

A DESCRIPTIVE STUDY TO EVALUATE THE CYTOMORPHOLOGICAL SPECTRUM OF CERVICAL LYMPHADENOPATHY BY FINE NEEDLE ASPIRATION CYTOLOGY

Pathology

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ABSTRACT

Background: Cervical lymphadenopathy is one of the commonest clinical presentation of patients attending out patient department in India. It may be presented as an isolated in one particular one area of neck or as a part of generalised lymphadenopathy. To evaluate the lymph node enlargement and proceed with the treatment, it is important to examine the cause of the lymphadenopathy cytologically. Fine Needle Aspiration Cytology (FNAC) is a simple, quick, inexpensive and minimally invasive technique that can be used as an outpatient procedure to diagnose them. **1 Aims and objective:** To study the cytomorphological spectrum of enlarged cervical lymph nodes using Fine Needle Aspiration Cytology (FNAC). **Material and method:** Observational cross sectional study was conducted on 300 cervical lymphadenopathy cases in Department of Pathology, SMS Medical College and Attached Hospitals, Jaipur for a duration of 16 months from December 2023 to March 2025. **Results:** In our study of total 300 cervical lymphadenopathy, 134 (55.33%) cases were male and 166 (44.67%) were female. The study population range from 8 months old to 83 years. In the present study, benign 231 (77%) cases of cervical lymphadenopathy were more common as compare to malignant 69 (23%) cases of cervical lymphadenopathy. **Conclusion:** Our study concluded that Fine needle aspiration cytology examination is a rapid, cost-effective, and minimal invasive diagnostic tool for evaluation of cervical lymphadenopathy. FNAC for evaluation cervical lymphadenopathy serves as a valuable practical first-line tool in a developing country like India.

KEYWORDS

Cervical lymphadenopathy, fine needle aspiration cytology (FNAC)

INTRODUCTION

Lymph nodes are local circumscribed collections of lymphoreticular tissue invested by a fibrous capsule and located at anatomically generally invariable points along the course of lymphatic. Of the 800 lymph nodes in the human body, 300 are in the neck and they can be classified in different ways. Any abnormality in the size, consistency, and number of lymph nodes is defined as lymphadenopathy, which is caused by the invasion or propagation of either inflammatory or neoplastic cells into the lymph node.² Cervical lymphadenopathy is one of the commonest clinical presentation of patients attending out patient department in India.

It may be presented as an isolated in one particular one area of neck or as a part of generalised lymphadenopathy. According to its duration, cervical lymphadenopathy can be categorised into acute (2 weeks duration), subacute (4-6 weeks duration) and chronic lymphadenopathy (does not resolve by 6 weeks duration). The main etiology for lymphadenopathies are categorised and to make it easier to recall, some authors suggest acronyms like MIAMI (malignancies, infections, autoimmune, miscellaneous and iatrogenic). Cervical lymphadenopathy may occur when the draining nodes react to a nearby infection in the head and neck region including upper respiratory infection or when the infectious agent localizes in the node itself. The etiology varies from an inflammatory process to a malignant condition.³ Cervical lymph nodes are a common site of metastasis for various neoplastic lesions.

To evaluate the lymph node enlargement and proceed with the treatment, it is important to examine the cause of the lymphadenopathy cytologically. Before cytological interpretation, it is important to review the clinical information. In order to formulate a proper differential diagnosis, the following clinical features are needed: age, site (cervical/inguinal), lymph node size, presence of B symptoms (fever, weight loss, night sweating), previous medical history (primary or metastatic), infectious signs, autoimmune disease, and history of drug or chemical exposure.⁴ The management of these various lesions are very different and hence the determination of the etiology is of paramount importance. A quick, inexpensive and reliable investigative tool is therefore required. FNAC has emerged as a sensitive, specific, and cost-effective tool to diagnose cervical lymphadenopathy.⁵

Fine Needle Aspiration Cytology (FNAC) is a simple, quick, inexpensive and minimally invasive technique that can be used as an outpatient procedure to diagnose them.⁵ FNAC remain a valuable diagnostic tool and is a recommended first line investigations of suspected malignancy cases.⁶ The diagnosis of metastatic malignancy in lymph node cytology smear is highly reliable. According to the latest guidelines set by the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS), an open biopsy is only necessary if FNAC, core biopsy, physical examinations, and other ancillary test prove to be undiagnostic.⁷

MATERIALS AND METHODS:

An observational cross-sectional study was conducted in Department of Pathology, SMS Medical College and Attached Hospitals, Jaipur for a duration of 16 months from December 2023 to March 2025. A total of 300 patients with cervical lymphadenopathy were evaluated. After thorough examination of the enlarged cervical lymph node, fine needle aspiration were performed and prepared a minimum of 4 smears immediately. 2 smears are fixed in 95% methanol for H&E staining and the 2 air dry smears are stained with MGG. The cytomorphological features seen in the aspirated smears were examined and analysed. Aspirate from suspicious cases of tuberculosis were also applied with Ziehl-Neelsen staining.

