

Diagnostic Accuracy of Fine Needle Aspiration Cytology in Work Up of Cervical Lymphadenopathy

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ABSTRACT

Background: Fine Needle Aspiration Cytology (FNAC) is an inexpensive quick and simple method that is used to sample superficial cervical lymph nodes. FNAC is important in the early diagnosis of the cervical lymphadenopathy, and is also helpful in directing the appropriate investigations.

Objective: To determine the diagnostic sensitivity and accuracy of Fine needle aspiration cytology in the workup of cervical lymphadenopathy.

Material and Methods: This was a prospective descriptive study conducted at the Pathology and ENT Department, Gajju Khan Medical College Swabi and Ayub Medical College Abbottabad from January 2015 to December 2015. A total of 100 patients of cervical lymphadenopathy fulfilling the inclusion criteria were included in the study. FNAC was performed and the diagnosis was made which was later on compared with histopathological diagnosis. The diagnostic sensitivity and accuracy was calculated

Results: A total of 100 patients were included with age ranging from 1 to 64 years with a mean age of 35.2 years with majority of patients from 3rd to 6th decade. The diagnostic sensitivity, specificity, positive predictive value and negative predictive value of FNAC in cervical lymphadenopathy were 87.5%, 98.6%, 95.4% and 96.1% respectively. The overall diagnostic accuracy was 96% (96/100) while the overall discordance score was 4% (4/100)

Conclusion: FNAC provides as reliable result as histopathology and is cost effective and less traumatic.

Key Words: FNAC, cervical lymphadenopathy, Sensitivity, accuracy

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INTRODUCTION

The immune system consisting of lymph nodes, spleen, tonsils, adenoids and Peyer patches remove antigens from the extracellular fluid.¹ There are about 800 lymph nodes in the whole body and 300 of them are present in the neck.² An atypical increase in the size and/or changed texture of lymph nodes is known as lymphadenopathy. Any localized or generalized disease process may be a cause of lymphadenopathy.^{3,4} In Asian and African countries tuberculosis is a common disease to cause enlargement of lymph nodes.^{5,6} The frequency of various etiological processes for lymph nodes enlargement varies with geographical condition and socio-economical setup.^{7,8} Clinical workup is recommended if lymphadenopathy fails to resolve after two months.⁹ Different modalities used for the assessment of cervical lymphadenopathy includes Fine Needle Aspiration Cytology (FNAC), ultrasound guided biopsy and an

excisional biopsy.^{2,10} FNAC is an inexpensive Quick and easy method, used to sample superficial cervical lymph nodes.¹¹ FNAC has emerged as a standard diagnostic tool and frequently performed less invasive method in the investigation of cervical lymphadenopathy. FNAC is cheap, accurate and relatively pain free.^{9,12}

Aspirated material from the lymph nodes varies in cellularity and the result may vary from a confirmed diagnosis to a suspicion of malignancy and asking for histopathology.^{13,14} FNAC may yield an accuracy of 79 % to 94.5 % in cases of lymphadenopathy due to carcinomas. In tuberculosis the diagnostic accuracy of FNAC of the lymph nodes may range from 87 to 100%, compared to the histopathology. An increased incidence of non diagnostic sampling, increased false negative result in Hodgkin lymphoma and insufficient classification of non-Hodgkin disease are the shortfalls of FNAC.^{3, 11,14} The objective of this research is to determine the diagnostic sensitivity of FNAC in cervical lymphadenopathy and its value in diagnostic importance amongst doctors.

MATERIAL AND METHODS

A Descriptive study conducted at the Pathology Department, Ayub Medical College Abbottabad & Gajju Khan Medical College Swabi from 1st Jan 2015 to 31st Dec 2015 including one hundred patients using purposive sampling technique.

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Patients included were those referred for FNAC by general or ENT surgeons with history of cervical lymphadenopathy. Patients having cervical lymphadenopathy less than four weeks duration or other neck swelling (like thyroglossal duct cyst, branchial cyst lipoma, sebaceous cyst and enlarged thyroid) and pus on aspiration were excluded. Informed written consent was taken from every patient before procedure as part of ethical practice.

