IJPRP

Indian Journal of Pathology: Research and Practice
Volume 7 Number 10, October 2018
DOI: http://dx.doi.org/10.21088/ijprp.2278.148X.71018.6

Original Research Article

A Correlation of Cytomorphology and Acid Fast Bacilli Positivity in Tuberculous Lymphadenopathy: It's Importance in Resource Poor Countries

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Received on 16.08.2018,

Accepted on 13.10.2018

Abstract

Background: Tuberculous lymphadenitis is one of common cause of peripheral lymphadenopathy in developing countries. Fine needle aspiration cytology (FNAC) is important tool in early detection and can be further supported by demonstration of acid fast bacilli. *Objective:* A review of Cytomorphological features, in correlation with frequency of presence of acid fast tubercular bacilli in peripheral lymphadenopathy. *Method:* This retrospective study was conducted in the department of Pathology, All India Institute of Medical Sciences, Patna. Records of 726 cases of lymphadenopathy reported from June 2014 to December 2016 were reviewed. A total of 240 cases were reported as tuberculous lymphadenitis. Reports were studied in respect to age, sex, clinical diagnosis, site of aspiration and cytological findings. Smears were stained by May-Grunwald Giemsa (MGG), Papanicolaou (PAP) and ZN stain. Empirically Cytomorphological patterns were divided into five categories. *Results:* A total of 726 cases of lymphadenopathy subjected to FNAC was studied, of which 240 were tuberculous lymphadenitis. Most of positive cases were in third decade of age with female preponderance. Most common site was cervical lymph node (43.75%). Nature of aspirate was whitish in 65.4% cases. Caseous necrosis with intact or degenerated inflammatory cells (40%) were predominant cytological finding. The overall AFB positivity in the series was 49.16%. *Conclusion:* FNACis useful tool to diagnose tuberculous lymphadenopathy and its sensitivity is further increased by adding with acid fast staining.

Keywords: Fine Needle Aspiration; Cervical; Lymphadenopathy; Tuberculous; Epithelioid; Granuloma.

Background

Tuberculosis is the leading cause of lymphadenopathy and is considered as one of the major life threatening health hazard in developing countries [1,2].

Lymphadenopathy is the most common extra-pulmonary manifestation of tuberculosis. The incidence of extra-pulmonary tuberculosis in India accounts for 20% of all TB cases [2]. Fine needle aspiration cytology (FNAC) is a safe, easy, cost effective and outpatient procedure to diagnose tuberculosis and considered equivalent to lymph node core needle biopsy or excision biopsy [3,4]. It is first line of investigation also

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suitable for follow up [5]. Required cytodiagnosis of tuberculosis include, presence of epithelioid cell granulomas with or without necrosis, Langhan's giant cells along with presence of acid fast bacilli (AFB) for confirming diagnosis [5,6].

Objective

The aim of study is to assess the Cytomorphological patterns of tuberculous lymphadenitis with their relative frequency and to know correlation between FNAC and Ziehl-Neelsen (Z-N) stain in diagnosis of tuberculous lymphadenitis.

Methods

The study presented is a cross-sectional study of 726 patients presenting with peripheral lymphadenopathy in the cytology section of Department of Pathology, AIIMS-Patna reported from June 2014 to December 2016. Sampling technique was non-probability convenience sampling. Only tuberculous lymphadenopathy cases was included in this study.

Self-made checklist was made for data collection. The study was approved by the ethics committee of All India Institute of Medical Sciences, Patna and written informed consent was taken from each enrolled patient.

All the relevant clinical data including patient's age, gender, location of lymph nodes, clinical presentation, nature of aspirate, Cytomorphological findings along with special staining for AFB were considered in study. FNAC was done using 22 gauge needle with disposable 10 ml syringe with antiseptic precautions. All the smears were stained by air dried May-Grunwald Giemsa (MGG), wet fixed Papanicolaou (PAP) stain and special stain ZN stain to demonstrate tubercle bacilli.

