

A Comparative Study between Digital Mammography, B Mode Ultrasound, Shear-Wave and Strain Elastography to Distinguish Benign and Malignant Breast Masses

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Abstract : BACKGROUND: Breast cancer is the commonest malignancy among women globally, with an estimated incidence of 2.3 million new cases as of 2020, representing 11.7% of all malignancies. As per Globocan data 2020, it accounted for 13.5% of all cancers and 10.6% of all cancer deaths in India. Early diagnosis and treatment can improve the overall morbidity and mortality, which necessitates the importance of differentiating benign from malignant breast masses. OBJECTIVE: The objective of the present study was to evaluate and compare the role of Digital Mammography (DM), B mode Ultrasound (USG), Shear Wave Elastography (SWE) and Strain Elastography (SE) in differentiating benign and malignant breast masses (ACR BI-RADS 3 - 5). Histo-Pathological Examination (HPE) was considered the Gold standard. MATERIALS & METHODS: We conducted a cross-sectional study on 53 patients with 64 breast masses over a period of 10 months. All patients underwent DM, USG, SWE and SE. These modalities were individually assessed to know their accuracy in differentiating benign and malignant masses. All Digital Mammograms were done using the Fujifilm AMULET Innovality Digital Mammography system and all Ultrasound examinations were performed on SAMSUNG RS 80 EVO Ultrasound system equipped with 2 to 9 MHz and 3 - 16 MHz linear transducers. All masses were subjected to HPE. Independent t-test and Chi-square or Fisher's exact test were used to assess continuous and categorical variables, respectively. ROC analysis was done to assess the accuracy of diagnostic tests. RESULTS: Of 64 lesions, 51 (79.68%) were malignant and 13 (20.31%) ($p < 0.0001$) were benign. SE was the most specific (100%) ($p < 0.0001$) and USG (98%) ($p < 0.0001$) was the most sensitive of all the modalities. E max, E mean, E max ratio, E mean ratio and Strain Ratio of the malignant masses significantly differed from those of the benign masses. Maximum SWE value showed the highest sensitivity (88.2%) ($p < 0.0001$) among the elastography parameters. A combination of USG, SE and SWE had good sensitivity (86%) ($p < 0.0001$). CONCLUSION: A combination of USG, SE and SWE improves overall diagnostic yield in differentiating benign and malignant breast masses. Early diagnosis and treatment of breast carcinoma will reduce patient mortality and morbidity.

Keywords : digital mammography, breast cancer, ultrasound, elastography

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