

The Role of Magnetic Resonance Imaging (MRI) in Screening Women at High-Risk of Breast Cancer

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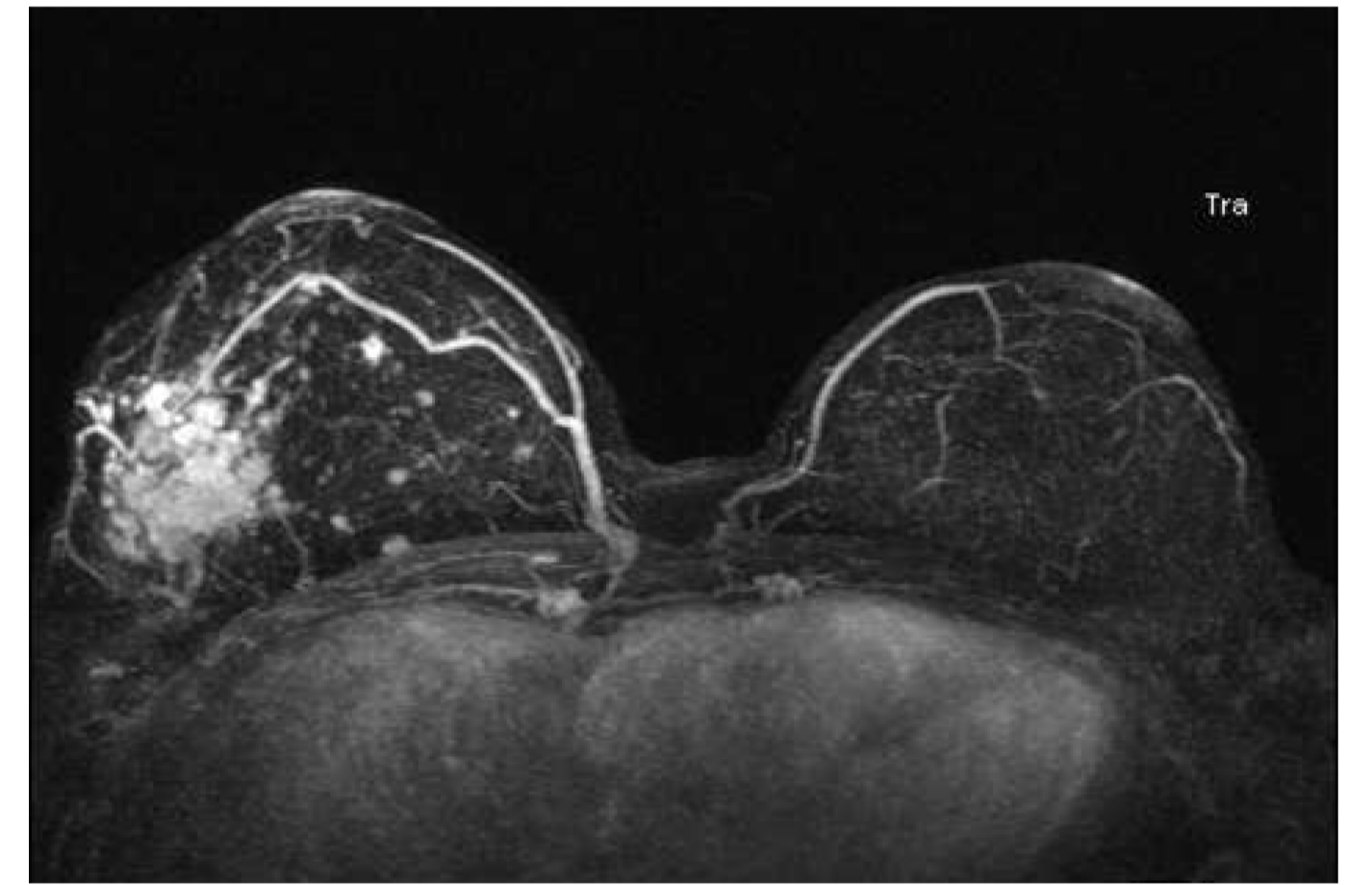
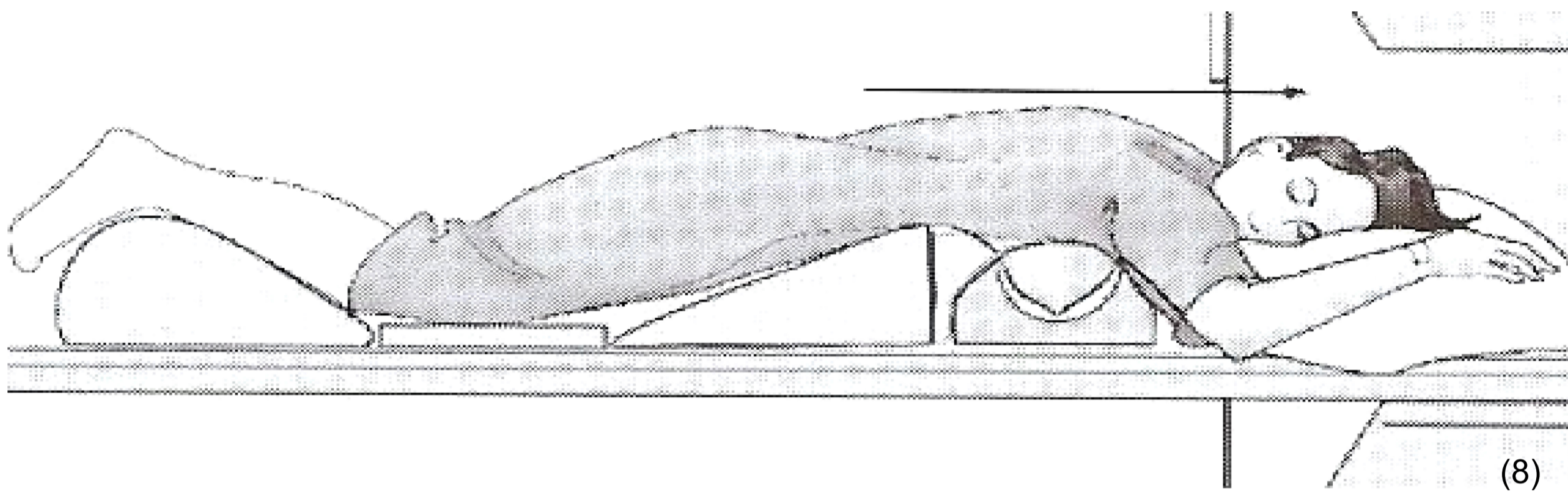
INTRODUCTION . Breast cancer is the most common UK cancer with 1 in 8 women developing the disease in their lifetime (1). The World Health Organisation (WHO) states that early detection of this cancer is vital to improve breast cancer outcome/ survival (2). Mammography is currently accepted as the only proven screening method with a reduction of 25% in breast cancer mortality (3). Women with a family history have an increased risk of developing breast cancer and need for regular surveillance (4). The 2006 National Institute for Health and Clinical Excellence (NICE) recommend that women known to be at high-risk of developing breast cancer should be offered annual MRI surveillance (94). These guidelines also state that mammographic surveillance should not be available for women younger than 30 years (4). However, the existing evidence for the effectiveness of MRI relative to film-screen mammography (FM) in this patient group is limited(6).

