

Original Research Article

Usefulness of fine needle aspiration cytology in diagnosis of causes of lymphadenopathy in children

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ABSTRACT

Background: The present study was conducted to study the causes of lymphadenopathy, associated clinical findings, usefulness of FNAC in diagnosis of various causes of lymphadenopathy as lymph node biopsy is a difficult and invasive procedure in children attending pediatric department.

Methods: A study was done at Katuri medical college and hospital. A total of 50 patients with lymphadenopathy including both local and generalized were studied for a period of 2 years by taking proper history, through physical examination both generalized and systemic and all the patients were subjected for relevant investigations for establishment of diagnosis which is essential for institution of proper treatment. A prospective study consisting 50 patients with lymphadenopathy (<12year) is undertaken to find the incidence of various causes of lymphadenopathy in the affected patients for 2 year.

Results: It was observed that 10, 17 and 23 children were having lymphadenopathy in the age groups of 0-3-year, 4-8 year and 9-12 year respectively. Majority of patients were having lymphadenopathy only after 4 year of age, male 28 and female 22. The major symptoms in order of incidence were palpable swelling, fever, cough, weight loss, loss of appetite and sore throat. Duration of lymphadenopathy of less than 1 month was seen in 25 cases, 1-6 months 24 cases and more than 6 months in 1 case. Enlargement of lymph nodes in cervical region, was the major finding in these patients. 47 cases were having local lymphadenopathy mainly in the cervical region and 3 cases were having generalized lymphadenopathy. 80% of the patients were having firm lymph nodes, remaining 20% of the patients were having soft lymphadenopathy. 36 patients were having mobile lymph nodes while 14 patients were having matted lymph nodes. Tenderness was observed in 21 cases against absence of tenderness in 29 cases. Analysis of the FNAC results revealed positive for tuberculosis in 11 cases reactive hyperplasia in 26 cases, granulomatous changes seen in 4 cases and suppurative lymphadenitis in 6 cases.

Conclusions: In developing countries like India whenever a patient attends the Department of Paediatrics with lymphadenopathy it is always be prudent to exclude tuberculosis, which is quite prevalent. FNAC is helpful in those with benign conditions like reactive hyperplasia to rule out underlying serious systemic diseases and reassuring the parents.

Keywords: FNAC in lymphadenopathy, FNAC vs clinical lymphadenopathy, Lymphadenopathy in children

INTRODUCTION

Examining the lymph nodes is an important aspect of the general physical examination of both well and ill children

and adolescents. Lymph nodes are normal structures, and certain lymph nodes may be palpable in a healthy patient, particularly in a young child. Palpability of lymph nodes is called lymphadenopathy. Lymph node enlargement is a

common clinical finding in pediatric practice. It may represent at normal age related physiological changes or transient response to various benign local or generalized infections originating from upper respiratory tract infection or skin.¹ However, it may also herald chronic infections like tuberculosis, brucellosis, and serious conditions like malignancy and autoimmune disorders or other rare causes like atypical mycobacterial lymphadenitis, SLE, brucellosis, or histiocytosis.^{2,3} The etiological profile varies from country to country and region to region. In developing countries like India, acute upper respiratory infections, suppurative skin infections and tuberculosis are the major causes for regional lymphadenopathy.⁴

Examining the lymph nodes is an important aspect of the general physical examination of both well and ill children and adolescents.⁵ Thus, the challenge for the general pediatrician is to learn how to distinguish pathologic from non-pathologic lymph nodes and to develop a rational approach to the evaluation of lymphadenopathy.⁶

The aims and objectives of the study are to know the various causes of lymphadenopathy in children; to know various associated clinical findings with lymphadenopathy in children and to know the usefulness of FNAC in diagnosis of various causes of lymphadenopathy as lymph node biopsy is a difficult and invasive procedure.

METHODS

The study was conducted in Department of Paediatrics, Katuri Medical College and Hospital, Guntur. Children with lymphadenopathy attending Pediatric OPD and admitted in Pediatric Department were included in the study.

Inclusion criteria

- Age <12 years
- Lymphadenopathy of >1cm in cervical, axillary and >1.5cm in inguinal region.

Exclusion criteria

- Insignificant palpable lymph nodes are excluded i.e. lymphadenopathy of <1cm in cervical axillary and <1.5cm in inguinal region.

Informed consent was taken from the accompanying parent or guardian for inclusion into the study. The clinical and laboratory data of these patients were recorded on a structured proforma.

