

P-021 Assessing the quality of post-cochlear implant radiographs - an audit

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Bradford Teaching Hospitals is a supra-regional Cochlear Implant Centre with a large catchment area covering Yorkshire and beyond. Following implantation all patients currently undergo AP and modified Stenvers radiographs to assess the position of the device. A complaint from ENT regarding poor quality radiographs prompted this audit whose aims were to examine both the technical adequacy of these images and our ability to interpret them.

Over a 12 month period from April 2012 to March 2013 76 patients aged from 1 to 89 years underwent 77 procedures. 22 of these were right sided, 31 left sided and 24 bilateral implants. M:F (40:36). Using Departmental guidelines criteria were devised to assess the quality of the radiographs including penetration, positioning and coning. Results show that only 22% of AP views and 53% of Stenvers view were technically adequate when these were applied. Reasons for 'failure' include not centring unilateral AP radiographs over the orbit on that side resulting in exposure of both orbits to the primary beam. AP radiographs were often malpositioned craniocaudally with suboptimal placement of the petrous ridge over the orbit. On three radiographs the implant had actually been omitted from the film.

Despite this it was possible to assess electrode position clearly in 88%, with difficulty in 8% and not at all in 4%. Examples of good and poor radiographs will be shown along with the criteria used for assessment and relevant radiological anatomy. Discussion will cover factors contributing to poor technical results, improvements to be made and plans for re-audit.

P-022 Pearls and pitfalls when reporting MRI in the investigation of sensorineural deafness in adults

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Aims: To demonstrate the variety of pathologies that should be considered when interpreting MRI in the investigation for unilateral sensorineural deafness in adults.

Content: A pictorial review of the common pitfalls of imaging adults with sensorineural deafness and highlight conditions which may be easily overlooked.

Relevance: MRI brain with an internal auditory meatus protocol should be performed when evaluating the causes for sensorineural deafness in adults. When assessing these images a common error is to simply exclude a cerebellar pontine angle mass and not fully evaluate for potential underlying inherited conditions.

Sensorineural hearing loss can be hereditary or acquired and nonsyndromal or syndromal. Although the majority of inherited hearing loss occurs at birth, some children will inherit the predisposition to develop hearing loss later in life. Deafness during adulthood is often attributed to age related hearing loss or environmental triggers. Cholesteatoma and dysplastic conditions including vestibular aqueduct syndrome, otosclerosis & pagets disease as well as inherited disorders including absent VIII cranial nerve and pendreds syndrome are some of a few diagnoses which can cause adult onset hearing loss.

Outcomes: To provide a learning tool for radiologists when assessing MRI in adults with sensorineural deafness highlighting conditions which may be easily overlooked by radiologists.

Discussion: Interpreting MRI of the internal auditory meatus involves considering inherited and acquired causes of sensorineural hearing loss. As a general radiologist it is important to be aware of the common pitfalls of imaging adults with sensorineural deafness and we highlight conditions which may be easily overlooked.

P-023 Diagnostic accuracy of FNAC in neck nodes in lung cancer: A DGH experience

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Introduction: Lung cancer is a leading cause of death in UK. Recent NICE and SIGN guidelines recommend the use of FNAC in N2/3 disease for staging and tissue diagnosis.

Aim: Our aim was to audit the efficacy, safety and diagnostic accuracy of FNAC for neck nodes in lung cancer patients. Target compliance for the diagnostic accuracy was set at 85% and complication rate less than 5%.

Material and Method: It was a retrospective audit of 52 patients in a District General Hospital, over a period of 2 years. Patients who underwent FNAC of neck nodes for other diagnoses were excluded from the study.

Data collected comprised of distribution of age and sex, sample deemed adequate by radiologist after the procedure, complications, pathology report and further interventions if the sample was insufficient.

Result: The diagnostic accuracy of the test was 91%. More than 85% of patients were between 60-80 age groups with nearly equal sex distribution. There were no reported post procedural complications. 96% of the target lesions were adequately visualized before the FNAC.

