Original Research Article

Study of fine needle aspiration cytology of lymphadenopathy in tertiary care centre of Ahmedabad, Gujarat

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Abstract

Introduction: Lymph nodes are a site for organized collections of lympho-reticular tissue and are pink gray bean shaped encapsulated organs. Lymphadenopathy is one of the most common clinical presentations of patients attending the outpatient department. Lymph nodes are among the commonly aspirated organs for diagnostic purposes. Fine-needle aspiration cytology (FNAC) is a clinical technique used to obtain cells, tissues and/or fluid through a thin needle attached with disposable syringe for the purpose of diagnosis of masses. **Aims and Objectives:** The aims of this study is to find out the frequency of lymphadenopathy, etiological factors and cyto-morphologial features in different age groups and incidence of various lymph node diseases on fine-needle aspiration cytology (FNAC) and to analyze the utility and diagnostic importance of FNAC in lymph node diseases. **Materials and Methods:** The present study was carried out in Department of Pathology at GMERS Medical College, Sola-Ahmedabad, Gujarat a Tertiary Care Centre. A total of 268 patients of all age groups underwent FNAC of enlarged lymph nodes during this study period. **Results:** Tuberculous lymphadenitis was recorded as the most common presentation of lymphadenopathy in the cervical region. Male to female ratio is 1:1.13. Most common causes of lymphadenopathy in 11-40 years age group was tubercular lymphadenitis and metastatic carcinoma in patients >50 years of age. **Conclusion:** FNAC of lymph nodes is an excellent first line investigation to determine the nature of lesion. It is quick, safe, minimally invasive, and reliable and is readily accepted by the patient.

Keywords: Fine needle aspiration cytology (FNAC), Lymph node, lymphadenopathy, tuberculous lymphadenitis

Introduction

Medicine is an ever-changing science and the past few decades have witnessed dramatic advances in every sphere. Despite rapid advances and the advent of newer methods of diagnostic imaging, an important determinant of patient management rests on tissue diagnosis. Aspiration of lymph nodes for diagnostic purposes was first done by Griey and Gray in 1904, in patients with sleeping sickness [1]. Lymph nodes are among the commonly aspirated organs for diagnostic purposes [2]. In 1927, Dudgeon and Patrick were the first to use FNAC in diagnosing tuberculous lymphadenitis [3]. Lymph nodes are a site for organized collections of lympho-reticular tissue and are pink gray bean shaped encapsulated organs. They are located at anatomically constant points along the course of lymphatic vessels. The common sites of distribution are cervical, axillary, mediastinal, retroperitoneal, iliac, and inguinal regions.

Fine-needle aspiration cytology (FNAC) is a clinical technique used to obtain cells, tissues and/or fluid through a thin needle attached with disposable syringe for the purpose of diagnosis of masses [4]. De May has summarized the advantages of FNAC with the acronym SAFE means Simple, Accurate, Fast and Economical [5]. The diagnostic yield of FNAC can be improved if it is accompanied by radiological guidance like ultra-sonography and computed tomography scan [6].

Lymphadenopathy is one of the most common clinical presentations of patients attending the outpatient department. Thus, lymphadenopathy may be an incidental finding and/or primary or secondary

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manifestation of underlying diseases which may be neoplastic or non-neoplastic [7]. Lymph node aspiration is of great value in diagnosing lymphadenitis, lymphomas, and metastatic carcinoma [8]. In 1847, Kun had done the pioneering act of first time reporting the use of aspiration biopsy.

Since then fine needle aspiration cytology (FNAC) has been a rapid, simple, safe, reliable minimally invasive and inexpensive method of establishing the diagnosis of lesions and masses in various sites and organs and is the most convenient bedside diagnostic aid [9,10,11,12,13].

Draw backs of FNAC also exist like sampling error in form of improper technique,micro metastasis, benign epithelial inclusions, partial lymphnode involvement by lesion and a very small lymph node where sampling is difficult, also a high incidence of false results [8].

Aims and Objectives

The aims of this study are:

1. To evaluate the role of FNAC in patients presenting with lymph node enlargement.

2. To find out the frequency of lymphadenopathy in different age groups.

3. To find out the etiological factors causing lymphadenopathy in different age groups.

4. To assess the cytomorphological features and incidence of various lymph node diseases on fine-needle aspiration cytology (FNAC)

5. To analyze the utility and diagnostic importance of FNAC in lymph node diseases.

Materials and Methods

Type of study: Retrospective study

Place of Study: This retrospective study was carried out in Department of Pathology at GMERS Medical College, Sola-Ahmedabad, Gujarat a Tertiary Care Centre for the period of two years from January 2016 to December 2017 was taken up for our study. A total of 268 patients of all age groups underwent FNAC of enlarged lymph nodes during this study period.

