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Original Research Article

Clinical profile of cervical lymphadenopathy and to find diagnostic efficacy of fine-needle aspiration cytology, ultrasonography and histopathological examination

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ABSTRACT

Background: Cervical lymphadenopathy is the sign of a disease process which involves lymph nodes that are anomalous in uniformity and dimensions. It is very vital to exercise fine-needle aspiration biopsy, histopathological investigation, and ultrasonography for the diagnosis of palpable lesions.
Methods: This is a prospective study of 12-month duration from January 2018 to December 2018 in 61 patients presenting with cervical lymphadenopathy admitted in the ENT Department at Geetanjali Medical College and Hospital, Udaipur.
Results: In biopsy, most common diagnosis was chronic granulomatous lymphadenitis i.e. in 62.3% of the patients. As compared to biopsy, fine-needle aspiration cytology (FNAC) showed chronic granulomatous lymphadenitis in 46% of the patients, with overall sensitivity of 91.1%, and specificity of 60.0%. and accuracy of 88.5%. Whereas ultrasonography (USG) reported, 64% cervical lymphadenopathy in patients, with overall sensitivity came out to be 91.1%, specificity to be 40.0%, accuracy was 86.9%.
Conclusions: Present study showed that biopsy is the gold standard procedure for diagnosis of cervical lymphadenopathy lesions followed by FNAC, USG. Tuberculous lymphadenitis was most common diagnosis made by the diagnostic modalities.

Keywords: Cervical lymphadenopathy, USG, FNAC, Histopathological examination

INTRODUCTION

In India, the commonest cause related to cervical lymphadenopathy is tuberculosis lymphadenitis which is a common sign of extra-pulmonary tuberculosis since tuberculosis is the major global health problem because of social and economic issues.[1]

Lymph nodes are organs which are present in the region of the neck, chest, abdomen, and groin. Neck has around 1/3rd of the overall lymph nodes that are there in a body.[2]

There is decipherable indication of a clinical manifestation if a lymph node is enlarged more than 1 cm.

Lymphoid tissues constitute lymph nodes, and are situated length-wise of the lymphatic vessels. When these tissues flow all over the body, they perform the function of filters for the lymphatic fluid. The lymph nodes enclose T and B cells apart from dendritic cells that form a part of the immune system and perform the role of countering disease as well as infections.

The disparity-related diagnoses with regard to lymphadenopathy is huge, and the most significant reasons for it are the self-limited bacterial or viral infections. An exhaustive medical history and careful clinical investigation are imperative in narrowing this disparity-related syndrome.[3]

It is very vital to exercise fine-needle aspiration biopsy for the diagnosis of palpable lesions. Despite the fact that an accurate diagnosis can be carried out clinically, histopathological investigations are mandatory for endorsing the diagnosis. The aforesaid requirements can be taken care of by conducting fine-needle aspiration cytology (FNAC), which can be done with ease and certainty. This process can be done quickly and at a very limited cost as it needs only a specialist-input cytologist.[4]

In case FNAC is ineffective or in case adequate material is not acquired from a preliminary FNAC, the FNAC should be carried out again earlier to undertaking open biopsy.[5,6]

As compared to physical examination, imaging can pinpoint the dimension and distribution of the node more precisely. For the purposes of assessing lymph nodes in superficial such regions as the neck, ultrasound is a noninvasive technique.[7,8]

This survey has been conducted with an objective of gauging relative diagnostic effectiveness of the clinical evaluation, fine-needle aspiration cytology, open biopsy, and ultrasonography. So, that early management of cervical lymphadenopathy can be carried out.

Aim

Primary outcome measure was to evaluate the efficacy and correlate the three different investigation modalities for cervical lymphadenopathy (ultrasonography, fine needle aspiration cytology and biopsy).

Secondary outcome measure was to evaluate the cause of cervical lymphadenopathy based on histopathological diagnosis.

METHODS

Study design and setting

The present study is a prospective study of 12-month duration from January 2018 to December 2018 in 61 patients presenting with chief complaints of cervical lymphadenopathy admitted in the ENT Department at Geetanjali Medical College and Hospital, Udaipur. The study was conducted after getting ethical clearance from the Ethical committee. Patients and the attendants were informed and counselled regarding the disease process, surgical procedure involved and the expected outcomes, complications and alternative treatments available. Written and informed consent was taken from the patient as well as the attendant.

