Radiographer Reporting of Magnetic Resonance Imaging Breast Examinations: findings of an accredited postgraduate programme

Poster No.:	C-0272
Congress:	ECR 2017
Type:	Educational Exhibit
Authors:	L. J. Pittock[1], K. Piper[1], N. H. Woznitza[2]; [1]Kent/UK, [2]London/UK
Keywords:	Breast, MR, Diagnostic procedure, Education and training
DOI:	10.1594/ecr2017/C-0272

Learning objectives

This poster aims to:

- Present the objective structured examination (OSE) results of the initial cohorts of radiographers (n=6) who have completed a postgraduate education programme (accredited by the College of Radiographers) to report magnetic resonance imaging (MRI) investigations of the breast.
- Examine the performance of this small cohort in comparison to other similar studies.
- Explore the role of radiographer reporting in service delivery

Background

Radiographer reporting is an established component of radiology service delivery in the UK, ensuring timely and accurate results in order to optimise patient management decisions [1]. Since the first postgraduate reporting programme was developed for radiographers by Canterbury Christ Church University (CCCU) in 1994, this area of advanced radiographer practice has diversified to include amongst others MRI [2], CT head [3], adult chest [4] and mammography [5,6], and results have shown performance to be equivalent to that of radiologists.

Chronic staff shortages have been identified in breast radiology [7]. The number of radiographers reporting mammograms within the National Health Service Breast Screening Programme (NHSBSP) has increased from 6% in 1995 to 22% in 2016 [8]. The key drivers behind involving radiographers in this aspect of the service was identified as high clinical workload and the limited availability of radiologists [8]. Specialist breast radiologist vacancies were identified in 2016 by the Royal College of Radiologists as an area of concern due to the continuously increasing numbers of new breast cancer diagnoses, with 13% of vacancies remaining unfilled [9].

To help address the demands on service delivery, the Consultant Radiographers group of the Society and College of Radiographers (SCoR) approached CCCU to develop a MRI breast reporting programme. With the background of proven observer performance in radiographer clinical reporting practice, and increasing demands on breast imaging services, a programme of study was developed. Reporting radiographers within the NHSBSP had not, until the development of this programme of study, been able to

undertake a full analysis of all imaging undertaken as part of a breast examination due to the lack of suitable accredited MRI breast reporting education.

All students who are accepted onto this accredited programme already report across modalities (mammography and ultrasound) within a specialist breast service. NHSBSP guidelines require all MRI breast examinations to be double read and to be reported in conjunction with the current mammograms [10].

This study presents the results of the initial cohorts of students completing the postgraduate course.

Findings and procedure details

Alongside academic essay submissions, each student is required to report 200 MRI breast examinations prior to undertaking a case based objective structured examination (OSE). To pass the OSE each student must achieve a minimum agreement rate of 85% and sensitivity/specificity rates of 90%. This reflects the minimum standard expected by reporting programmes of more complex areas of study at CCCU including MRI of the knee, head and spine, CT head and adult chest.

To test the students' knowledge at the appropriate level and to reflect clinical practice the OSE included abnormal and normal examinations. Twenty-five MRI investigations (prevalence of abnormal cases approximately 50%) were used in the OSE which included the following appearances: malignant mass (Fig 1); multi-focal disease; nipple and/or lymph node involvement; benign cysts; implant rupture (Fig 2) (intra and extra capsular) and normal breasts (with and without implant). Cases were only included if there was agreement on the findings between three consultant radiologists. Students' answers were assessed against this reference diagnosis.

The students indicated if the appearances were normal or abnormal and provided a description and interpretation of any abnormal appearances. Students were advised to include a BIRADS (Breast Imaging Reporting and Data System) score for each breast in keeping with recommended practice [11]. Responses (n=150) were compared to the expected answers previously agreed with a consultant radiologist external examiner and based on the reference diagnosis. Sensitivity and specificity rates were calculated on the normal or abnormal decision and the total percentage agreement rates were calculated using a pre-determined marking scheme. Fractionated scoring was used where appropriate and a maximum of five marks were awarded for each abnormal case. This enabled partly correct or incorrect findings to be scored accordingly and deductions made were dependent on the clinical impact of the error.

