

Contrast-Enhanced Digital Mammography in the Surgical Management of Breast Cancer

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Objective

The purpose of this study was to evaluate the role of contrast-enhanced digital mammography (CEDM) in determining the surgical management of breast cancer. When breast MRI (bMRI) was also performed, CEDM results were compared with bMRI.

Methods

This is a retrospective review of patients who had undergone dual energy CEDM and breast surgery. These patients may also have had bMRI. Databases tracking imaging procedures and surgical planning for breast cancer were prospectively recorded and independently evaluated as to if CEDM or bMRI had an impact on breast surgery planning. Impact included, additional imaging or biopsy and/or changed the surgical procedure including: extending the size of breast conservation therapy (BCT), converting from BCT to mastectomy and converting from mastectomy to BCT. Adverse events for CEDM are reported, but the study was not established to compare the limitations of CEDM to those of bMRI.

Results

Databases revealed 351 patients who underwent CEDM en route to surgery. Of these none had allergic reactions to contrast. Investigators found 105 malignancies in 101 patients who had CEDM and breast surgery; 103 malignancies remained after 2 patients were excluded due to surgery prior to CEDM. CEDM identified 101/103 (98%) malignancies; 92% were invasive. The two cancers not identified were Paget disease diagnosed by punch biopsy and an inferior parasternal not in the field of view.

Seventeen of 101 patients (16%) were recommended for additional imaging based on CEDM and 12 patients for biopsy. Eight of the 12 patients (67% true positive rate) that went on to biopsy were proven to have additional invasive cancers. CEDM changed surgical management in 20 patients (20%) leading to a more extensive BCT in 16 patients (16%) and a change to mastectomy in 4 patients (4%). These changes were corroborated by the final histopathology.

In the subset of patients that also had bMRI, there were 43 cancers in 41 patients. The sensitivity for CEDM and bMRI was 98% (42/43) and 100% (43/43) respectively (parasternal lesion was in this group). bMRI led to additional biopsies in 10 patients (24%). Additional lesions identified on bMRI only and CEDM only, but not detected on the other modality were 7 (17%) and 3 (7%) respectively; none of the additional findings were malignant.

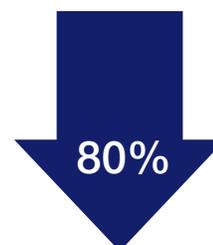
Conclusion

Although this study does not provide a direct comparison between CEDM and bMRI, the authors discuss the results in the context of the potential for CEDM to replace bMRI for the purpose of surgical planning for at least a good portion of complex cases requiring further imaging. CEDM was found to be highly sensitive, demonstrated size measurements that correlated with the histology size, and had a low rate of false-positive additional biopsy findings.

In this institution, the cost of the CEDM is 80% less than bMRI and the patient experience may be improved because CEDM is a shorter exam and contraindications, such as claustrophobia can be negated. The authors concluded that utilizing CEDM is low cost, relatively easy alternative to MRI for surgical planning and maintains the high sensitivity of bMRI.

CEDM Results	(n)	(%)
Identified index lesion and extent of disease	101/103	98%
Resulted in additional breast imaging	17/101	16%
True positive rate for biopsy	8/12	67%
Resulted in additional breast biopsy	12/101	12%
Altered surgical plan	20/101	20%
More extensive BCT	16/101	16%
Conversion to mastectomy	4/101	4%
Underwent CEDM and MRI (43 malignancies in 41 patients)	41/101	41%
CEDM	42/43	98%
MRI	43/43	100%

Advantage	CEDM	MRI
Low cost examination	✓	
Fast examination	✓	
Well tolerated	✓	
Lack of breast irradiation		✓
Iodinated contrast allergy		✓
Low cost equipment	✓	
Quick image acquisition	✓	
Easy image interpretation	✓	
Biopsy capability		✓



The cost to the healthcare system is **80% less for CEDM exam** as opposed to MRI exam.

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