Section: Pathology

Original Research Article

CYTOMORPHOLOGICAL PATTERN ANALYSIS OF VARIOUS LYMPHADENOPATHIES IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: The human body consists of approximately 600 lymph nodes. Tonsils, adenoids, spleen and Peyer's patches are various parts of the lymphoid tissue and their role is to provide immunity against various pathogens. Peripheral lymph nodes are located deep in the subcutaneous tissue and can be palpated if any thing causes them to enlarge. Lymph node enlargements are one of the commonest clinical presentation of patients and it encompasses a wide spectrum ranging from inflammation to a malignant lymphoma and finally metastatic malignancy. FNAC needle aspiration cytology (FNAC) is a rapid, simple, reliable, minimally invasive and cost-effective procedure which can be used as a outpatient setting however, histopathological examination remains as the gold standard in the evaluation of lymphadenopathy. The aim of the study was to evaluate the cytomorphological patterns of various diseases causing lymphadenopathy.

Materials and Methods: A three years study of 100 cases of lymphadenopathy presenting to the Department of pathology from 1stJanuary 2023 to 31stDecember 2025 taken up for our study. FNAC performed using a 23/24 gauge needle and 5ml syringe. Smears were fixed in 95% ethyl alcohol and stained with Hematoxylin and Eosin, Papanicolaou stain, Leishman stain and Giemsa stain. Special stains like periodic acid–Schiff for mucin (PAS) and Ziehl–Neelsen stain (ZN) stain for acid-fast bacilli (AFB) performed wherever required.

Results: Most common lesion observed in our study was reactive lymphadenitis (25%), followed by granulomatous lymphadenitis (28.15%), tubercular lymphadenitis (17.39%) and metastatic lesions (14.23%). Cervical lymphadenopathy found to be the most common site in our study. During the course of 3 years a total of 100 cases were received and were studied. Age of patients ranged from 1 year to 78 years. Females were 32 and males were 68 in number. Most common lesion found in our study was Reactive hyperplasia (25%), followed by Granulomatous (22%), Tuberculosis (20%), Suppurative (10%), Necrotic (5%), Parasitic (1%), Metastasis (12%), Lymphoma (5%).

Conclusion: Our study highlighted the various cytomorphological patterns of lymphadenopathy. This study demonstrates that fine needle aspiration is a safe accurate and valuable tool in the evaluation of various lymphadenopathies. FNAC analysis shows that accuracy is 95%, since histopathological diagnosis is invasive procedure.

Keywords: Lymph node, Lymphadenopathy, Fine needle aspiration cytology, Granulomatous, Malignant.

INTRODUCTION

Lymphadenopathy is one of the most common clinical presentations of patients attending the outpatient department. The degree and pattern of morphological changes depend on the inciting stimulus and the intensity of the response. Thus, lymphadenopathy may be an incidental finding and / or primary or secondary manifestation of underlying diseases which may be neoplastic or non neoplastic.[1] Fine needle aspiration cytology (FNAC) as the first line of investigation has assumed importance in diagnosing a variety of disease processes as it is rapid, simple, reliable, minimally invasive and cost effective procedure which can be used in outpatient setting.[2]

The etiology varies from an inflammatory process to a malignant condition. The knowledge of the pattern of lymphadenopathy in a given geographical region is essential for making a confident diagnosis or suspecting a disease.[3] Tuberculosis is the most common cause of lymphadenopathy in developing countries such as India and should be considered in every case of granulomatous lymphadenopathy unless proved otherwise. FNAC is a reliable, simple, safe, rapid and inexpensive method of establishing the diagnosis of lesions and masses at various sites and organs.[4]

FNAC has important role in the evaluation of peripheral lymphadenopathy, and it can be used as a safe alternative to excision biopsy.[5] FNAC has been used extensively for diagnosis of primary and secondary lymphadenopathy. The present study was undertaken to determine the role of FNAC in the evaluation of cytomorphological features of various lymph node lesions.