A detailed history was taken, which included the duration and course of swelling, and associated general symptoms like fever, cough, weight loss, loss of appetite, history of respiratory tract infection, ear discharge, presence of wound or skin lesion. History of contact with pet animals

at home was also enquired. Immunization status, socioeconomic history, antibiotic therapy received was also recorded.

Thorough general physical examination was carried out. Palpable peripheral lymph nodes were examined noting their size, location, consistency, number, mobility, presence of matting and presence of any local changes like redness, discharge or sinus formation.

The area drained by enlarged lymph nodes was examined for presence of features of infection or inflammation like tonsillitis, pharyngitis, ear infection, dental infection, and wound or pyoderma lesions over the skin. Systemic examination was done including respiratory, cardiovascular, abdominal and central nervous system. Significant findings were recorded.

For all patients in the study group blood examination for hemoglobin level, total and differential count and erythrocyte sedimentation rate were done by standard hematological techniques. As the prevalence of tuberculosis was high in Guntur, Mantoux test was done in the patients as a part of routine workup.

Fine Needle aspiration cytology (FNAC) was done in study group after selecting the most prominent node. In patients with source of infection, swab was taken for culture and sensitivity. In patients with suspected systemic infection or malignancy following tests were done - Chest X-ray, Serological tests for HIV, Acid fast bacilli staining and lymph node biopsy.

A prospective study consisting 50 patients with lymphadenopathy (<12 year) is undertaken to find the incidence of various causes of lymphadenopathy in the affected patients for 2 year.

RESULTS

A total of 50 patients with lymphadenopathy including both local and generalized were studied for a period of 2 years by taking proper history, through physical examination both generalized and systemic and all the patients were subjected for relevant investigations for establishment of diagnosis which is essential for institution of proper treatment.

Age wise evaluation of patients with lymphadenopathy, it was observed that 10, 17 and 23 children were having lymphadenopathy in the age groups of 0-3-year, 4-8 year and 9-12 year respectively comprising of 20%, 46% and 34%. Majority of patients were having lymphadenopathy only after 4 yr of age.

Sex distribution: 28 male and 22 female children were found to have lymphadenopathy comprising of 56 % and 44% respectively. There is an increased incidence of lymphadenopathy in male children. The male to female ratio was 1.27:1.

Table 1: Symptoms.

Symptoms	Number of cases	Percentage
Palpable swelling	45	90
Fever	45	90
cough	27	54
Weight loss/failure to gain weight	16	32
Loss of appetite	16	32
Sore throat	10	20
Ear discharge	4	8
Orodonal pain	4	8
More than one symptom	35	70

Analysis of the symptoms of the patients with lymphadenopathy, the major symptoms in order of incidence were palpable swelling (45;90%), fever (45;90%), cough (27;54%), weight loss (16;32%), loss of appetite (16;32%) and sore throat (10;20%). Minor features like ear discharge and orodental pain were also observed (Table 1).

Duration of lymphadenopathy of less than one month was seen in 25 cases, 1-6 months 24 cases and more than 6 months in 1 case. 98% of the cases with lymphadenopathy were seen below 6 months of duration.

Table 2: Site of lymphadenopathy.

Site	Number	Percentage
Cervical	50	100
Supraclavicular	3	6
Axillary	5	10
Supratrochlear	3	6
Inguinal	3	6

Observation of site of lymphadenopathy, all cases were having cervical lymphadenopathy, few cases were having enlargement of lymph nodes in supraclavicular, axillary, supratrochlear and inguinal region. Enlargement of lymph nodes in cervical region, was the major finding in these patients (Table 2).

Table 3: Localized versus generalized lymphadenopathy.

Lymphadenopathy	Number of cases	Percentage
Localised	47	94
Generalised	3	6
Total	50	100

Of the above analysis it was observed that 47 cases were having local lymphadenopathy mainly in the cervical region and three cases were having generalized lymphadenopathy. In generalised lymphadenopathy, all the three cases are associated with leukemia (Table 3).

On palpation of the lymph nodes 80% of the patients were having firm lymph nodes, remaining 20% of the patients were having soft lymphadenopathy (Table 4).

Table 4: Consistency.

Consistency	Number of cases	Percentage
Firm	40	80
Soft	10	20
Total	50	100

On palpation of the lymph nodes 36 patients were having mobile lymph nodes while 14 patients were having matted lymph nodes comprising of 72 % and 28 % respectively (Table 5).

Table 5: Mobility.