Inclusion criteria: All patients presenting with lymph node enlargement were included in the study.

Exclusion criteria: Those patients with aspirated material was either inadequate orsmears were unsatisfactory for evaluation and known case of malignancy were excluded from this study.

Sample collection and method: After obtaining the Ethical Committee Clearance from our institution and informed consent from the patients, FNAC was performed using a 22–24 gauge needle and 10 ml syringe. Two of the prepared smears were fixed in alcohol and stained with hematoxylin and eosin and Papanicolaou stain.

Two smears were air dried, one was stained with Leishman stain and the other kept unstained to be used for Ziehl–Neelsen (ZN) staining whenever a cytological diagnosis of granulomatous disease was made and also in cases with abundant necrosis and suppuration. In cases where fluid was aspirated, the fluid was centrifuged and smears were made from the sediment, followed by the above staining methods.

After studying all the clinical data, the smears were examined under the microscope. Based on the cellularity, the smears were categorized as of high, moderate, and low cellularity. The smears, which were hemorrhagic or with scanty cellularity to the extent that diagnosis could not be offered were labeled as inadequate for opinion.

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 [14].

Results

In this retrospective study which was carried out at GMERS Medical College, Sola-Ahmedabad, Gujarat during the period of two years from January 2016 to December 2017, total of 268 patients of all age groups were underwent FNAC for enlarged lymph nodes.

Table: 1 shows the cytomorphological diagnosis in 268 patients with lymphadenopathy. Most common lesion found in our study was tubercular lymphadenitis in 146 cases (54.5%), followed by granulomatous lymphadenitis in 45 cases (16.8%) and metastatic carcinoma in 28 cases (10.4%).

Table:1 Distribution of cytomorphological diagnosis of lyumphadenopathy.

Sr. No.	Cytological Diagnosis	No. of Cases		Total (%)
		Male (%)	Female (%)	
1.	Tuberculous Lymphadenitis	61 (41.8)	85 (58.2)	146 (54.5)
2.	Reactive Hyperplasia	12 (57.1)	09 (42.9)	21 (7.8)
3.	Granulomatous Lymphadenitis	18 (40.0)	27 (60.0)	45 (16.8)
4.	Metastatic Carcinoma	17 (60.7)	11 (39.3)	28 (10.4)
5.	Hodgkin's Lymphoma	02 (100.0)	-	02 (0.8)
6.	Non-Hodgkin's Lymphoma	03 (75.0)	01 (25.0)	04 (1.5)
7.	Acute Suppurative Lymphadenitis	13 (61.9)	08 (38.1)	21 (7.8)
8.	Others (Fungal Infection)	-	01 (100.0)	01 (0.4)
9.	Total	126 (47.0)	142 (53.0)	268 (100.0)

Table: 2 shows the age and sex distribution of the patients with lymphadenopathy. Age of the patients ranged from 2 to 78 years. The youngest patient was diagnosed as tubercular lymphadenitis, and the oldest patient was diagnosed as having metastatic squamous cell carcinoma. Out of total 268 cases, majority of the patients were in the age group of 11–40 years, with a peak (91 patients, 34.0%) in the age group 21–30 years, followed by 62 patients (23.1%) in the age group of 31-40 years and 40 patients (14.9%) in the age group of 11-20 years. Out of total 268 patients, there were 126 male (47.0%) and 142 female (53.0%) patients, with a male to female ratio of 1:1.13.

Table: 2 Age and Sex wise Distribution of lyumphadenopathy.

Age Group (in Years)	No. of Males (%)	No. of Females (%)	Total (%)
< 10	05 (1.9)	04 (1.5)	09 (3.4)
11-20	17 (6.3)	23 (8.6)	40 (14.9)
21-30	41 (15.3)	50 (18.7)	91 (34.0)
31-40	30 (11.2)	32 (11.9)	62 (23.1)
41-50	14 (5.2)	13 (4.9)	27 (10.1)
51-60	09 (3.3)	09 (3.3)	18 (6.7)
>60	10 (3.7)	11 (4.1)	21 (7.8)
Total	126 (47.0)	142 (53.0)	268 (100.0)

Table 3 shows the site wise lymph node groups involved in various types of lymphadenopathy. It has been found that out of total 268 patients, the most common lymph nodes group involved in various types of lymphadenopathy were the cervical group having 168 patients (62.7%) followed by axillary group having 46 patients (17.2%) and supraclavicular group having 36 patients (13.4%). Out of total 168 patients of cervical lymphadenopathy, most common finding was of tuberculous lymphadenitis in 119 patients (70.8%). In 46 patients of axillary lymphadenopathy, most common finding was of granulomatous lymphadenitis in 18 patients (39.1%). In 36 patients of supraclavicular lymphadenopathy, most common finding was of tuberculouslymphadenitis

Table: 3 Site wise Lymphnode group involved in various lyumphadenopathy.