Images for this section:

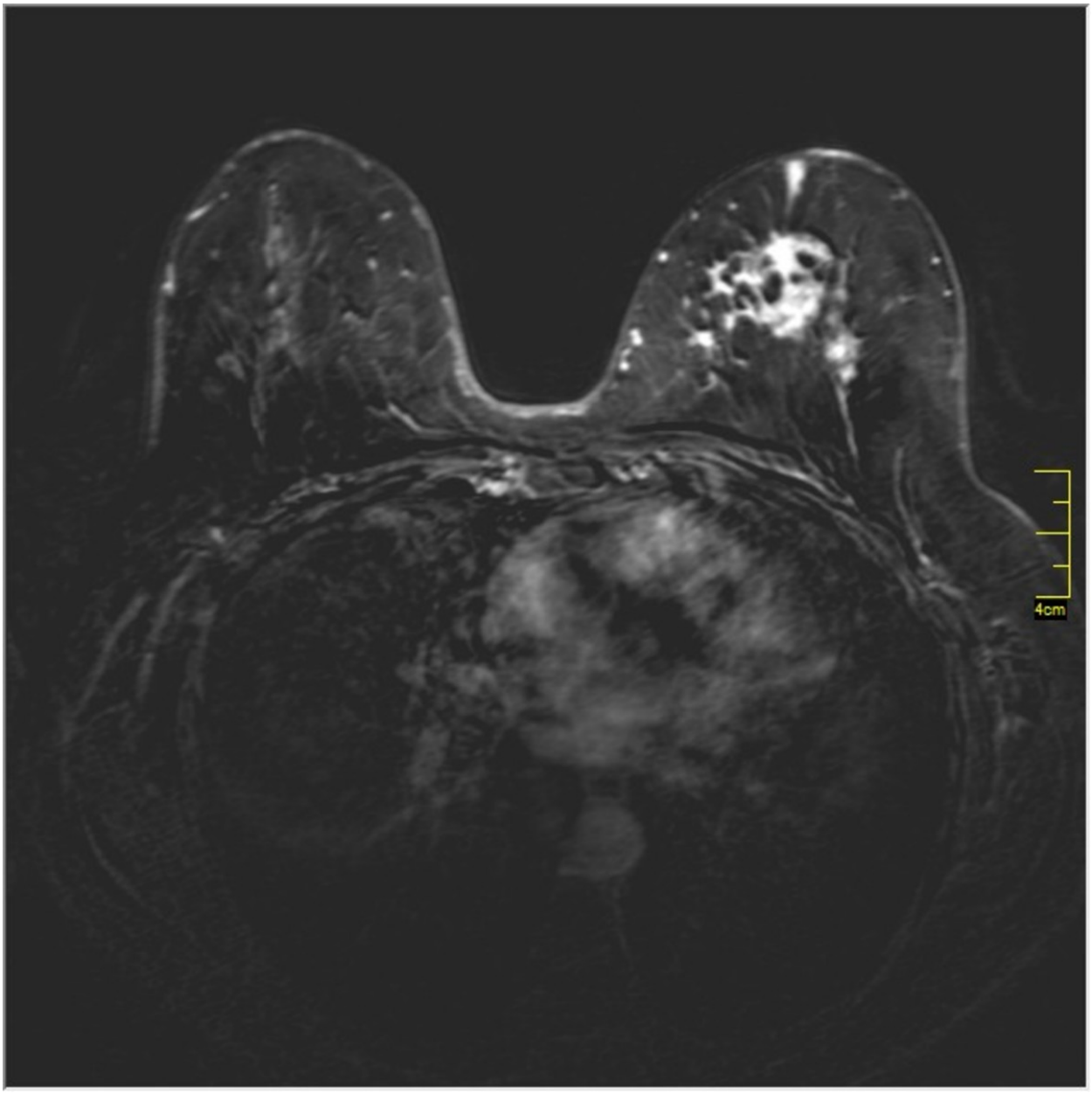

Fig. 1: Large breast carcinoma

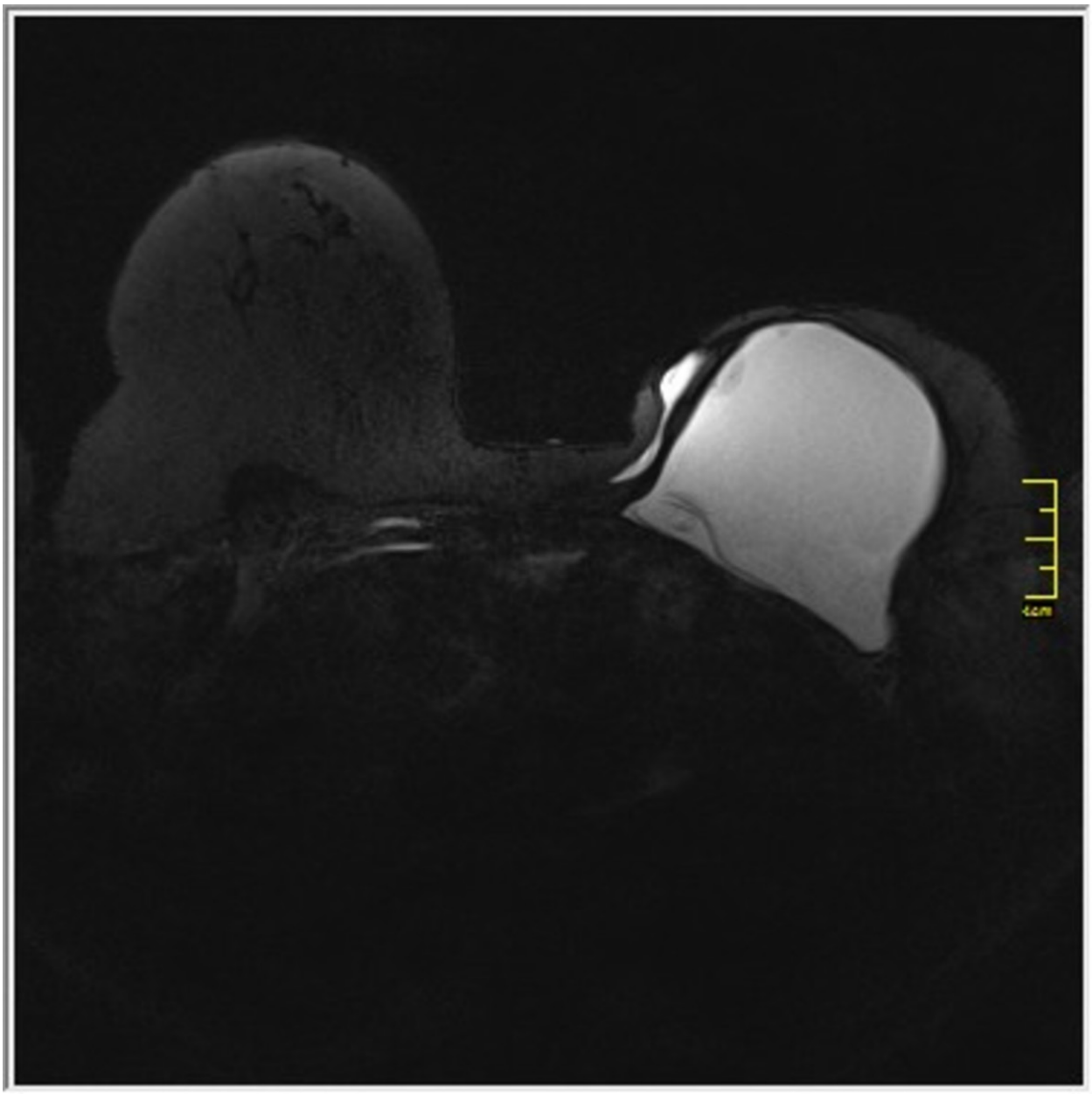

Fig. 2: Ruptured breast implant

Conclusion

The mean rates (and 95% Confidence Intervals) for sensitivity, specificity and agreement for the 6 students were 96.0% (82-98%), 95% (85-98%) and 89.8% (80-96%), respectively (Fig 3). The most common errors which resulted in both false positive and false negative findings were lymph node involvement and implant rupture.

Implant rupture was the most common error. MRI has been described as the gold standard imaging procedure for evaluation of implant failure as it assesses the integrity of the shell and has the ability to selectively enhance or suppress signal from silicone [12]. The sensitivity of MRI for rupture has been found to be 80-90% and specificity 90-97% [12]. Implant failure signs are well documented but can be challenging to the reader. Radial folds can appear complex and agreement between observers is not always achieved [13].

In one case in the OSE a ring enhancing mass was described as a possible infected cyst. This case was recommended by the student as requiring further evaluation but no suspicion of malignancy was indicated. Rim enhancement is a sign that should be identified as suspicious for malignancy [13] although a study by Warren et al in 2006 [14] also found this to be inconsistently identified.

In 2006 fifteen radiologists who reported normal and abnormal cases demonstrated a sensitivity rate of 88%, specificity was 69% and AUC (area under the curve) 0.8512. The low specificity in this study was attributed to the higher number of normal and unusual benign cases included in the test banks than would be seen in normal clinical practice [14].

A more recent evaluation conducted by Baltzer et al in 2015 included 6 radiologists who reported 219 breast MRI examinations in cases where there were known lesions. Sensitivity scores ranged from 82-91%, specificity from 71-86%. Receiver operator characteristic curves were also calculated with AUC (area under the curve) measured as 0.8-0.9 [15]. Experience of the radiologists did not appear to influence agreement for non-mass like enhancement, however novice radiologists (<100 cases) did not distinguish between benign and malignant cases as well as more experienced radiologists. As no normal cases were included in this analysis, specificity could have been underestimated due to prevalence bias. The sensitivity of the reporting radiographers in the current study (86%) is broadly in line with the mean performance of the consultant radiologists across both studies (86-88%) [14,15]. It also demonstrates the complexity in interpreting breast MRI.