RESULTS:

The present study comprised of FNAC of total 300 cases of cervical lymphadenopathy, 134 (55.33%) cases were male and 166 (44.67%) were female. The study population range from 8 months old to 83 years. The highest prevalence was 24% observed in individuals of aged 21-30 years age group. The maximum cases of cervical lymphadenopathy in female age group were in 11-20 years with 47 (15.6%) cases, and the least cases were seen in age group 80 and above with 2(0.67%) cases. Among male, highest cases were found in age group 21-30 years and 51-60 years with 23(7.6%) cases each and least cases were seen in age group 80 years and above with 1(0.33%) case.

Table 1: Distribution of all cases of cervical lymphadenopathy according to age

Age group	Number of cases	Percentage (%)
0-10	17	5.6
11-20	59	19.6
21-30	69	23
31-40	39	13
41-50	32	10
51-60	34	11
61-70	34	11
71-80	13	4
80 and above	3	1
Mean age	36.0 ± 20.2	

Out of total 300 cases of cervical lymphadenopathy, in male, there was predominance of cervical lymphadenopathy in left side with 63 (23.6%) cases, and in female, there was predominance in right side with 78 (29.2%) cases. Bilateral cervical lymphadenopathy were found with 2(0.75%) cases each in both male and female.

In the current study, out of total 300 cervical lymphadenopathy, 231(77%) cases were benign and 69 (23%) cases were malignant lesions. The most commonly found benign lesion was granulomatous lymphadenitis with 84 (28%) cases followed by Tubercular lesion with

73 (24.33%) cases, reactive lymphadenitis with 63 (21%), acute inflammatory lesion and acute suppurative lesion with 4 cases each and the least cases were found as non-specific inflammation with 3 (1%) cases. Out of 69 malignant lesions found in this study, metastatic squamous cell carcinoma with 29 cases (42.03%) was the most common followed by metastatic malignant epithelial neoplasm with 27 cases (39.13%), 7 cases (10.14%) cases of metastatic malignant neoplasm and lymphoproliferative neoplasm with 6 cases (8.70%) was the least common.

Among the most common presenting sign and symptoms, all (100%) patients presented with lymph node enlargement in both malignant and benign cases. 44 benign cases had fever while 5 malignant cases had fever. Loss of weight is one of the common complaints among the patients with 34 cases of benign and 14 malignant cases.

Table 2 : Distribution of various cervical lymph node lesions on cytology

Cytomorphological findings	Number of cases	Percentage (%)
Reactive lymphadenitis	63	21
Granulomatous lymphadenitis	84	28
Tubercular	73	24.33
Acute inflammatory lesion	4	1.33
Acute suppurative	4	1.33
Non specific inflammation	3	1
Metastatic malignant epithelial neoplasm	27	9
Metastatic squamous cell carcinoma	29	9.66
Metastatic malignant neoplasm	7	2.33
Lymphoproliferative neoplasm	6	2
Total	300	100

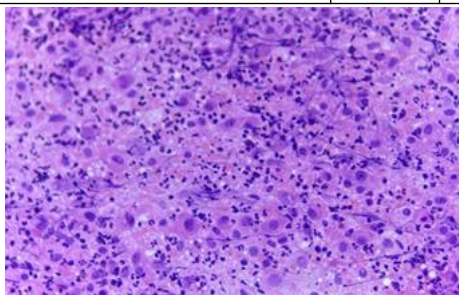


Figure 1 (H&E x 400) Non specific inflammatory pathology : Photomicrograph of cytosmear showing few lymphoid cells and mixed inflammatory cell infiltrate including macrophages.

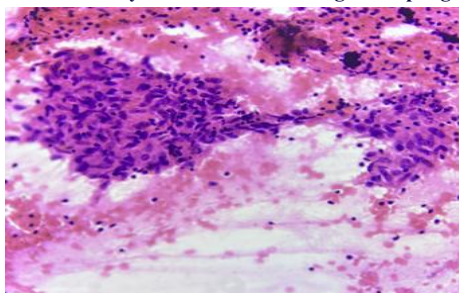


Figure 2 (H&E x 400) Tubercular Lymphadenitis : Photomicrograph of cytosmear showing epithelioid cell granuloma in a necro-inflammatory background.

