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Fine Needle Aspiration Cytology of Lymph Nodes- An Analysis of 893 Cases

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Abstract
Objectives: *The present study was undertaken to establish the etiologic diagnosis of enlarged lymph nodes and to classify the spectrum of diseases causing lymphadenopathy by Fine needle aspiration cytology.*
Methods: *The study was carried out over a period of 4 years. Fine needle aspiration cytology was performed in 893 patients presenting with lymphadenopathy. Patients included in the present study were in the age group of 9 months to 80 years.*
Results: *There were 482 males and 411 females. Maximum number of cases were in the age range of 21-40 years. The most common site of enlarged lymph nodes was cervical group of lymph nodes. Tuberculous lymphadenitis was seen as most common inflammatory disease followed by reactive and acute lymphadenitis. In neoplastic diseases, metastatic tumors in head and neck region were most common followed by lymphomas. 65 patients were HIV positive. In these patients, enlarged lymph nodes were mostly secondary to tuberculosis. Histopathology and cytology correlation was available in only 30 cases. One case of non-specific lymphadenitis was over-diagnosed as non-hodgkin lymphoma on cytology. The accuracy rate was 100% in tuberculous lymphadenitis, non-hodgkin lymphoma and metastatic squamous cell carcinomas.*
Conclusions: *Thus Fine needle aspiration cytology of lymph nodes as a first line of investigation is a cost-effective procedure and is not only useful in the diagnosis of various lesions but can also help in deciding on appropriate management.*
Keywords: *Fine needle aspiration cytology, Tuberculous lymphadenitis, Metastatic tumors, Lymphoma.*

Introduction

Lymph nodes are enlarged in various diseases comprising of inflammatory, neoplastic and other causes. In most circumstances, etiology of enlarged lymph nodes can be confirmed by Fine needle aspiration cytology. Fine needle aspiration cytology is a simple, rapid, inexpensive, cost-effective and safe procedure. It is equally reliable and can be used as a routine OPD procedure in the etiologic diagnosis of lymphadenopathy[1]. In many cases, FNAC reduces the need of surgical biopsy and also helps the clinician in formulating the further line of treatment. The present study is undertaken to evaluate the usefulness of fine-needle aspiration cytology (FNAC) as a diagnostic tool in cases of lymphadenopathy, to find the

frequency & cause of lymph node enlargement in patients of different age groups and analyze the different cytomorphological patterns associated with various lymphadenopathies.

Material and Methods

In the present study, 893 patients who underwent fine needle aspiration procedure of the lymph nodes were analysed over a period of 4 years. All the cases, irrespective of age, sex and presenting symptoms, were subjected to fine needle aspiration cytology. In each instance, a brief history and physical examination along with evaluation of relevant investigations, if available, was carried out. Aspiration was done as an OPD procedure using a 22-gauge needle with standard precautions. Four to five smears were obtained by using multiple passes. Both air dried and alcohol-fixed smears were prepared. Smears obtained were stained with Hematoxylin and eosin stain (H&E), May Grunwald-Giemsa stain (MGG) and Papanicolaou stain (PAP). Special stains used were Zeil-Neelson (ZN) stain for acid fast bacilli (AFB) and periodic acid-Schiff stain (PAS) for fungi.

Results

Out of 893 patients with palpable lymphadenopathy, in 24 cases samples were inadequate for opinion due to unsatisfactory smears.

Table 1: Age and Sex distribution of cases

Age group (yrs)	No.of cases			Percentage
	Male	Female	Total	
0-10	46	30	76	8.51
11-20	49	59	108	12.09
21-30	**79**	**127**	**206**	**23.08**
31-40	**94**	**80**	**174**	**19.48**
41-50	66	49	115	12.88
51-60	53	30	83	9.29
61-70	69	27	96	10.75
71-80	**26**	**9**	**35**	**3.92**
Total	**482**	**411**	**893**	**100**

The maximum number of cases (42.5%) were in the age group of 21-40 yrs, while the minimum number of cases were in the age group of 71-80 yrs in the study group. The youngest patient was 9 month old male while oldest patient was 80 yrs old male. The male to female ratio was 1.2:1 as shown above in Table-1.

