Research Article

Comparison Between Ultrasound (US) And Fine Needle Aspiration (FNA) Findings In Axillary Lymphadenopathy (LAP) "Classification"

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Abstract

Background: Axillary lymphadenopathy is one of the most common pathologies encountered in the axillary region, which is defined as an abnormality in the size and characteristics of the lymph node. The imaging modality of choice for evaluation of the axilla is ultrasound. When suspicious lymph nodes are identified on ultrasound, fine-needle aspiration or core-needle biopsy typically follows, both to establish a histological diagnosis and to guide further management. **Objective:** The objective of the study is to know whether the suspicious lymph nodes in ultrasound are in fact pathologic or not. **Methodology:** present study was prospective observational comparative study implemented in Rizgary teaching hospital and Erbil Breast center in duration of two years from 1st march 2023 to 1st March 2025 on sample of 120 patients with axillary lymphadenopathy, FNA was taken from the ultrasonographically suspicious lymph nodes and the results have been compared. **Results:** The accuracy indicators of ultrasonography compared with the fine needle aspirate were as follows: sensitivity (64.5%), specificity (67.2%), predictive value of a positive test (67.8%), predictive value of a negative test (67.2%), The malignancy rate among patients with round lymph nodes (77.8%) was significantly higher ($p < 0.001$) than that in patients with oval lymph nodes (36%). When the hilum was not preserved, the malignancy rate was 68.8%, compared to 32.1% when the hilum was preserved ($p < 0.001$). Malignant changes were observed in patients with hypoechoic lymph nodes, compared to 31.1% in patients with normal echogenicity ($p < 0.001$). **Conclusion:** No single ultrasound sign is absolutely accurate in diagnosing peripheral lymph node malignancy. The association of signs produces a highly suggestive appearance in most cases.

Keywords: axillary lymphadenopathy, ultrasonography, fine needle aspiration.

1. Introduction

Axillary lymphadenopathy (LAP) is one of the most common pathologies encountered in the axillary region. Lymphadenopathy is defined as an abnormality in the size and characteristics of the lymph node. It may be the result of inflammatory or neoplastic events caused by systemic diseases or malignancies, such as breast cancer. Nodal hyperplasia, collagen tissue diseases, granulomatous diseases, silicone lymphadenopathy, and infectious diseases are benign causes of lymphadenopathy of the axillary region. Lymphoproliferative diseases, breast cancer, and metastasis due to malignancies other than breast cancer are usually accepted as malignant causes of axillary lymphadenopathy.(1)

Axillary lymph node involvement is one of the most important prognostic factors of breast cancer.(2)

The imaging modality of choice for evaluation of the axilla is ultrasound (US). When suspicious lymph nodes are identified on US, fine-needle aspiration biopsy (FNA) or core-needle biopsy typically follows, both to establish a histological diagnosis and to guide further management.(3,4)

Preoperative axillary ultrasound is used as feasible diagnostic criteria for assessing axillary node status, size, morphology, cortical thickness and vascularity. Of such criteria, the most accurate parameters for predicting metastatic lymph nodes are the L/D ratio (or long axis to short axis or diameter ratio), localized or eccentric cortical thickening, and absent or displaced fatty hilum on ultrasonography. (5,6)

however, typical US signs of malignant lesions may also be observed in benign entities. US-guided sampling is widely used for the histological diagnosis of axillary lymphadenopathy because of its minimally invasive nature and safety. (6)

Fine needle aspiration cytology (FNAC) is a relatively safe, quick, easy and a cheap diagnostic tool to decipher

the benign or the malignant nature of the swelling. (7)

When first introduced by Bonnema and co-workers in 1997, axillary ultrasound followed by US-guided fine needle aspiration of sonographically suspicious lymph nodes (US + FNAC) seemed to be promising. (8)

Some investigators reported that combined use of US and fine needle aspiration biopsy (FNAB) could provide a highly accurate preoperative lymph node screening. (9)

Several studies have found that ultrasound-guided fine-needle aspiration (FNA) has adequate sensitivity and accuracy, excellent specificity and a good positive predictive value (PPV) in detecting lymph node metastases. (10)

2. Materials and Methods

An Observational comparative study was conducted on 120 patients with axillary lymphadenopathy who underwent ultrasound and ultrasound guided fine needle aspiration, the study was conducted at Erbil Breast Center and Rizgary Teaching Hospital at Erbil city between 1st March 2023 to 1st March 2025. All adult patients with pathological looking ultrasound features of axillary lymph nodes were included in the study. Typical benign looking lymph nodes, pediatric patients (less than 12 years) and patients with known systemic metastasis were excluded; ethical issues were subjected to Ethical committee of Kurdistan Board for Medical Specializations by approval of Hospital authorities and confidentiality of data.