MATERIALS AND METHODS

This is a retrospective study composed of 100 cases of lymphadenopathy which was presented in the Department of Pathology for the past 3 years from 1st January 2020 to 31st December 2022, was taken up for this study. Informed consent was taken from all patients in the study prior to the procedure. FNAC was performed under aseptic conditions, using a 22-24 gauge needle and 5 ml syringe. The smears thereafter were fixed in 95% ethyl alcohol and stained in various stains such as Hematoxylin and Eosin, Papanicolaou stain, Giemsa stain and Leishman stain. Cases of granulomatous disease, necrosis and suppuration, Ziehl-Neelsen stain was done for Gram negative acid fast bacilli. Few cases had fluid aspirate which was centrifuged and sediment smears was made using the above stains. The criteria for the lymph node aspirates to be diagnosed as tubercular lymphadenitis included the presence of epithelioid cell granuloma and caseous necrosis with or without Langhans giant cells or ZN positivity. Granulomatous lymphadenitis was diagnosed in the presence of epithelioid cell granuloma with or without giant cells and with the absence of necrosis.[6] This was followed by excision biopsy of the significantly enlarged lymph node from the same anatomical region was performed under local anaesthesia with the help of surgeons and the excised sample was sent for histomorphological examination in the same department.

RESULTS

A total of 100 aspirates were obtained out of which 68% were males and 32% were females. The age of the patients ranged from 1 year to 78 years with mean age of 39 years. Maximum incidence of cases were seen in the age range of 30 – 40 years. A slight male preponderance with a ratio of 1.17: 1 was noted.

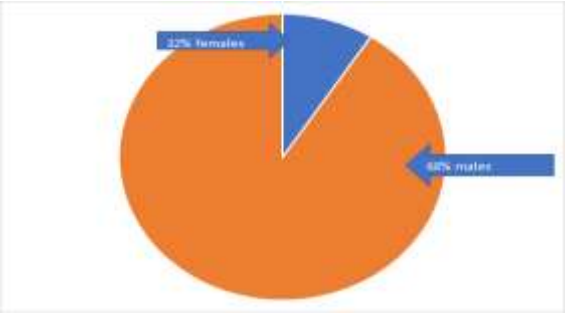

Table 1: Showing distribution of age distribution of various lymphadenopathy.

Age (years)	Reactive Hyperplasia	Granulomatous	Tuberculosis	Suppurative	Necrotic	Parasitic	Metastasis	Lymphoma	Total
<1	-	-	-	-	-	-	-	-	-
1-10	-	2	4	3	1	-	-	-	10
11 -20	2	6	6	2	1	-	-	-	17
21 -30	3	7	4	5	2	1	-	-	22
31-40	15	5	3	-	-	-	2	-	25
41-50	5	2	3	-	1	-	1	-	12
51-60	-	-	-	-	-	-	3	-	3
61-70	-	-	-	-	-	-	3	2	5
71-80	-	-	-		-	-	3	3	6
Total	25	22	20	10	05	01	12	05	100

Lymph nodes of varying sizes were subjected to FNAC. The smallest lymph node measured 1 cm and largest lymph node measured 3.5cm. Most of the lymph nodes ranged in size between 1 and 2 cm.

The most common group of lymph nodes aspirated were in a decreasing order cervical (38), submandibular (22), supraclavicular (18), axillary (12), and inguinal (10).

Table 2: Showing the percentage distribution of lymph node lesions in decreasing order.

Lesion	Percentage(%)
Cervical	38%
Submandibular	22%
Supraclavicular	18%
Axillary	12%
Inguinal	10%

Cytomorphological diagnosis were made in all the 100 cases. Of the 100 cases, majority was reactive hyperplasia (30%), followed by tuberculosis (22% cases), granulomatous (15 %), Suppurative (10 %), Necrotic (5 %), Parasitic (1%), metastatic malignancy (12 %) and lymphoma (5 %).

The tubercular lymph nodes were matted, firm in consistency, mobile and non-tender on palpation. For the cases of tuberculosis ZN staining was done and 6 cases showed acid fast bacilli. The rest of the cases were ZN negative, however CB-NAAT study showed positive for Mycobacterium tuberculosis.

Other lymph nodes were discrete, fixed with the overlying skin and non- tender. Non- Hodgkin's Lymphoma cases lymph nodes showed multi-regional involvement and were tender. Hodgkin's lymphoma cases lymph nodes also showed multi regional involvement and were tender on palpation.

The most common anatomical site of involvement of lymph nodes by different diseases was the cervical lymph nodes followed by submandibular and supraclavicular lymph nodes.