Table 2: Site distribution of cases

Site of FNAC of lymph node	Total	%
Cervical	751	84.10
Axillary	84	9.40
Inguinal	40	4.48
Generalised	18	2.02
Total	893	100

The most common site of enlarged lymph nodes was cervical lymph nodes followed by axillary, inguinal and generalized lymphadenopathy as shown in Table-2.

Table 3: Distribution of various lesions on FNAC

Sr No.	Cytologic diagnosis	No. of cases	%
I	**Inflammatory diseases**		
a)	Tuberculous lymphadenitis	371	41.55
b)	Reactive lymphadenitis	208	23.29
c)	Acute lymphadenitis	33	3.69
II	**Neoplastic diseases**		
a)	Metastatic tumours	222	24.86
b)	Lymphoma	28	3.14
c)	Positive for malignant cells	7	0.8
III	**Inadequate for opinion**	**24**	**2.69**
	Total	893	100

The spectrum of diseases (Table -3) showed that most common finding was inflammatory disease (68.5%) identified in 612 cases while in 257 cases (28.7%) neoplastic diseases were noted. Tuberculous lymphadenitis was seen as most common inflammatory disease followed by non-specific or reactive and acute lymphadenitis. In neoplastic diseases, metastatic tumors were most common followed by lymphomas (Hodgkin's disease 1 case and Non Hodgkin lymphoma in 27 cases).

Reactive lymphadenitis was seen most often seen in first two decades of life [95 cases(45.4%)], tuberculous lymphadenitis in the third & fourth decades [240 cases (64.7%)], 42% acute lymphadenitis in the first & third decades, 49% metastatic tumors in sixth & seventh decade and 39% lymphomas in the seventh & eighth decade.

Males showed preponderance of non-specific lymphadenitis, acute lymphadenitis, metastatic tumors and lymphomas while tuberculous lymphadenitis showed female preponderance.

A diagnosis of tuberculous lymphadenitis was made when smears showed (i) epithelioid cell granulomas (Fig. 1) with or without caseous necrosis (Fig. 2) (ii) necrotic material only but positive ZN staining for AFB (Fig. 3), (iii) necrotic material, negative AFB staining but positive culture for AFB[2].

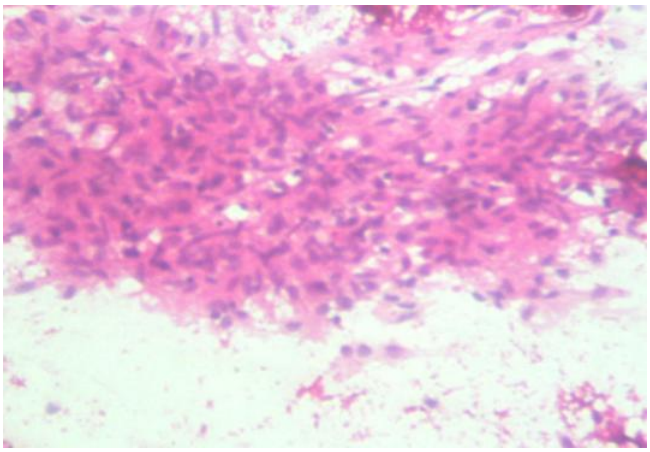

Figure 1. Tuberculous lymphadenitis showing granulomas (H & E x 10)

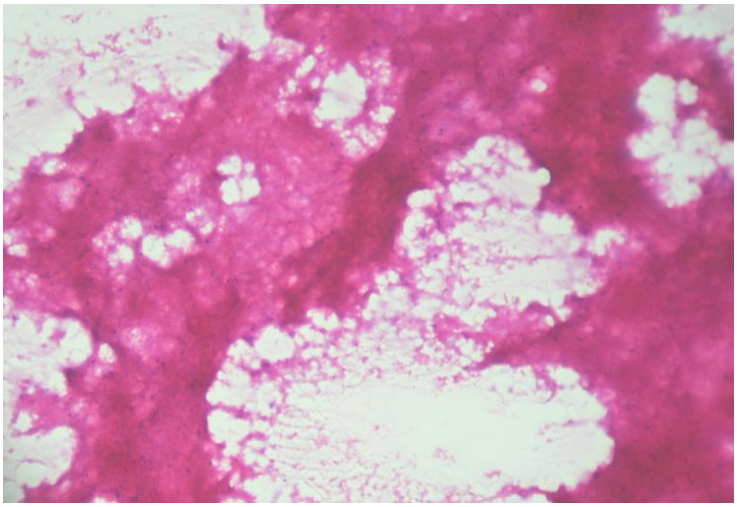

Figure 2. Tuberculous lymphadenitis showing caseous necrosis (H & E x 10)