Mobility	Number of cases	Percentage
Mobile	36	72
Matted	14	28
Total	50	100

On palpation of lymph nodes, tenderness was observed in 21 cases against absence of tenderness in 29 cases (Table 6).

Table 6: Tenderness.

Tenderness	Number of cases	Percentage
Present	21	42
Absent	29	58
Total	50	100

In the present study of analysis of associated findings, it was found that 11, 6, and 6 patients were having tonsillitis, otitis media and hepatosplenomegaly respectively and few cases were having impetigo of scalp and caries tooth (Table 7).

Table 7: Associated findings.

Associated findings	Number of cases	Percentage
Tonsillitis	11	22
Ear infection	6	12
Skin lesions	2	4
Orodonal infection	3	6
Hepatosplenomegaly	6	12

All the 50 patients were subjected for routine investigations like TC, DC, ESR, Hb, Mantoux test, X-ray chest and peripheral smear examination for the establishment of the diagnosis (Table 8).

Analysis of the investigations revealed 24 (48%) patients had leukocytosis and 25 patients had anemia, ESR was raised in 23 patients comprising of 46% of patients.

Among the 50 cases 3 patients presented with generalized lymphadenopathy with lymphoblasts in peripheral smear indicating that the patients were having acute lymphoblastic leukemia which is the commonest type of leukemia in children. Mantoux test was positive (more than 10 mm) in 15 cases out of 50 comprising of 30%. X-ray chest was positive in 9/50 cases in the form of prominent hilar lymphadenitis and pneumonitis.

Table 8: Investigations.

Findings	Number of cases	Percentage
Leucocytosis	24	48
Anemia	25	50
Lymphoblast cells	3	6
ESR raised	23	46
Mantoux positive	15	30
Abnormal chest X-ray	9	18

Cultures

Out of 50 cases 20 had features of infection in the local area of drainage of enlarged lymph nodes and 16 swabs were taken for culture and sensitivity from the following areas. Throat (9), ear discharge (5), scalp lesions (2).

Table 9: Throat culture.

Organism	Number of cases	Percentage
Staphylococci	2	22.22
Streptococci	5	55.56
Normal commensal	2	22.22
Total	9	100

Culture of the organisms from the specimens collected from various sites of infection isolated various types of organisms. Streptococci was the predominant organism isolated from throat culture (Table 9).

Table 10: Ear swab.

Organism	Number of cases	Percentage
Staphylococci	1	20
Pseudomonas	2	40
Citrobacter	2	40
Total	5	100

Swabs were taken from patients who had ear discharge (5 cases). Pseudomonas was isolated in 40% of cases, Citrobacter in 40% cases and Staphylococci in 20% of cases (Table 10).

Table 11: Scalp lesion culture.

Culture	Total no. of cases	No. of cases with positive culture	Percentage
Staphylococci	2	2	100

Two cases presented with impetigous lesion over the scalp. Staphylococcus aureus was isolated in all the cases (Table 11).

Table 12: Culture of pus aspirate from lymph nodes.

Pus culture	No. of cases	Percentage
Staphylococci	3	60
Sterile	2	40
Total	5	100

Out of 5 cases, 3 (60%) cases were culture positive for staphylococcal aureus. These patients had single group of lymph nodes enlargement. The lymph nodes were painful, tender, soft, fluctuant. Remaining 2 (40%) cases had sterile culture (Table 12).

Table 13: Fine needle aspiration cytology (FNAC).

Cytology	Number of cases	Percentage
Tuberculosis	11	23.4
Granulomatous	4	8.5
Suppurative	6	12.7
Reactive hyperplasia	26	55.3
Total	47	100

Fine needle aspiration was done in 47 cases out of 50 and submitted for histopathological examination for confirmation of the diagnosis. FNAC was not done in 3 cases because the peripheral smear examination revealed that the children are suffering from acute lymphoblastic leukemia (Table 13).

Analysis of the FNAC results revealed positive for tuberculosis in 11 cases reactive hyperplasia in 26 cases, granulomatous changes seen in 4 cases and suppurative lymphadenitis in 6 cases. So, it revealed tuberculous changes were seen in 11 children and non-tuberculous in 33 children. Tuberculosis was positive in 23.4%, which was the single most specific lesion causing lymphadenopathy.

Table 14: Mantoux test.