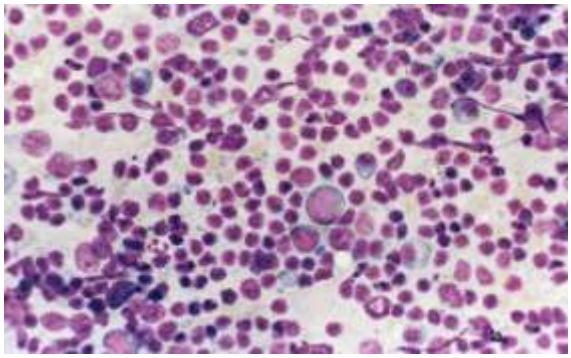

Figure 1: Microphotograph of reactive lymphadenitis showing mixed population of lymphoid cells.(400x)

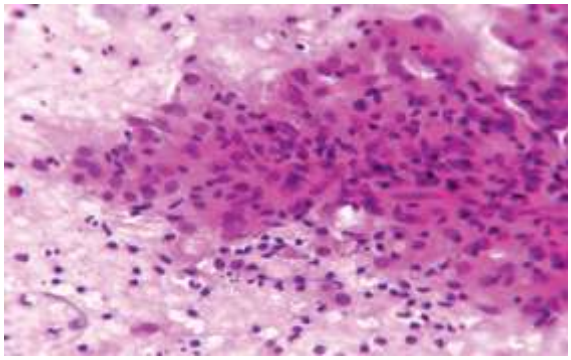

Figure 2: Microphotograph of tubercular epithelioid cell granuloma in the background of caseous necrosis.(400x)

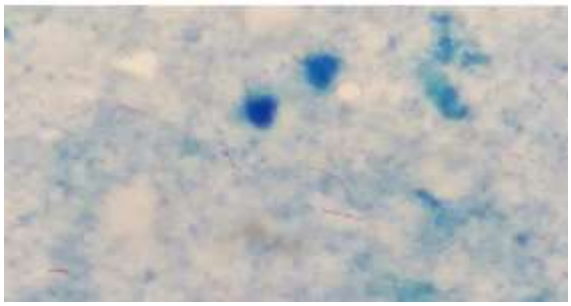

Figure 3: Microphotograph of Ziehl- Neelsen Stain showing gram negative acid fast bacilli.(100x)

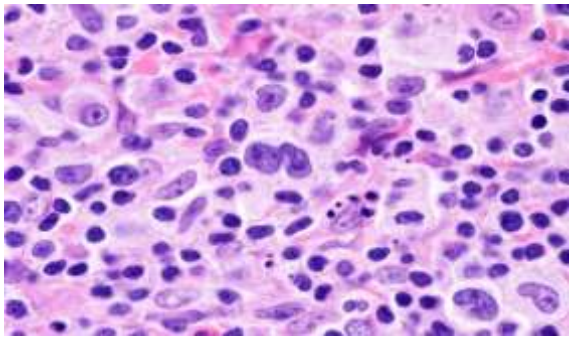

Figure 4: Microphotograph of Hodgkin's lymphoma showing RS cell-Cytology, high power view(400x)

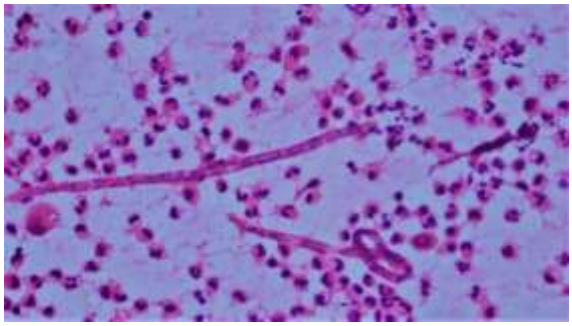

Figure 5: Microphotograph of microfilaria(H&E)- high power view(400x).

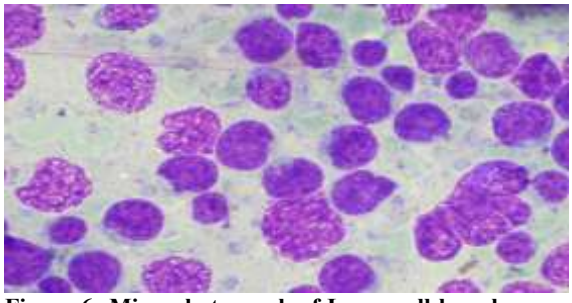

Figure 6: Microphotograph of Large cell lymphoma – high power view – (400x).

DISCUSSION

Lymph node aspiration is of great value in diagnosing lymphadenitis, lymphomas and metastatic carcinoma. The value of FNAC also lies in the early direction of appropriate investigations, other than making the diagnosis. However, limitations and draw backs of the procedure are there.

In developing countries like India, tuberculosis, acute upper respiratory tract infections and suppurative lymphadenitis are some of the common causes of lymphadenopathy. It has been stated that any significant lymph node enlargement not subsiding or remaining static in size for more than 2 weeks after conventional antibiotics need to be thoroughly investigated.

