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Diagnostic utility of fine needle aspiration cytology in superficial lymphadenopathy in pediatric patients

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ABSTRACT

Background

Lymphadenopathy is one of the common clinical presentations in outdoor patient department, especially in pediatric age group. Fine needle aspiration cytology (FNAC) of the lymph nodes has become an integral part of initial diagnosis and management of patients. The aim of this study is to evaluate the diagnostic utility of FNAC of lymph nodes and to study the spectrum of diseases in pediatric patients with superficial lymphadenopathy.

Methods

This study was carried out in Department of Pathology, Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan, Sonapat from July 2012 to June 2015. A total of 217 cases of superficially palpable lymph nodes in pediatric age group (0-14 years) were included in this study.

Observation

In this study, M: F ratio is 1.4:1. Most common cause of lymphadenopathy was non-specific reactive hyperplasia 118 (54.88%) followed by granulomatous lymphadenitis 79 (36.74%), acute suppurative lymphadenitis 14(6.51%), and neoplastic 4 (1.86%). Among malignant group, all 4 cases are primary lymphoma. Male showed preponderance for reactive hyperplasia and suppurative lymphadenitis while tuberculous lymphadenitis was more common in females. Cervical group of lymph nodes were most frequently involved by all causes of lymphadenopathy.

Conclusion

FNAC is a simple, reliable, rapid and safe diagnostic modality for the etiologic workup in significant lymphadenopathy in children.

Keywords: FNAC, Lymphadenopathy, Granulomatous, Necrotizing.

INTRODUCTION

Lymphadenopathy is one of the common clinical presentations in outdoor patient department in most hospitals, especially in pediatric age group. It is a clinical manifestation of regional or systemic disease and serves as an excellent clue to the underlying disease. The cause may range from an infectious process to a malignant condition.¹ Fine needle aspiration cytology (FNAC) of the lymph nodes is rapid, simple, safe, cost effective and reliable diagnostic modality for establishing the etiology of significant lymphadenopathy. There is no requirement of anaesthesia for aspiration and can be carried out easily at outpatient department or bedside.² The sensitivity of FNAC for the diagnosis of lymphadenopathy averages 90% with a specificity of 95%.³ The common causes of lymphadenopathy in pediatric age group are inflammation, reactive hyperplasia, infection and lymphoproliferative disorders.⁴ Tuberculous lymphadenitis is among the most frequent presentations of extra pulmonary tuberculosis. It is responsible for up to 43% of peripheral lymphadenopathy in the developing world.⁵ The purpose of this study was to evaluate the diagnostic utility of FNAC on lymphadenopathy in the pediatric population and to study the spectrum of diagnosis in pediatric patients with superficial lymphadenopathy.

MATERIAL AND METHOD

This study was carried out at Department of Pathology, Bhagat Phool Singh, Government Medical College for Women, Khanpur Kalan, Sonapat from July 2012 to June 2015. Significant lymphadenopathy was considered when the size of lymph node in the cervical and axillary group was >1.0cm and the inguinal group was >1.5cm. A total of 217 cases of superficially palpable lymph nodes in pediatric age group (0-14 years) were included in this study. In each case, a brief history, thorough physical examination and relevant investigations are evaluated. The FNAC was performed using 21 to 25 G needle attached to 20 cc syringe without local anesthetic. Aspirate was collected in the needle hub and syringe and immediately slides were prepared as per standard

procedure. Two slides were immediately fixed in 95% ethanol and stained with Papanicolaou stain. Rest Smears were air-dried and stained with Romanowsky stain. Special stains like Ziehl-Neelsen (ZN) stain for acid fast bacilli using 20% H₂SO₄ was done when required. The cytological diagnoses were classified as non-specific reactive hyperplasia, acute suppurative lymphadenitis, granulomatous lymphadenitis and neoplastic. Further, all granulomatous lymphadenitis was subdivided into pure granulomatous, necrotizing and necrotizing granulomatous lymphadenitis based on cytomorphological features.

RESULTS

In the present study a total of 217 cases of superficial palpable lymphadenopathy in pediatric patients were studied during the period of three years. Two cases were inconclusive due to unsatisfactory smears and excluded from the study. The age of the patients ranged from 9 months to 14 years. 86 patients (40%) belong to the age group of 0-7 years while 129 patients (60%) belong to 7-14 years age group. Out of total 215 patients, 126 patients (58.60%) were male and 89 patients (41.40%) were female (Table-1). Non-specific reactive hyperplasia was the most common cause of lymph node enlargement in 118 (54.88%) followed by tuberculous lymphadenopathy 79 (36.74%), acute suppurative lymphadenitis in 14 (6.51%) and neoplastic in 4 cases (1.86%) (Table-2). The peak incidence of reactive hyperplasia was seen in males of 0-7 years age group were as tuberculous lymphadenopathy is maximally seen in females of 7-14 years age group. Males were more commonly affected by reactive hyperplasia (71.19%) while in contrast tuberculous lymphadenopathy was common in females (62.03%) (Table-3). Cervical group of lymph nodes was most commonly involved by all causes of lymphadenopathy. It has been observed that 93.22% of the reactive lymph nodes and 91.14% of tuberculous lymph nodes involve cervical group. Inguinal and epitrochlear groups are least involved with all types of lymphadenopathy, both accounting for 1.40% of the total cases (Table 4).