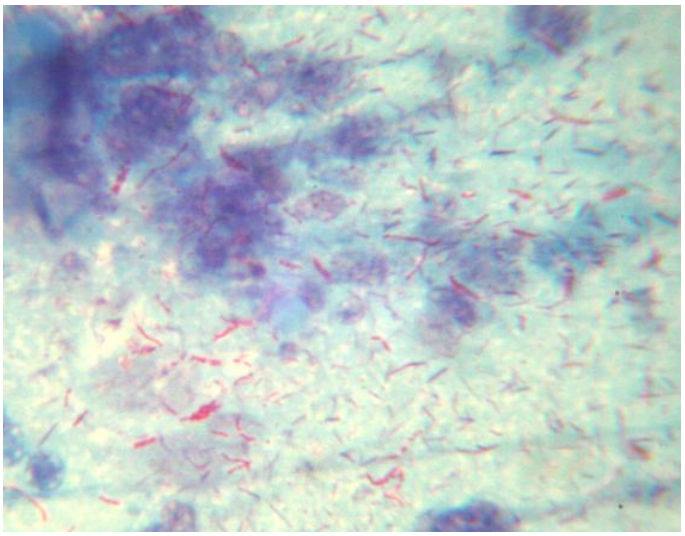

Figure 3. Tuberculous lymphadenitis showing acid fast bacilli (H & E x 100)

Table 4: Cytomorphological features in tuberculous lymphadenitis correlating with AFB positivity in HIV positive and negative individuals

Sr No.	Cytomorphological features	No. of HIV-ve cases with %	AFB positivity(%) in HIV- cases	No. of HIV+ve cases with %	AFB positivity (%) in HIV+ve cases
1.	Epithelioid cell granulomas without caseous necrosis	105 (33%)	13 (12%)	10 (19%)	4 (40%)
2.	Epithelioid cell granulomas with caseous necrosis	213 (67%)	123 (58%)	40 (75%)	27 (68%)
3.	Necrosis only in a neutrophilic b/g	-	-	3 (6%)	3 (100%)
	Total	318	136(43%)	53	30(57%)

In the present study, three cytomorphological patterns were found. Most prevalent cytomorphological pattern was Epithelioid cell granulomas with caseous necrosis. Over all, cases with caseous necrosis or only neutrophils showed high AFB positivity (Table-4).

65 of 893 cases were HIV positive. The spectrum of lymphadenopathy in these patients showed tuberculous lymphadenitis in 53 cases followed by progressive generalized lymphadenopathy in 6 cases while in 3 cases non-hodgkin lymphoma was noted. Majority of patients [31 cases (47.7%)] were in the age group of 31 – 40 years with male to female ratio of 1.5:1.Cervical lymph node (93.9%) was the most common site.

Table: 5 Distribution of different subtypes of metastatic tumors according to site of FNAC of lymph node

Site of lymph node	Metastatic Tumors				Total
	Squamous	Adeno	Papillary	Positive	
Cervical	156	13	1	4	174
Axillary	1	34	-	-	35
Inguinal	9	1	-	1	11
Generalised	-	2	-	-	2
Total	166	50	1	5	222

Secondary tumors were second most common finding (24.9%) in enlarged lymph nodes. Out of 222 cases, predominant cases were of metastatic squamous (Fig. 4) cell carcinoma (75%) followed by metastatic adenocarcinoma (Fig. 5) (23%). One case of metastatic papillary carcinoma (Fig. 6) was seen. 5 cases were given as suspicious for malignant cells, for which no subtyping was possible. Metastatic squamous cell carcinoma was common in 61- 70 yrs age group while metastatic adenocarcinoma in 41- 50 yrs. Cervical lymph node was the most common site for metastatic squamous cell carcinoma (94%) while axillary lymph node was the most common site for metastatic adenocarcinoma (68%) (Table-5).