Study period

The duration of study was one year from January 2018 to December 2018.

Sample size

61 patients from the Outpatient Department of ENT at the Geetanjali Medical College and Hospital, Udaipur.

Inclusion criteria

All age groups, all sexes, patients with cervical lymph node (unilateral or bilateral) more than 1 cm in size and patient with history of tuberculosis and on anti tubercular treatment were included.

Exclusion criteria

Secondaries of neck due to primary tumor, patients with head and neck tumor, patient not ready for excisional biopsy and patients unfit for open biopsy under general anesthesia were excluded.

Procedure

In the study, patients visiting ENT out-patient department with cervical swelling were admitted, evaluated and investigated after obtaining informed consent from the patient as well as the attendant.

A detailed and precise history including age, sex, duration of symptoms, and history of contact with tuberculosis patient was carried out. Comprehensive clinical examination-findings of the lymph node for site, size, laterality, number, mobility, uniformity, tenderness, extent of cervical lymph node, and systemic inspection was carried out. All basic routine investigations required for general anesthesia were carried out in all patients.

Thereafter, USG, FNAC were conducted and data was collected.

Excisional biopsy was carried out after excluding patients with metastasis based on FNAC outcomes, and was sent for histopathological investigation where it was studied thoroughly.

All biopsies were done under general anaesthesia.

Such patients who had cytological or histopathological confirmed tubercular lymphadenitis were referred to DOTS clinic for (ATT) anti tubercular cure with four drugs regimen for the first two months and thereafter two drugs extension for four months.

Findings on ultrasonography was categorized into 7 categories (Table 4).

The diagnostic efficacy of FNAC, USG, biopsy was earmarked.

Diagnostic biopsy is considered to be gold standard technique in evaluation of cervical lymphadenopathy.[11]

The data was compiled, analysed, and tabulated for securing the statistical and comprehensive outcomes. The rate of recurrence and aetiology of cervical lymphadenopathy correlated with outpatients was earmarked.

Standard statistical analysis was done and statistical package for the social sciences (SPSS) Software was used to analyze the data.

RESULTS

A total of 61 patients were included in the study with mean age of 29.6 years (Table 1) with male to female ratio of 1.03:1 (Table 2). The most common complaint was unilateral neck swelling i.e. in 77% of the patients with duration of 16 months. In FNAC most common diagnosis was chronic granulomatous lymphadenitis i.e. in 46% of the patients, followed by reactive lymphadenitis in 26.2% and acute inflammatory lesions in 14.8% of patients (Table 3). Overall sensitivity for FNAC was found to be 91.1%, specificity of 60%, Positive predictive value of 96.2%, negative predictive value of 37.5%, Accuracy of 88.5% (Table 9a) and p value of 0.014, making it statistically significant (Table 9).

Table 1: Age distribution of study subjects.

Age groups (in years)	N	%
0 to 15	8	13.1
16 to 30	32	52.5
31 to 60	19	31.1
61 & above	2	3.3
Total	61	100.0
Average	29.66 yrs	
SD	14.15 yrs	
Median	27 yrs	
Min	2 yrs	
Max	80 yrs	

Table 2: Sex distribution of study subjects

Sex	N	%
Male	31	50.8
Female	30	49.2
Total	61	100.0

Table 3: Distribution of lesions on FNAC.

FNAC	N	%
Chronic granulomatous lymphadenitis	28	45.9
Reactive lymphadenitis	16	26.2
Acute inflammatory lesion	9	14.8
Abscess	2	3.3
Chronic lymphadenitis	1	1.6
Others	5	8.2
Total	61	100.0

Table 4: Distribution of lesions on ultrasonography.

USG	N	%
Cervical lymphadenopathy with Tubercular Aetiology	6	9.8
Cervical lymphadenopathy	39	63.9
Cervical lymphadenopathy with abscess	2	3.3
Abscess	3	4.9
Cervical lymphadenopathy with metastatic etiology	2	3.3
Necrotic cervical lymphadenopathy	6	9.8
Others	3	4.9
Total	61	100.0

Table 5: Histopathological diagnosis (biopsy).

Biopsy histopathological examination	N	%
Chronic granulomatous lymphadenitis	38	62.3
Reactive lymphadenitis	16	26.2
Acute inflammatory lesion	2	3.3
Abscess	2	3.3
Chronic lymphadenitis	1	1.6
Others	2	3.3
Total	61	100.0

In USG, 64% reported cervical lymphadenopathy, with overall Sensitivity coming out to be 91.1%, specificity to be 40.0%, accuracy was 86.9% (Table 10a) with p value of 0.096 (Table 10).