Cytomorphological Diagnosis	Cervical	Axillary	Supra-clavicular	Inguinal	Generalised	Total (%)
Tuberculous Lymphadenitis	119	05	12	02	08	146 (54.5)
Reactive Hyperplasia	09	07	03	-	02	21 (7.8)
Granulomatous Lymphadenitis	14	18	12	01	-	45 (16.8)
Metastatic Carcinoma	12	09	05	02	-	28 (10.4)
Hodgkin's Lymphoma	01	-	01	-	-	02 (0.8)
Non-Hodgkin's Lymphoma	02	-	-	01	01	04 (1.5)
Acute Suppurative Lymphadenitis	11	06	03	01	-	21 (7.8)
Others	-	01	-	-	-	01 (0.4)
Total	168 (62.7)	46 (17.2)	36 (13.4)	07 (2.6)	11 (4.1)	268 (100.0)

Table 4 and 5 shows age wise distribution of lymphnode group and cytomorphological lesion. In all the age groups, most of the patients were presented with tuberculous lymphadenitis in cervical group. Metastatic carcinoma was more common in age group of more than 51 years and above and majority of the patients were male. Highest peak incidence was reported in more than 60 years of age group followed by 51-60 years age group.

Table: 4 Age, Sex and Site wise distribution of patients of lymphadenopathy.

Age Group	Sex	Cervical	Axillary	Supra-clavicular	Inguinal	General	Total	Total (M+F)
< 10	Male	03	01	-	01	-	05	09 (3.4%)
	Female	02	01	01	-	-	04	
11-20	Male	08	03	05	-	01	17	40 (14.9%)
	Female	12	05	03	01	02	23	
21-30	Male	30	08	02	-	01	41	91 (34.0%)
	Female	36	07	05	01	01	50	
31-40	Male	16	06	05	01	02	30	62 (23.1%)
	Female	22	04	04	01	01	32	
41-50	Male	09	02	02	01	-	14	27 (10.1%)
	Female	09	02	01	-	01	13	
51-60	Male	04	02	03	-	-	09	18 (6.7%)
	Female	05	01	02	-	01	09	
>60	Male	06	02	01	-	01	10	21 (7.8%)
	Female	06	02	02	01	-	11	
Total		168 (62.7%)	46 (17.2%)	36 (13.4%)	07 (2.6%)	11 (4.1%)	268 (100.0%)	268 (100.0%)

Table: 5 Age and Sex wise distribution of cytomorphological pattern of diagnosis.

Age Group	Sex	Tuber-culous	Reactive	Granulo-matous	Metastatic	Hodgkin's	Non-Hodgkin's	Acute Suppurative	Others	Total
< 10	Male	02	01	01	-	-	-	01	-	05
	Female	03	-	01	-	-	-	-	-	04
11-20	Male	09	01	02	-	01	-	04	-	17
	Female	13	02	05	-	-	-	03	-	23
21-30	Male	25	02	05	02	01	-	06	-	41
	Female	37	02	07	-	-	-	03	01	50
31-40	Male	17	04	06	01	-	-	02	-	30
	Female	21	02	09	-	-	-	-	-	32
41-50	Male	05	02	02	04	-	01	-	-	14
	Female	07	01	02	02	-	-	01	-	13
51-60	Male	02	-	01	05	-	01	-	-	09
	Female	02	02	02	03	-	-	-	-	09
>60	Male	01	02	01	05	-	01	-		10
	Female	02	-	01	06	-	01	01	-	11
Total Male		61	12	18	17	02	03	13	00	126
Total Female		85	09	27	11	00	01	08	01	142
Total (M+F)		146 (54.5%)	21 (7.8%)	45 (16.8%)	28 (10.4%)	02 (0.8%)	04 (1.5%)	21 (7.8%)	01 (0.4%)	268 (100.0%)

Discussion

In the present study, an attempt has been made to study the cytomorphological spectrum and epidemiological pattern of lymph node lesions. Adequate material was obtained in all 100% cases which correlated with the study by Hemalatha et al (98%) and Gupta et al (85.2%) and Budge SA et al (98.4%)[15,16,17]. In the present study, aspirates were benign in 87.3% cases; metastatic deposits were foundin 10.4% and lymphomas in 2.3%.

Similar findings werealso obtained by Budge SA et al, (LN-1) Gupta AK et al, Patra AK et al and Raghuveer CV et al [12,18,19]. In our study, the majority of the patients were in the age group of 21–40 years. This was correlated with the study by Budge SA et al and Chandanwale et al, where maximum numbers of cases were seen in the age group of 21–40 years [17,20]. Cervical lymph nodes were the most common group of lymph nodes involved was found in 168 cases (62.7%).

