International Journal of Clinical and Diagnostic Pathology

ISSN (P): 2617-7226
ISSN (E): 2617-7234
www.patholjournal.com
2024; 7(3): 43-47
Received: 25-04-2024
Accepted: 28-05-2024

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A comparative study of fine needle aspiration cytology and histopathology in the diagnosis of peripheral lymphadenopathy

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DOI: https://doi.org/10.33545/pathol.2024.v7.i3a.583

Abstract
Introduction: Lymphadenopathy is a common clinical problem in our country among all age groups and in both sexes. Lymphadenopathy is a feature of many diseases presented to different categories of clinicians in everyday practice. Tuberculous lymphadenitis is the most common cause of peripheral lymphadenopathy in a developing country.
Aims & Objective: In this study an attempt has been made to evaluate the clinical presentation and diagnosis of lymphadenopathy through fine needle aspiration cytology (FNAC) and its correlation with histopathologlcal examination (HPE).
Methodology: This hospital-based retrospective study was done in 60 cases of clinically apparent lymphadenopathy over a period of 2.5 years from January, 2021 to June, 2023. The results of FNAC and histopathologilcal examination (HPE) of the same lesion were compared and the diagnostic accuracy was estimated.
Results: Cytopathological study was successful in correctly identifying 85.2% of Tuberculous lymphadenitis, 66.6% of chronic non-specific lymphadenitis, 100% of necrotizing lymphadenitis, 88.9% of reactive lymphadenitis, 100% of non-Hodgkin's lymphoma, 50% of Hodgkin's lymphoma. Statistical correlation between aetiology of lymphadenopathy and cytopathological diagnosis with Spearman's rank correlation coefficient revealed a strong positive statistically significant correlation of cytopathology with histopathology.
Conclusion: FNAC is simple, safe, reliable, and inexpensive method that could be employed in detection of inflammatory, reactive and neoplastic conditions leading to clinical lymphadenopathy.

Keywords: FNAC, histopathology, peripheral lymphadenopathy

Introduction
Lymph node is an inevitable part of the body's defense system. Lymph nodes are local circumscribed collections of lymphoreticular tissue covered by a fibrous capsule and located at invariable anatomical points along the course of lymphatics [1]. Enlargement of lymph nodes due to stimulation by infectious agents or the involvement of metastasis or malignant diseases, such as lymphoma, is common. Enlarged lymph nodes were first organ to be biopsied by Fine Needle Aspiration Cytology (FNAC), they are frequently sampled tissues [2].

FNAC is a simple and rapid diagnostic technique. Because of early availability of results, minimal trauma and complication, it is increasingly used as a diagnostic tool in clinical practice throughout the world [3]. In the past assessment of lymphadenopathy was made directly from the clinicopathological parameters or biopsy, but nowadays biopsy avoided in most of the cases as FNAC is fairly accurate in the diagnosis of lymphadenopathy [4]. FNAC is choice of investigation in children also because it allay tension and anxiety of surgical procedure [5].

A tissue biopsy is accepted as the gold standard method for the diagnosis of lymphnode pathologies, as in other head and neck masses. However, when an excisional biopsy is performed, complications such as scar tissue formation, bleeding, neurovascular injury, and a long healing process have been observed in the excised area [6].

In this study an attempt has been made to evaluate the clinical presentation and diagnosis of peripheral lymphadenopathy (cervical, axillary, supraclavicular, submandibular, inguinal etc.) which is commonly encountered in medical wards and diagnostic value of FNAC has

been evaluated assuming the result of histopathology as the gold standard.

Aims & Objectives

- To evaluate the clinical presentation and diagnosis of lymphadenopathy through FNAC and its correlation with histopathological examination (HPE).
- To calculate the sensitivity and specificity of FNAC in comparison to histopathology.
- To motivate the patients and doctors to adopt the test which will be time saving, opd based and less costly to the patient.

Material and Methods

This hospital-based retrospective study was carried out in the Department of Pathology of a tertiary care teaching hospital, Ahmedabad. The duration of study was 2.5 years from January, 2021 to June, 2023 during which a total 60 cases of lymphadenopathy were evaluated by FNAC.

