



A CROSS-SECTIONAL STUDY ON PATTERN OF CYTOMORPHOLOGY IN LYMPH NODE LESIONS BY FINE NEEDLE ASPIRATION CYTOLOGY

Pathology

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ABSTRACT

Introduction: Enlarged lymph nodes were first organ to be biopsied by fine needle aspiration; today they are frequently sampled tissues.^[1] Fine needle aspiration cytology (FNAC) of lymph node is simple screening and diagnostic tool to diagnosis of inflammatory, benign and malignancies both primary as well as secondary which not only confirms the presence of metastatic disease, but also suggest regarding the nature and origin of primary tumor. It is a well-tolerated, cost effective, almost free of complication procedure and reproducible which helps to diagnose and monitor the recurrence of malignancies. The cytomorphological features obtained in fine needle aspiration cytology correlate very well with histologic appearances of same lesion and in some situations has qualities of micro biopsy.^[2] Fine needle aspiration cytology is excellent first line method for investigating the nature of lesion, as it is economical and convenient alternative for open biopsy.^[3] **Aim:** To assess the pattern of cytomorphology in lymph node lesion by FNAC. **Materials And Method:** This is a hospital record based cross sectional retrospective study of 175 patients in department of cytology for FNAC over a period of 6 months from 1st April to 1st September, 2023 in Gadag institute of medical sciences. **Result:** A total of 175 patients were included in present study. Maximum number of cases were below 30 years age group with male preponderance. Cervical lymph node was most commonly involved. Reactive lymphadenitis was diagnosed in 47%. Granulomatous lymphadenitis was diagnosed in 18.6%. Metastatic deposits were diagnosed in 30% and lymphoma were diagnosed in 2.3%. **Conclusion:** FNAC is simple, rapid and cost-effective method which is helpful in early diagnosis and monitoring the prognosis of cervical lymphadenopathy.

KEYWORDS

FNAC, cytomorphological pattern, Peripheral lymph node.

INTRODUCTION

Lymphadenopathy, characterized by the abnormal enlargement of lymph nodes, is a prevalent clinical condition that can signal a range of underlying health issues, from infections to malignancies. Lymph nodes, integral to the immune system, act as filters for harmful substances, including pathogens and cancer cells. Their enlargement often necessitates further diagnostic evaluation to ascertain the cause and inform treatment strategies¹.

Fine Needle Aspiration Cytology (FNAC) has become a cornerstone in the diagnostic approach to lymphadenopathy. This technique involves the use of a fine needle to collect cellular material from the lymph node, which is then examined microscopically². FNAC is highly valued for its minimally invasive nature, cost-effectiveness, and the speed with which it can provide diagnostic information. It is particularly useful in distinguishing between benign and malignant conditions, as well as in identifying specific types of infections and inflammatory diseases³.

One of the primary advantages of FNAC over more invasive methods like open biopsy is its reduced risk and quicker recovery time. Open biopsy, though definitive, involves surgical removal of tissue, which can be associated with significant morbidity, extended recovery periods, and higher healthcare costs. FNAC, on the other hand, can be performed in an outpatient setting with minimal discomfort, offering a swift diagnosis that facilitates timely clinical decision-making⁴. Additionally, FNAC's diagnostic utility is enhanced when combined with ancillary techniques such as immunocytochemistry, flow cytometry, and molecular studies, which can provide detailed insights into the nature of the lesion and guide therapeutic interventions^{5,6}.

MATERIALS AND METHODS

This study was designed as a retrospective cross-sectional observational study aimed at assessing the cytomorphological patterns in lymph node lesions through Fine Needle Aspiration Cytology (FNAC). The study was conducted over a period of six months, from April 2023 to September 2023, at the Department of Pathology, Gadag institute of medical sciences, Gadag. The retrospective cross-sectional design allowed for the collection and analysis of data from all patients presenting with lymphadenopathy during the study period, providing a

snapshot of the cytological findings in this population.

