

FNAC as a Diagnostic Tool in the Evaluation of Cytomorphological Spectrum of Peripheral Lymphadenopathy along with Histopathological Agreement - An Experience in a Tertiary Teaching Hospital of Northern India

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ABSTRACT

BACKGROUND

Lymphadenopathy is one of the commonest presentations in clinical practice. Fine Needle Aspiration Cytology (FNAC) is an established, easy, cost effective, diagnostic tool for lymphadenopathies. Judicious application of FNAC can avoid the need of biopsy. We wanted to compare the accuracy of FNAC and histological analysis of peripheral lymphadenopathy among patients visiting the Departments of Oncology, Pathology, Surgery of K.D. Medical College and determine the most prevalent cause of peripheral lymphadenopathy among different age groups of patients.

METHODS

This study was done among cases of peripheral lymphadenopathy whose FNAC & biopsy were available. 112 cases of lymph node FNACs were carried out in the Dept. of Pathology for a period of one and half years from July 2018 till December 2019. Special stains were used whenever necessary.

RESULTS

Out of 112 cases studied 68 cases were male and 44 cases were female. Ratio of M : F = 1.5. The commonest anatomical site for lymphadenopathy was cervical (70 %) followed by supraclavicular (13 %) and axillary (10 %). Coming to the spectrum of the disease 103 cases (91.9 %) were non neoplastic lesions and 9 cases 8.03 % were neoplastic lesions. Reactive hyperplastic was the most common condition 51 cases (45.5 %) followed by tuberculosis 34 cases (30.35 %). Out of cases 9 cases (8.03 %) of malignancy, 5 cases (4.4 %) were metastatic deposits & 4 cases (3.57 %) were lymphomas. The peak age group ranged between 21 - 30 years. Cervical location of distribution of lymphadenopathy is noticed to be highest (70 %), which is then followed by, supra clavicular (13 %), axillary (10 %) and inguinal (5 %). (Maximum number of cases were found in the age group of 21 yr. - 30 yr., least number of cases seen in the age group of 61 yr. - 70 yr. Correlative study between cytopathological & histopathological examination of lymphadenopathy showed diagnostic discordance in three cases and concordance in 109 cases.

CONCLUSIONS

Apart from reactive hyperplasia, tuberculosis is the commonest cause of lymphadenopathy & males are commonly affected. FNAC is a safe procedure with high degree of sensitivity and specificity and concordance of 96.64 % with histopathological diagnosis. For confirming the diagnosis of lymph nodes, histopathology is the gold standard.

KEYWORDS

Lymphadenopathy, FNAC, Histopathology, Biopsy, Tuberculosis

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BACKGROUND

Lymph nodes are a vital part of our immune system, which also includes other lymphoid tissue like tonsil, spleen, adenoid & thymus.¹ There are approximately 600 lymph nodes in human body, concentrated over neck, axilla, groin, mediastinum & mesenteries.¹ Lymph nodes play an important role in defence system & are distributed along the lymphatic pathways.¹ Lymphadenopathy is defined as enlargement of lymph nodes (1 cm or more) or altered consistency.¹ Granulomatous & suppurative lymphadenitis, reactive hyperplasia are the commonly encountered conditions leading to lymphadenopathy.² Apart from this other problems like malignancies, autoimmune diseases also seen.¹ Lymph nodes are also common site of metastatic diseases from different cancers.² Martin & Ellis introduced aspiration biopsy (FNAB / FNAC) in 1930 as a substitute for excisional biopsy.² In 1967 Zajichek & Franzen at Karolinska hospital, Sweden defined precise criteria for diagnosis of lymph node lesion.² Although clinical examination, laboratory tests, radiological modalities help in the diagnosis process, definite diagnosis is stamped only with tissue biopsy.¹ This study aims to evaluate the spectrum of cytopathological feature of various non-neoplastic & neoplastic lesion of lymph node. A rapid and accurate diagnosis of lymphadenopathy with the help of FNAC followed by confirmation by histopathology (wherever applicable tends to reduce morbidity and mortality by starting early specific therapy). Fine needle aspiration biopsy is an effective tool for the diagnosis of both primary and metastatic lesion with high degree of sensitivity and specificity.^{3,4,5,6,7,8,9} It is a rapid outpatient procedure that provides an immediate diagnosis as compared to other techniques.^{4,5,9,10} It permits the surgeons to discuss potential additional diagnostic procedures and therapies of the patient during the initial visit and facilitate for the processing or triaging of patient by the surgeon.^{9,10} The procedure includes minimal trauma, no cost and no need for hospitalization. It can offer confirmation of local recurrences and metastasis.^{9,10} Fine needle aspiration cytology can be performed on any subcutaneous lesions or lymph nodes.

