

Contrast Enhanced Spectral Mammography (CESM) - What Is The "Added Value" In A Symptomatic Setting? Initial Findings From A UK Centre

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Introduction

CESM is a novel technique combining the benefits of iodinated contrast with standard mammographic views. Dual energy acquisitions during one exposure yield two sets of images - a Low Energy (LE) set, equivalent to standard Full Field Digital Mammography (FFDM) [1], and a recombined set displaying contrast uptake. Despite encouraging data from Europe and the US, there is no UK data to support its use as a tool in the diagnosis and staging of breast cancer.

Method

Since November 2013, we have routinely performed CESM within our symptomatic breast service, according to local departmental guidelines. Women 35-70 years with a P4/5 [2] clinical abnormality are offered CESM instead of FFDM as an initial imaging test. We also offer CESM to younger women whose ultrasound is suspicious, or who have biopsy-proven malignancy. All patients undergoing CESM give written consent for the procedure, which includes subsequent use of their anonymised images for education and training purposes.

This is a retrospective, multireader study comparing LE images alone, to the entire CESM examination (i.e. LE and recombined images). Consecutive CESM examinations were anonymised and stored as teaching files on the local PACS system by staff who were not involved in the subsequent image review.

5 consultant radiologists (with 8-25 years of breast imaging experience) read the LE images in isolation, scoring any abnormalities using a 5 point scale [3]. At least 3 weeks later, the process was repeated, analysing both the LE and the recombined images. Brief, anonymised, clinical information was available to the readers for both reads.

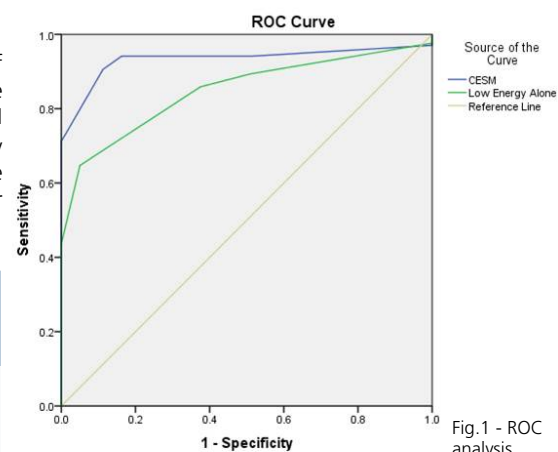
Pathology data were obtained for all cases. Differences in performance were assessed using receiver operative characteristic (ROC) analysis. Sensitivity, specificity and lesion size (vs. MRI or histopathology*) were analysed using 2-way independent t-test.

*Where patients underwent neoadjuvant chemotherapy, size was compared with reported size at baseline MRI scan. Where patients had surgery as their initial therapy, size was compared with reported histopathological (whole tumour) size.

Results

50 CESM examinations were analysed in this preliminary study. All were female, with a mean age of 49 years (range 25-69). 34 (68%) patients had biopsy proven malignancy, 16 (32%) patients were deemed benign following local clinical guidelines, including triple assessment as appropriate. CESM showed increased sensitivity compared with LE alone (94% vs. 86%, $p < 0.025$), increased specificity compared with LE alone (84% vs. 63%, $p < 0.025$) and better size estimation (mean size difference 23% vs. 31%, $p < 0.025$). ROC analysis showed overall performance of CESM was significantly better than LE alone (Fig. 1).

Test Result Variable(s)	Area Under The Curve	95% Confidence Interval		P Value
		Lower Bound	Upper Bound	
Low Energy Alone	0.848	0.802	0.895	P=0.0025
CESM	0.933	0.899	0.966	

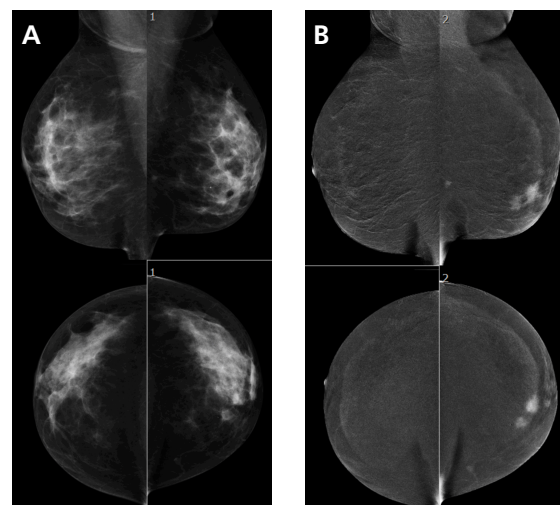


Conclusion

This preliminary study demonstrates the additional clinical utility of CESM in symptomatic patients. Its potential use in other clinical settings (e.g. screening of high-risk women), requires evaluation.

Case Study

58y F with a suspicious mass in the left central breast. The palpable lesion is occult on the LE images (A). Recombined images (B) demonstrate two ill-defined masses with a total extent of 34mm in the left retro-areolar region. A 7mm focus of enhancement is also evident in the medial aspect on the left, away from the palpable tumour. Targeted ultrasound of the medial breast revealed a 5mm mass. Core biopsies of the palpable tumour and the distal focus showed G2 carcinoma with lobular features. The patient underwent mastectomy. Final histology confirmed two clearly separate carcinomas measuring 24 mm and 6 mm.



References

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With thanks to Dr C Girio-Fragoulakis (ST4 Radiology) and Mrs. Laura Willoughby (Education administrator) for image anonymisation and admin. support.