All the three different modalities FNAC, USG, Biopsy were correlated with each other as shown in (Table 6-8).

In biopsy, most common diagnosis was chronic granulomatous lymphadenitis i.e. in 62.3% of the patients, followed by reactive lymphadenitis in 26.2% and followed by acute inflammatory lesions in 3.3%. (Table 5). Level 2 (upper jugular nodes) was the most common level of cervical lymph node involvement.

Table 6: Correlation between FNAC and biopsy histopathological examination.

FNAC	Total cases	Biopsy histopathological examination						P value
		Chronic granulomatous lymphadenitis	Reactive lymphadenitis	Acute inflammatory lesion	Abscess	Chronic lymphadenitis	Others	
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	
Chronic granulomatous lymphadenitis	28	26 (92.9)	2 (7.1)					<0.001
Reactive lymphadenitis	16	5 (31.3)	11 (68.8)					
Acute inflammatory lesion	9	3 (33.3)	2 (22.2)	2 (22.2)		1 (11.1)	1 (11.1)	
Abscess	2	1 (50)			1 (50)			
Chronic lymphadenitis	1	1 (100)						
Others	5	2 (40)	1 (20)		1 (20)		1 (20)	
Total	61	38 (62.3)	16 (26.2)	2 (3.3)	2 (3.3)	1 (1.6)	2 (3.3)	

Table 7: Correlation between USG and biopsy histopathological examination.

USG	Total cases	Biopsy histopathological examination						P value
		Chronic granulomatous lymphadenitis	Reactive lymphadenitis	Acute inflammatory lesion	Abscess	Chronic lymphadenitis	Others	
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	
1	6	5 (83.3)		1 (16.7)				<0.001
2	39	24 (61.5)	13 (33.3)	1 (2.6)				
3	2	2 (100)						
4	3	2 (66.7)			1 (33.3)			
5	2					1 (50)	1 (50)	
6	6	4 (66.7)	1 (16.7)				1 (16.7)	
7	3	1 (33.3)	2 (66.7)					
Total	61	38 (62.3)	16 (26.2)	2 (3.3)	2 (3.3)	1 (1.6)	2 (3.3)	

Table 8: Correlation of FNAC and USG.

FNAC	Total cases	USG							P value
		1	2	3	4	5	6	7	
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	
Chronic granulomatous lymphadenitis	28	5 (17.9)	17 (60.7)	1 (3.6)	2 (7.1)		3 (10.7)		0.213
Reactive lymphadenitis	16		12 (75)				2 (12.5)	2 (12.5)	
Acute inflammatory lesion	9	1 (11.1)	4 (44.4)	1 (11.1)		2 (22.2)		1 (11.1)	
Abscess	2		1 (50)		1 (50)				
Chronic lymphadenitis	1		1 (100)						
Others	5		4 (80)				1 (20)		
Total	61	6 (9.8)	39 (63.9)	2 (3.3)	3 (4.9)	2 (3.3)	6 (9.8)	3 (4.9)	

Table 9: Correlation between FNAC and biopsy histopathological examination.

FNAC	Biopsy histopathological examination				P value
	Negative		Positive		
	Frequency	%	Frequency	%	
Negative	3	60.0	5	8.9	0.014
Positive	2	40.0	51	91.1	
Total	5	100	56	100	

Table 9a: Sensitivity, specificity, positive predictive value, negative predictive value of FNAC.

Sensitivity	Specificity	PPV	NPV	Accuracy
91.1%	60.0%	96.2%	37.5%	88.5%

Table 10: Correlation between USG and biopsy histopathological examination.

USG	Biopsy histopathological examination				P value
	Negative		Positive		
	Frequency	%	Frequency	%	
Negative	2	40.0	5	8.9	0.096
Positive	3	60.0	51	91.1	
Total	5	100	56	100	

Table 10a: Sensitivity, specificity, positive predictive value, negative predictive value of ultrasonography.