The sample size was determined using a universal sampling method, where all cases of lymphadenopathy presenting to the pathology department during the study period were included. This approach was chosen to ensure comprehensive data collection and to capture a wide spectrum of cytomorphological patterns in lymph node lesions. A total of 175 patients were included in the study, providing sufficient data for meaningful statistical analysis.

A brief clinical history followed by physical examination was done and the findings were noted. FNAC was performed under aseptic precautions using 22-24 Gauge needles attached to 5 ml syringes. The aspirated material was smeared on to the glass slides. The smears were then fixed in 95% ethyl alcohol and stained with Hematoxylin and Eosin stain and Papanicolaou stain. Leishman stain was done on air dried smears. Zeil-Neelsen staining was done whenever required. The cytological diagnosis for each case was based on cytomorphology and available clinical information.

RESULTS:

A total number of 175 patients were studied. Among them, 96 (54.85%) patients were male and 79 (45.14%) were female patients (Table 1). The age of the patients ranged from 20 days to 80 years (Table 2). Cervical lymph nodes were enlarged in 118 of 175 cases (67.42%) followed by axillary in 17 cases (9.71%), inguinal in 15 cases (8.57%), submandibular lymph nodes in 13 cases (7.42%), submental in 8 cases (4.57%), supraclavicular lymph nodes in cases (1.14%), Preauricular in 01 cases (0.57%) and generalized lymphadenopathy in 01 cases (0.57%) (Table 3 & chart 2). Four cases had inadequate material and were thus unsatisfactory for evaluation. Among 175 cases, maximum number of reactive lymphadenitis were record in the age group of less than 25 years and metastatic cases were recorded in more than 65 years. A major proportion of lymphadenopathies in this study were due to benign conditions (77.14%). Out of 175 cases, the most frequent cause of lymphadenopathy was found to be Reactive Lymphadenitis (figure 1) with 82 cases (46.85%). The next frequent diagnosis was Tuberculosis (Figure 2) with 32 cases (18.28%) followed by metastatic squamous cell carcinoma (Figure 3) in 18 cases

(10.28%), necrotizing lymphadenitis in 11 cases (6.28%), acute suppurative lesion in 10 cases (5.71%), metastatic adenocarcinoma in 7 cases (4%), metastatic ductal carcinoma of breast in 7 cases (4%), Non Hodgkin's lymphoma (Figure 4) in 3 cases (1.71%) and Hodgkins lymphoma in 01 cases (0.57%) (Table 4 & chart 2).

Table 1: Gender Wise Distribution Of Patients (n=175)

	No of cases	Percentage
Male	96	54.85%
Female	79	45.14%

Table 2: Age Wise Distribution Of Patients (n=175)

Age group in years	No of cases	Percentage
0-20	72	41.14%
21-40	42	24%
41-60	30	17.14%
61-80	31	17.71%

Table 3: Sites Of Lymph Node Involvement (n= 175)

Site	Number of cases	Percentage
Cervical	118	67.42%
Axillary	17	9.71%
Inguinal	15	8.57%
Submandibular	13	7.42%
Submental	8	4.57%
Supraclavicular	02	1.14%
Preauricular	01	0.57%
Generalized	01	0.57%

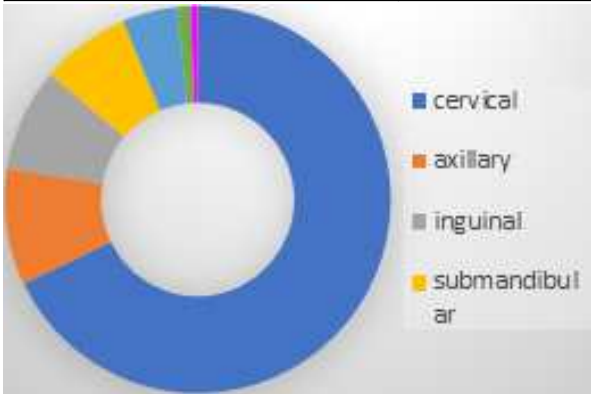


Chart 1: Pai chart showing Sites of lymph node involvement

Table 4: Cytological Diagnoses Of Lymph Node Aspirations(n=175).

