Original Research Article

Correlation between preoperative axillary ultrasound and histopathology of resected lymph nodes in patients with carcinoma breast

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ABSTRACT

Background: Axillary Ultrasound is an important tool in assessing regional lymph node status in women who are node negative clinically as many of them will prove to have axillary lymph node involvement on histopathology. The aim of the present study was to establish the role of axillary ultrasound in preoperative assessment of lymph node status in women with carcinoma breast and to correlate the findings of axillary ultrasound with the histopathology of resected axillary nodes.
Methods: Forty patients (all women) were included in this study and the preoperative axillary ultrasound was done to know the status of axillary lymph nodes and the findings were correlated with histopathological findings of the resected nodes.
Results: The sensitivity of axillary ultrasound was found to be 66.67%, specificity was 87.5%, accuracy 75%, positive predictive value (PPV) of 88.89% and negative predictive value of 63.4%.
Conclusions: Axillary ultrasound is very important tool in assessing preoperative axillary lymph node status in patients with carcinoma breast. It is also important in assessment after inadequate axillary dissection and for follow up of non-treated axilla.

Keywords: Axillary ultrasound. Fine needle aspiration cytology, National Health Service screening programme in UK

INTRODUCTION

Breast cancer is known to be the second major cause of cancer related deaths among women in the world. Overall, 01 in 28 women is likely to develop breast cancer during her life time.[1] About 05 to 10% of cases have genetic predisposition including BRCA1 and BRCA2 which are inherited in an autosomal dominant fashion.[2] Screening tests include self breast examination, clinical examination, mammography, genetic screening, ultrasound and magnetic resonance imaging. Tissue diagnosis can be made by fine needle

aspiration biopsy (FNAC), core needle biopsy or open biopsy. The combination of diagnostic mammography, ultrasound or stereotactic localization and FNA biopsy achieves a specificity of almost 100% (94.8-100%) in the preoperative diagnosis.[3]

Axillary ultrasound is important in assessing regional lymph nodes in women who are clinically node negative as many of these women will prove to have axillary lymph node involvement on histopathological examination.[4] The sensitivity of examination for the status of axillary node ranges from 35 to 82% and

specificity ranges from 73 to 97%.[4] Cortical thickness is the commonest feature used by radiologists to evaluate lymph nodes for malignancy. It has been found that cortical thickness >3mm is the most reliable predictor of metastasis on axillary ultrasound.[5]

The aim of the study was to establish the role of axillary ultrasound in the preoperative assessment of lymph node status in patients affected by breast carcinoma and to correlate the findings of ultrasound and histopathology in resected axillary lymph nodes in carcinoma breast.

METHODS

The prospective study was conducted in the Post Graduate Department of Surgery at a tertiary health center. All females with carcinoma breast from November 2016 to October 2017 were included in the study.

After detailed history and clinical examination, a thorough examination of the breast and axilla was done. The axilla was examined for palpable/non-palpable axillary lymph nodes regarding their location, number, size, surface/margins, fixity, consistency, etc.

All patients were fully investigated which includes CBC, coagulation profile, renal function tests, liver function tests, chest X-ray, mammogram, USG Abdomen (optional), histopathological examination, ER, PR and HER2/neu status of the specimen.

All patients were subjected to ultrasound examination of axilla and the number, location, size, shape, echogenicity, consistency and cortical thickness of the lymph nodes was seen. The ultrasound findings were classified as per the criteria laid down by Luparia A et al, as shown in Table 1.[6]

Table 1: Ultrasound (US) classification of axillary lymph nodes.

USG parameters	Normal	Probably benign	Suspicious for malignancy	Probably malignant
L/T ratio	>/=2	>/=2	<2	<2
H/L ratio	>/=50%	>/=50%	<50%	<50%
Cortical thickness (mm)	</=2	>2	>2	>2
Morphology	Oval shaped	Oval shaped	Rounded shape	Globular shape
Hilum	Clearly visible	Clearly visible	Not completely visible	Absent

(L/T, longitudinal and transverse ratio; H/L, hilar and longitudinal ratio)

FNAC of the breast lump was done and the results were classified in accordance with the National Health Service (NHS) screening programme in to five categorie[7]

- C1= inadequate,
- C2= negative,
- C3= equivocal, probablybenign,
- C4= suspicious of malignancy,
- C5= malignant.

Inclusion criteria

Patients with biopsy proven carcinoma breast who underwent surgery.

Exclusion criteria

- Patients with stage 4 disease
- Patients with large, fixed axillary lymph node
- Patients who had undergone chemotherapy/ radiotherapy prior to surgery.

