ROLE OF MAMMOGRAM AND MRI IN SURVEILLANCE OF "MAMMOGRAM OCCULT" BREAST CANCERS AND OTHER HIGH RISK PATIENTS

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Objectives

1. Role of both mammograms and MRI surveillance in three groups of high risk patients (see below)
2. To evaluate recall rate of mammogram versus MRI
3. To evaluate benign biopsy rate following recall

Introduction

Breast cancer is the most common female cancer globally and in the U.K. (1,2). In 2015, there were nearly 2,800 Welsh breast cancer diagnoses (3). A third of U.K. breast cancers are detected by screening (4,5). Screening programmes for average-risk women in the U.K. are well established (6). Best practice for high-risk screening women is more controversial, therefore mammographic screening is supplemented with Magnetic Resonance Imaging (MRI). For the purpose of this study, high risk patients comprised patients with previous 'mammogram occult' breast cancers, known genetic mutation or >20% lifetime risk of developing breast cancer and patients treated with radiation therapy for Hodgkin's disease.

This study retrospectively analyses high-risk breast cancer patients receiving routine follow up from 2011-2016 and MRI and mammography follow up efficacy in these three high-risk groups. This research was a clinical audit, so did not require ethical approval.
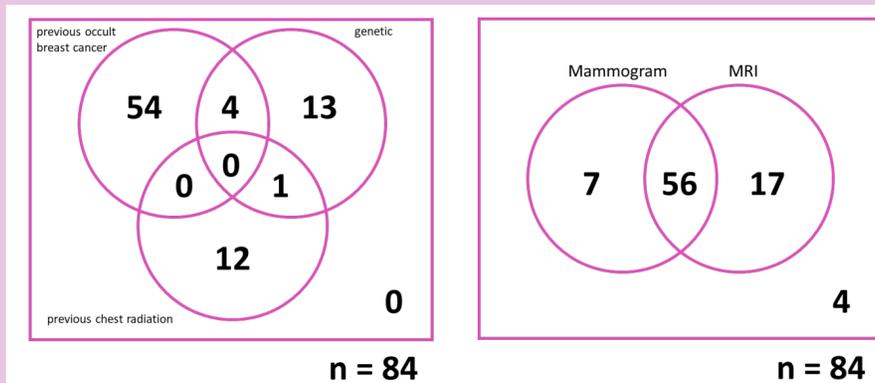

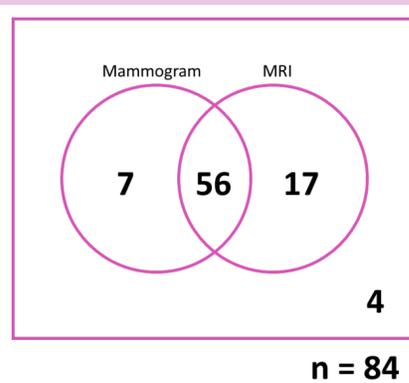Figure 1. Risk factors for all patients recruited to study

Figure 2. Follow up modality received by each patient

Method

There were 508 images of 84 patients. All had 12 to 18 monthly mammograms/MRI performed as part of routine surveillance. Patients with mammograms and MRI pairs had imaging performed on the same day. Reporting radiologist was not blinded to any previous imaging or imaging from same day. Clinical information was then collected regarding each of the 84. If a patient was recalled during follow up, information about the reason for recall, modality and the number of recalls were recorded. If a recall returned positive, details about malignancy were taken. After the database was completed, the data collected was statistically analysed.

Figure 3. Mammogram/MRI versus histology

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Results

There were 43 recalls in the study period amongst all patients in the study group. In total, 34 individuals (40.5%) were recalled, three of these patients were recalled twice, and two recalled four times. 29 recalls were based on abnormalities found on MRI only, nine were due to abnormal mammographic findings only, two recalls were requested after both modalities detected abnormalities and the reason for three recalls was clinical and not imaging related. Therefore, 25.6% of total recall cases were due to mammogram findings and 72.1% were due to MRI findings. 31 (10.8%) MRIs were recalled out of 286 MRIs, compared to 11 (4.95%) out of 222 mammograms. Out of these 31 MRI recalls, all led to 'second look' ultrasound (US) and in some cases it led to short interval MRI. Following these MRI recalls, 11 (35.4%) US guided biopsies were reported as benign after histopathological examination.

Parameter	Mammogram	MRI
Sensitivity	40.0 [5.3-85.3]	40.0 [5.3-85.3]
Specificity	84.5 [72.6-92.7]	60.1 [48.8-72.0]
Positive Predictive Value	18.2 [6.1-43.2]	6.45 [2.2-17.3]
Negative Predictive Value	94.2 [88.8-97.1]	93.8 [87.8-96.9]
Positive likelihood ratio	2.58 [0.75-8.82]	1.02 [0.34-3.10]
Negative likelihood ratio	0.71 [0.34-1.47]	0.99 [0.47-2.07]

Figure 4. Table comparing statistics from the mammogram and MRI groups

Except where otherwise indicated, data are shown as a percentage [95% confidence interval]

Mammography has a statistically significant superior specificity when compared with MRI, similar to other study findings (7,8). Only two of five positive recalls were detected by Imaging, meaning only four of 508 radiological images correctly found abnormalities.

Limitations

Small sample size and single centre status affects the validity and reproducibility of results. It was not possible to access follow up imaging if continued outside of the Cardiff area, so findings may have a geographical selection bias. Sensitivity is not true sensitivity as patients presented with symptoms before imaging surveillance started. Not all patients received follow up with both imaging modalities, so in individuals with follow up from only MRI or mammogram, comparison of efficacy is impossible.
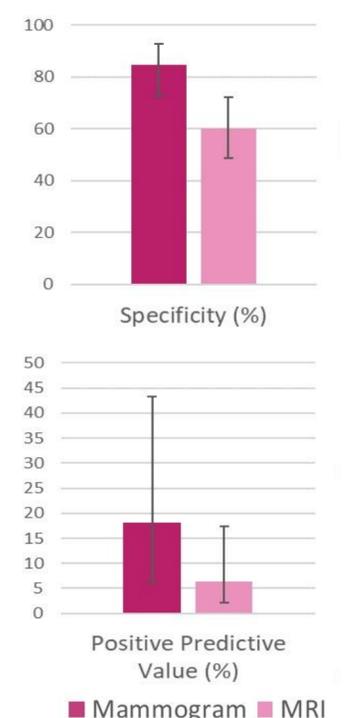

Figure 5. Bar chart displaying relevant data from Figure 4

Conclusion

With an increasing number of women with previous history of breast cancer and average risk women having MRI as an adjuvant to mammograms in routine surveillance, it is important to understand the implications of increased imaging surveillance. Use of MRI leads to increased number of recalls and benign biopsies. The benefits of increased cancer detection and harms of increased benign biopsies should be properly evaluated in prospective studies with larger sample size and longer duration. This study suggests that a considerable proportion of recurring cancers in high-risk women present symptomatically. Educating high-risk breast cancer patients to be vigilant about symptoms of breast cancer is vital.