Conclusion: FNAC remains a safe, simple, quick and effective test for tissue diagnosis and staging in lung cancer patients. It has high diagnostic accuracy as seen in our study in DGH settings. Limitations of this test can be, that very small lesions may not be adequately visualized by US, or difficulties related to patient's habitus like having a short neck.

P-024 Cystic masses of the neck: A pictorial review

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Aim/purpose: 1.Pictorial review of radiological features of various cystic lesions of the neck on ultrasound, CT and MRI. 2.To illustrate normal anatomical compartments of neck and relevant developmental embryology that contributes to clinical presentation.

Content: 1.This pictorial review describes and illustrates the typical ultrasound, CT, MRI radiological appearances of various cystic lesions of the neck like Ranula, Branchialcleft cyst, Thyroglossal Cyst, Internal and External laryngocele, Cystic lymphnodes, Cystic metastasis etc.

2. The poster also illustrates normal anatomical compartments in the neck and relevant developmental embryology that contributes to the clinical presentation.

Relevance: Imaging plays a vital role in the evaluation of cystic neck masses. In order to facilitate and aid correct diagnosis it is important for radiologists to recognise imaging features of cystic neck masses to enable accurate and prompt management.

Conclusion This exhibit would highlight the radiological features of various cystic lesions of the neck and various how different imaging modalities can compliment each other to arrive at accurate diagnosis and aid in relevant treatment.

P-025 Confirmation of nasogastric tube position - are we meeting national guidelines?

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Relevance/impact: Nasogastric tubes (NGTs) are routinely inserted for the purpose of feeding. Historically, the main cause of patient harm and death resulting from accidental feeding into the lung was the misinterpretation of NGT position on chest radiographs. As a result, in 2011 the National Patient Safety Agency issued guidance focusing on safe interpretation of chest radiographs. They re-emphasised that pH testing should be used as the first-line test to confirm NGT position and that chest radiographs should only be used as a second-line test.

Aims: Our audit assessed:

- 1) The proportion of unjustified chest radiographs performed to confirm NGT position for the purpose of feeding.
- 2) Correct interpretation of NGT position on chest radiograph.
- 3) The adequacy of documentation surrounding NGT insertion.

Content: Causes of morbidity/mortality related to incorrectly placed NGTs.

Recommended algorithm to confirm NGT position.

Correct chest radiograph interpretation/documentation to confirm NGT position.

Audit method, results and strategies to improve current practice.

Results: 29% of cases with pH aspirate ≤ 5.5 had unjustified chest radiographs.

Only 17% radiographs were confirmed by two doctors or a radiologist.

Only 3% of chest radiographs had adequate documentation to confirm NGT position.

Outcomes/discussion: Educate healthcare professionals.

Encourage NGT aspirate result or justified reason for chest radiograph to be recorded on all x-ray request forms. This will empower radiographers to help prevent unnecessary imaging/reduce workload for the radiology department.

Encourage completion of NGT placement sheet.

Consequences of unjustified chest radiographs and poor documentation.

P-026 A study to determine the spatial distribution of scattered radiation during dental intra-oral radiography (IOR)

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Rationale: The use of digital imaging technology and X-ray tube operating potentials of 70kVp are now commonplace for IOR. Presently there is a lack of research investigating the scattered dose distribution that the implications for the preferred operator position during IOR in the absence of a barrier when undertaking contemporary IOR imaging.

Aim: To establish the spatial distribution of scattered radiation dose to the operator at different points around the patient's head during digital IOR.

Method: The experimental set-up used a Planmeca Intra X-ray Unit operating at 70kVp, rectangular collimation; anthropomorphic phantom and ionization chamber. The phantom and X-ray equipment was set-up in the erect position to mimic IOR of upper right pre-molar. Scattered radiation dose was measured at operator gonad height and distances from the patient's head ranging to 1.5m at 450 intervals. Three measurements were taken at each position to account for precision errors.