In this study, reactive lymphadenitis was the most common lesion, but in other studies the most common lesion recorded was tuberculosis. The next common lesion in the study was tuberculosis which was followed by metastatic malignancies in accordance with the study conducted by Malakaret al.[7] In many clinical settings, it is very difficult to decide which patient is more likely to have a reactive or neoplastic lymphadenopathy. Here, knowledge about the pattern of lymphadenopathy is helpful to the clinician for solving the dilemma.[8]

Lymph node lesions can be seen in patients ranging from very early to advanced age. In our study, the youngest patient with lymphadenopathy was 1 year and oldest was 78 years old with a mean age of 39 years. In our study, male preponderance was noted with a male to female ratio of 1.2:1.[9,10]

Cervical lymph nodes were the most common group of lymph nodes 78 cases (78%) involved which was similar to that observed by Hirachandet al., Khajuria et al., and Chandanwale et al.[11]

Out of the 100 cases studied, 83 were benign/ infectious and 17 cases were malignant. The most common cytological diagnosis was reactive hyperplasia (25%) in the present study. The criteria used to diagnose reactive hyperplasia was established included high cell density, polymorphic patterns of cells and considerate number of tangible bodies macrophages. Similar findings was observed by Lakley et al.[12,13]

However, A B Pandav et al,[14] and A K Kochhar et al,[15] found Tuberculous lymphadenitis as the most common cytological diagnosis. These variations maybe due to sample size, age of patients, place and duration of the study, local, genetic and environmental factors.

In our study, 22 cases of tuberculous lymphadenitis were subjected for ZN staining to confirm gram negative acid fast bacilli. 22 cases were positive for gram negative acid fast bacilli. Ng et al,[16] reported positivity in 41.6% cases. India is the country with the highest burden of tuberculosis 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. This could be the reason for the high number of TB lymphadenitis in the present study.[17]

12 cases of lymph nodes in our study showed malignant features after comparing with Histomorphological study. This is in correlation with the studies by Sharma R.I er al,[18] and Bhavani et al,[19] where metastatic deposits were seen in 10.4% cases and 9.5% respectively. Most of the metastatic deposits were from squamous cell carcinoma arising commonly in the tongue, alveolus, buccal mucosa, palate and from lung followed by adenocarcinoma. This high percentage of squamous cell carcinoma was probably because of very high number of people have a bad habit of tobacco chewing.[20]

Cytology of lymph nodes has become a window for diagnosis of many disease conditions. Optimal material and experience, when combined, make cytological diagnosis of equal significance as histopathology.[21] However, it is not a replacement for conventional surgical pathology but is complimentary to identify the pathology of the disease.

We had one case(1%) which presented with multiple swelling over the right inguinal region measuring 2 x 3cm, clinically diagnosed as great saphenous-femoral junction thrombophlebitis. On ultrasound examination showed right sapheno-femoral junction incompetence. FNAC was done for right inguinal swelling. Microscopy showed slender microfilarial worms along with eggs, sheets of neutrophils along with lymphocytes, many plasma cells, eosinophils and cyst macrophages.

Filariasis is a term for infection caused by any of the filarial worms; however, in daily practice, the term filariasis is indicative of lymphatic filariasis caused by Wuchereia or Brugia species. The vector used for transmission was the Culex mosquito. Microfilaria exhibit nocturnal periodicity in the peripheral blood.[22] Fine needle aspiration cytology can be a sensitive, cost-effective, and valuable tool for the detection of helminthic etiology in unexplained lymph node masses.[22,23]

CONCLUSION

Fine needle aspiration cytology of lymph nodes is an excellent first line investigation to determine the nature of lesion. Accuracy of FNAC is comparable with histopathology. It is quick, safe, minimally invasive and reliable and is readily accepted by the patient. It is useful tool in diagnosing both non-neoplastic and neoplastic lesions. ZN stain done in cases with granulomas, necrosis or suppuration is highly valuable for routine diagnosing of tuberculosis. It is an economical and convenient alternative to open biopsy of lymph nodes. With the introduction of FNAC, all the peripheral lymph nodes that are easily accessible can be assessed through a needle to arrive at the diagnosis.

The most frequent cases of lymphadenopathy are reactive lymphadenitis, tubercular lymphadenitis and

metastatic malignancies. FNAC alone can aid in establishing the diagnosis in large number of cases. In certain situations it can be enough for diagnosis in clinical setting to avoid surgical procedure like biopsy. FNAC used in conjunction with clinical findings, radiological and laboratory investigations can be cost effective method.

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