ORIGINAL RESEARCH PAPER

Radiology

Volume - 7 | Issue - 3 | March - 2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

ELASTOGRAPHY IN CHARACTERIZATION OF SMALL BREAST LESIONS- A NEW ADJUNCT??

KEYWORDS: elastography, ultrasound, strain, lymph nodes, malignancy

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ABSTRACT

AIMS AND OBJECTIVES : This short study aims to establish the efficacy of strain elastography in predicting malignancy in small breast lesions and to test the negative predictive value of this method in excluding malignancy. Also wherever possible the usefulness of elastography in predicting malignancy in axillary lymph nodes was evaluated.

METHODS AND MATERIALS : Prospective study on a sample of 40 was conducted on patients in KMC Hospital, Ambedkar Circle in a study period of 4 months mode ultrasonography, doppler, elastography was performed on all patients and compared with gold standard which was histopathology. Cystic lesions were excluded. The lesions were examined on a Logic E7 machine using 9L and 6-14 linear probes. The morphology and sonoelastography with elastography graph were assessed in all patients. B-mode images were assessed according to the BI-RADS system while elastography was analysed according to elastography scoring system proposed by Itoh et al(2006) and images attributed to one of the five elasticity scores.

RESULTS : Qualitative and semi quantitative approach was used for calculations. Malignant lesions showed elastography score>3 and sensitivity, specificity paralleled those of conventional B-mode imaging. The ROC curve plotted helped to differentiate benign from malignant lesions. Among malignant, most common pathology was invasive ductal carcinoma while commonest benign lesion proved to be fibroadenoma.

CONCLUSION : Strain elastography can be used in cases where B-mode imaging is unequivocal or as a collaborative tool. Its solitary role in obviating the need of invasive procedures like FNAC/biopsy for suspected malignant breast lesions although is doubtful .It could also aid in nodal staging of breast tumours and choosing the appropriate node for biopsy.

INTRODUCTION:

Palpation is the standard screening procedure in the clinical examination, for the detection of breast, thyroid, prostate and liver abnormalities.The use of elastography technique, which is a based on similar principle has become increasingly popular in recent times as an additional tool for evaluation of breast lesions. According to a recent study published in 2014 by Aysun Atabey et al although breast imaging modalities carry high sensitivity, there is need for higher specificity to rule out malignancy in small breast lesions. Elastography scores are insensitive to the thickness and the echogenicity of the breast and size of the lesion. Mammography id difficult to interpret in women with dense breasts and in women younger than 50 years (leading to false-negative findings on mammography)in addition to disadvantage of ionizing radiation. As also Todd Kumm and Margaret Szabunio concluded in their study 'Elastography for the Characterization of Breast Lesions' a reliable, non-invasive method would significantly reduce number of unnecessary biopsies.

Difference in the size of a breast lesion in strain images, relative to its size in a normal B-mode image is a significant criterion for differentiating malignant from benign breast lesions.

This short study aims to establish the efficacy of strain elastography in predicting malignancy in small breast lesions and to test the negative predictive value of this method in excluding malignancy. Also wherever possible the usefulness of elastography in predicting malignancy in axillary lymph nodes was evaluated.

CLINICAL EXPERIENCE IN A SAMPLE POPULATION OF SOUTH INDIA:

METHODS AND MATERIALS

Prospective study on a sample of 40 was conducted on patients in KMC Hospital, Ambedkar Circle, Mangalore in a study period of 4 months mode ultrasonography, doppler, elastography was performed on all patients and compared with gold standard which was histopathology. Cystic lesions were excluded. The lesions were examined on a Logic E7 machine using 9L and 6-14 linear probes. The size, shape, margins, internal echopattern, posterior acoustic enhancement/shadowing, vertical/horizontal orientation of the lesion, Doppler parameters where indicated and sonoelastography with elastography graph were assessed in all patients. B-mode images were assessed according to the BI-RADS system while elastography was analysed according to elastography scoring system proposed by Itoh et al(2006) and images attributed to one of the five elasticity scores. The sensitivity, specificity, accuracy, positive and negative predictive values, and false-positive and –negative rates were calculated for each modality and the combination of UE and sonography.

RESULTS

Maximum women were in age group 30-60 years (20-30yrs:4, 30-40yrs:11,40-50yrs:13,50-60-7 and 60-70:5 in number).Qualitative and semi quantitative approach was used for calculations. Malignant lesions showed elastography score>3 and sensitivity, specificity paralleled those of conventional B-mode imaging. The ROC curve plotted helped to differentiate benign from malignant lesions. Among malignant, most common pathology was invasive ductal carcinoma while commonest benign lesion proved to be fibroadenoma.