Results: At 50cm from the patient, scattered dose ranged from 50-124.3 μ Sv/hr. At the edge of the controlled area (1.5m), dose was highest in the forward scatter direction (aligned with the central ray). Lowest scattered dose (9.4 μ Sv/hr) was measured behind the X-ray tube. Dose reductions of 40.2% were measured when standing away from the imaging side of interest within the mouth.

Conclusion: The spatial distribution of scattered radiation was not the same in eight directions around the patient. Although the preferred position for the operator is behind a suitable barrier, the preferred position in the absence of a barrier is directly behind the X-ray tube.

P-027 Pictorial review of dental anatomy and common dental pathology

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Aims/objectives: Plain radiographs and CT are common modalities used for investigating dental pathology. Teeth and their associated supporting structures are routinely included on head and neck imaging. The aim of this review is to provide clinicians and radiologists with an overview of tooth anatomy, a systematic approach to image interpretation and common dental pathology that may be encountered.

Content: We present a pictorial review of tooth anatomy and common dental pathology seen on both plain radiographs and CT including caries and periodontal disease, periapical inflammatory pathology and trauma.

Relevance/impact: An understanding of the dental pathology will allow early diagnosis and appropriate referral to dental or maxillofacial surgeons to treat disease or manage trauma.

Discussion: Clinicians and radiologists who commonly deal with head and neck pathology/imaging should have a good understanding of dental development and pathology. Accurate image interpretation is key in establishing a likely diagnosis and guiding appropriate management.

P-028 The comet tail artefact and other echogenic foci in thyroid ultrasound - what is the clinical significance?

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Thyroid nodules are very common; the vast majority are benign however there is approximately a 4-7% risk of malignancy.

The comet tail artefact, an inverted echogenic triangle, is one of several echogenic foci encountered during ultrasound examination of the thyroid.

The purpose of this poster is to:

1. Illustrate the appearance of echogenic foci during ultrasonographic evaluation of the thyroid.
2. Describe the clinical significance of echogenic foci.
3. To determine if modern ultrasound technology has an effect on the identification of such artefacts.

A Pub Med and Medline literature search of English language studies published between 2003 and 2013 was performed. Further relevant articles were identified from the reference lists of the articles obtained.

There is a degree of overlap in benign and malignant ultrasonographic features. No feature demonstrates both a high sensitivity and high positive predictive value for malignancy. Identification of the comet tail artefact in isolation is highly likely to indicate a benign lesion (colloid cyst). However, colloid may also be identified within malignant lesions.

Calcification increases the risk of malignancy; microcalcifications demonstrate the highest positive predictive value for malignancy.

No studies were identified which investigated the influence of modern ultrasound technology on the appearance of echogenic foci in thyroid nodules. With the continued use of ultrasonography in the assessment of thyroid nodules this topic is identified as a focus for future research.

The illustrations and literature review provide a summary of clinically relevant characteristic features that are encountered during ultrasonographic evaluation of a thyroid nodule.

P-029 Audit: Specimen adequacy of ultrasound scan (USS) guided Fine Needle Aspiration Biopsy (FNAB) of the thyroid in a District General Hospital (DGH)

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Aims/objectives: To assess the adequacy of Ultrasound scan (USS) guided fine needle-aspiration biopsies (FNABs) using liquid-based cytology as opposed to conventional smears for the assessment of thyroid nodules.

Content: We will review the results of a retrospective audit which determined the number of FNABs performed between 2010 and 2013, in the Radiology department of our district general hospital (DGH). Cytological assessment using Thy staging was recorded and used as the indicator for specimen adequacy.

Relevance/impact: CytoLyte solution is a useful preparation technique for FNABs. This has been used at our hospital since 2009 to assess thyroid nodules for suspected malignancy. A local standard was adopted. Thy1 samples are

considered non-diagnostic for cytological diagnosis and this should be no more than 30% of the samples. 70 - 80% of FNABs of thyroids should be adequate according to Thy staging.