Table-1

Age and sex distribution of total 215 patients

Age group	Male	Female	Total
0-7 years	55	31	86
7-14 years	71	58	129
Total	126	89	

Table -2 Cytological diagnosis of 215 cases of lymphadenopathy

Cytological diagnosis	No. of cases	Percentage
Reactive hyperplasia of lymph node	118	54.88
Acute suppurative lymphadenitis	14	6.51
Tuberculosis	79	36.74
Neoplastic	4	1.86

Table-3 Age and sex distribution of various types of lymphadenopathy

Cytological diagnosis	0-7 yrs		7-14 yrs	
	M	F	M	F
Non-specific reactive hyperplasia	43	16	41	18
Acute suppurative lymphadenitis	4	4	5	1
Tuberculosis	6	10	24	39
Neoplastic	2	0	1	1
Total	55	30	71	59

Table-4 Group wise distribution of various types of lymphadenopathy

Diagnosis	Cervical			
	Axillary	Inguinal	Epitrochlear	
Reactive hyperplasia	110	5	2	1
Acute suppurative lymphadenitis	13	1	0	0
Tuberculosis	72	4	1	2
Neoplastic	3	1	0	0
Total	198	11	3	3

Table-5 Cytological features and AFB staining of 79 cases of tubercular lymphadenitis

Cytological diagnosis	Total cases	AFB Positive
Necrotizing granulomatous lymphadenitis	37	26
Granulomatous lymphadenitis	30	3
Necrotizing lymphadenitis	12	7
Total	7	36

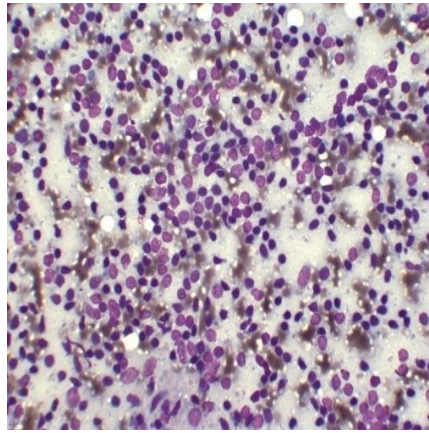


Figure 1. Microphotograph showing reactive lymphoid cells (Romanowsky stain X400.)

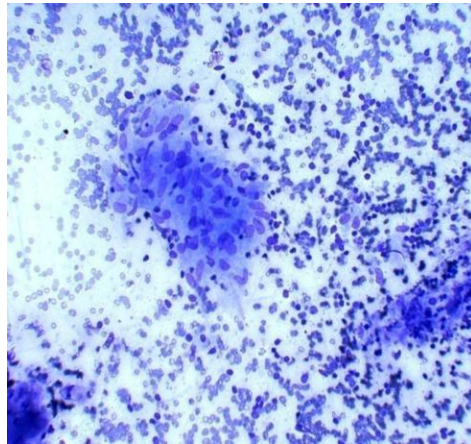


Figure 2. Microphotograph showing epithelioid cells granulomas in tuberculous lymphadenitis (Romanowsky stain X200).

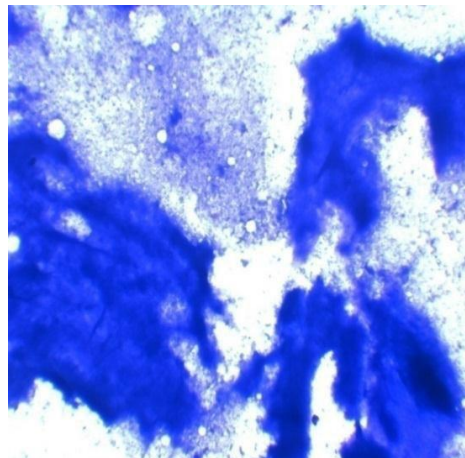


Figure 3. Microphotograph showing granular pink caseous necrotic material in tuberculous lymphadenitis (Romanowsky stain X200).

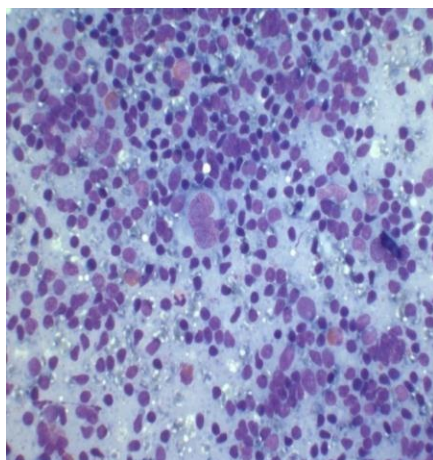


Figure 4. Microphotograph showing Reed-Sternberg cell in background of lymphoid cells and eosinophils in case of Hodgkins lymphoma (Romanowsky stain X400)

The lymph node aspirates with either only epithelioid cell granulomas without any necrosis or epithelioid cell granulomas with caseation necrosis or only granular necrotic material were suggestive of tuberculous lesions. Acid Fast Bacilli (AFB) staining was done by Ziehl-Neelsen method in all suspicious cases of tuberculosis and average positivity was found to be 45.57%. It was also observed that 70.27% cases of necrotizing granulomatous lymphadenitis and 58.33% cases of necrotizing lymphadenitis were AFB positive, whereas only 10% cases of granulomatous lymphadenitis turn out to be AFB positive (Table 5).