Although FNA is indicated for the analysis of any mass that is either palpable or detected by radiography, it can be performed on any subcutaneous lesion, whenever incisional biopsy is contraindicated. If necessary multiple separate needle puncture can be performed or by altering the direction of the needle during single puncture, multiple sites of the mass can be aspirated out.

The procedure does not disrupt the tissue planes / contaminate the subsequent surgical site. Thus no bridges are burnt and if non diagnostic FNAC can be followed by another biopsy procedure. Ricardo Gonzalez Campora is of the opinion that cytoarchitectural findings in conjunction with clinical correlation and ancillary methods have broadened the diagnostic spectrum. None the less, FNAC is not without pitfalls, some of which are derived from the nature of the tumour, such as scarcity of the cells in the aspirate, tumour heterogeneity, last but not the least the limited experience of the pathologist.

The correct evaluation of the results requires a high degree of cooperation between pathologist and surgeons along with cytological findings and the results of the special staining techniques wherever essential.

A careful histopathological examination was done and a comparison between cytological and histological study was attempted to establish the percentage of accuracy of cytological diagnosis of lymphadenopathy.

Objectives

- (1) to analyse both the neoplastic & non-neoplastic pattern of lesions seen in peripheral lymphadenopathy cases in terms of gender, age, distribution, prevalence
- (2) to determine its correlation with the histopathological diagnosis.
- (3) to determine the diagnostic accuracy of fine needle aspiration cytology procedure.

METHODS

The present study is a cross sectional study conducted in the Dept. of Pathology, Department of Oncology, Department of Surgery, K. D. Medical College Hospital and Research Center, Mathura from July 2018 to December 2019. There was a total of 120 cases of peripheral lymph node FNAC included in this study. 336 numbers of aspiration were done & each aspiration being spread onto 2 or 3 slides. Hence, 998 numbers of cytosmear slides were studied with an average of 8 slides per case & a range of 1 - 11 slides. Subsequently in 112 cases we were able to get the surgical specimens. Hence, finally 112 cases were evaluated with reference to cytological & histological picture.

Smears were prepared, fixed in 70 percent alcohol and air dried for H & E, Papanicolaou, May Grunwald, Giemsa / Leishman stain respectively. Needling was also done in some cases, wherever the size of the lymph node was small.

Materials

1. Disposable syringe with needle
2. Glass slides
3. Leishman-Giemsa stain, Z N stain, PAP stain, H and E stain
4. Knife for tissue cutting
5. Formalin for fixation
6. Alcohol, Xylene and paraffin wax for tissue process
7. Paraffin wax for blocking
8. Microtome for section cutting
9. Light Microscope.
10. Special stains - Z N stain

Prior to the study of F.N.A.C. of lymph nodes and corresponding histopathology study, some relevant important clinical data of each case were taken into account in order to establish the diagnostic value of F.N.A.C. of lymph nodes.

Inclusion Criteria

A) Patients with superficial lymphadenopathy, which was palpable and referred from various departments including IPD and OPD for FNAC and FNAC done under radiological guidance were included in this study.

B) Lymph node biopsy specimens for histopathological examination sent to the Department of Pathology were also included in the study.

C) Cases of lymph node biopsies whose FNAC were done in the Department of Pathology were included in the correlation study.

Exclusion Criteria

A) Patients already diagnosed to be suffering from non-lymphoid malignancy.

Statistical Analysis

Data was collected and entered in Microsoft excel spread sheet. Descriptive statistics were used to elaborate age and sex distribution. Charts were obtained in the form of pie charts and bar graphs, were used to describe common diagnosis prevalent in hospital patients with peripheral lymphadenopathy. Chi-square test was calculated to find agreement between the two testing modalities: Histopathology and FNAC, with histopathology being the gold standard. Correlation coefficient was drawn across data with age wise distribution.

Null Hypothesis: There is no difference between the cytology results and histopathology as gold standard for the cause of peripheral lymphadenitis.

Alternative Hypothesis: There exists a significant difference between the correctness of diagnosis by cytology when compared to histopathology as gold standard.

At alpha 95 %, the p-value of less than 0.05 shall be considered significant.