Mantoux test	Number of cases	Percentage
Positive	15	30
Negative	35	70
Total	50	100

Analysis of the Mantoux test: Sizable number of patients were positive for Mantoux test in 30% and was negative in 70% (Table 14). Whenever a patient attends pediatric O.P. department with lymphadenopathy, Mantoux test has to be done to exclude tuberculosis which is cheap easily available and gives nearly good results.

Finally, disease wise analysis of the cases of lymphadenopathy, specific diseases like tuberculosis and acute lymphoblastic leukemia were identified in 15 and 3

cases respectively. Rest of the 32 cases were having nonspecific lymphadenopathy. After identifying the specific diseases, the other diseases like tonsillitis, otitis media, and scalp infection might have caused non-specific lymphadenitis (Table 15).

Table 15: Causes of lymphadenopathy.

Cause	No. of cases	Percentage
Tonsillitis	10	20
Otitis media	6	12
Scalp infection	2	4
Orodental infection	3	6
Tuberculosis	15	30
Lymphadenitis	5	10
Leukemia	3	6
Cause not known	6	12
Total	50	100

DISCUSSION

In the present study, 50 cases of lymphadenopathy were studied in detail by taking history, detailed clinical examination and relevant investigation was done for institution of appropriate treatment over a period of 2 years in the Department of Pediatrics, Katuri Medical College.

Lymphadenopathy is a common clinical entity for which the child is brought to the hospital for evaluation.

Age

In the present study maximum number of patients were having lymphadenopathy between 4-8 years age comprising of 46%. The present study was in correlation with study of other authors like Reddy PM et al and Prasath S et al where the reported incidence was 55% and 47% respectively.^{7,8} In the study of Singh et al the reported incidence between 5-10 year was 48.59%.⁹ In a study done by Kadarienz C et al in 382 patients with peripheral lymphadenopathy, the maximum incidence was observed at the median age was 7 years.¹⁰ It shows that the incidence of lymphadenopathy was more common in the age group of 4-8 year during the lymphoid phase.

Sex

In the study the incidence of lymphadenopathy was more in male children than in females where the sex ratio was 1.27:1. Similar sex incidence was reported where there is male preponderance in the studies of other authors like Bezabin M et al, Mitra S et al where the incidence was 1.3:1; 1.27:1.^{11,12} Ahmad T et al reported there is an increased incidence of female children than male children comprising the ratio of 0.47:1.¹³ The reason for the increased incidence in male children has to be studied in detail to know the exact reason. The present study was a

hospital-based study, the increased incidence in male children may not reflect true incidence.

Site

In the present study, cervical group of lymph nodes was most commonly involved (50 cases, 100%), followed by axillary (5 cases, 10%). Of the analysis of the distribution of lymph nodes in various areas of the body, it was observed all the cases were having cervical lymphadenopathy, followed by axillary, supratrochlear and inguinal lymphadenopathy. Three patients were having generalized lymphadenopathy in which the lymph nodes were palpable in cervical, supratrochlear, axillary and inguinal lymphadenopathy. In study done by Yaris et al; reported after palpation of 153 lymph nodes in 98 patients, cervical lymphadenopathy was present in all the cases.¹⁴

Duration of lymphadenopathy

In the present study, 50% (25) of cases were having the duration of <1 month, 48% (24) were between 1 month and 6 months duration and 2% (1) was more than 6 months. Similar results were obtained in study done by Somaiah G et al in which 50.8% cases had swelling <1 month duration, 41.3% cases had duration of 1 to 6 months and 7.9% cases had duration of more than 6 months.¹⁵ In this study the maximum number of cases were reported before 1 month of duration and remaining after 1 month of duration, very few cases were reported after 6 months of duration.

Symptoms

The most common symptom in my study is palpable swelling in the neck seen in 88% (44 cases), followed by fever 44% (22 cases) and cough in 42% (21 cases). In study done by Somaiah G et al 90% of cases had patients with presenting symptom as swelling in the region of neck followed by fever in 90% and cough in 52.9%.¹⁵

Similar results were obtained in study done by Ellison et al who studied 100 children with generalized lymphadenopathy who observed swelling in the neck as the most common presenting symptom (52% of cases).¹⁶

Consistency, tenderness and mobility

On palpation of lymph nodes in present study, firm consistency was observed in 80% of the patients, which was in comparison with studies of others like Phillip K et al with incidence of 96%.¹⁷

In present study, non-tender nature of lymph nodes were observed in 58% of cases as against the tender lymph nodes of 42%. The similar findings of non-tender lymphadenopathy was observed Phillip K et al and in which the incidence was 68%.¹⁷

Culture

Culture of the organisms from the specimens of throat, ear, scalp and aspirate from the lymph nodes revealed the isolation of the predominant organisms like Streptococci, pseudomonas and Citrobacter, Staphylococci (specimen from both scalp and lymph node aspiration) respectively.