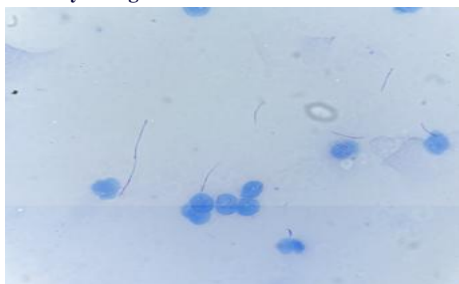


Figure 3; Oil immersion (AFB-T): Photomicrograph of cytosmear showing acid fast bacilli in tuberculosis.

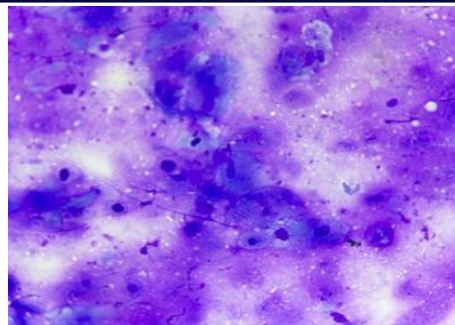


Figure 4 (MGG x 400) Metastatic squamous cell carcinoma : Photomicrograph of cytosmear showing metastatic deposits of poorly differentiated squamous cell carcinoma.

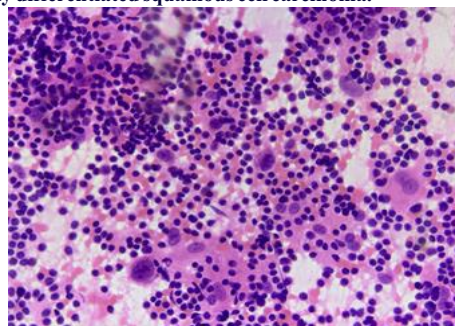


Figure 5 (H&E x 400) Lymphoproliferative neoplasm : Photomicrograph of cytosmear showing scattered lymphoid cells having folded nuclear membrane, nuclear indentation and prominent nucleoli. Few cells showed binucleation.

DISCUSSION:

Cervical lymphadenopathy is a symptom that is frequently seen among outpatients, and it is important to differentiate benign lesions from malignant lesions. Cervical lymph nodes are the group of lymph nodes with most common and main target areas of metastasis for carcinoma around head and neck. FNAC is a valuable diagnostic tool for establishing a diagnosis in cases of lymphadenopathy. The use of this technique has revolutionized the diagnosis of lymphadenopathy, limited the need for excision of enlarged lymph nodes, especially in cases of reactive and tubercular lymphadenitis in a developing country like India with limited financial and health care resources.

In our study of 300 cases of cervical lymphadenopathy, various cytomorphological features were studied. According to age group among which we recorded the age group with the highest incidence of cervical lymphadenopathy, the maximum incidence of cervical lymphadenopathy was 69 (24 %) cases seen in age-group 21–30 years almost similar to study conducted by Vimal et al²⁰¹⁶ who found 24.06% cases in the age group 20-30 years. This early-adult clustering is mainly of benign etiology. Individual in this age group are the most actively involved in day-to-day activity with lots of social interaction and hence, higher chances of exposure to the causative agents. At this age group, the immune system is very robust, so lymph nodes readily undergo reactive hyperplasia to minor antigen or infections.

Out of 300 cases, 134 (55.33%) cases were male and 166 (44.67%) were female. Gender distribution was slightly female-skewed (M : F = 0.8 : 1). Our study is comparable to the study conducted by Patel D et al²⁰²¹ who found male 80 cases and female 120 cases. In contrast, few studies where male had higher incidence than female. Higher female incidence in our study may be due to low immunity among the Indian females, particularly those belong to low socio-economic status and those in the reproductive age group.

Cervical lymphadenopathy were presented in various levels of neck and hence aspiration was done according to the level of neck. Left-level II nodes accounted for 16.7 % of all swellings, marginally over-taking right-level II which is 16.3 %. Level II cervical lymph nodes are most common site of lymph node enlargement as they receive lymphatic drainage from a large number of region in the head and neck, including the oral cavity, oropharynx, nasal cavity, paranasal sinus etc,. This makes them the primary drainage site for many infections, inflammatory

conditions and malignancies of the upper aerodigestive tract.

Cytology resolved 231 cases (77%) as benign and 69 (23%) as malignant lesions, which is in accordance to the study conducted by Magasi et al.¹⁰ 2013 who found 120 (85.7%) cases as benign and 12 (14.2%) cases as malignant and Losari et al¹¹ 2022 who found 53(88.3%) cases as benign and 7(11.66%) cases as malignant. Some other studies yielded more malignancy cases and this difference may be because our institute being a general hospital serving a diverse population where infectious aetiology is predominant.