After consent of the patient, detailed history is taken and FNAC was performed under strict aseptic conditions by 10 ml disposable syringes connected with 22 to 24 bore hypodermic needles and aspirating cytological material from lesions of lymphadenopathy.

The air dried cytological smears prepared from the aspirate. The smears were stained with May-Grunwald-Giemsa stain and alcohol fixed smears were stained by Haematoxylin & Eosin stain and Papanicolaou stain. Special stain such as modified Ziehl-Neelsen stain was used for acid-fast bacilli (AFB).

The aspiration smears after staining were then studied under microscope and diagnosis is made. Finally, biopsy of the swelling was taken and subjected to histopathological examination for fixation, gross sectioning, routine tissue processing, block embedding, section cutting, staining and mounting by DPX. The results of FNAC and HPE of the same lesion were compared and the diagnostic accuracy was estimated.

Results

In our study total 60 patients underwent for FNAC and biopsy procedure were assesed. Out of 60 patients, 35 (58%) female and 25 (42%) were male. Age ranged from 9 to 70 years. Maximum patients were seen in the age range of 11-20 years. [Fig. 1].

Most common group of lymph nodes involved were the posterior group of lymph nodes (43%) followed by inguinal group of lymph nodes (17%). supraclavicular region was involved in (15%), axillary lymph nodes in (12%), submandibular lymph nodes in (10%) and anterior group of lymph nodes in (3%). [Fig. 2].

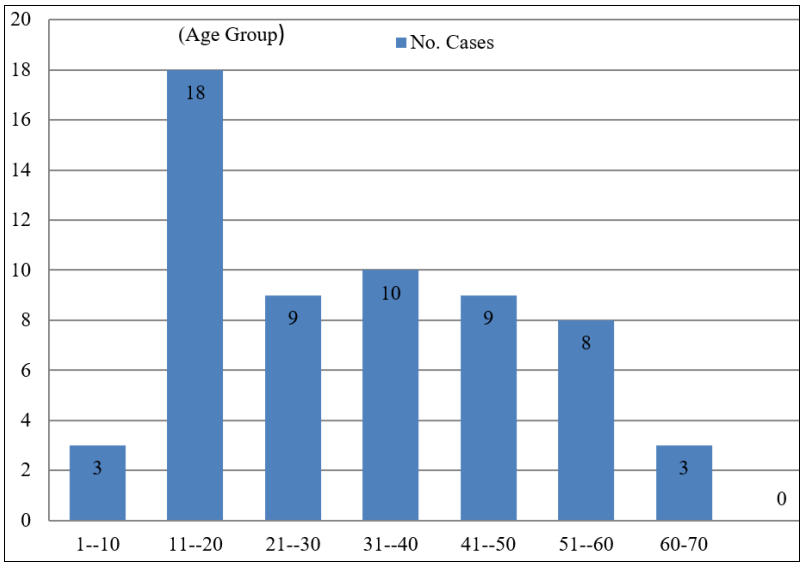

Fig 1: Age wise distribution

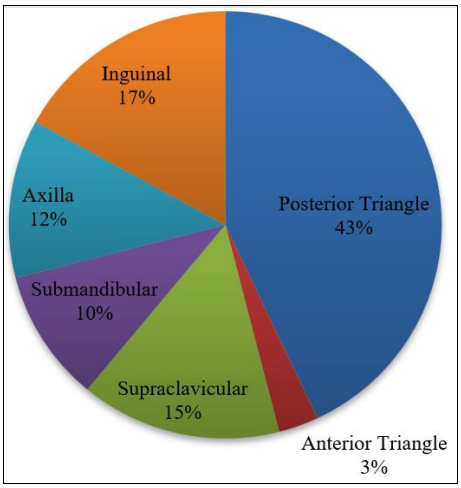

Fig 2: Site of lymphadenopathy

Histopathological findings were deemed as gold standard to evaluate diagnostic value of cytopathology in this study. Cytopathological study was successful in correctly identifying 85.2% of Tuberculous lymphadenitis, 66.6% of chronic non-specific lymphadenitis, 100% of necrotizing lymphadenitis, 88.9% of reactive lymphadenitis, 100% of non-Hodgkin's lymphoma, 50% of Hodgkin's lymphoma. (Table-1).