Similar findings were seen in the studies done by Dajani S et al in which streptococci was the predominant from throat specimen.¹⁸

Culture of the ear swab specimen, it was observed that the following organisms were isolated such as pseudomonas, Citrobacter, and *Staphylococcus aureus*, comprising of 40%, 40% and 20% respectively which is in correlation with the study of Ojala KS et al where the reported incidence was pseudomonas and staphylococcus aureus was 19%, 22%.¹⁹ He did not isolate Citrobacter in his studies.

Fine needle aspiration

FNAC was done in 47/50 cases in the evaluation of children with lymphadenopathy for proper establishment of diagnosis and institution of appropriate treatment.

Histopathological examination revealed reactive hyperplasia in 55.4%, tuberculosis in 23.4% and suppurative lymphadenitis in 12.7%. In 3 cases FNAC was not done because peripheral smear examination revealed that the patients are suffering from acute lymphoblastic leukemia. The cytological evaluation in the present study was comparable to the studies observed Vimal et al with minor variation.²⁰

Sensitivity of FNAC

The sensitivity of FNAC in the present study was 71.3%. when it is compared with the studies of other authors the sensitivity was low where the reported sensitivity observed by other authors was as follows such as EI Hag et al, Ramzy et al, Stanfield et al, Buchino et al and Usha R singh et al where the reported sensitivity was 94%, 97%, 98%, 96% and 94% respectively.²¹⁻²⁵

Thus, FNAC as a primary diagnostic test is of value in diagnosing 71.3% of tuberculosis cases. It is helpful in those with benign conditions like reactive hyperplasia to rule out underlying serious systemic disease and reassuring patients. It is helpful in pyogenic cases to obtain material for culture and sensitivity there by instituting antibiotic treatment.

Cause of lymphadenopathy

Analysis of the causes of lymphadenopathy, it was reported that tonsillitis, otitis media, scalp infection, orodental infection, tuberculosis, leukemias and unknown causes were the major etiological factors for causing

lymphadenopathy comprising of 20%, 12%, 4%, 6%, 30%, 6%, 6% and 12% respectively.

Tuberculosis, tonsillitis, otitis media and unknown cause were the major etiological factors causing lymphadenopathy comprising of 74%. Among all the etiological factors tuberculosis was the major cause of concern for causing lymphadenopathy which is totally preventable by giving BCG vaccination and appropriate treatment to the patients who are having open tuberculosis. The present incidence of various etiological factors causing lymphadenopathy with other authors from various places like Annam et al, the incidence was comparable with their study with minor variation.²⁶

Only the present study reported that 6% of the patients who were having generalized lymphadenopathy found to have acute lymphoblastic leukemia.

CONCLUSION

Lymphadenopathy is one of the most common clinical entity in which the child is brought to the department of pediatrics for evaluation to establish the diagnosis and also for institution of appropriate treatment. So, the incidence of lymphadenopathy is more in the age group of 4-8 years which are in the lymphoid phase of development. The incidence of cervical lymphadenopathy is more when compared with other sites because of location of more number of lymph nodes in the neck and also the incidence of diseases are more common in and around the oral cavity. The common presentation of any disease either local or systemic is lymphadenitis. Lymphadenitis is not a disease, but it is the expression of the underlying disease process. So, detailed examination of the patient is very important to unearth the underlying disease process.

After thorough examination routine investigations like TC, DC, ESR, Mantoux test X-ray chest are very important to establish the diagnosis like tuberculosis. Mantoux test is a simple skin test which is easily available in remote areas of India is very useful to diagnose tuberculosis. X-ray chest is also very useful to diagnose primary complex and also disseminated tuberculosis. All the investigations are complimentary to each other. FNAC is a simple bed side investigation though traumatic is of immense value for diagnosing various cases. Even though it may not be a replacement for lymph node biopsy, it is preferred as a first line investigation because of its simple procedure.

In the present study the incidence of reactive hyperplasia was more followed by tuberculosis. In developing countries like India whenever a patient attends the department of Paediatrics with lymphadenopathy it is always be prudent to exclude tuberculosis, which is quite prevalent. FNAC is helpful in those with benign conditions like reactive hyperplasia to rule out underlying serious systemic diseases and reassuring the parents.

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