Verbal and written consent was obtained from each patient prior to participation, a questionnaire form filled after patients underwent ultrasound. The ultrasound was performed using high frequency linear array transducer, in supine oblique position with the patient's hand over the head. Later, the patient underwent ultrasound guided fine needle aspiration under aseptic conditions, the samples were placed on slides and then sent for cytology, when cytology results were available, they were compared with the ultrasound features of the corresponding lymph nodes.

Patients' data were entered and analysed using the Statistical Package for Social Sciences (SPSS, version 26). The chi-square test of association was used to compare proportions. Fisher's exact test was used when the expected frequency of more than 20% of the cells of the table was less than 5. The McNemar test was used when the results of the ultrasound (US) were compared with the FNA results of the same patients. The following table shows how the validity indicators of the US were calculated:

		FNA		
		Positive	Negative	
US	Positive	TP	FP	TP+FP
	Negative	FN	TN	FN+TN
Total		TP+FN	FP+TN	Grand total

TP=True positive; TN=True negative; FP=False positive; FN=False negative.
Sensitivity = TP / (TP+FN)*100; Specificity = TN / (FP+TN)*100; Predictive value positive (PV+): TP / (TP+FP) * 100; Predictive value negative (PV -): TN / (FN+TN) * 100; Total agreement = (TP + TN) / Grand total. A p-value of ≤ 0.05 was considered statistically significant.

3. Results

The study sample included 120 patients with axillary lymphadenopathy. Their mean age (SD) was 44.3 (13.5) years, the median was 44, and the age range was 16-77. Around one-third (31.7%) were aged 50 or older, and 15.8% were aged less than 30. Almost all (96.7%) were males, and 12.5% of the sample had a history of cancer (Table 1).

Table (1) Basic characteristics.

	No.	%

Age (years)		
< 30	19	15.8
30-39	28	23.3
40-49	35	29.2
≥ 50	38	31.7
Gender		
Female	116	96.7
Male	4	3.3
History of cancer		
Yes	15	12.5
No	105	87.5
Total	120	100.0

The majority (74.2%) of the patients had a palpable lymph node (LN), and the shape of the LN was oval in 62.5% of the patients, and it was round in 37.5%. The cortical thickness was ≥ 3mm in 53.3% of the patients, and the hilum was not preserved in 53.3% of them. Half of the patients had a LN size of ≥ 10 mm, and the LN was hypoechoic in 38.3% of the patients. The vascularity was central in 55% and peripheral in 45% of the patients (Table 2).

Table (2) Lymph nodes characteristics.

	No.	%
Palpable lymph node		
Yes	89	74.2
No	31	25.8
Shape		
Round	45	37.5
Oval	75	62.5
Cortical thickness		
≥ 3mm	64	53.3
< 3mm	56	46.7
Hilum		
Not preserved	64	53.3
Preserved	56	46.7
Size		
≥ 10 mm	60	50.0
< 10 mm	60	50.0
Echogenicity		
Hypoechoic	46	38.3
Normal	74	61.7
Vascularity		
Peripheral	54	45.0
Central	66	55.0
Total	120	100.0

The accuracy indicators of ultrasonography compared with the fine needle aspirate were as follows: sensitivity (64.5%), specificity (67.2%), predictive value of a positive test (67.8%), predictive value of a negative test (67.2%), and the total agreement was 65.8%. No significant difference was found between the two diagnostic methods (p = 0.755).

Table (3) Accuracy of ultrasound results in diagnosing malignant changes.

		Fine needle aspirate		

		Malignant	Benign	Total	p-value*
Ultrasound	Malignant	40	19	59	
	Benign	22	39	61	0.755
	Total	62	58	120	
	Sensitivity	Specificity	PV+	PV-	Agreement
	64.5%	67.2%	67.8%	67.2%	65.8%

*Calculated by McNemar test.

According to the FNA results, the higher the age, the greater the rate of malignancy, with 10.5% among those under 30, increasing to 65.8% in patients aged 50 or older ($p < 0.001$). No significant association was found between malignancy diagnosed by FNA and variables such as history of cancer ($p = 0.490$), palpable lymph node ($p = 0.682$), cortical thickness ($p = 0.071$), lymph node size ($p = 0.465$), or vascularity ($p = 0.441$). The malignancy rate among patients with round lymph nodes (77.8%) was significantly higher ($p < 0.001$) than that in patients with oval lymph nodes (36%). When the hilum was not preserved, the malignancy rate was 68.8%, compared to 32.1% when the hilum was preserved ($p < 0.001$). Malignant changes were observed in patients with hypoechoic lymph nodes, compared to 31.1% in patients with normal echogenicity ($p < 0.001$). More details are presented in Table 4.