Diagnosis	Number of cases	Percentage
Reactive lymphadenitis	82	46.85%
Granulomatous tuberculosis	32	18.28%
Metastatic squamous cell carcinoma	18	10.28%
Necrotizing lymphadenitis	11	6.28%
Acute suppurative lymphadenitis	10	5.71%
Metastatic adenocarcinoma	7	4%
Metastatic ductal carcinoma	7	4%
Non Hodgkin's lymphoma	3	1.71%
Hodgkin's lymphoma	01	0.57%

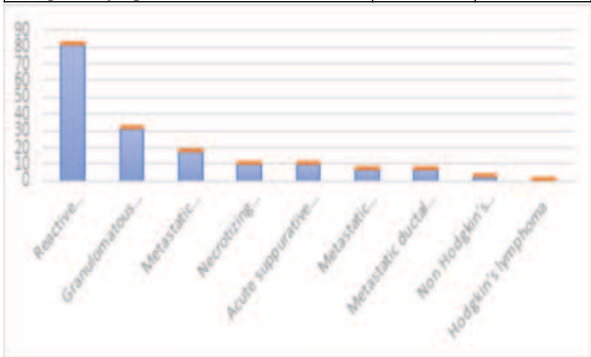


Chart 2: Bar chart showing cytological diagnosis of lymph node

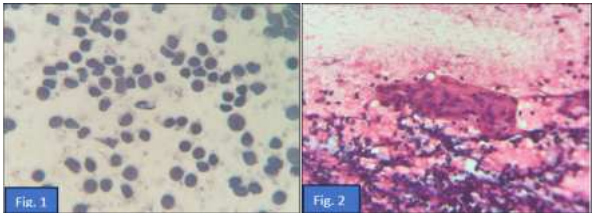


Fig 1: Reactive Lymphadenitis showing polymorphic population of lymphocytes.(Pap smear 100x.)

Fig 2: Smear shows epithelioid cell granulomas and necrosis in the background (H & E stain; 100x).

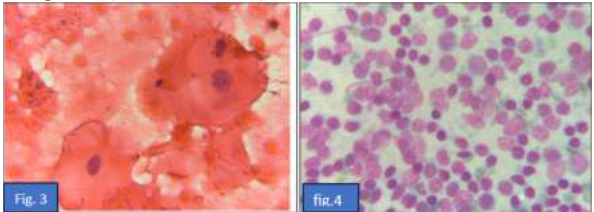


Fig 3: Metastasis Of Squamous Cell Carcinoma Polygonal Cells With Prominent Nucleoli. (H& E 100x).

Fig 4: Non Hodgkin's Lymphoma Showing Biphasic Population Of Lymphocytes. (H&E 100X).

DISCUSSION:

Age Distribution:

The study population ranged in age from 20 days to 80 years, with a mean age of 39.73 years. The majority of patients were clustered in the 0-20 and 21-40 age groups, each comprising 65.14% of the total cases. This suggests that lymphadenopathy is more prevalent adulthood. This age distribution is consistent with previous studies that have shown similar trends in Gupta et al. and Jayaram et al. The younger age group (0-20 years) accounted for 41.4% of cases, indicating that while lymphadenopathy can occur in children and adolescents, it is more common compared to adults. The presence of lymphadenopathy in older age groups may be associated with a higher incidence of chronic diseases and malignancies in these populations in Mitra et al and Ton Eryilmaz O et al.

Gender Distribution:

The gender distribution in this study revealed a slight male predominance, with 96 (54.85%) males and 79 (45.14%) females. This male-to-female ratio of approximately 1.1:1 aligns with some previous studies but differs from others that have reported a higher prevalence in females in Bagwan et al. The near-equal distribution between genders suggests that lymphadenopathy affects both males and females similarly. However, the slight male predominance observed could be due to gender-specific factors such as occupational exposures or lifestyle differences that may predispose males to certain infections or diseases causing lymphadenopathy Mallik et al.