Smears were divided into five categories on the basis of Cytomorphological patterns.

Category I: Smears showing epithelioid cell clusters, Langhan's giant cellswith caseous necrosis (Figure 1)

Category II: Smears showing epithelioid cell clusters, giant cells without caseous necrosis. (Figure 2)

Category III: Smears showing epithelioid cells only.

Category IV: Smears showing caseous necrosis only. No giant cell or epithelioid cell seen. (Figure: 3)

Category V: Smears showing caseous necrosis with intact or degenerated inflammatory cells.

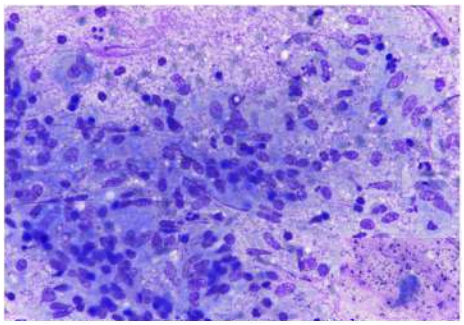

Fig. 1: Microphotograph showing well-formed epithelioid cell granulomas with caseous necrosis in background. (MGG; 400X). Inset shows presence of Langhan's giant cells. (MGG Stain; 400X)

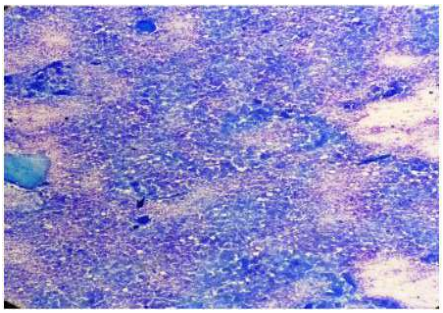

Fig. 2: Microphotograph showing epithelioid cell granulomas, chronic inflammatory cells without caseous necrosis in the background (MGG Stain; 100X). Inset shows: Acid- fast Tubercle bacilli (ZN stain; Oil immersion lens)

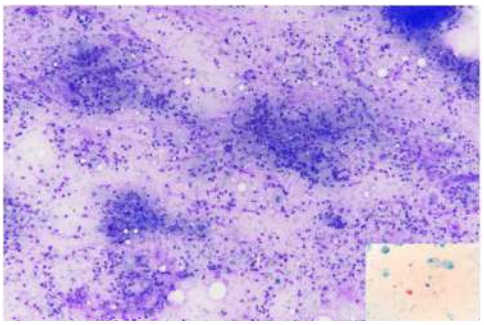

Fig. 3: Microphotograph showing caseous necrosis only. (MGG Stain; 100X)

Result

Out of 726 cases, the total number of tuberculous lymphadenitis was 240 (33.05%).

Cervical lymph nodes were most frequently involved group (43.75%) in tuberculous lymphadenitis. Other sites were axillary (18.33%), supraclavicular (13.75%), inguinal (12.9%), submandibular (5.0%), submental (2.08%), mesenteric (2.55%) and peri-pancreatic (1.64%). (Table 1).

Among the 240 cases of tuberculous lymphadenitis, most common age group affected was 3rd decade followed by 2nd decade. Mean age of presentation of tuberculosis lymphadenopathy was 36 years, with the youngest as a 4 months old infant and the oldest of 78 years. There was a female predominance with female to male ratio of 1.26:1. Both male and female preponderance was high in 3rd decade of life. No significant difference in incidence noted among males and females in the middle and elderly age group (Table 2).

Nature of aspirated material was predominantly whitish in 65.4% of cases, while in 14.1% cases the aspirate was blood mixed, cheesy in 12.2% and purulent in 8.3% cases (Table 3).