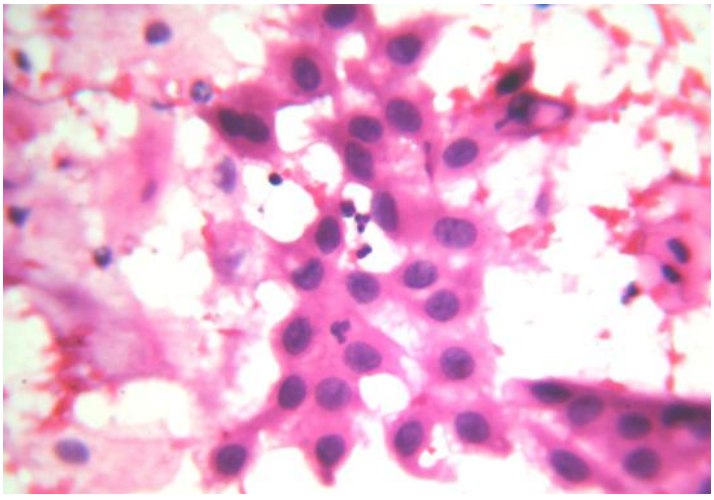

Figure 4. Metastatic squamous cell carcinoma (H & E x 40)

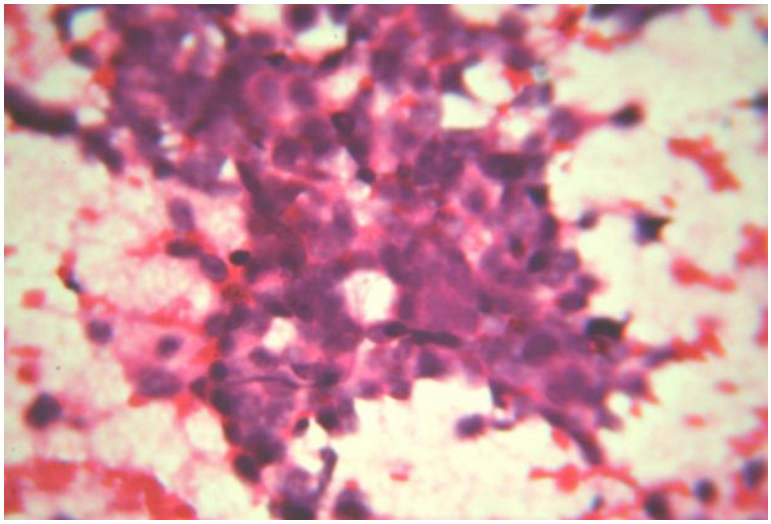

Figure 5 Metastatic adeno carcinoma (H & E x 40)

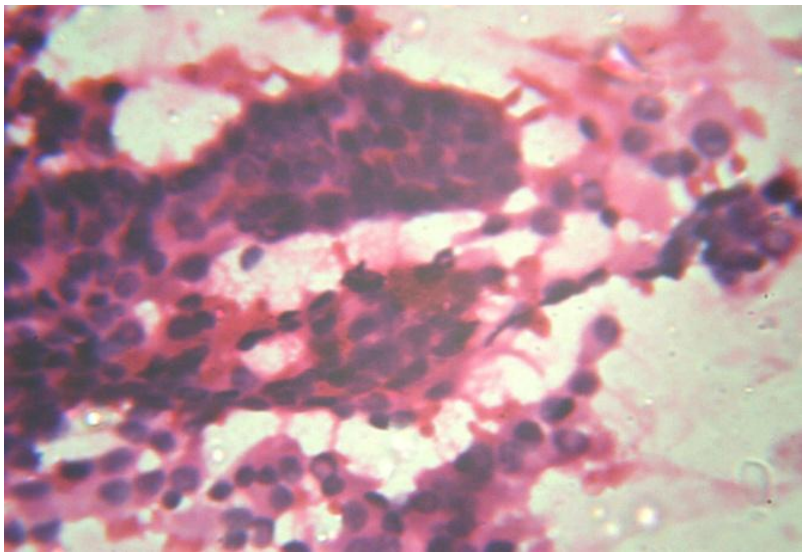

Figure 6 Metastatic papillary carcinoma (H & E x 40)

In 117 out of 222 cases, prior history of malignancy was available. Head and neck region (96%) was the most common primary site of metastatic squamous cell carcinoma while breast (83%) was the most common site of metastatic adenocarcinoma. 2 cases of inguinal lymph node aspirates were associated with primary tumors of penis. Both were squamous cell carcinoma.

