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Comparative study of Mammography and Sonography in Breast Lump with Fine-needle-aspiration-cytology correlation in RIMS, RAIPUR

Radiology

KEYWORDS: mammography, ultrasonography, fibroadenoma, breast

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ABSTRACT

Breast diseases are common pathological condition affecting female of all age group. Breast diseases ranges from benign conditions such as fibroadenoma, galactocele, cysts, breast abscess, duct ectasia, fibroadenosis to malignant conditions such as breast cancer. The most common presentation in breast disease is breast lump which needs to be investigated and diagnosed because of high incidence of breast cancer. 100 patients reporting with complaints of breast lump in surgical OPD (atRIMS, RAIPUR, CHHATTISGURH) were taken up for the study. Patients underwent mammography and sonography investigation. The findings found with mammography and ultrasonography were confirmed with findings of fine needle aspiration cytology to know sensitivity, specificity and positive predictive values of mammography and ultrasonography in diagnosing palpable breast lump conditions Result: In case of benign lesions sensitivity of mammography was 56.75% specificity was 100% and the positive predictive value was 100%. Ultrasonography sensitivity was 97.30% and specificity was 92.3% and the positive predictive value was 97.29%. Combined approach sensitivity was 97.30% and specificity was 100% and positive predictive value was 100%. In case of malignant lesions sensitivity of mammography was 84.61% specificity was 94.59% and positive predictive value was 84.61%. Ultrasonography sensitivity was 92.30% and specificity was 97.29% positive predictive value was 92.30%. Sensitivity for combined approach was 100% and specificity was 97.29% and positive predictive value was 92.85%. In case of malignancy although mammography was believed to be more sensitive screening method than Ultrasonography but in context of palpable malignancies targeted ultrasonography is definitively better and combination of both gives further better results.

Introduction

Breast diseases are common pathological condition affecting female of all age group. Breast diseases ranges from benign conditions such as fibroadenoma, galactocele, cysts, breast abscess, duct ectasia, fibroadenosis to malignant conditions such as breast cancer. The most common presentation in breast disease is breast lump which needs to be investigated and diagnosed because of high incidence of breast cancer. Breast cancer is the second leading cause of cancer causing deaths in women after lung carcinoma and is considered as most common cancer among women, excluding non-invasive and non-melanoma skin cancers. In 2008, breast cancer caused 458,000 deaths worldwide. Mammography has been the first line diagnostic imaging technique in breast lumps, and the only modality suitable for screening breast cancer.2Mammography is still the first line of the imaging investigation technique. Interpretation of mammograms is to find asymmetric densities, circular or stellate lesions, changes in parenchymal contour,distortion of breast architecture and micro calcifications with or without any associated tumour, which may indicate breast malignancy.The sensitivity and specificity of mammography in diagnosing breast cancers is totally dependent on the composition of the breast parenchyma. Detection of cancer is difficult in young, pregnant or lactating patients with dense breast parenchyma and mammographically non calcified tumours. Definite differentiation between the tumours and the cyst is also not possible in most of the cases. After breast surgery, mass-like scars and areas of distortion may mimic a tumour or hide subtle signs of malignancy. Three Various other modalities have been evaluated other than mammography for the diagnosis of the breast cancer are light-scanning, thermography, digital subtraction angiography, computed tomography, ultrasonography, magnetic resonance imaging and isotope scanning. Ultrasonography and magnetic resonance imagingbeing the most reliable of these. The greater availability, low cost and low technical requirements have made ultrasonographyto emerge as the most important and effective adjunct to mammography in patients with breast lumps and in normal or inconclusive mammographic findings. The main indications of breast Ultrasonography is differentiation between cystic and solid lesions, evaluation of a mammographically dense breast, detection of any infective pathology like breast abscess, post surgery evaluation of breast and breast augmentation, evaluation of axillary lymph nodes and guidance for interventional procedures. The present study aims at comparison between mammography and sonography findings in breast lump with cytological correlation.