Sensitivity	Specificity	PPV	NPV	Accuracy
91.1%	40.0%	94.4%	28.6%	86.9%

DISCUSSION

In developing countries like India, tuberculous lymphadenitis is the most common form of extra pulmonary tuberculosis and arises as a result of lymphatic spread from primary focus.[1]

Our present study included 61 patients with cervical lymphadenopathy. whereas, Similar study was done by Rao et al and Khadka et al where 46 and 67 patients were recruited.[9,10] In contrast to our study, Mili et al conducted study on 112 patients.[2]

The mean age in our study was 29.66 with standard deviation of 14.15 years which was also seen in a study done by Biswas et al who reported most of the patient belonged to 15-59 years (65.2%) with mean age of 29.04.[11] This was similar to another study done by Motiwala et al who reported most common age group 13 to 20 years (39.13%) followed by 21 to 30 years (28.70%).[12] Another study was done by Rao et al and Gorle et al who also reported 21 to 30 years (32.6%) as the most common age group.[9,13] In our present study, the youngest patient was of 2 years' age and oldest was of 80 years of age.

Cervical lymphadenopathy is more common in males. In our study, 31 (50.8%) were males and 30 (49.2%) were females, with male to female ratio (1.03:1) almost equal. In contrast, a study done by Mili et al reported 79 (70.53%) were males and 33 (29.47%) were females (M:F=2.39:1).[2] Motiwala et al also reported male to female ratio was 1.61:1.[12] The frequently affected age group was 21 to 30 years in male (19.13%) and 13 to 20 years in females (23.48%). This difference was statistically significant ($p<0.001$; $z=-5.302$ Z test of proportion). Study done by Rao et al and Gorle et al.[9,13] Male to female ratio was (1:1.09) and (1.22:1).

Unilateral neck swelling i.e. in 77% of the patients is the most common clinical presentation in the present study. Motiwala et al who reported tuberculosis lymphadenopathy patients (49.57%) presented with unilateral lymph node involvement.[6] Majority of the cases presented before 6 months' duration with average duration of complaint is 249.3 days.

In our study, history of anti tuberculosis treatment was positive in 44.3% of the cases i.e. in 27 patients. In a study conducted by Rao et al and Mili et al.[2,9] There was a contact with tuberculosis patients in 6 cases (13%) and 4 cases (6.15%) respectively.

The most common neck mass in children is due to reactive lymphadenopathy which presents with constitutional symptoms such as anorexia, general malaise and a painful neck mass. Where as tuberculous lymphadentitis presents with painless neck mass with evening rise of temperature and weight loss.

In our study, weight loss was present in 31.1% of the patients. Painful lymphadenopathy was common in 47.5% of the patients. A 39.3% of the patients reported evening rise of temperature. In a study done by Mili et al reported of 65 cases of tubercular etiology, 18 cases (27.69%) showed the presence of constitutional symptoms, while 6 cases (100%) of reactive lymphadenitis showed the constitutional symptoms.[2] A study by Kumar et al reported neck swelling was the presenting symptom in 78 children (90%).[3] Fever and cough were the presenting symptoms in (89.5%) and (52.3%) of children who presented with reactive lymphadenopathy on biopsy report. History of failure to gain weight and loss of appetite were seen in 31.3% of children.18.6% children had a history of sore throat. Swelling was painless in majority of cases (92.9%) and pain in swelling was seen in (7.1%). In 60 (69.7%) of children there were more than one presenting symptoms.

A majority of the patients in our study reported chronic granulomatous lymphadenitis i.e. in 46% of the patients on FNAC followed by reactive lymphadenitis in 16 patients (26.2%). In contrast Annam et al reported most common finding as reactive lymphadenitis in 58% of the patients, followed by granulomatous lymphadenitis in 30.55%, and suppurative lymphadenitis in 7.10%.[16] In study done by Mili et al, 65 cases (58.03%) were detected as tubercular lymphadenitis, 6 cases (5.35%) were detected as reactive lymphadenitis.[2] Motiwala et al reported the most common cause of cervical lymphadenopathy was found to be tuberculosis which was present in 63 cases (54.78%) followed by reactive lymphadenitis in 26 cases (22.61%), chronic nonspecific lymphadenitis in 14 (12.17%) cases and metastatic lymphadenopathy in 9 cases (7.83%).[9]

On USG, a majority of the patients reported cervical lymphadenopathy i.e. in 63.9% of the patients. Cervical lymphadenopathy with tubercular etiology was detected in only in 6 cases (9.8%). Cervical lymphadenopathy with metastasis etiology was detected in 2 cases (3.3%) cases, where as biopsy did not confirm it to be metastatic. Study conducted by Khanna et al.[14] On ultrasonography, the long axis to short axis ratio of reactive lymph nodes was highest at 2.2 followed by 1.8 in tubercular, 1.5 in lymphoma and least in metastatic lymph nodes at 1.2 ($p<0.01$). When overall USG was correlated with biopsy report, sensitivity came out to be 91.1%, specificity to be 40.0%, positive predictive value to be 94.4%, negative predictive value to be 28.6%. Overall accuracy was found to be 86.9% with (p value=0.096) stating it to be not statistically significant It suggests that ultrasonography is not the only investigation to be done to find out the etiology of cervical lymphadenopathy. Excisional biopsy is needed to confirm the etiology.

