|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||
International Journal of Medical and Biomedical Studies
Available Online at www.ijmbs.info
PubMed (National Library of Medicine ID: 101738825)
Index Copernicus Value 2018: 75.71
Original Research Article
Volume 3, Issue 6; June: 2019; Page No. 308-311

COMPARATIVE ANALYSIS OF ELASTO-GRAPHY AND HISTOPATHOLOGY FINDINGS OF MAMMARY LUMP AT A MEDICAL COLLEGE IN CENTRAL INDIA

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Article Info: Received 05 June 2029; Accepted 28 June 2019
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Conflict of interest: No conflict of interest.

Abstract

Background: Mammary carcinoma has become the commonest type of carcinoma in India's urban population. Mammary sonoelasto-graphy is a non-invasive imaging technology that can reveal the location of lesions in the mammary.

Aims & objectives: We examined elasto-graphy and histopathological results of mammary lumps, as well as the diagnostic accuracy of elasto-graphy, in this study.

Material and Methods: The current investigation was a prospective observational analysis in female patients with sonographically apparent solid mammary lesions that were smaller than 3 cm in diameter and were classed as BIRADS 3 and 4.

Results: During the study period, 252 female patients had USG elasto-graphy, then biopsy/surgery, with histopathology reports available. According to histology, 42% of the tumours were benign, while the balance (58%) were malignant. In malignant instances, age, BIRADS, Elasto-graphy Score, and Strain ratio were much greater than in benign cases, and the difference was statistically noteworthy (p0.001). According to histopathological diagnosis, the commonest benign lesions were fibroadenoma (77%) and fibrocystic disease (9%), benign fibroepithelial lesion (7%), abscess (5%), and sclerosing adenosis (3%). (1 percent). Invasive ductal carcinoma accounted for the bulk of malignant cases (67%) followed by invasive mucinous carcinoma (13%), invasive poorly differentiated carcinoma (8%), ILC (6%), medullary ca (2%), papillary ca (2%), and phylloids (1%). (2 percent), The combination of Ultrasound Score + Elasto-graphy Score + Strain Ratio yielded excellent results.

Conclusion: In discriminating benign and malignant mammary masses, ultrasound elasto-graphy combined with strain elasto-graphy and ultrasound score has a high sensitivity, specificity, and diagnostic accuracy.

Keywords: mammary lump, mammary malignancy, elasto-graphy, histopathology

Introduction

Mammary carcinoma has become the commonest type of carcinoma in India's urban population[1]. It is rapidly displacing cervix carcinoma as the commonest type of carcinoma in women. Age, genetics, family history, diet, alcohol, obesity, lifestyle, physical inactivity, and endocrine factors are all thought to play a role in disease pathogenesis[2,3]. The "gold standard" method for detecting mammary lumps is a biopsy, but it is an invasive procedure with a high diagnostic cost[4,5]. Elasto-graphy has gained popularity as a supplemental approach to ultrasonography in noninvasive mammary carcinoma screening in recent years. Real-time elasto-graphy is used in conjunction with traditional ultrasonography to improve diagnostic accuracy. Mammary sono-elasto-graphy is a non-invasive imaging technology that can reveal mammary abnormalities[6,7]. It measures the hardness of a mammary lesion in comparison to surrounding tissue and can help distinguish between benign and carcinomaous tissue. Strain (compression-based) and shear wave elasto-graphy are two techniques now available for clinical application[8,9]. The lesions are quantified according to the colour scale in Sono-elastogram. In elasto-graphy, the Tsukuba elasticity score is the most well-known and widely used of the many scoring methods[10].

Aims & objectives: We examined elasto-graphy and histopathological results of mammary lumps, as well as the diagnostic accuracy of elasto-graphy, in this study.

MATERIAL AND METHODS

The current study was a prospective observational study conducted in a medical college in Central India's Department of Radio Diagnosis. The study was place over

the course of a year. The approval of the institutional ethical committee was obtained.

Female patients with sonographically apparent solid mammary lesions measuring less than 3 cm and classed as BIRADS 3 and 4 were eligible.

Exclusion criteria: Cystic lesions and solid lesions identified as BIRADS type 2 or 5 are excluded. Lesions that are close to the skin's surface, the chest wall, or both Lesions that haven't been diagnosed cytologically or histopathologically Before being included in the study, all participants signed a written informed consent form. One of the two radiologists with 8 and 10 years of experience in mammary ultrasounds and training in elasto-graphy performed real-time ultrasound followed by SE on a Samsung RS80A unit (Samsung Medison BLDG., 42 Teheranro 108gil, Gangnamgu, Seoul 135851, South Korea) with a 3–12 MHz linear array transducer.

Demographic information, medical history, and clinical examination findings were all recorded. The lesions were first evaluated using conventional Bmode ultrasonography in a supine posture utilising a radial scanning pattern. Using conventional ultrasound criteria such as form, echotexture, margin, orientation, and posterior acoustic properties, each lesion was assigned a BIRADS category. The Elasto-graphy score (ES) was calculated using Itoh et alfive-point .'s Tsukuba categorization system. Lesions with an ES of 1–3 were regarded benign, but those with an ES of 4 or 5 were suspected of being carcinomaous. The strain ratio (SR) was measured by first establishing a region of interest (ROI) in the target lesion and then a second ROI in lateral subcutaneous fat tissue that was identical in size and depth to the target lesion. For comparison of conventional ultrasonography and elasto-graphy findings, histopathological results derived from biopsy or surgical specimens were employed as the reference standard. The Mann–Whitney U test was used to assess the sonographic and elastographic characteristics for benign and malignant lesions in relation to the histological diagnosis. A P value of 0.05 was chosen as the criterion of significance.