Histopathology and cytology correlation was available in only 30 cases. One case of non-specific lymphadenitis was over-diagnosed as non-hodgkin lymphoma on cytology. The accuracy rate was 100% in tuberculous lymphadenitis, non-hodgkin lymphoma and metastatic squamous cell carcinomas.

Discussion

In the present study, youngest patient was 9 months old and oldest was 80 years of age. These figures come in close comparison to the study of Steel BL et al[3] and Kanhere et al[1]. Maximum number of cases (42.5%) in the present study, were in the age range of 21 – 40 years. Similar observations have been made in other studies[1,4,5,6,21,22]. In present study a male to female ratio was 1.2 : 1. This corresponds well with the findings of most of the authors[1,4,5,6,7], but differed from Dasgupta A et al[7],and Bhargav P et al[5]. This may be due to different study population. The most common site of enlarged lymph nodes was cervical lymph nodes followed by axillary, inguinal and generalized lymphadenopathy in the

present study. Similar finding was observed by other authors[8,9,10,12,21,22].

In the present study, spectrum of diseases showed that most common finding was inflammatory disease and most common cause of inflammatory disease was tuberculous lymphadenitis. In India, tuberculous lymphadenitis is one of the most common type of lymphadenopathy encountered in clinical practice[1,4,6,10,11,22]; whereas it is in contrast to low frequency in the western studies (Kline TS et al[7] and Hirachand S et al[12]). Metastatic tumors in lymph nodes was the commonest cause when neoplasia explained the lymphadenopathy. This was in agreement with other authors[13].

In the present study, tuberculous lymphadenitis was seen most frequently in third and fourth decade of life with female preponderance. Similar findings were observed by other authors[1,4,5,8,10.] However, Badge et al[22], found maximum case of tuberculous lymphadenitis in second and third decade of life. Cervical lymph nodes followed by axillary were the most common sites involved. Similar findings were noted by most of the other authors[4,5,10,22]. However, Ahmad S et al[14] found maximum cases of tuberculous lymphadenitis in younger age group and Bailey et al[15], Rajsekaran S et al[5] and Ahmad S et al[14] noted a male predominance. In the present study, three cytomorphological patterns were found. The most common microscopic feature was granuloma formation. In immunocompromised patients, in some cases only caseous necrosis while in few cases neutrophils with histiocytes admixed with necrotic background was noted. When cytology smears showed granulomas with necrosis, AFB positivity increases compared to the smears showing granulomas without necrosis. Cases with caseous necrosis or only neutrophils showed higher AFB positivity. Similar observations have been made in other studies[2,4,5,7,16,22].

65 patients were HIV positive. In the present study, enlarged lymph nodes were mostly secondary to tuberculosis. This finding is similar to Satyanarayana et al[17], Shenoy et al[18] and Vanisri HR et al[16]. However, in western studies reactive lymphadenopathy was the most common presentation of HIV cases[19,20]. Majority of patients were males in the age group of 31 – 40 years. Similar findings were observed in other studies[5,15,18]. In our study and as well as in other studies, most common site involved was cervical lymph node[5,10,17]. However, Satyanarayana et al[17] report axillary node involvement being more common in their study.

In the present study, metastatic tumors constituted the second largest group (24.9%). The highest incidence was seen in seventh decade with a male preponderance. Similar findings were noted by most of the other authors[1,8,10,13]. Metastatic squamous cell carcinoma was the most frequently observed subtype. Cervical lymph node was the most common site for metastatic squamous cell carcinoma while axillary lymph node was the most common site for metastatic adenocarcinoma. Head and neck region was the most common primary site of metastatic squamous cell carcinoma while breast was the most common site of metastatic adenocarcinoma. Similar observations have been made in other studies[13].

To conclude, Fine needle aspiration cytology (FNAC) of lymph node is an integral part of the initial diagnosis and management of patients with lymphadenopathy due to early availability of results, simplicity, and, minimal trauma with less complication. It can avoid the need for excisional biopsy in most cases and allow rapid onset of therapy.

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