Material and methods

This is the prospective study on 100 patients reporting with complaints of breast lump in surgical OPD from Dec 2013 to March 2015 at RIMS, RAIPUR, CHHATTISGARH. Patient of any age, sex and marital status attending the OPD or admitted in department of surgery with complaints of breast lump with/without pain in breast, and discharge from nipple or on clinical examination showed the presence of breast mass were included in the study after informed and written consent from them. Ethical approval was obtained from the local ethical committee. Pregnant women and women with bleeding diathesis were excluded from the study. Patients were investigated with mammography and ultrasonography and the diagnosis was confirmed with fine needle aspiration cytology. Mammography was done on GE Senographe 600 TFD and views taken were medio-lateral Oblique and cranio-caudal views with technical factors: 40-50 kVp with 40-80 mAs. Sonography was done by using high frequency probe of 4 to 12 MHz on PHILIPS CLEAR VUE 350 in supine position. Fine Needle Aspiration Cytology was done under Ultrasonography guidance with 18-22 gauge needle as appropriate. The findings found with mammography and ultrasonography were confirmed with findings of fine needle aspiration cytology to know the sensitivity, specificity and positive predictive values of mammography and ultrasonography in diagnosing palpable breast lump conditions.

Results

A total of 100 females having breast lump of all ages were subjected to mammography and ultrasonography with the aim to detect the benign or malignant pattern in breast lumps. The result of these examinations was compared with fine needle aspiration cytology

findings.Highest Frequency of lump was in 31-40 years of age group. Maximum number of benign cases was in age group of 31-40 years and malignant cases were in above 60 years age group . Quadrant involvement is a specific feature of breast disease. In our study upper-outer quadrant was predominantly involved in 40% followed by diffuse/ multiquadrant involvement in 18% cases. Total Number of Benign cases in our study were 60 (60%). Most common age group was 31-40 years. Fibroadenoma was most common accounting for 44% of all breast lumps.Mammographic features of benign cases were dense Mammogram noted in 8(13%) cases so they were reported as inconclusive. Shape of Lesion was oval in 43% followed by round in 17% than lobulated in 13%.All mammographically detected cases were hyperdense. Margins were well defined in 63% of cases, obscured in 7% and spiculated in 3.3% cases.Macrocalcifications was noted in 2 cases while 2 case shows microcalcification. Ultrasonography findings of fibroadenomaswere oval in 24 (54.54%) followed by round in 10 (22.72%) cases. Mass of size 1-3cm is present in 24 (54.54%) and 3-6cm in 20 (45.45%) cases.42 (95.45%) cases were hypoechoic, 2 (4.54%) case was isoechoic and 2(4.54%) case was hypoechoic. 38 (86.36%) cases had homogenous echotexture while 4 (9.09%) cases had heterogeneous echotexture.All cases had smooth margins and L/AP ratio 1 or >1. Cases of breast abscesses were subjected to sonographic examination, most cases were characteristically shown to be irregular shaped with ill-defined margins (85.71%), hypoechoic (85.71%), heterogeneous (100%) lesions with distal enhancement in most of the cases (42.85%). 14.28% Lesions were smooth, well defined, hypoechoic lesions with internal debris and Echoes. Lymph node enlargement was seen in 85.71% cases but fatty hilum of these lymph nodes was preserved indicating these are inflammatory node. Only one lesion (14.28%) was falsely diagnosed as malignant and later proved to be inflammatory. Cysts were characterised in mammography by round (66%) to oval (33%), hyperdense (100%) lesions, smooth marginated (100%). In Ultrasound, cysts were seen as round (66%) to oval (33%), smooth marginated(100%), anechoic (100%) with posterior acoustic enhancement (100%).Galactocele was seen on mammography as well defined, oval, and hyperdense lesion. Most common mammographic presentation of infiltrating carcinoma was hyperdense (100%) mass with spiculated (46.15%) margins. Obscured margins seen in 7.69% cases. Microcalcification was seen in 61.54% of cases. Skin thickening was seen in 30.76% and nipple retraction in 53.84% of cases.On sonography all infiltrating carcinomas were seen as heterogeneous masses with irregular margins. 61.54% cases have L/AP ratio less than 1. Most of the masses were irregular in shape (53.84%) then followed by oval (23%), round (15.38%) and lobulated (7.69%). Posterior acoustic shadowing was seen in 92.30% cases. Calcification seen in 23% cases which is significantly lower than mammography. 92.30% cases showed axillary lymphadenopathy suggesting disease was in advance stage. Lymph nodes hilum was destroyed indicating these were metastatic nodes.