Calculation of sensitivity (proportion of true positives that are correctly identified by the test), specificity (proportion of true negatives that are correctly identified by the test), positive predictive value (proportion of patients with positive test results who are correctly diagnosed), negative predictive value (proportion of patients with negative test results who are correctly diagnosed), likelihood ratio for a positive test result (how much the odds of the disease increase when a test is positive) and likelihood ratio for a

negative test result (how much the odds of the disease decrease when a test is negative) confirms the diagnostic value of cytopathology in peripheral lymphadenopathy by demonstrating high values for different aetiology. (Table 2).

Discussion

In the present study, out of 60 cases, maximum cases were recorded between the age group of 11 years to 20 years which is comparable with the study done by Chawla Nitin *et al.*, [7] where maximum cases were recorded in the age group of 11-30 years. In this study there was a preponderance of female patients (58%) which is similar to the results reported from studies done by Sharma *et al.* and Kumar H *et al.* [8, 9].

Tuberculous lymphadenitis (48.3%) is the most common cause of lymphadenopathy in our study, similar findings were noted by Shah *et al.* [10] India is the country with the highest burden of TB that mainly involves the lungs followed by cervical lymph nodes. The portal of entry of TB bacilli into cervical lymph nodes is usually tonsils or adenoids [11]. This could be the reason for the high number of TB lymphadenitis in the present study. The diagnostic sensitivity and specificity of tubercular lymphadenopathy by cytopathology was 85.2% and 96.8% in this study. In other studies, the diagnostic accuracy for tubercular cytopathology in different centers varied from 79% to 98.9% [12, 13, 14].

In this study reactive lymphadenitis was the second most common diagnosis accounting for 13.3% of the total 60 cases, in the series of Kumar H *et al.* and Shilpa G *et al.*, reactive lymph node hyperplasia was also the second most common diagnosis [9, 15].

The application of FNAC in the diagnosis of lymphoma is still controversial, particularly in cases of low-grade Non-Hodgkin's lymphoma. In this study, a total of four cases (6.6%) of lymphoma were diagnosed by cytopathology, out of which one case (1.6%) was of Non-Hodgkin's lymphoma and 3 cases (5%) were of Hodgkin's lymphoma. In study done by Vimal S *et al.*, [1] there were a total of five cases (2.6%) of lymphomas, amongst which one case was of Hodgkin's lymphoma, and the rest of the four were Non-Hodgkin's lymphoma. In our study, there were 03 false negative cases of lymphoma. Out of three false negative cases of Hodgkin's lymphoma, two were reported as reactive lymphadenitis and other one was reported as chronic nonspecific lymphadenitis.

In this study statistical correlation between aetiology of lymphadenopathy and cytopathological diagnosis with Spearman's rank correlation coefficient revealed a strong positive statistically significant correlation of cytopathology with aetiology, i.e. histopathology (Table-3). Distributions of different lesions in various studies is shown in table no. 4, [13, 16, 17].

In the present study, FNAC had a sensitivity of 81.7% and a specificity of 96.6%. Positive and Negative predictive value were 89.6% and 95.9% respectively and diagnostic accuracy was 94%. This is in comparison with other similar studies as shown in table no. 5. [13, 16, 17, 18, 19].

Table 1: FNAC findings in different aetiologies of lymphadenopathy

Histo-pathological diagnosis	Cytopatholgical Diagnosis					
	Tuberculous lymphadenitis	Chronic nonspecific lymphadenitis	Necrotizing lymphadenitis	Reactive lymphadenitis	Non- Hodgkin's lymphoma	Hodgkin's lymphoma
Tuberculous lymphadenitis	29 (85.2%)	3 (8.8%)	0 (0.0%)	2 (5.8%)	0 (0.0%)	0 (0.0%)
Chronic nonspecific lymphadenitis	1 (16.7%)	4 (66.7%)	0 (0.0%)	1 (16.7%)	0 (0.0%)	0 (0.0%)
Necrotizing lymphadenitis	0 (0.0%)	0 (0.0%)	2 (100%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Reactive lymphadenitis	0 (0.0%)	1 (11.1%)	0 (0.0%)	8 (88.8%)	0 (0.0%)	0 (0.0%)
Non-Hodgkin's lymphoma	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100%)	0 (0.0%)
Hodgkin's lymphoma	0 (0.0%)	1 (16.7%)	0 (0.0%)	2 (33.3%)	0 (0.0%)	3 (50%)