In our study, out of 300 cases 231 (77%) cases yielded as benign lesions. Benign pathologies in our studies were granulomatous lymphadenitis (28%) constituted the single largest benign category, followed by tubercular lymphadenitis (24.3%), reactive lymph node (21%), acute suppurative lesion (4%), acute inflammatory lesion (4%) and non-specific inflammation (3%). High incidence of granulomatous lesion and tubercular lesions among the study population in our study was due to low socio-economic status, less awareness to prevent the contamination, close contact with the family members already having tuberculosis and low hygiene.

The predominance of cervical nodal involvement in tuberculosis has been established by many studies conducted by Kumar H et al¹² 2019 who found 102 (47.67%) cases as tubercular lymphadenitis, Shilpa G et al¹³ 2013 who found out 457 (48.5%) cases as tubercular lymphadenitis and Losari et al¹¹ 2022 who found 42 (63.63%) cases as tubercular lymphadenitis.

In our study, tubercular lymphadenitis were diagnosed along with the routinely employ special stain Ziehl-Neelsen for cervical lymphadenopathy with suspicion for tuberculosis. Only the cervical lesion with ZN stain positive were given tubercular lymphadenitis. If epithelioid granulomas were detected, but no caseation necrosis or AFB were seen, a diagnosis of granulomatous lymphadenitis was offered. Tuberculous lymphadenopathy is the commonest manifestation of extrapulmonary tuberculosis where cervical groups of lymph nodes are most frequently involved. Tuberculosis once thought to be under control has undergone a dramatic resurgence in the number of cases due to complacency and growing number of drug resistant strains.

In this study, 69 (23%) yielded as malignancy. Compare to benign cervical lymphadenopathy, majority of the malignant nodes surfaced after 50 years. The most common age group affected by malignancy in the present study was 61-70 years (6.67%), comparable to findings of studies conducted by Meena P et al¹⁴ 2013 and Mehdi G et al¹⁵ 2015 who found 12% and 24% respectively. Decline immunity and higher chances of prolonged exposure to carcinogens over the years may be the main reason behind the higher incidence of malignancies in older age group.

Among the 69 malignant nodes, 52 cases were metastatic and 6 cases were lymphoproliferative neoplasm. The most common metastatic cytological diagnosis in the present study was metastasis of squamous cell carcinoma, reported in 29 (42.03%) cases, which was comparable to findings in other studies conducted by Shah MG et al,¹⁶ who also found metastatic squamous cell carcinoma as the most common metastasis with 82% cases. In contrast, the study conducted by Arundhati et al¹⁷ 2012 showed 44% cases of metastatic adenocarcinoma as the highest incidence malignancy.

The diagnosis metastatic malignant epithelial neoplasm was given for those cases in which morphology were not definitive to categorize in a specific group of neoplasm but are sure of a metastatic malignant epithelial neoplasm. In Indian male population, there is widespread use of tobacco and cigarettes which is a risk factor for cancer and the primary reason behind higher frequency of cancer in male population.

Among the known primary cases, the oral cavity was the most common primary site of malignancy in the present study, and similar findings were noted by the other authors Wilkinson AR et al, Gupta C et al.^{18,19} In present study, males were predominantly affected by malignancies with 51 cases (17%), compared to females with 18 cases (6%), resulting in a male-to-female ratio of 2.8:1. A male preponderance was also noted by Rathod G and Singla D (3.2:1), and Mehdi G et al., (3.1:1).^{20,15}

CONCLUSIONS

Fine needle aspiration cytology examination is a rapid, cost-effective,

and minimal invasive diagnostic tool for evaluation of cervical lymphadenopathy. It provides high diagnostic accuracy in distinguishing between reactive, infectious, granulomatous lymphadenitis, neoplastic, and metastatic lymph node lesions thereby guiding timely and appropriate clinical management. FNAC reduces the need for more invasive surgical biopsies, minimizing patient's discomfort and facilitates early detection of malignancies, improving patient outcomes. Also, FNAC helps in tracing occult malignancy/primaries when the lesion is clinically or radiologically not identified and is least suspected for a malignancy. However, correlation with clinical features, radiological findings and where necessary, histopathological confirmation remains essential for definite diagnosis and further categorization for malignancies like lymphoma. In this study, FNAC demonstrated its strength as a frontline diagnostic technique, enabling prompt initiation of appropriate treatment and thereby reducing patient mobility. Overall, FNAC for evaluation cervical lymphadenopathy serves as a valuable practical first-line tool in a developing country like India.

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