RESULTS

The study was conducted in the Dept. of Pathology, Department of Oncology, Department of Surgery K D Medical College and Research Centre, Mathura, Uttar Pradesh. A total of 120 cases of lymph node FNAC were done, out of this only in 112 cases biopsy specimens were available, rest 8 cases were lost to follow up. These were studied in reference to age, sex, site of distribution & diagnosis. So a cytological and histological correlation study was based on 112 cases. (Figure 1) shows distribution of cases of lymphadenopathy according to anatomical location. (Figure 2) shows age distribution. (Table 1) shows the frequency of reactive hyperplasia and granulomatous lesions and other lesions diagnosed cytopathologically. After analysing the data of age, gender and distribution it was revealed that cervical location of distribution of lymphadenopathy is noticed to be highest (70 %), which is

then followed by, supra clavicular (13 %), axillary (10 %) and inguinal (5 %). (Figure 1)

Cytological Diagnosis	Number of Cases
Chronic Non-Specific Lymphadenitis	49 Cases (43.75 %)
Granulomatous Lymphadenitis	34 Cases (30.35 %)
Suppurative Lymphadenitis	18 Cases (16.07 %)
Metastasis	5 Cases (4.46 %)
Lymphoma	4 Cases (3.57 %)
Inconclusive	2 Cases (1.78 %)

Table 1. Distribution of Cases According to Cytological Diagnosis

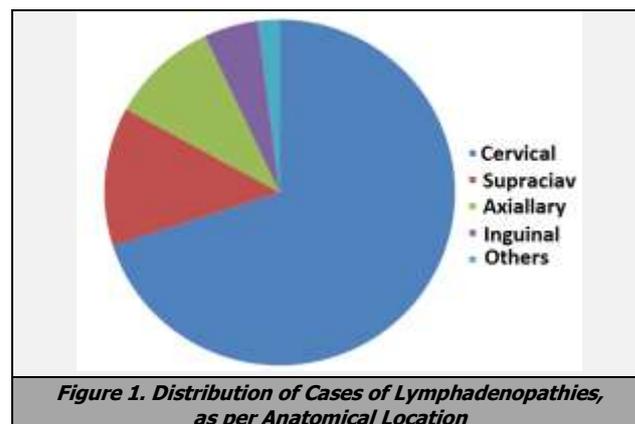
Maximum number of cases were found in the age group of 21 yr. - 30 yr., least number of cases seen in the age group of 61 yr. - 70 yr. (Table 1). Males, 68 (60.7 %) are more affected than females, 44 (39.2 %), ratio (M: F) being 1.5. (Table 2) shows distribution of cases according to cytological diagnosis (total - 112 cases). Maximum number of cases are of "chronic non-specific lymphadenitis", followed by "granulomatous lymphadenitis" least number of cases were of lymphoma.

Age	Chronic Non-Specific Lymphoma	Granulomatous Lymphoma	Suppurative Granuloma	Metastasis	Hodgkin Lymphoma (HL)	NHL	Inconclusive
0 - 10	15	-	-	-	2	-	2
11 - 20	11	12	6	-	-	-	-
21 - 30	18	12	8	-	-	-	-
31 - 40	4	2	2	2	-	2	-
41 - 50	1	2	2	2	-	-	-
51 - 60	-	2	-	1	-	-	-
61 - 70	-	4	-	-	-	-	-
Total	49	34	18	5	2	2	2

Table 2. Distribution of Cases of Lymphadenopathies According to Cytopathological Diagnosis in Each Decade of Age

Diagnosis	Histopathological	Cytological	Total
Chronic non-specific Lymphadenitis	48	49	97
Granulomatous Lymphadenitis	33	34	67
Suppurative Lymphadenitis	18	18	36
Metastasis	05	05	10
Lymphoproliferative Disorders	01	04	05
Total	105	110	215

Table 3. Distribution of Diagnosis of Patients According to Histopathology and Cytopathology Agreement (in Diagnosis)