Table 2: Sensitivity, specificity, positive and negative predictive value and likelihood ratio for a positive and negative test result of cytopathological study in different aetiologies of lymphadenopathy

Cytopathology diagnosis	Sensitivity	Specificity	Positive predective value	Negative predective value	Likelihood ratio for positive test result	Likelihood ratio for negative test result
Tuberculous lymphadenitis	85.2%	96.8%	96.6%	86.1%	26.6%	0.15%
Chronic nonspecific lymphadenitis	66.6%	91.8%	80%	96.5%	8.12%	0.36%
Necrotizing lymphadenitis	100%	100%	100%	100%	0%	0%
Reactive lymphadenitis	88.9%	91.2%	61.5%	98.1%	10.1%	0.12%
Non-Hodgkin's lymphoma	100%	100%	100%	100%	0%	0%
Hodgkin's lymphoma	50%	100%	100%	95%	0%	0%

Table 3: Statistical correlation between aetiology of lymphadenopathy and cytopathological diagnosis

	Spearman'srank correlation	Histopathological diagnosis
Cytopathological diagnosis	Correlation Coefficient	0.915
	Significance (P*) (1-tailed)	0.010
	N	60

Table 4: Distributions of different lesions in various studies

Studies	Tuberculous lymphadenitis	Reactive lymphadenitis	Non- Hodgkin's lymphoma	Hodgkin's lymphoma	Metastasis
Jindal N. *et al.* [17]	48.4%	22.5%	-	15.8%	13.3%
Islam MR *et al.* [13]	36.6%	3.33%	20%	6.6%	16.6%
Bhide SP *et al.* [16]	44.2%	42.4%	1.32%	1.32%	13.24%
Present study	48.3%	13.3%	1.6%	5%	-

Table 5: Comparison of the results of the present study with other similar studies

Studies	Sensitivity (%)	Specificity (%)	N
Mohammad *et al.* [18]	75.8	96.6	151
Islam MR *et al.* [13]	84	95.8	30
Bhide SP *et al.* [16]	78.5	100	151
Eryilmaz OT *et al.* [19]	87.9	100	73
Present study	81.7	96.6	60

Conclusion

In the present study maximum number of cases were in the age group of 11-20 years. There were 35 females and 25 males with a female to male ratio was 7:5. Out of these 60 cases, 29 cases (48.3%) were diagnosed as tuberculous lymphadenitis, 8 cases (13.3%) were reactive lymphadenitis, 4 cases (6.6%) were Chronic nonspecific lymphadenitis, 2 cases (3.3%) were necrotizing lymphadenitis, 1 case(1.6%) was non- hodgkin's lymphoma and 3 cases (5%) were of hodgkin's lymphoma.

In the present study, FNAC had a sensitivity of 81.7% and a specificity of 96.6%. Positive and Negative predictive value were 89.6% and 95.9% respectively and diagnostic accuracy was 94%. Finally it was concluded that, Fine needle aspiration cytology is easy, reliable, repeatable and simple diagnostic test and less time consuming outpatient procedure which can be used as an initial diagnostic tool for lymphadenopathies but the limitations of the procedure should be kept in mind.

Acknowledgement

Not available.

Author's Contribution

Not available.

Conflict of Interest

Not available.

Financial Support

Not available.

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Diagnostic value of lymph node fine-needle aspiration cytology. Cytojournal, 2021, 18.

How to Cite This Article
Patel KJ, Bhanvadia VM, Goswami H. A comparative study of fine needle aspiration cytology and histopathology in the diagnosis of peripheral lymphadenopathy. International Journal of Clinical and Diagnostic Pathology. 2024;7(3):43-47.