Outcomes: 131 FNABs of thyroid nodules was performed at our hospital during the study period. 27% of these were Thy1 and insufficient for cytological analysis. 73% were adequate.

Discussion: Liquid-based cytology is a good technique to preserve specimens. To increase our diagnostic yield we could agree a protocol for referral for FNA. Patients are often anxious when they come to have the procedure therefore an information leaflet explaining the procedure would be useful. A combination of aspiration and non-aspiration techniques together with multiple passes into the nodule may also improve results.

P-030 Acoustic neuromas: Unusual features and differential diagnosis - an MDT experience

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Aintree University Hospitals NHS Foundation Trust

Aims/objectives: Acoustic neuromas are one of the commonest causes of referral to the skull base MDT. The aim of this poster is to provide an update on atypical features of acoustic neuroma that the diagnostic radiologist may encounter and the relevant differential diagnosis of more unusual cases of cerebello-pontine angle mass lesion.

Content: We present our experience as a tertiary referral skull base MDT in the area of acoustic neuroma imaging. We have collated several atypical features and incorrect diagnoses as part of reviewing cases for the MDT.

We discuss the unusual features of acoustic neuromas such as calcification, cystic change, documented shrinkage of acoustic neuromas without treatment, abnormal T2 signal suppression from the inner ear endolymph indicating permanent inner ear damage, association with neurofibromatosis type 2 and sarcomatous change in an acoustic neuroma associated with invasion of the adjacent brain stem.

We also present the several cases where initial imaging has suggested an acoustic neuroma but subsequent review indicated lipoma, meningioma, cholesteatoma and arachnoid cyst.

Relevance/impact: Although majority of acoustic neuromas may appear to be straightforward diagnoses, this poster will help the radiologist to consider the varied appearances of acoustic neuromas and provide a differential for the cerebello-pontine angle masses.

Outcome: This poster will assist the diagnostic radiologist in making an appropriate diagnosis of cerebello pontine angle lesion and alert them to more unusual presentations and other possible diagnoses.

Discussion: We present images predominately MR images but also some CT images to illustrate these cases.

P-031 New neurofibromatosis type 2 multidisciplinary team meeting - our initial radiological experience

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Aims: In 2013 a new Neurofibromatosis type 2 MDT was established at Aintree hospital, Liverpool. We present our initial experience of the evaluation and presentation of the first 19 patients attending this complex multidisciplinary meeting. The multifocal nature of Neurofibromatosis type 2 makes assessment of these patients complex with all patients having multiple scans scattered through time and anatomical regions.

Contents: Of the 19 patients that's presented a total of 216 individual cross sectional imaging studies were reviewed. By far the commonest investigation was MR Brain and IAM (n=144) followed by MR scan of the whole spine (n=56).

Outcomes: 15 patients presented with bilateral acoustic neuromas, 5 with multiple meningiomas, 6 with solitary meningiomas, 2 with spinal ependymomas, 1 with spinal meningioma and 1 with spinal schwannoma. 13 of the 19 patients had multiple pathologies related to NF2.

Our initial assessment of MDT preparation for these patients indicated that a large amount of time is required to assess the multiple examinations presented and equal attention had to be given to each of the lesions and it's progression through time. It was very valuable to have clinical input at the MDT as this provided the relevant worsening symptomatology that would help to direct the most appropriate treatment.

Conclusion: Review of these interesting and complex cases was of value to the patients but it is essential that adequate resource be given to the Radiologist to review the multiple scans contained within this small population group.

P-032 The anatomy and pathology of the parapharyngeal space - a pictorial review

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Aims/objectives: The parapharyngeal space sits beneath the skull base. In this poster we aim to:

- 1) Demonstrate the anatomy and contents of the parapharyngeal space.
- 2) Discuss the direction and displacement of the parapharyngeal fat pad in relation to pathology.