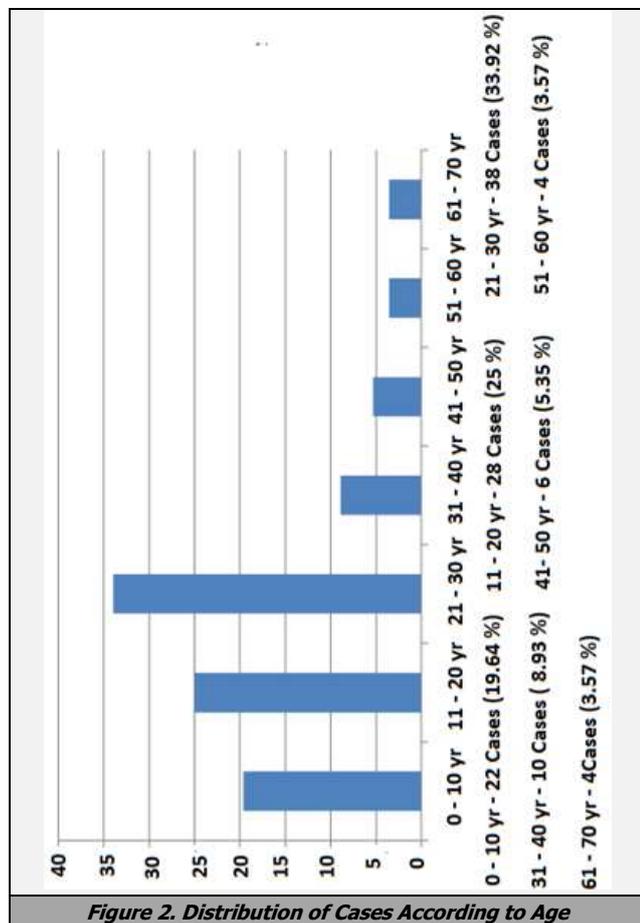


Figure 2. Distribution of Cases According to Age

Cytological Diagnosis	Histopathological Diagnosis			
	No. of Cases	Chronic Non-Specific Lymphadenitis	Granulomatous Lymphoma	Metastasis
Chronic Non-Specific Lymphadenitis	49	48		1
Granulomatous Lymphadenitis	34		33	1 Case (Squamous Cell Carcinoma)
Suppurative Lymphadenitis	18			18
Metastasis	5			5
Lymphoproliferative Disorder	4	1		

Table 4. Similarity in Results between Cytopathological and Histopathological Diagnosis of Lymphadenopathies

(Table 3) shows distribution of cases of lymphadenopathies according to cytopathological diagnosis in each decade of age, out of 5 cases of lymphadenopathies reported as suggestive of metastatic deposit in FNAC, 3 cases were suggestive of squamous cell carcinoma, 2 cases were suggestive of adeno carcinoma and 1 case was indeterminate. Chi-square test statistic was calculated using SPSS version 16. It was found to be 1.7086 with p-value > 0.05, dF = 4, we accept the null hypothesis and can postulate that there is no significant difference between the histopathological and cytopathological diagnosis of diagnosing peripheral lymphadenopathy. We can conduct more large-scale studies to prove our hypothesis that FNAC can be performed as an investigation of choice for its accuracy in diagnosing the cause of peripheral lymphadenopathy. (Table

4) shows diagnostic discordance between cytopathological and histopathological results in 3 (3.36 %) cases out of 112 cases.