Current NHSBSP requirements that all breast MRI examinations are double read poses significant challenges but may serve to address the interobserver variability observed in studies [14]. A recent survey by the Royal College of Radiologists (RCR) has established that only 10% of breast clinicians (clinicians specialising in breast disease diagnosis and management) currently interpret breast MRI [9], further compounding the breast imaging workforce shortage.

The results of the first cohort of 6 students who completed the OSE examination show encouraging findings. All students achieved the standard required based on a range of normal and abnormal examinations which would commonly be encountered in clinical practice. The OSE scores reflect similar findings described in other studies.

This study is limited by the cohort size but the results, which are encouraging, suggest that expert breast radiographers, with additional postgraduate education, can report MRI breast examinations to a satisfactory level of competence. This additional capacity could be of benefit to clinical departments committed to achieving NHSBSP guidelines for double reading of all breast MRI examinations. Further work involving a larger cohort and work in clinical practice is required to confirm the clinical application of these initial findings.

Images for this section:

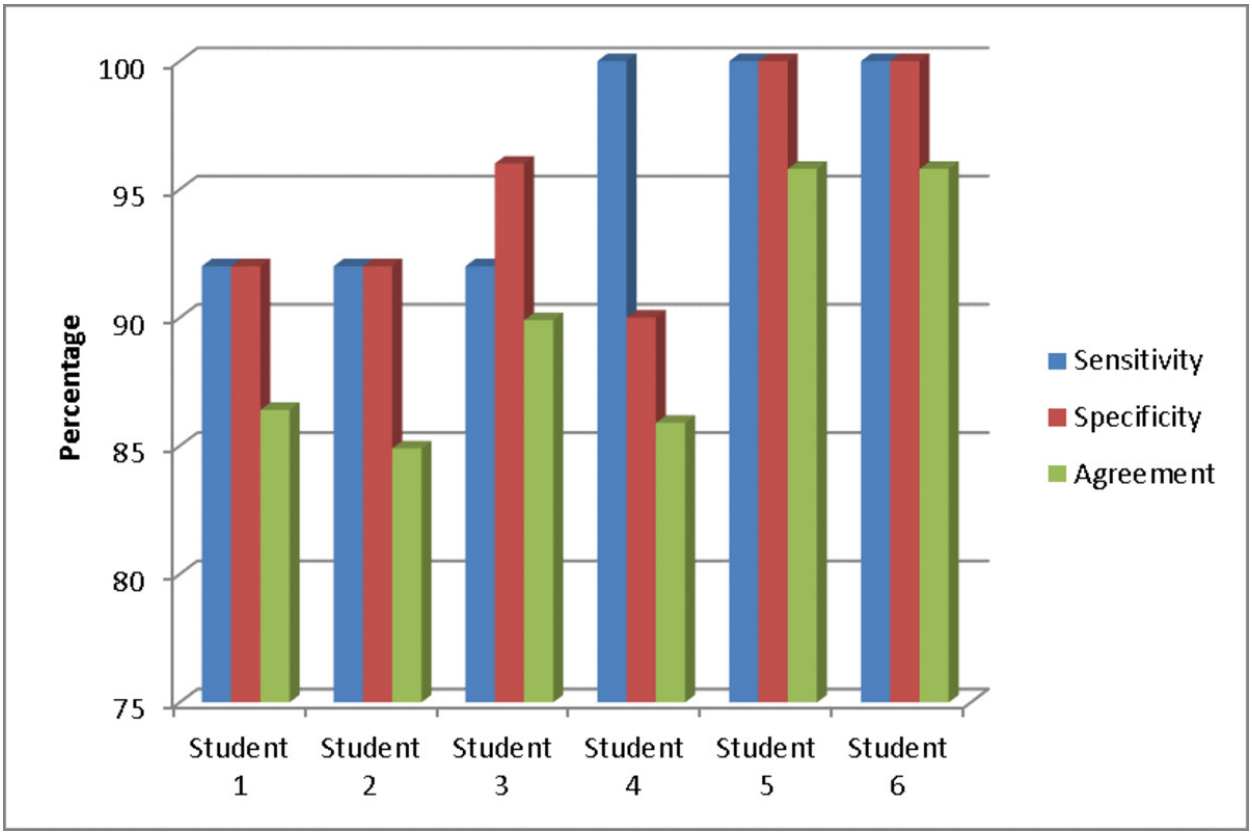

Fig. 3: Sensitivity, specificity and accuracy scores

Personal information

Mrs Lisa Pittock, Programme Director MSc Clinical Reporting programme, Canterbury Christ Church University, Canterbury, Kent, UK;

Dr Keith Piper, Principal Lecturer, Canterbury Christ Church University, Canterbury, Kent, UK;

Mr Nick Woznitza, Clinical Academic Reporting Radiographer, Homerton Hospital, London, UK.

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