Content: We present cross-sectional imaging of more than 15 cases of mixed benign and malignant pathology where involvement and displacement of the parapharyngeal space is of diagnostic importance.

Relevance: Understanding of the parapharyngeal space, particularly the anatomy, will aid radiologists with differential diagnoses of this space.

Outcomes: This poster provides an anatomy update and presents the differential diagnosis of parapharyngeal space mass lesions including a methodical approach to shortening the differential.

Discussion: The principle pathologies of the parapharyngeal space include deep lobe of parotid tumours, both benign and malignant, and neurogenic tumours arising from the area of the carotid space. These are the commonest pathologies to cause distortion of this space and the diagnostic differences of the two conditions are presented. We also present cases of tonsillar carcinoma where invasion of the parapharyngeal space elevates the stage to T3 and effectively precludes transoral laser resection as a diagnostic option. The space can be involved in patients who have tonsillar abscess and infection has spread through the deep parapharyngeal space. Recurrent head and neck squamous cell carcinoma has a predilection for involvement of the mandibular nerve and spread to this space via this route is a common feature.

P-033 A pilot study examining the role of diffusion-weighted MRI in high risk TIAs

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MR is recognised as the imaging modality of choice in diagnosing Transient Ischaemic Attacks (TIAs). However due to limited access and long scan times MRI is not always available. DWI is a form of MR that relies on restricted diffusion of water molecules that occurs in cellular damage immediately following an ischaemic event. The short scan time in diffusion imaging, high sensitivity and specificity potentially allows limited sequences to be performed in selected cases thereby increasing patient turnover.

From April to July 2013, a pilot study was instigated at Ipswich Hospital University Trust. The pilot study was designed to test whether limited sequence DWI is beneficial in the diagnosis of high risk TIAs. Data was collected from all TIA clinic patients with high risk TIAs. High Risk TIAs were classified using an ABCD2 score of 4 or more. Radiologists allocated two daily DWI slots for high risk TIAs.

We looked at 64 patients, of those 32 patients had DWI scans. Where DWI was not available, they went on to have a CT instead (32 patients). Patients who had a CT did not have a follow up MRI. Results highlighted that 14/32 (44%) MRIs showed a positive scan and 9/32 (28%) positive CTs (p-value 0.3). Fisher analysis showed that although there were more positive MRIs than CTs, statistically this was not significant. Our results are limited due to our small sample size. DWI is a valuable tool in evaluating high risk TIAs. We recommend the use of DWI in high-risk TIA patients.

P-034 Implementing radiographic CT head reporting: The experiences of students and managers

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Introduction: In the face of growing demand in radiology, skill mix initiatives have sought to improve and expand service provision. Within the UK radiographer reporting is now widespread, although the growth in computerised tomography (CT) head reporting has not been as rapid as anticipated. The literature in this area is limited, but case studies have highlighted the successful implementation of this training through new radiographer roles in practice.

Method: A cross-sectional survey was developed to elicit information from radiographers and managers on their experiences before, during and after post-graduate training in CT head reporting.

Results: 71 responses were received comprising 48 past students (n=48/111; 43.2%) and 23 service managers (n=23/67; 34.3%). Key factor for the development were personal continual professional development for students and departmental need for managers. Challenges during training included lack of study time due to staff shortages and access to radiologist mentors. Only 48.8% of students responding have gone on to use the new skills in practice cited reasons include staff shortages, resistance from radiologists and increase in radiological staffing.

Conclusions: This study has demonstrated that those trusts who have implemented CT head reporting have evidenced perceptible benefits for both the department and individuals. Those radiographers who are successfully reporting have shown themselves to be highly motivated and persistent in their development.

P-035 The development of a low cost cranial phantom for computed tomography that simulates common pathologies

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Aims/Objectives: To develop a CT test phantom that simulates common intracranial pathologies.