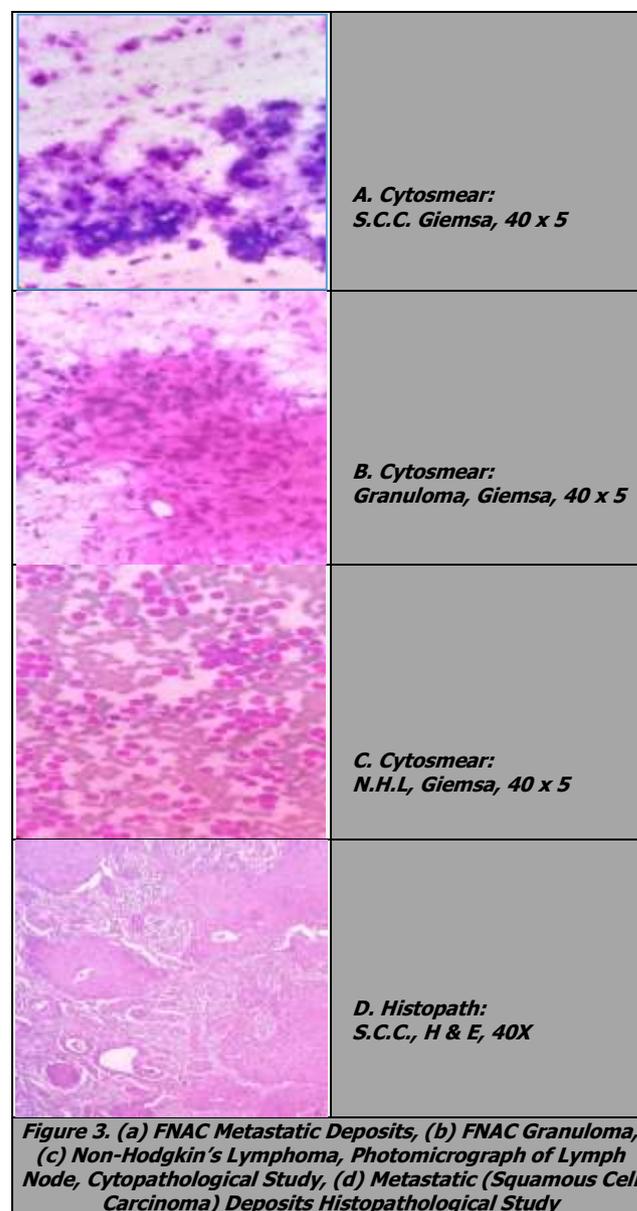


Figure 3. (a) FNAC Metastatic Deposits, (b) FNAC Granuloma, (c) Non-Hodgkin's Lymphoma, Photomicrograph of Lymph Node, Cytopathological Study, (d) Metastatic (Squamous Cell Carcinoma) Deposits Histopathological Study

DISCUSSION

In this study the most common diagnosis is the non-neoplastic lesions.¹ Similar findings were observed in various other studies of India & also outside India. Lymphadenopathy is a common clinical presentation. Cervical lymph node was the common LN, subjected to FNAC.

(70 %), this is followed by supraclavicular and axillary lymph nodes. This is consistent with Vidya k et al¹¹ and many recent studies.^{12,13,14,15} Lymphadenopathy could be reaction to infection or inflammatory condition (granulomatous / acute / chronic) or metastatic deposit or lymphoproliferative disorders.¹⁶ Tuberculosis is one of the commonest cause of lymphadenopathies in our country. Where its prevalence is high. Lymph nodes are the most common site of metastatic

malignancy and also constitute the only clinical manifestation of the disease in many cases.^{17,18,19} Using FNAC, aetiology of lymphadenopathy can be decided & also it point towards a possible occult primary site in case of secondaries with unknown primaries.¹⁶ In this series satisfactory evaluation could be done on 112 cases amongst 120 cases of FNAC of lymph nodes. The age range of patient in our study was 0 - 70 years, with a peak between 21 - 30 years; (38 cases) & male patient outnumbered female patients, (M:F is 1.5). This finding is similar to other recent study.¹¹

The commonest cytopathological diagnosis of lymphadenopathy in the study was reactive chronic non-specific lymphadenopathy (49 cases - 43.75 %) with a peak between 21 - 30 year (18 cases) followed by granulomatous lymphadenopathy (37 cases - 30.35 %), peak age is 11 - 20 years and 21 - 30 years, this correlates with the study conducted by Arun Kumar et al²⁰ And Malakar et al.²¹

In our study out of 34 cases of granulomatous lymphadenitis 13 cases (38 %) were positive for AFB which is similar to studies conducted by Arora et al,²² W.F.Ng et al,²³ S.S. Ahmed et al.²⁴ Out of four (4) cases diagnosed as lymphoproliferative lesion one (1) case was suggestive of Hodgkin's lymphoma, three (3) cases were non-Hodgkin's lymphoma. Out of five (5) cases of metastatic deposit cases of lymphadenopathy, three (3) (60 %) cases were suggestive of squamous cell carcinoma, one (1) (20 %) case was suggestive of adenocarcinoma & (20 %) case was indeterminate. This result is similar to study conducted by Raghuvveer et al.²⁵

The most common tumour metastasizing to the cervical lymph nodes was squamous cell carcinoma & the upper aero digestive tract is the commonest primary site. Correlative study between cytopathological and histopathological examination of lymphadenopathy showed diagnostic discordance in three cases. One (1) case diagnosed as chronic non-specific lymphadenitis in FNAC proved to be a case of Hodgkin's lymphoma, on histopathology. One (1) case diagnosed to be granulomatous lymphadenitis in FNAC proved to be metastatic deposits from squamous cell carcinoma with necrosis in histopathology study. Out of our (4) cases lymphadenopathies diagnosed as lymphoproliferative neoplasms in FNAC three (3) cases (3.36 % cases) showed histological diagnosis dis-concordance, and one (1) case was diagnosed as chronic non-specific lymphadenopathy.

CONCLUSIONS

Peripheral lymphadenopathy is seen in both genders & in wide range of age groups. Tuberculosis is the second most common cause of lymphadenopathy, primary cause being chronic non-specific lymphadenopathy & affects predominantly young females. FNAC is a safe procedure with high degree of diagnostic accuracy and concordance (96.64 %) and 3 case of discordance (3.64 %) with histopathological diagnosis which can be used independently for initial treatment option. Though we have many different

tools to investigate lymphadenopathy, histopathology remains the gold standard for diagnosis.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

Financial or other competing interests: None.

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