After breast surgery (mastectomy/ lumpectomy) along with axillary lymph node dissection, note was made of involvement of axillary lymph nodes including their size,

number, location, consistency, histopathology etc. After histological examination of the resected axillary lymph nodes, correlation was made between clinical findings, ultrasound findings, FNAC and per operative findings.

RESULTS

In present study, most of the patients were in the age group of 39 to 72years with mean age of 55.7years. Most of the patients present with breast lump followed by nipple discharge, retraction and pain. Lymph nodes were palpable only in 12 patients 12/40 (30%). Most of the patients were in tumor stage II, 22 patients (55%) followed by 14 patients (35%) in tumor stage I and 4 patients (10%) in tumor stage III. FNAC was done on all 40 patients. Histologically, most common type of invasive tumor detected was invasive ductal carcinoma as seen in 35 patients (87.5%), followed by invasive lobular carcinoma in 04 patients (10%) and medullary carcinoma was seen in one case (2.5%).

All patients were subjected to mammography prior to surgery. BIRADS score of 5 was seen in affected sides of 19 patients (47.5%), BIRADS score of 4 in 18 patients (45%), BIRADS score of 6 in 2 patients (5%). BIRADS score of 3 or less was seen in only one patient. Axillary

ultrasound detected one lymph node in 42.5% patients, two in 15%, >4 in 20%. In 22.5% patients no lymph node was detected. The maximum longitudinal diameter on axillary ultrasound was found to be 36 mm with a mean diameter of 11.17mm. Most of the patients n=16 (51%)

had maximum longitudinal diameter in the range of 5-10mm. The maximum transverse diameter on axillary ultrasound was found to be 23mm and the mean diameter was found to be 7.08mm.

Table 2: Correlation between T staging, histopathological examination, USG features and clinical assessment (n=40).

T staging	Lymph node HPE+	Lymph node HPE-ve	USG +	USG-ve	C/E +	C/E –ve
T1 (n=14)	6 (15%)	8 (20%)	3 (7.5%)	11 (27.5%)	1 (2.5%)	13 (32.5%)
T2 (n=22)	14 (35%)	8 (20%)	11 (27.5%)	11 (27.5%)	7 (17.5%)	15 (37.5%)
T3 (n=4)	4 (10%)	0	4 (10%)	0	4 (10%)	0
Total	24 (60%)	16 (40%)	18 (45%)	22 (55%)	12 (30%)	28 (70%)

HPE = Histopathological examination, C/E = Clinical examination and T = tumor stage, n= no. Of patients, +ve= present, -ve = absent.

Table 3. Concordance between axillary ultrasound and histological examination (n=40).

USG appearance	Total	HPE +ve	HPE –ve	Concordance
U1	10 (25%)	2 (5%)	8 (20%)	20%
U2	12 (30%)	6 (15%)	6 (15%)	50%
U3	10 (25%)	8 (20%)	2 (5%)	80%
U4	8 (20%)	8 (20%)	0 (0%)	100%
Total	40 (100%)	24 (60%)	16 (40%)	-

HPE = Histopathological examination. U1 = Normal, U2 = Probably benign, U3 = Suspicious for malignancy, U4 = Probably malignant, +ve= present, -ve = absent.

Most of the patients n= 14 (25.8%) had maximum longitudinal diameter in the range of 5-10mm. The ratio between longitudinal and transverse diameters was found and 17 out of the 31 patients (54.8%) had longitudinal to transverse ration of less than 02. Fourteen patients out of the 31 had the ratio more than 2. Hilar to longitudinal ratio was assessed on axillary ultrasound and was found to be less than 50% in 17 patients (55%) and >50% in 14 patients (45%), cortical thickness was <3mm in lymph nodes of 12 patients (38.8%), while it was >3mm in lymph nodes of 19 patients (61.2%) indicating presence of metastasis on axillary ultrasound. It was seen that lymph nodes with a lower longitudinal to transverse ratio (L/T ratio) had higher chances of being histopathologically positive than the ones with higher longitudinal to transverse ratio. The lymph nodes with L/T less than 02 were found to harbor metastasis in 16 patients (40%) whereas the lymph nodes with L/T ration more than 02 were found to have no malignancy in 14 patients (35%). Hilum was visible on axillary ultrasound in lymph nodes of 19 patients (61.2%), partially visible in 8 patients (25.8%) and absent in 04 patients (13%).After resection of the breast carcinoma specimen, the most commonly found histopathology was invasive ductal carcinoma seen in 34 patients (85%) followed by invasive lobular carcinoma in 05 patients (12.5%); the findings being similar to the FNAC findings. Lymph nodes were found to have malignant potential in 16 patients (40%) out of the total 18 patients (45%) that were labeled

positive on axillary ultrasound and out of the 22 lymph nodes that were labeled negative on axillary ultrasound, 14 lymph nodes (35%) were found to have no malignancy on histopathological examination while 08 patients (20%) were found to be positive on histopathological examination. It was seen that out of the 18 patients (45%) in whom lymph nodes were detected on axillary ultrasound, only 12 (30%) were clinically palpable. Axillary ultrasound could detect 6 patients (15%) extra with lymph node involvement who had clinically non-palpable lymph nodes. It was found that all the patients n=12 (30%) who had palpable axillary lymph nodes harbored malignancy whereas there were an additional 12 patients (30%) who were found to have affected lymph nodes on histopathology in spite of having no clinically palpable lymph nodes. The findings have been depicted in Table 2 and 3.