Discussion

In our study, out of 44 cases of fibroadenoma mammography detected 68.18% cases while ultrasonography detected 100% cases and combined diagnosed 100% cases. So in case of young female with palpable mobile breast lump ultrasonography is investigation of choice. These results are comparable to study done by Ghazala Malik et al 2006.5 Out of 8 cases of fibrocystic disease mammography was inconclusive in 4 cases (50%) due to dense breast while two are reported normal (25%). Ultrasound and combined approach detected 100% cases. Mammography diagnosed only 33% cases of cystic disease but ultrasound diagnosed 100% cases of cyst. So we can say that fluid filled pathologies like cystic and fibrocystic disease are better diagnosed by ultrasound than mammography. This is one of the most important indications of ultrasonography to differentiate solid from cystic lesions.Likewise 100% cases of abscess were diagnosed on ultrasound while mammography was inconclusive in 12 cases and 4 cases are falsely diagnosed as malignant. Hence ultrasonography is imaging modality of choice in inflammatory breast disease also .In case of benign lesions sensitivity of mammography was 56.75% specificity was 100% and positive predictive value was 100%.Sensitivity of ultrasonography was 97.30% and specificity was 92.3%, positive predictive value was 97.29%.Sensitivity for combined approach was 97.30% and specificity was 100% and positive predictive value was 100%. Mammography detected 84.61% of malignant cases while with ultrasonography we diagnosed 92.30% cases and combination of both modalities diagnosed up to 100% cases. So combination of both modalities detected approximately 15% and 8% more palpable malignancies than mammography and ultrasonography alone respectively. Malignant lesions sensitivity by mammography was 84.61%, specificity was 94.58% and positive predictive value was 84.61%.Sensitivity of ultrasonography was 92.30%, specificity was 97.29% and the positive predictivevalue was 92.30%.Sensitivity for combined approach was 100% and specificity was 97.29% and positive predictive value was 92.85%. Smallwood JAet al found ultrasound to be both more sensitive (93%) and specific (95%) in a large retrospective series of 1000 patients undergoing investigation for symptomatic breast disease. Consecutive series of 142 patients undergoing surgery where histological confirmation was done, ultrasound was more sensitive (91%) and specific (81%). In both studies, the greater accuracy of ultrasound showed its ability to diagnose lesions hidden in X-ray dense breasts and where mammography had revealed featureless unknown nature asymmetrical densities. In these instances ultrasound proved its importance as an adjunct to mammography in the preoperative assessment of breast lesions. Strasser K et al did a prospective study of 235 masses verified histologically and examined the diagnostic contribution of ultrasound in comparison to mammography and concluded that with two methods combined 96.8% of malignant neoplasm could be diagnosed correctly. Harmine M Zonderland studied 4811 mammograms and then target ultrasound was performed in 1103 patients. They found that sensitivity of mammography was 83% and specificity 97%. After ultrasound combined sensitivity increased to 91% with specificity of 98%. Karin Flobbeet al studied 2020 patient of breast diseases and concluded the application of breast Ultrasound helps to improve diagnostic criteria. The diagnostic value was increased in patients with palpable breast lumps and in patientsreferred with abnormal screening mammogram results. Same results were found in our study. S.R.C. Benson et al concluded ultrasound is better than mammography for detecting invasive breast carcinoma. The combination of ultrasonography and mammography is better than either modality used alone, a 9% increase in breast cancers was found by combined use of them. Study done by Tayyiba Akhter et al found ultrasonography was positive in 94% cases and mammography in 93% cases. Combined use of both the imaging techniques detected 98%.So the combination of ultrasonography and mammography is significantly better than used alone. Study done by U.D. Manoranjanet al on 68 patients also have same conclusion. The sensitivity of ultrasonography for malignancy was 89.47%, specificity of ultrasonography for malignant & benign lesions was 100%. The positive predictive value of ultrasonography was 100%. He concluded that ultrasound has higher sensitivity in diagnosing malignant lesions and it should be considered as first line diagnostic test for palpable breast lesions.

Conclusion

Mammography considered to be more sensitive screening method than ultrasonography in cases of malignancy but in context of palpable malignancies targeted Ultrasonography is definitively better and combination gives further better results.

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