Clinical Presentations:

The demographic data also highlighted the common clinical presentations among the patients. Most patients presented with palpable lymph node enlargement, which is the primary indication for FNAC. Other associated symptoms included fever, weight loss, and night sweats, which are more commonly reported in cases of malignancy and chronic infections. The correlation between these symptoms and specific age groups or genders was not significant, indicating that these symptoms are generally prevalent across all demographics in Mourad et al. study.

Our study observed that reactive lymphadenitis is characterized by a diverse population of lymphoid cells, including small lymphocytes, immunoblasts, and plasma cells, often accompanied by tingible body macrophages. This mirrors the findings of Goel et al., who documented similar cellular compositions in reactive lymphadenitis cases in their study. Additionally, Jayaram et al. also reported a comparable prevalence of reactive lymphadenitis in their extensive review of lymph node aspirates. These studies, along with ours, underscore the commonality of reactive lymphadenitis as a benign condition secondary to infections or inflammatory stimuli.

Granulomatous lymphadenitis in our study was primarily associated with the presence of epithelioid cell granulomas, multinucleated giant

cells, and caseation necrosis in some instances. This is consistent with the results reported by Reddy et al., who highlighted the diagnostic significance of granulomas in chronic infections such as tuberculosis. Our findings also align with those of Mallick et al., who emphasized the importance of special stains like Ziehl-Neelsen for identifying mycobacterial infections.

In cases of suppurative lymphadenitis, our study identified abundant neutrophils, necrotic debris, and occasional bacterial clusters, indicative of acute bacterial infections. Bagwan et al. documented similar cytological features in their evaluation of suppurative lymphadenitis, emphasizing the utility of FNAC in rapidly diagnosing bacterial infections and guiding appropriate antibiotic therapy. Mourad et al. also reported the effectiveness of FNAC in identifying suppurative lymphadenitis and initiating prompt treatment, which is corroborated by our findings.

The detection of malignant lesions, including both primary lymphomas and metastatic carcinomas, in our study revealed distinct cytomorphological features. For lymphomas, the presence of Reed-Sternberg cells was diagnostic of Hodgkin's lymphoma, while a heterogeneous population of atypical lymphoid cells suggested non-Hodgkin's lymphoma. These findings are in line with those of Jayaram et al. and Mallik et al., who reported similar cytological characteristics in their studies. Additionally, our identification of metastatic carcinoma through clusters of malignant epithelial cells with specific morphologic features supports the observations made by previous researchers in Goel et al. and Waldeyer, W., et al.

The analysis of demographic data in conjunction with cytomorphological patterns provides a comprehensive understanding of lymphadenopathy. For instance, reactive lymphadenitis was more frequently observed in younger patients, particularly those under 40 years, often associated with viral infections or nonspecific inflammatory responses. Granulomatous lymphadenitis was prevalent in middle-aged adults, correlating with chronic infections like tuberculosis, which is more common in this demographic in Mallick et al. and Dhawan, V., et al. Malignant lesions, including metastatic carcinoma and lymphomas, were predominantly seen in older patients, reflecting the increased risk of malignancies with advancing age.

CONCLUSION:

This study has highlighted the significant role of FNAC in the diagnostic evaluation of lymphadenopathy. The detailed analysis of cytomorphological patterns provides valuable insights that are crucial for accurate diagnosis and effective patient management. Future research should focus on addressing the limitations identified, such as expanding sample sizes and incorporating advanced diagnostic technologies, to further enhance the utility and accuracy of FNAC. By continuing to refine and improve FNAC techniques, clinicians can ensure that patients receive the highest standard of care in the diagnosis and treatment of lymph node lesions. This study contributes to the growing body of evidence supporting the pivotal role of FNAC in modern diagnostic pathology and underscores the need for ongoing advancements in this field.

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