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Original Research Article

Study of diagnostic accuracy of fine needle aspiration cytology of lymph nodes over 6 years in a tertiary care hospital

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ABSTRACT

Background: Lymph node fine needle aspiration cytology (FNAC) is the first line investigation for evaluation of lymph node disease. Existing literature reports high degree of correlation between lymph node FNAC and histological examination. The aim of the present study is to re-evaluate the diagnostic accuracy of FNAC in view of frequent discordance between FNAC and diagnosis on biopsy.
Methods: Among a total of 495 lymph node FNACs and 291 biopsies, 69 adequate FNACs which were followed up with biopsy were evaluated with standard statistical methods for assessment of diagnostic accuracy.
Results: The commonest diagnosis on biopsy was reactive lymph node (34.71%) followed by granulomatous disease (26.12%) and lymphoid neoplasms (20.96%). Reactive lymphadenitis and granulomatous disease were also the two commonest categories on FNAC (34.34% and 24.85% respectively). However, the sensitivity of FNAC in diagnosis of granulomatous disease was found to be 45.83%, which increases to 70.03% if necrosis is included as a marker of granulomatous disease. The greatest sensitivity was achieved in diagnosis of metastatic disease (88.89%), followed by lymphoid neoplasms (69.23%).
Conclusions: FNAC is a useful tool for excluding specific categories of lymph node diseases, esp. metastatic disease. However, the technique needs improvement as to sample more representative areas of the node, to improve its sensitivity.

Keywords: Biopsy, Fine needle aspiration cytology, Lymph node, Sensitivity

INTRODUCTION

Lymph nodes are one of the commonest pathological specimens encountered in laboratory practice. Usually fine needle aspiration cytology (FNAC) is the first line investigation, followed by biopsy if clinically indicated. FNAC is widely regarded as a sensitive tool to detect various categories of lymph node lesions.[1]

Most studies have reported a high degree of sensitivity and specificity in diagnosis of lymph node disease. However, in laboratory practice, correlation between diagnosis in FNAC and diagnosis on biopsy is not often achieved, suggesting that FNAC might have a few shortcomings in predicting the outcome of a biopsy. The present study aims to estimate the sensitivity, specificity, positive and negative predictive value of FNAC in the diagnosis of various categories of lymph node lesions, in the context of a tertiary care hospital in East India.

METHODS

A retrospective study model was chosen. After initial ethical clearance for accessing hospital records, 495 Lymph node FNAC and 291 lymph node biopsies between the period 2011-2016 at this hospital was reviewed. Among these, 87 lymph node FNACs has been followed up by biopsy. The diagnosis on biopsy and

immunohistochemistry was accepted as gold standard. The test characteristics of FNAC as a method for predicting the outcome on biopsy, was assessed by standard statistical methods.

RESULTS

Table 1 shows the different categories of diagnosis given on lymph nodes on biopsy, distributed as per age and sex. The commonest diagnosis on biopsy was reactive lymph node (34.71%) followed by granulomatous disease (26.12%) and lymphoid neoplasms (20.96%) (Table 1). After carrying a chi square analysis with respect to age and a diagnosis of lymphoid neoplasm, $\chi 2 = 12.94$, $p = 0.004$, suggesting that age is statistically associated with development of lymphoid neoplasm. In addition, a chi square analysis of age and a diagnosis of metastatic malignancy shows that $\chi 2 = 24.67$, $p = 0.000018$, which means age is also statistically associated with a metastatic disease.

Table 1: Age sex distribution of diagnostic categories on lymph node biopsy.

	< 20		20-39		40-59		60 and above		Total
Diagnostic category	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	
Reactive	15	4	29	9	19	12	10	3	101 (34.71%)
Granulomatous	8	2	27	7	10	11	7	4	76 (26.12%)
Lymphoid neoplasm	7	3	8	2	7	10	18	6	61 (20.96%)
Metastatic	0	0	3	2	11	8	15	4	43 (14.78%)
Others	2	2	1	1	1	0	1	2	10 (3.44%)
Total									291

Table 2: Distribution of diagnostic categories in FNAC lymph nodes.

Category	Number
Reactive	170 (34.34%)
Granulomatous	123 (24.85%)
Necrotising	23 (4.65%)
Metastatic adenocarcinoma	22 (4.44%)
Metastatic, unspecified	9 (1.82%)
Metastatic squamous carcinoma	44 (8.89%)
Non-Hodgkin's lymphoma (NHL)	17 (3.43%)
Hodgkin's lymphoma (HL)	6 (1.21%)
Suppurative	22 (4.44%)
Inadequate	48 (9.70%)
Atypical hyperplasia	11 (2.22%)
	495

A review of the 495 FNACs carried out on lymph node shows the following distribution of diagnostic categories (Table 2): the commonest diagnosis on FNAC is a reactive lymph node (34.34%), followed by granulomatous disease (24.85%) and metastatic disease (15.15%). A diagnosis of necrotizing lymphadenitis was given in 4.65% of cases. A comparison of Table 1 and Table 2 shows that reactive lymphadenitis and granulomatous disease are the two commonest diagnostic categories, on both FNAC and biopsy. However, a diagnosis of lymphoid neoplasm was more frequently made on biopsies (20.96%) than on FNACs (4.64%). Figure 1 shows the distribution of diagnostic categories on FNAC.

