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Preliminary assessment of ShearWave(TM) elastography features in predicting breast lesion malignancy

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Abstract:
Purpose

This analysis is of an ongoing prospective multi-centre international study to evaluate the impact of adding ShearWave (TM) Elastography (SWE) features to the BI-RADS® classification in the framework of breast cancer diagnosis.

Methods and Materials

A subset of 192 female breast lesions was analysed, of which 110 were benign and 82 were malignant. Reproducibility of SWE size and elasticity measurements was assessed through intra observer reliability (IOR). Logistic regression analysis was performed to predict the pathology findings. The reference model considered BIRADS®>=4 as a positive test for malignancy. Two and three variable models added one or two SWE features to BIRADS®>=4. The impact of SWE features was determined by the area under the ROC curve, sensitivity and specificity.

Results

Reproducibility of SWE size measurements and maximum and mean elasticity measurements was very high (IOR> 0.93, 0.84 and 0.88 respectively). When added to BIRADS®>=4, maximum and mean elasticity increased ROC area from 0.773 to 0.925 and 0.917 respectively. The best three-variable model (BIRADS®>=4 + elasticity shape + maximum elasticity) increased ROC area to 0.934. In this model, sensitivity decreased from 92.7% to 87.8%,but specificity increased from 61.8% to 87.3%. The rate of correctly classified lesions increased from 75 to 87.5%.

Conclusion

In this ongoing study, SWE provided reproducible information that increased the diagnostic performance of ultrasound imaging. Features that led to the highest performance (mean and maximum elasticity values, homogeneity and shape of the SWE signal) are directly linked to the features of SWE: local quantification and millimetre resolution.
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