Table (4) FNA results by the studied factors.

	FNA result			
	Malignant	Benign	Total	p-value
	No. (%)	No. (%)	No. (%)	
Age				
< 30	2 (10.5)	17 (89.5)	19 (100.0)	
30-39	15 (53.6)	13 (46.4)	28 (100.0)	
40-49	20 (57.1)	15 (42.9)	35 (100.0)	
≥ 50	25 (65.8)	13 (34.2)	38 (100.0)	0.001*
Gender				
Female	58 (50.0)	58 (50.0)	116 (100.0)	
Male	4 (100.0)	0 (0.0)	4 (100.0)	0.120**
History of cancer				
Yes	9 (60.0)	6 (40.0)	15 (100.0)	
No	53 (50.5)	52 (49.5)	105 (100.0)	0.490*
Palpable lymph node				
Yes	45 (50.6)	44 (49.4)	89 (100.0)	

No	17 (54.8)	14 (45.2)	31 (100.0)	0.682*
Shape				
Round	35 (77.8)	10 (22.2)	45 (100.0)	
Oval	27 (36.0)	48 (64.0)	75 (100.0)	<0.001 *
Cortical Thickness				
≥ 3mm	38 (59.4)	26 (40.6)	64 (100.0)	
< 3mm	24 (42.9)	32 (57.1)	56 (100.0)	0.071*
Hilum				
Not preserved	44 (68.8)	20 (31.3)	64 (100.0)	
Preserved	18 (32.1)	38 (67.9)	56 (100.0)	<0.001 *
Size				
≥ 10 mm	33 (55.0)	27 (45.0)	60 (100.0)	
< 10 mm	29 (48.3)	31 (51.7)	60 (100.0)	0.465*
Echogenicity				
Hypoechoic	39 (84.8)	7 (15.2)	46 (100.0)	
Normal	23 (31.1)	51 (68.9)	74 (100.0)	<0.001 *
Vascularity				
Peripheral	30 (55.6)	24 (44.4)	54 (100.0)	
Central	32 (48.5)	34 (51.5)	66 (100.0)	0.441*
Total	62 (51.7)	58 (48.3)	120 (100.0)	

*Calculated by the chi-square test. **Calculated by Fisher's exact test.

4. Discussion

Clinical, radiological and blood laboratory findings may provide preliminary information about the nature of axillary lymphadenopathy. In daily practice, the initial assessment following the clinical assessment involves ultrasonographic imaging. Based on US findings, fine needle aspiration can be performed to detect the nature of axillary lymphadenopathy.(1)

According to our study, benign looking lymph nodes are more likely to be oval in shape, preserving the echogenic fatty hilum, with thin cortex and central vascularity. On the other hand, round hypoechoic lymph nodes that do not preserve the hilum, with thickened cortex and peripheral vascularity are more likely to be malignant, with the most significant features being (round, hypoechoic and loss of fatty hilum), this is consistent with Vijayaraghavan GR et al,Fidan N et al, Singh SP et al, Fujioka T et al, Mainiero MB et al and Kapila K et al which revealed loss of fatty hilum is one of the most significant features of malignant lymphadenopathy(3,4,5,6,11,18), it is compatible with Fidan N et al,Singh SP et al and Oz A et al in being hypoechoic to be significant feature (4,5,9), also compatible with Aktaş A et al which showed round lymph nodes are more likely to be malignant(20), Our study differed from Lee B et al and Aktaş A et al in showing that increased cortical thickness is not a significant ultrasonographic feature for malignancy (13,20).

According to our study, comparing the ultrasonographic features of the lymph nodes to the fine needle aspiration results showed (64.5%) sensitivity, which is compatible with the other studies, and (67.8%) specificity, which is close to Aktaş A et al (20) but slightly lower than the other studies, this may be due to the differences in the reliability of laboratory findings, the number of samples and the fact that many studies have used tru-cut biopsy methods for the exact results which is more dependable and accurate than fine needle aspiration results that have been used in the current study.

5. Conclusion

No single ultrasound sign is absolutely accurate in diagnosing peripheral lymph node malignancy. The association of signs, however, produces a highly suggestive appearance in most cases, and makes of ultrasonography an extremely useful diagnostic means. Critical appraisal of gray-scale signs is crucial for an accurate diagnostic approach. In addition Doppler study contributes to the diagnostic confidence.

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