Content: This presentation will chart the development of a cranial phantom that simulates common intracranial pathologies and important cranial anatomy not ordinarily represented within traditional anthropomorphic phantoms (eg. the grey/white matter interface). This work was conducted in collaboration with an industry partner to ensure the tool will be accurate and reproducible.

The first stage was to explore and review a range of cranial phantoms that are currently available. The density of each of the pathological conditions of interest was then determined by identifying the average Hounsfield Units for each condition, this data was obtained from the literature. In an attempt to identify materials that would adequately simulate the required densities different strengths of gelatine, contrast solutions and everyday food items were scanned. Phantom development was then undertaken.

Relevance/impact: Technical advances and dose reduction initiatives are frequently being developed within CT. It is essential that these technological developments are tested and before being applied in clinical practice. Current phantoms available simulate certain tissue characteristics and densities but do not replicate the complexities of the anatomical structures and potential pathology within the cranium.

Outcomes: Testing is on-going but results from a prototype indicate promising results for simulation of normal and abnormal brain findings.

Discussion: Although further testing will be necessary research and evaluation undertaken with the resultant phantom is likely to have enhanced clinical relevance.

P-036 Are emergency department CT head requests adequately completed?

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Background: If any discussion were required regarding a CT head scan from the Emergency Department the referrer may have finished their shift and the patient may no longer be in the department. Therefore, it is important that detailed and accurate clinical information is provided on the request form to aid the radiologist in addressing the clinical question. The Royal College of Radiologists guidelines state that a referrer has the responsibility to 'ensure the completeness and accuracy of data relating to a patient's condition'.

Aims: Establish if CT head requests from the Emergency Department are adequately completed giving information on: 1) Clinical history, 2) Clinical examination (stating Glasgow Coma Score [GCS], neurology examination findings and pupils), and 3) Clinical question.

Method: Retrospective data collection of 150 CT head requests from September 2013.

Results: 93% of requests provided a clinical history. Only 33% of requests provided some clinical examination findings and of these 65% provided neurological examination findings, 29% provided the GCS, 4% provided both GCS and neurological examination findings, and 2% provided GCS and pupil findings. 75% of requests stated a clinical question.

Conclusion: 93% of requests provided a clinical history, however, only a third provided clinical examination results. It is important for clinicians to recognise that providing a clinical history is not a substitute for examination findings.

The relevance of providing examination findings and a clinical question should be emphasized in order for the radiologist to provide a relevant report that will aid in the efficient management of the patient.

P-037 Minimising claustrophobia in MRI radiotherapy planning of the head and neck

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Aim: MRI is a valuable tool in planning Radiotherapy treatment of head and neck tumours, however, refusal of MRI examinations due to claustrophobia has been reported to be up to 30%. Techniques must be adopted in order to minimise refusal of MRI in this claustrophobic and anxiety inducing situation.

Background: Claustrophobia is defined as a fear of confined or enclosed spaces with a fear of restriction and fear of suffocation as components.

Benefit of MRI in radiotherapy planning of head and neck tumours.

MRI is utilised in the radiotherapy planning of head and neck tumours as it offers excellent characterisation of soft tissue and visualisation of tumour extent.

The superior image contrast resolution results in improved multi-planar target volume delineation and assessment of planning margins compared to delineation on CT alone.

The benefit of MRI also applies to re-treatments by differentiating between changes due to recurrent cancer opposed to post treatment fibrosis.

The patient is strictly immobilised using a beam directional shell to plan and execute radiotherapy of head and neck tumours due to the sensitivity of adjacent anatomy such as optical structures, facial nerves, salivary glands and major blood vessels. Any discrepancies between planning scans and radiotherapy treatment could result in geographical miss and local failure causing catastrophic consequences.

This poster will highlight anxiety reduction techniques that can be incorporated into the MRI planning procedure in order to reduce claustrophobia and limit refusal rates.