RESULTS

During the study period, 252 female patients had USG elasto-graphy, then biopsy/surgery, with histopathology reports available. According to histology, 42% of the tumours were benign, while the remaining 59% were malignant. In malignant instances, age, BIRADS, Elasto-graphy Score, and Strain ratio were much greater than in benign cases, and the difference was statistically noteworthy (p0.001).

Table 1: Average values of variables with respect to histopathological diagnosis

Variants	Benign	Malignant	P
Age	39.49 ± 10.40	55.43 ± 14.35	<0.001
BIRADS	3.18 ± 0.25	4.33 ± 0.33	<0.001
Elasto-graphy Score	2.21 ± 0.31	4.33 ± 0.31	<0.001
Strain Ratio	1.41 ± 0.42	4.33 ± 1.15	<0.001

According to histopathological diagnosis, the commonest benign lesions were fibroadenoma (77%) and fibrocystic disease (9%), benign fibroepithelial lesion (7%), abscess (5%), and sclerosing adenosis (3%). (1 percent). Invasive ductal carcinoma accounted for the bulk of malignant cases (67%) followed by invasive mucinous carcinoma (13%), invasive poorly differentiated carcinoma (8%), ILC (6%), medullary ca (2%), papillary ca (2%), and phylloids (1%). (2 percent).

Table 3: Histopathological diagnosis amongst malignant and benign lesions

HPE RESULTS	Number Of Cases	Percentage (%)
Benign (n=148)		
Fibroadenoma	114	77 %
Fibrocystic disease	14	9 %
Benign fibroepithelial lesion	10	7 %
Abscess (ABS)	8	5 %
Sclerosing adenosis	2	1 %
Malignant (n=104)		
Invasive ductal carcinoma	70	67 %
Invasive mucinous carcinoma	14	13 %
Invasive poorly differentiated carcinoma	8	8 %
ILC	6	6 %
Medullary Ca	2	2 %
Papillary Ca	2	2 %
Phylloids	2	2 %

Though scores were good, excellent scores were noted with the combination of Ultrasound Score + Elasto-graphy Score + Strain Ratio as sensitivity, specificity, diagnostic accuracy, NPV, and PPV of 96 percent, 96 percent, 96 percent, 94 percent, and 97 percent, respectively.

DISCUSSION

In addition to the traditional B-mode Ultrasonogram, sonoelasto-graphy is an enhanced sonographic technique utilised in the assessment of suspicious mammary masses. Sonoelasto-graphy measures the elasticity of tissues by applying pressure to them[11]. According to research by Thomas A et al and Lee JH et al, sonoelasto-graphy has a sensitivity of 67 percent to 83 percent and a specificity of 87 percent to 90 percent. According to studies, combining elastographic data with traditional B mode USG can enhance sensitivity and specificity[12,13]. Sono-elastogram versus dynamic MR Mammogram on BIRADS III and above categories lesions had a sensitivity of 84 percent for Sonoelasto-graphy and 88 percent for MR Mammogram in a study by ElSaid NAet al. The study found that Sonoelasto-graphy had an 84 percent specificity and MR Mammography had an 80 percent specificity[14,15].

In line with several prior studies, using a combination of ultrasonic characteristics and elasto-graphy parameters (ES and SR) gave better outcomes than using individual values in each category. In a research by Kumar AMS et al., 14 of 90 individuals had benign lesions and 44 had malignant lesions[16]. B-mode USG had a sensitivity, specificity, and diagnostic accuracy of 71.74 percent, 90.91 percent, and 81.11 percent, respectively, while elasto-graphy had a sensitivity, specificity, and diagnostic accuracy of 96 percent, 68 percent, and 82 percent, respectively. They came to the conclusion that elasto-graphy could be used in conjunction with standard B-mode USG to improve diagnostic performance. The current study found similar results. When a cut off value of 3 was chosen for elasticity score, Sinha R et al found a sensitivity of 97 percent and specificity of 87 percent in 120 mammary lump patients[17,18]. When a cutoff of 3.8 was utilised for strain ratio, a specificity of 95% and a sensitivity of 93.3 percent were found (SR). The degree of the disease, local or contiguous dissemination, and vascular involvement anticipated by ultrasound elasto-graphy study matched the cytological findings in all patients[19,20]. On HPE, Jishan.Ahmed discovered 74 (70.48 percent) benign and 31 (29.52 percent) malignant lesions in 106 patients. USE and FNAC had sensitivity, specificity, positive and negative predictive values of 88 percent, 98.57 percent, 95.65 percent, 95.79 percent and 89.28 percent, 100 percent, 100 percent, 96.05 percent in diagnosing malignant mammary lumps, respectively[21].

CONCLUSION

In discriminating benign and malignant mammary masses, ultrasound elasto-graphy combined with strain elasto-graphy and ultrasound score has a high sensitivity, specificity, and diagnostic accuracy. Elasto-graphy has limitations because it is impacted by the amount of tissue compression. Because strong pressure can lead to a misdiagnosis, tissue diagnosis should be done with mild pressure. Necrosis, bleeding, and sarcomatous components can all alter the elasticity score in large malignant tumours.

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