In our study majority of the patients (63%) were reported as chronic granulomatous lymphadenitis on biopsy.

Level 2 (upper jugular group) of cervical lymph node was found to be the most common level involved in the present study i.e. in 67.2%. Upper jugular group (level-2) was the commonest to get involved in tuberculosis (30.76%) which was reported by Mili et al.[2]

Motiwala et al reported submandibular nodes involved in 51 cases (44.35%), upper deep cervical nodes (level 2) were involved in 48 cases (41.74%), middle deep cervical in 39 cases (33.91%), lower deep cervical node in 9 cases (7.83%), and posterior group of nodes in 15 cases (13.04%).[6] Gorle et al reported posterior triangle of neck as commonly involved in tubercular etiology followed by level 2 (21.5%).[13]

In our present study sensitivity of FNAC to diagnose chronic granulomatous lymphadenitis was 68.4%, specificity was 91.3%, positive predictive value was 92.9%, negative predictive value is 63.6%, accuracy is 77%. P value is less than 0.001. Sensitivity of FNAC to diagnose reactive lymphadenitis was 68.8%, specificity was 88.9%, positive predictive value was 68.8%, negative predictive value is 88.9%, accuracy is 83.6%. P value is less than 0.001 making it highly significant. FNAC was fairly accurate in diagnosing cases of cervical lymphadenopathy. Gorle et al reported sensitivity and specificity of FNAC for diagnosing tuberculous lymphadenitis is 80.4% and 100% respectively FNAC was able to diagnose tuberculosis only in 41 out of 51 patients of tuberculosis with other cases diagnosed as chronic non-specific lymphadenitis.[13] There was no false positive case.

In a study done by Mili et al reported that FNAC can be deemed as a frontline investigation with both sensitivity and specificity for malignant secondaries was 100% whereas for tuberculosis sensitivity was only 86.20% and specificity was 100%.[2] Another study done by Gupta et al reported FNAC could achieve 100% sensitivity and 96.7% specificity for tubercular lymphadenopathy with positive predictive value to be 90% and negative predictive value to be 100%.[15]

A study done by Deeva et al reported the sensitivity and specificity of FNAC for tuberculosis is 95.4% and 83.3%. and for chronic nonspecific lymphadenopathy is 93.75% and 96.66%.[3]

Khadka et al reported, sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy for granulomatous lymphadenopathies were 90.0%, 98.0%, 90.0%, 98.0% and 97.01% respectively.[10] In this study 9 (13.43%) cases, cytological diagnosis was not correlating with histopathological diagnosis but FNAC and histopathology correlated in 86.57% cases. This concluded that FNAC is very simple and accurate technique and can distinguish tubercular lymphadenitis from reactive and granulomatous lymphadenitis in majority of cases.

Similarly, Kartikranjan et al concluded that the sensitivity and specificity of FNAC for diagnosing tuberculous lymphadenitis is therefore 86% and 100% respectively.[17]

In our study, sensitivity of FNAC was 91.1%, in a study done by Motiwala et al.[6] Sensitivity of FNAC in diagnosis of tuberculosis was found to be 79.36% whereas specificity was found to be 100%.

Khanna et al reported ultrasonographic examination of cervical lymph nodes can yield important information regarding the diagnosis.[14] A lymph node biopsy can often be avoided by utilizing a combination of FNAC and ultrasonographic examination of the neck nodes. But to avoid any disparity-related diagnoses with regard to lymphadenopathy, and to start early anti tubercular treatment biopsy is regarded as the gold standard investigation.

CONCLUSION

From this study it can be concluded that in diagnosis of cervical lymphadenopathy FNAC is more reliable than ultrasonography and is easy to perform, cost effective and speedy results can be obtained. Gold standard is open biopsy.

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