RESEARCH QUESTIONS

For this patient group:

- How does the sensitivity and specificity of MR compare to the gold standard screening modality - mammography?
- What are the dose implications of screening with mammography?
- Is MRI an acceptable and cost-effective screening option?

METHODOLOGY. A systematic literature review of the available research was carried out which were assessed against inclusion and exclusion criteria. The selected research studies were critically analysed and evaluated using appropriate critical appraisal tools to ensure quality (7).



ACCURACY OF MRI

From the research it is clear that the diagnostic accuracy of MRI for breast cancer screening varies. The consensus is one of significantly higher sensitivity of MRI when compared to FM, however the specificity of MRI was found to be significantly lower than that of FM in some studies, resulting in more recalls and biopsies. However, several researchers have reported that recall rates decreased in subsequent rounds of screening. It seems that, while the increased sensitivity of MRI leads to a higher call-back rate, it also leads to a higher number of cancers detected. As with FM and other screening tests, false negatives after MRI screening can be due to inherent technological limitations of MRI, patient characteristics, and human error.

Ref	n=	Screening Rounds	Mammo Sens (%)	Mammo Spec (%)	US Sens (%)	US Spec (%)	MRI Sens (%)	MRI Spec (%)
9	1,909	2,431	33	-	-	-	80	-
10	529	1,542	33	96.8	40	90.5	91	97.2
11	687	1,679	33.3	99.1	37	98	92.6	98.4
12	649	1,881	40	93	-	-	77	81
13	367	367	25	-	-	-	100	-
14	171	171	33	97.7	17	97.7	100	91.8
15	327	672	50	98	42.9	98	85.7	92
16	184	387	58	95.4	42	93.8	83	93.6
17	609	609	39	94	17	88	71	79

SAFETY CONSIDERATIONS

MRI has the advantage that it does not involve ionising radiation, the biological effects and role as a cause of cancer of which are well established. However, there is uncertainty about the potential of mammography-induced cancers, particularly in high-risk women. Other considerations are the use of gadolinium contrast agents in MRI studies which have been linked with a small number of cases of Nephrogenic Systemic Fibrosis, a severe adverse reaction.

PATIENT ACCEPTABILITY & TOLERANCE

The literature search revealed no qualitative work on the experiences of patients undergoing breast MRI and was limited to two studies using questionnaires. From the limited literature identified it seems that women at high risk of breast cancer do find MRI to be an acceptable option.

COST IMPLICATIONS

The consensus of the identified studies is that annual MRI screening of women at high-risk of developing breast cancer does involve considerable additional cost. This additional cost is found to be justified and therefore breast cancer screening using MRI is cost-effective for women at high-risk of developing breast cancer.

CONCLUSION. The reported diagnostic accuracy of MRI for this patient group varies but the sensitivity of MRI is significantly higher than FM. However, the variation in the reported specificity of MRI is larger with some studies finding it to be significantly lower than FM and others finding it to be comparable. At present there is no investigation of the impact of this increased cancer detection on mortality and it is not known whether improvements in sensitivity and specificity give rise to improved patient outcomes. Therefore this review has not definitively proven that MRI screening for high-risk breast cancer should be the gold standard. Findings on patient acceptance and tolerance is limited with a distinct lack of robust qualitative work on the patient experience of breast MRI. However, the research identified agrees that MRI is an acceptable option for patients. It is found that MRI screening is associated with a significant additional cost which is justified for this group.

IMPLICATIONS FOR CLINICAL PRACTICE. A lack of MRI image reader expertise and differences in equipment/ protocols was identified and should be addressed to ensure that women at high-risk of breast cancer receive a high quality service. It is essential to provide counselling and information about the uncertainty surrounding potential findings and the higher risk of false positive findings of MRI screening. The safety implications identified must be addressed in pre-screening questionnaires.

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