Cytomorphological features are empirically divided into five categories. Maximum number of cases belonged to Category V (40%) followed by Category II (23.75%), category I (20%), Category IV (13.33%) and lastly category I (2.92%). Category V showed highest AFB positivity (23.33%), followed by category I (10.42%. (Figure 3; inset). Least AFB positivity was seen in smears showing presence of epithelioid cells only (0.83%). The overall AFB positivity in the series was 49.16% (Table 4).

Table 1: Distribution of different sites of lymph nodes involved in tuberculous lymphadenitis

Anatomical site	Number of cases (%)
Cervical	105 (43.75)
Supraclavicular	33 (13.75)
Axillary	44 (18.33)
Inguinal	31 (12.91)
Submandibular	12 (5.0)
Submental	5 (2.08)
Mesenteric	6 (2.50)
Peripancreatic	4 (1.68)
	240 (100%)

Table 2: Age–wise incidence of tuberculous lymphadenitis. (M: Male, F: Female)

Age in years	No. of patients (N)
1-10	12 (M: 07; F: 05)
11-20	50 (M: 22; F: 28)
21-30	96 (M: 42; F: 54)
31-40	39 (M: 16; F: 23)
41-50	23(M: 11; F: 12)
≥50	20 (M: 08; F: 12)
Total	240 (M: 106; F: 134)

Table 3: Gross nature of aspirate

Gross nature of aspirate	Percentage%
Whitish	65.4
Blood mixed	14.1
Cheesy	12.2
Purulent	8.3

Discussion

Tuberculous lymphadenopathy is one of the most common cause of lymphadenopathy observed in developing countries like India. The most important cause of high incidence of tuberculosis in developing countries is due to large population, overcrowding and low socioeconomic status. Present study is comparable with Chawla et al. [6].

The most common age group affected in tuberculous lymphadenopathy was 3rd decade followed by 2nd decade. The youngest patient in our series was a 4 month old child while the oldest one was of 78 years. This finding was in concordance with study done by Mohapatra and Janmeja et al. [7]. Narang et al. [8] had reported minimum age of 3 months with maximum being 70 years. Mean age of tuberculous lymphadenitis in our

Table 4: Cytomorphological features with acid fast bacilli positivity (AFB +ve) in tubercular lymphadenitis

Category	Cytomorphological features	No. of cases	%	No. of cases positive for AFB in different categories	% of positivity of AFB at different categories
Category I	Epithelioid cell cluster + Giant cell + necrosis	48	20.00%	25	10.42%
Category II	Epithelioid cell cluster + Giant cellwithout necrosis	57	23.75%	08	3.33%
Category III	Epithelioid cell only	07	2.92%	02	0.83%
Category IV	Caseous necrosis only. No epithelioid cell, no giant cell	32	13.33%	27	11.25%
Category V	Caseous necrosis with intact or degenerated neutrophils	96	40.00%	56	23.33%
Total		240	100%	118	49.16%

study was 36 years. The disease is more common in reproductive age group and less common in extremes of age group.

Incidence of tuberculous cervical lymphadenopathy was more in females than males in the study by Tripathy SK et al. [9] Present study also showed female preponderance (52%) than male (48%), with cervical lymph nodes involvement more frequently.

The increased incidence in females may be due to concurrent malnourishment. The other confounding factors influencing are overcrowding, lack of education, early marriage and pregnancy, large families with poor socioeconomic conditions [10].

There was no definite history of contact in 79% of cases and a definite history of TB was present in 21% of cases. In S.K. Sen series of tuberculous cervical lymphadenopathies of 386 cases 78.8% cases had no history of contact with tuberculosis, 19.1% had definitive history of contact with tuberculosis [9,10].