Fig1,Fig2

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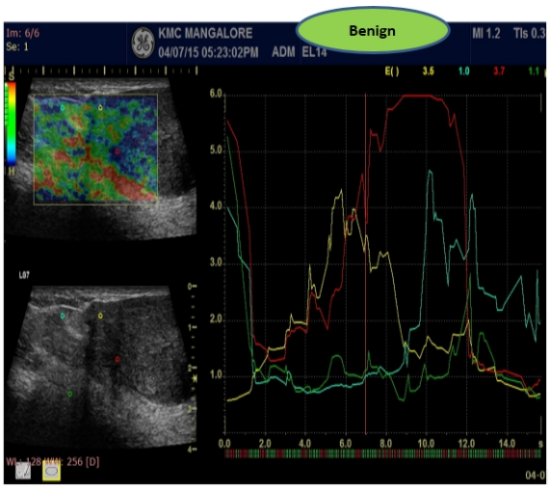

Fig1

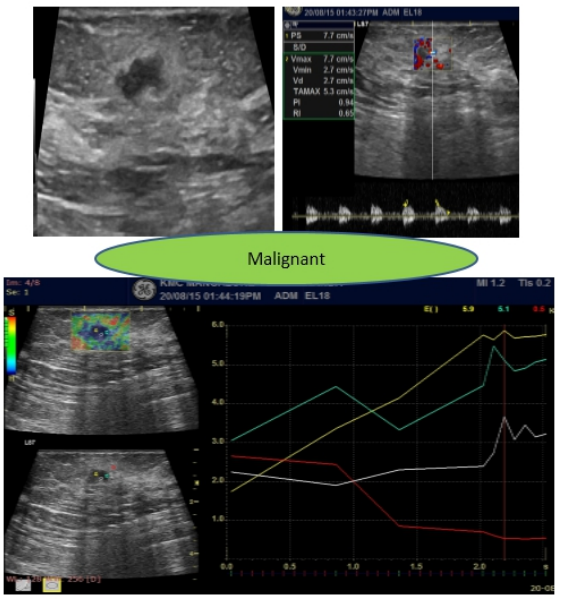

Fig2

Out of the 40 subjects the mean age was 45 years and breast lesions were identified as BIRADS-6(n= 2),BIRADS-5(n=9),BIRADS-4(n= 6), BIRADS-3 (n=3)and BIRADS-2(n=11).

LIMITATIONS OF ELASTOGRAPHY

Overlap of the elasticity between benign and malignant lesions.

- Large-scale necrosis may impair the diagnostic assessment in UE – false negative.
- Lesions with calcifications -False positive
- Carcinoma in situ - identified on mammography by the presence of microcalcifications.

Because the hardness of carcinoma in situ is lower than that of infiltrating cancer, a little harder than benign tissues, it is not easy to differentiate carcinoma in situ

CONCLUSION

Strain elastography can be used in cases where B-mode imaging is unequivocal or as a collaborative tool. If incorporated in the diagnostic flow chart, it may avoid the use of biopsy in BI-RADS 3 and may postpone the follow up schedule to 1 year.

By combining UE and sonography, the detection accuracy can be improved greatly, and the combination potentially could reduce unnecessary biopsy. This combination was the optimal screening modality in our study. An additional benefit could be its ability to predict recurrence in known cases of malignancy. It could also aid in nodal staging of breast tumours and choosing the appropriate node for biopsy.

The mean strain index values was found to be ~3.8 for benign and 5.4 for malignant lesions. The sensitivity, specificity, positive and negative predictive values were 84.2%,81%,80%,85% respectively with an accuracy of 82.5%.(Fig 3,Fig4)

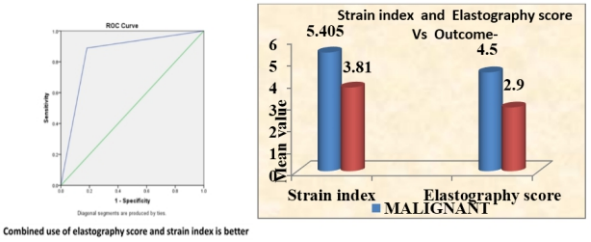

Fig 3 and Fig4

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