DISCUSSION

In present study all patients were females 40 (100%), and the majority of the cases were Invasive ductal carcinoma (87.5%) followed by invasive lobular carcinoma (10%) and one case of medullary carcinoma (2.5%) Rajesh et al. in their study on 1118 cases observed infiltrating duct carcinoma in 89.5% of the patients.[8] Patil et al, reported infiltrating duct carcinoma in 88.5% patients.[9] Jain et al, reported infiltrating duct carcinoma in 91.9% patient.[10] In present study max. Longitudinal diameter (L) on axillary

ultrasound was found to be 36mm and a mean diameter of 11.17mm whereas the max. transverse diameter (T) was found to be 23mm and a mean transverse diameter of 7.08mm. With regard to correlation between L/T ratio and final histology, 14 out of the 22 lymph nodes with L/T ratio >2 were found to be free of metastasis whereas 16 out of the 18 lymph nodes having L/T ratio <2 (index of probably malignant node) were found to harbor metastasis. The sensitivity was found to be 66.6%, specificity 87.5%. Luparia et al, in a study done on 427 patients found that out of the 287/427 lymph nodes with

L/T ratio >2, 240 were free of metastasis on axillary surgery with a specificity of 83.6% (240/287). Out of the140/427 lymph nodes with L/T <2, final histology confirmed the presence of metastasis in 123/140 cases with a sensitivity of 87.9%. In present study, the specificity was comparable, but the sensitivity was lower than this study. In a study conducted by Podkrajsek M et al, mean longitudinal diameter of metastatic axillary lymph nodes was 16mm (range 6-29mm), mean longitudinal diameter 12mm (range 4-23mm) and the mean L/T ratio 1.3.[11]

Table 4: Comparison between axillary ultrasound findings and histopathological examination.

Study	No. of cases	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Accuracy (%)
Luparia et al[7]	427	72.3%	93.4%	N/A	N/A	85%
Sato et al[13]	262	89.2%	100%	N/A	94.3%	96.1%
Tahir et al[14]	197	47.1%	100%	100%	70%	76.3%
Nori et al[15]	132	45.2%	86.6%	61.3%	77.2%	73.5%
Present study	40	66.67%	87.5%	88.89%	63.4%	75%

In present study, hilum size (H) of the lymph nodes was assessed on axillary ultrasound and was found to be less than 5mm in 55% patients and more than 5mm in 45% lymph nodes. The mean hilar size was 5.29mm (range 3-16). In present study, there was loss of hilum seen in 50% of the patients with metastatic axillary lymph nodes, thereby providing a sensitivity of 50%, specificity of 100%, PPV of 100% and NPV of 36.84%. The overall accuracy was 61.29%. In a study conducted by Lee B et al, the loss of hyperechoic hilum with histologically confirmed nodal involvement was seen in 22.6% cases.[12]

There was a sensitivity of 40.8%, specificity of 92.3%, a PPV of 90% and NPV of 46%. In present study the mean cortical thickness was found to be 4.62mm with a maximum cortical thickness of 9mm. Cortical thickness was <3mm in 38.8% lymph nodes, while it was >3mm in 61.2% lymph nodes indicating presence of metastasis on axillary ultrasound. When compared with the final histological examination of the lymph nodes, axillary ultrasound done taking cortical thickness cut off of 3mm had a diagnostic accuracy of 65% (26/40), sensitivity of 58.62% (17/29), and specificity of 81.82% (9/11). Comparison between Axillary ultrasound findings and histopathological examination between different studies and present study is shown in Table 4.

The results in these studies were comparable to present study. In present study, it was seen that out of the 18 patients (45%) in whom lymph nodes were detected on axillary ultrasound, only 12 (30%) were clinically palpable. Axillary ultrasound could detect 06 patients (15%) extra with lymph node involvement who were non-palpable on clinical examination. The sensitivity of

clinical findings was 50%, specificity of 100%, PPV of 100% and NPV of 57.14%.

CONCLUSION

Axillary ultrasound is very important tool in assessing preoperative axillary lymph node status in patients with carcinoma breast. It is also important in assessment after inadequate dissection and for follow up of non-treated axilla.

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