DISCUSSION

Fine needle aspiration cytology of lymph node has become an integral part of the initial diagnosis and management of patients with lymphadenopathy due to the early availability of results, simplicity and minimal trauma with less complication.⁶ It almost offers an accurate diagnosis of non-specific reactive hyperplasia, infectious disease, granulomatous lymphadenitis and metastatic malignancy. Thus, it can avoid the need for surgical excision in most cases and allows rapid onset of therapy.⁷ In the present study, 215 cases of superficial palpable lymphadenopathy in pediatric patients were studied during the period of three years. In our study, more than half of the cases (54.88%) were non-specific reactive hyperplasia. This is because of frequent infections of nose, ear and throat in pediatric age group. Similar findings were observed by Sharique A et al (69.20%) and Maria et

al (70%).^{5,8} In another study, Patar et al found 41.75% cases of reactive hyperplasia whereas Lee et al reported 54.9% cases in children and adolescent patients.^{4,9} Tuberculous lymphadenitis (36.74%) was found to be the most common cause of infectious lymphadenopathy in current study. This finding is higher as compared to studies conducted by Peter et al, 26.9%, Maria et al 14% and Sharique et al 22.45%.^{4,5,8} This etiological variation of pediatric patients with lymphadenopathy may be due to variation in socioeconomic and nutritional status in different geographical areas of the world. Tuberculosis (TB) is a major cause of childhood morbidity and mortality in developing countries.^{10,11} Accurate figures on the prevalence of pediatric TB are not available because the health information system in endemic countries is inadequate and limited attention is paid to children who contribute little to TB transmission in affected countries. More than 80% of children with TB are sputum smear-negative and extrapulmonary TB is common in these patients.¹² Despite of the latest advances in knowledge and technology, TB still remains a major health problem in developing countries. In rural India, the prevalence of tubercular lymphadenopathy in children up to 14 years of age is approximately 4.4 cases per 1000 (Narang et al, 2005).¹³ Indian Academy of Pediatrics recommends FNAC of all suspected cases of TB.¹⁴ It not only offers a diagnostic tool for confirmation of TB but also fine needle aspirate can be used for culture and drug sensitivity testing.¹² The sensitivity, specificity and diagnostic accuracy of FNAC in childhood

tuberculosis were found to be 98%, 100% and 99% respectively.¹⁵ AFB positivity for lymph node by Ziehl-Neelsen method varies from 25% to 88.7%, with an average of 52.9%.^{16,17} The finding of AFB positivity in an increasing order in the three cytologic groups is described as epithelioid granuloma without necrosis (average 7.4%), epithelioid granuloma with necrosis (average 35.6%) and necrosis without epithelioid granuloma (average 54.2%).^{17,18,19} However, we observed that 41.94% cases of necrotizing granulomatous lymphadenitis and 35.29% cases of necrotizing lymphadenitis were AFB positive whereas only 9.09% cases of granulomatous lymphadenitis turn out to be AFB positive. All four cases of neoplasia in our study were reported as lymphoma. A similar finding of lymphoma being the most common neoplastic lesion in pediatric age group was observed by Maria et al, Sharique et al and Peter et al.^{4,5,8} The present study showed that male patients predominate over female patients with M: F ratio 1.4:1. Similar finding was observed by Sharique et al with M:F of 1.79:1 while Patar et al show contrasting results of female preponderance with M:F ratio of 1:1.09.^{4,8} We found that males were more commonly affected by reactive hyperplasia (79.75%) while in contrast tuberculous lymphadenopathy was common in females (71.19%). Similar findings were observed by Sharique et al that male more commonly involved by

reactive hyperplasia (68.79%) and female by tuberculous lymphadenopathy (51.91%).⁸ This may be attributed to poor nutritional status and poor accessibility to health care services by females. On correlating the pattern of lymphadenopathy with age group, it revealed that reactive hyperplasia and neoplastic lesions are equal in both age subgroups of 0-7 years and 7-14 years. In contrast, acute suppurative lymphadenitis is frequent in 0-7 years age, while tuberculous lymphadenopathy is common in 7-14 years age group. We also found that cervical group were most commonly involved group of lymph nodes followed by axillary.

CONCLUSION

Despite many limitations and pitfalls, FNAC appears as a good first line method for investigating the cases of lymphadenopathy especially for children. It is safe, cost effective, rapid and minimally invasive modality with no reported complications. In our study, non-specific reactive hyperplasia is the most common cause of lymph node enlargement in children followed by tuberculosis. FNAC is not only useful as a first line diagnostic method but aspirated material can also be used for ancillary techniques like immunohistochemistry to help in further confirmation of diagnosis.

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