss the findings uncovered from a PhD study conducted in the United Kingdom (UK). It will illustrate new errors in diagnostic radiography within the general radiographic environment, attributed to advancing technology. It highlights new challenges that radiographers and managers may encounter following the integration of digital radiography within a clinical environment, which can be overcome. The research demonstrates an awareness of potential pitfalls that X-ray operators can overcome. Through this awareness the future use of digital radiography can be enhanced, prevent radiological errors and facilitate optimum patient care delivery.

Molecular and functional imaging

P138 Impact of FDG PET-CT in gynaecological malignancy: Single institutional experience

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Aim: To evaluate the clinical impact of PET-CT in gynaecological malignancy at our institution.

Method: Retrospective CRIS search for all patients referred for PET-CT from gynaecology at our institution. Comparison was made with previous MR/CT and subsequent histology/surgicopathological findings where available. Impact on treatment intent was assessed.

Results: 19 PET-CTs in 18 patients between March 2009 and November 2014. Primary sites included cervix (10), ovary (4), endometrium (2), vagina (1). 2 presented with vulval and retroperitoneal lesions respectively.

PET-CT indications included: diagnosis of primary cancer (2), initial cancer staging (2), to exclude extrapelvic metastases in known pelvic recurrence (7), for diagnosis of suspected recurrence (6), for restaging of recurrent disease (1) and to assess for residual disease post chemoradiotherapy (1).

PET-CT had major impact in 12 cases with detection of pelvic recurrence, occult colonic primary, breast pathology, nodal and bone metastases and characterisation of liver and adrenal lesions, indeterminate on CT. Minor impact with confirmation of suspicious findings at MR/CT but no change to management in 5 cases. No impact in 1 case. 1 false negative with PET-negative vaginal vault lesion and right external iliac node in patient with previous TAH and BSO for endometriosis. Subsequent vaginectomy and lymphadenectomy showed endometrioid cancer in atypical endometriosis.

Outcomes: PET-CT in gynaecological malignancy had major impact in 63% and excluded further metastatic disease in 26% cases.

Discussion: PET-CT had significant impact on patient management, stratifying into palliative or curative treatment and optimising radiotherapy planning. It is a useful adjunct to MR/CT.

P139 Local institutional experience of FDG PET-CT in plasma cell dyscrasias

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