Similar results were observed by Hirachand et al, Budge SA et al, Chandanwale et al and Khajuria et al[14,17,20,21]. Tuberculous lymphadenitis was the most common lesion and was reported in 146 cases (54.5%) out of total 268 cases. This correlated with the study by Budge SA et al (48.7%) and Khajuria et al. (52.3%)[17,21]. 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. This could be the reason for the high number of TB lymphadenitis in the present study [22].

In present study, it was seen more frequently in the third and fourth decades of life with a female preponderance (male: female = 1:1.13). Cervical lymph nodes were most commonly involved by tuberculosis (70.8%), followed by axillary group (10%). Similar observations were made in the study by Budge SA et al and Khajuria et al [17,21]. Out of total 146 cases of tuberculous lymphadenitis, ZN staining for AFB was positive in 59 cases (40.4%) in our study. Ng et alreported positivity in 41.6% cases and Ahmed et al in 46% cases [23,24]. In our study, necrosis alone was seen in 11 cases and all 11 cases were positive for AFB. Granulomatous lymphadenitis was seen in 45 cases (16.8%). Majority ofthe patients were between 21-40 years. Similar age distribution was found by Hemalatha et al and Ng et al[15,23].In present study, reactive lymphadenopathy was in 21 (7.8%) cases. This is similar to the study by Budge SA et al (8.06%), Khan et al(28%) and Javed et al (16.66%)[17,25,26].

Lymph node aspirates in 28 cases (10.4%) showed metastatic deposits. This is in correlation with the studies by Patel et al, Ghartimagar et al and Bhavani et al where metastatic deposits were seen in 27.06%, 18% cases and 9.5% respectively [27,28,29]. 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 [30]. Similar to most of the recently published studies, our series also noted that SCC was most common metastasis in the cervical lymph nodes followed by adenocarcinoma [29,31]. The application of FNAC in the diagnosis of lymphoma isstill controversial, particularly in cases of low-grade NHL.In this study, a total of six cases (2.3%) of lymphoma were diagnosed out of which four cases (1.5%) were of Non Hodgkin's lymphoma and two case (0.8%) were of Hodgkin's lymphoma. Similar results were found by Vimal S et al (2.67%), Arul P et al (3.0%) and Bhavani et al(1.2%) [8,22,29]. Age of the patient and polymorphous population of cells and atypical cells should raise a suspicion of Hodgkin's lymphoma. Inadequate samples and fibrosed nodes in advanced disease may be the cause of lack of Reed–Sternberg cells. Entities that can be diagnosed definitely on FNAC include high-grade lymphomas such as small no cleaved lymphoma, lymphoblastic lymphoma, immunoblastic lymphomas, Hodgkin's lymphoma, diffuse large B-cell lymphoma, and myeloblastic and lympho-blastic leukemia/ lymphoma.

FNAC plays a greater role in the management of Hodgkin's disease as compared to NHLas it helps in the primary diagnosis, staging of the patient and monitoring the recurrence of the disease. Suboptimal cytologic preparations, variable pattern in one node, distinction from reactive lymph node and limitations of the FNAC procedure like aspirates can only be taken from thefocal area in the lymph node are some of the shortcomings which make the diagnosis of NHL difficult. With the helpof flow cytometry and immunohistochemistry in adjunctto FNAC the diagnosis of NHL can be made much easier.

Conclusion

FNAC of lymph nodes is an excellent first line investigation to determine the nature of lesion. It is quick, safe, minimally invasive, and reliable and is readily accepted by the patient. It is an economical and convenient alternative to open biopsy of lymph nodes. Our study concluded that FNAC in the diagnosis of cervical lymphadenopathy was sensitive, specific, and accurate. In the current study, tuberculous lymphadenitis was recorded as the most common presentation of lymphadenopathy in the cervical region. This study also highlights the usefulness of FNAC as are liable method of investigation for lymphadenopathy. Most common causes oflymphadenopathy in 11-40 years age group was tubercular lymphadenitis and metastatic carcinoma in patients >50 years of age. In present study, male to female ratio is 1:1.13. In present study, the most commonly involved group in various types of lymphadenopathy was the cervical group.

Importance of this study: FNAC is the most reliable, safe and cost effective technique in diagnosis of any lymphadenopathy. Cytological diagnosis by Fine Needle Aspiration Cytology must be undertaken before excision biopsy. Majority of the diagnosis can be done by cytology.

Author contribution: First author Dr. Renu Sharma has prepared the study design and drafted manuscript in presentable manner for publication in journal. Second and corresponding author Dr. Chetan Dharaiya has collected all data and done study in his own institute.

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