In the present study most of the patients had superficial lymphadenopathies with few of them with deep lymphadenopathies. Other presenting symptoms were weight loss and loss of appetite (35%), fever (30%), axillary and inguinal swellings (4%), cold abscesses (8%), pain (6%), sore throat, cough, discharging sinus, old sinus scars (2%). Cervical lymph nodes were involved in 43.75% cases, followed by axillary group of lymph nodes (18.33%). Supra clavicular lymphadenopathy and inguinal lymphadenopathy comprised of 13.75% and 12.9% respectively. There was unilateral involvement in 68% of cases. Right side was affected in 32% of cases and left side was affected in 36% of cases. Bilateral involvement was seen 32% of patients. In S. K. Sen series there was bilateral involvement in 54.5%, unilateral in 45.5% of cases and neck nodes associated with other group of lymph nodes in 28.5% of cases [9-12]. Upper anterior deep cervical group of lymph nodes were the most commonly involved, followed by upper posterior deep cervical group of lymph nodes.

Gross nature of aspirate in our series, maximum were whitish (65.4%), followed by blood mixed (14.1%), cheesy (12.2%) and purulent (8.3%). Metre and Jayaram [12] in their study maximum aspirate was blood mixed followed by cheesy and purulent. Cytomorphological features have divided by various previous studies [13-16] are as follows:

a) Cases with only caseous necrosis

b) Cases with caseous necrotic material and degenerated inflammatory cells

c) Cases with caseous necrotic material along with epithelioid cell granulomas and giant cells

d) Cases with epithelioid cell granulomas without caseous necrosis.

We divided Cytomorphological pattern into five categories in our studies, maximum cases were having caseous necrotic material along with intact or degenerated inflammatory cells (40.0%). This was followed by caseous necrotic material with epithelioid cell clusters, Langhan's giant cells without caseous necrosis (23.75%), epithelioid cell clusters, Langhan's giant cells with caseous necrosis (20.0%), only caseous necrotic material (13.3%) and epithelioid cell only (2.92%). Paliwal et al., in their series of 176 cases of tubercular lymphadenopathy, had the maximum cases having cytopathological picture of necrosis only without epithelioid granulomas (39.2%), followed by cases having polymorphs with necrosis with or without epithelioid granulomas (30.1%). Their series had 16.4% cases with epithelioid cell granulomas with necrosis whereas the least common cytopathological finding of epithelioid cell granuloma without necrosis was seen in 14.3% cases [13-16]. Gupta et al. had higher percentage of cases showing epithelioid cell clusters with or without Langhan's giant cells with necrosis [15]. Studies by Gomes et al, Das et al, also followed the same cytological parameters for diagnosis of tuberculous lymphadenitis [11,14].

In our study AFB positivity was 49.16% while Paliwal et al. had 71% positivity and 59.5% cases by Bezabih et al. [16,17]. Das Gupta et al., in their series of 180 cases of cervical lymphadenopathy reported 45.65% AFB positivity which is similar to our series of 240 cases [14,15]. A very low positivity rate of AFB (19.6% cases) on Z.N staining was reported by Aggarwal et al, in their aspirate of 138 cases [18]. Since prevalence of tuberculosis is very high in India and that's why possibility of tubercular etiology is always considered and the patient is advised for further ancillary investigations and follow up even AFB is negative in presence of epithelioid cell granulomas with or without necrosis as described by Das et al. [14].

Various studies done in past have shown that chance of finding AFB is higher with cold abscess formation i.e. cases showing necrosis and degenerated inflammatory cells [19-22]. Maximum AFB positivity of 23.33% was seen in cases with caseous necrosis with intact or degenerated inflammatory cells and least was seen in smears showing epithelioid cell only i.e. 0.83%. Similar observations were also reported by Paliwal et al, Bezabih et al and Gupta et al. [16,17,23]. Highest

AFB positivity in our case series was with cheesy white aspirate, microscopically showing presence of caseous necrosis with intact or degenerated neutrophils, followed by purulent and blood mixed aspirates.

Conclusion

FNAC is a simple, reliable, quick and economical investigating technique in diagnosing tubercular lymphadenopathy. It provides a high degree of diagnostic accuracy, which can be enhanced by combining cytomorphology with Z.N. staining. Prompt diagnosis is helpful in reducing morbidity and mortality of tuberculosis.

Conflict of Interest: None

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