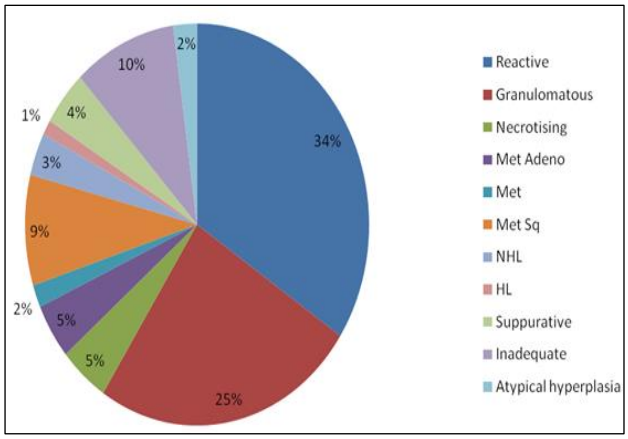

Figure 1: Diagnostic categories in lymph node FNAC.

Of these FNACs, 87 cases were followed up with a biopsy. The results of FNAC and biopsy on the same lymph nodes were analyzed, and the correlation was grouped as an exact match (62.32%), close match (24.64%) and no match (13.04%). 18 (eighteen) FNACs were reported as inadequate/ unsatisfactory on FNAC and were excluded from the analysis, so that 69 cases were analyzed.

Table 3 shows the results of the analysis. The sensitivity of FNAC in diagnosis of granulomatous disease is 45.83%; if the diagnostic category 'necrotizing lymphadenitis' is included as a marker of granulomatous disease, the sensitivity increases to 70.83%. The best sensitivity was obtained in the diagnosis of metastatic

disease (88.89%), followed by metastatic disease (69.23%).

Table 3: Test characteristics of FNAC in diagnosing granulomatous lesions, lymphoid neoplasms and metastatic cancers in lymph node.

		Biopsy diagnosis		
		Granulomatous	**Non-granulomatous**	**Total**
FNAC diagnosis	Granulomatous	11	6	17
	Other	13	39	52
Total		24	45	69
Sensitivity	45.83%	Positive predictive value	64.71%	
Specificity	86.67%	Negative predictive value	75.00%	
		Biopsy diagnosis		
		Lymphoid neoplasm	**Not lymphoid neoplasm**	
FNAC diagnosis	Lymphoid neoplasm	9	1	10
	Other	4	55	59
Total		13	56	69
Sensitivity	69.23%	Positive predictive value	90%	
Specificity	98.21%	Negative predictive value	93.22%	
		Biopsy diagnosis		
		Metastasis	**Not metastasis**	
FNAC diagnosis	Metastasis	8	0	8
	Others	1	60	61
Total		9	60	69
Sensitivity	88.89%	Positive predictive value	100%	
Specificity	100%	Negative predictive value	98.36%	

DISCUSSION

The common patterns of lymph node diseases have been extensively studied. In a study of 925 patients who had isolated lymph node biopsies for diagnosis from 1973 to 1977, 60% of the nodes had benign lesions, 28% carcinoma, and 12% lymphoid neoplasm.[2] Age was found to be the most important predictor of a malignant diagnosis. The initial analysis with regards to age and sex (Table 1) verified a well-known fact, that advancing age is a risk factor for developing lymphoid neoplasm and lymph node metastasis. This is in keeping with previous studies. The analysis of subtypes of lymphoid neoplasms on biopsy was concordant with the commonest lymphoid neoplasm subtypes.[3]

FNAC is known to be a sensitive tool in the diagnosis of malignant lymphoid lesions.[4] However, data regarding the correlation with biopsy in nonmalignant lesions is incomplete. The two commonest diagnosis on FNAC were found to be reactive changes and granulomatous disease, respectively. However, the sensitivity of FNAC has varied between studies. In a series of 22 cases, a definitive diagnosis on FNAC with ancillary investigations was achieved in 82% (18 out of 22) of the cases.[5] In another study from India, 100% sensitivity and 96.7% specificity was achieved for tubercular lymphadenopathy, and for metastatic disease it was 98.5% and 100% respectively.[6]

In another large study from Egypt, the overall diagnostic sensitivity, specificity, positive predictive value, and negative predictive value of FNAC of cervical lymph nodes were 90.9%, 67.2%, 82.6%, and 81.3%, respectively.[7] The overall diagnostic accuracy was 82.2%, while the overall discordance rate was 17.8%. The diagnostic accuracy of reactive lymphoid hyperplasia, chronic necrotizing lymphadenitis, chronic granulomatous lymphadenitis, metastatic carcinoma, Hodgkin lymphoid neoplasm, and Non-Hodgkin lymphoid neoplasm was 85%, 83.3%, 70%, 100%, 77.8%, and 75%, respectively. Various other research groups from have carried out similar studies and found out sensitivity of FNAC to be between 80-100%.[8-11] In a study of HIV infected patients, FNAC predicted the histological findings in 65 out of 73 cases (89%) and missed 7 cases (9.5%), with a sensitivity of 93.1%, specificity of 100%, positive predictive value of 100% and negative predictive value of 78.7% for tuberculosis.[12]

In the present study, sensitivity of FNAC in diagnosing granulomatous diseases, lymphoid neoplasm and metastatic malignancies were found to be between 45-88%, after exclusion of non-representative and inadequate FNACs. The sensitivity of diagnosis of

granulomatous disease in FNAC was only 45.83%, which increases to 70.03% if necrosis is accepted as a surrogate marker of granulomatous disease. For accurate prediction of a lymphoid neoplasm, the sensitivity of FNAC is 69.23%. These figures are much lower than reported in earlier studies. The highest sensitivity and specificity is obtained in the diagnosis of metastatic disease (88.89% and 95.16% respectively). However, the specificity of the diagnosis was > 88% in all diagnostic categories.

CONCLUSION

The results of this study indicate that FNAC as a technique needs to improve to pick up more representative areas of a lymph node, to increase the sensitivity and diagnostic accuracy in comparison to lymph node biopsy. But the results also suggest that it is a useful tool to exclude lesions of various categories, especially metastatic disease.

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