Demographic information like name, age and gender were obtained. A short history (about the duration of swelling, onset, progression, associated features like dysphagia hoarseness of voice fever and weight loss), clinical examination (size, consistency, mobility of swelling, overlying skin and fixity to surrounding structures) and some base line investigations (like FBC,ESR,ICT for TB, x-ray Chest for suspected tuberculosis & serum LDH for suspected lymphoma) were made as and when necessary. The FNAC was done by a qualified histopathologist (having FCPS & minimum 5 years working experience. FNAC was done by attaching a 24G needle to a 20 ml syringe and Franzen handle. Lymph node aspirates were taken from multiple points allowing only three passes and was put onto the slides. In all the cases, 4-6 slides were prepared. 2 slides were air dry and then immersed in 90% methanol and stained with Diff-Quik and remaining 4 slides were

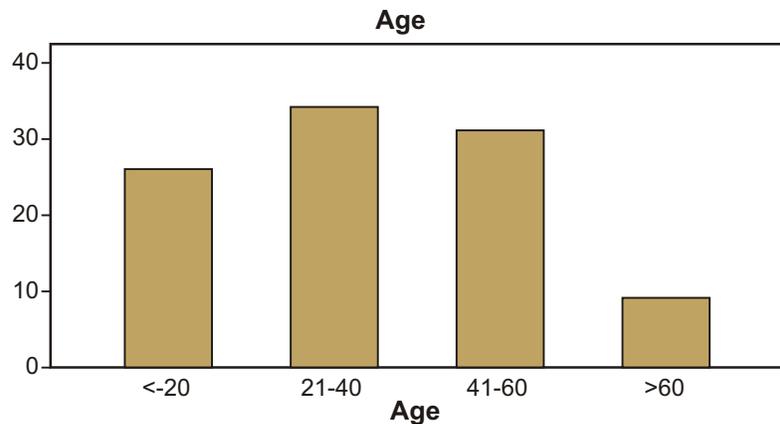
instantly dipped in ethanol 90% solution. Staining was done by H & E, PAP and Ziel Neelson (ZN) stain and for lymphoma when needed. The slides were studied by the histopathologist to make a most likely diagnosis by microscopic histopathological features and clinical correlation was made. Any complication was noted and recorded in Performa. The results of FNAC were categorized as benign malignant and suspicious and then compared with the histological diagnosis.

In statistical analysis, age and duration of cervical lymphadenopathy were calculated by mean \pm standard deviation while gender and pattern of lymphadenopathy by Frequency and percentages. All the results were represented as tables/charts. The stored data was analyzed by using SPSS version 16.

RESULTS

In this study there were 100 patients. The age of patients was from 1 to above 60 years having a mean age of 35.2 ± 2.99 and majority of patients with lymphadenopathy were from 3rd to 6th decade as shown in Fig 1. Gender wise 63% were males and 37% females. The most affected lymph nodes were upper cervical then submandibular subsequently and majority presented with single lymph node (67%), involving unilateral (93%) side of neck.

Figure1. AGE



On FNAC 52 were tuberculous lymph nodes, 26 were reactive or having non-specific lymphadenopathy, 15 were metastatic carcinoma while 7 were suspicious of lymphoma. The cytomorphological diagnosis on FNAC was compared with the histopathological diagnosis.

Among 52 tuberculous patients on FNAC, 50 (96%) cases were having tuberculosis on

histopathology also while 2 cases turned out that of lymphoma. Among 26 patients of reactive or non-specific lymphadenitis, 20 were reactive and 5 were tuberculous on histopathology with one case of lymphoma. Among 15 cases of metastatic lymph nodes,(biopsy samples were sent by the concerned ENT and general surgery departments) 12 were having squamous cell carcinoma on histopathology also while 1 patient

Each of malignant melanoma, adenocarcinoma and spindle cell carcinoma, with 100% accuracy of FNAC. Among 7 cases of lymphoma, 6 cases

were of lymphoma on histopathology also while one case turned out to be tuberculous. (Table 1)

Table 1. Comparative Analysis Of FNAC Diagnoses and Histopathological Diagnoses and Accuracy Of FNAC

Type of Tumor	Cytological Diagnosis(FNAC)	No. of Cases	Histopathological diagnosis				Accuracy (%)
			Reactive	T.B	Metastatic	Lymphoma	
Benign	Reactive	26	20	5	-	1	76.92%
	T.B	52	-	50	-	2	96.15%
Malignant	metastatic	15	-	-	15	-	100%
	Lymphoma	7	-	1	-	6	85.7%

So in 78 benign cases on FNAC, 75 cases were presented to be benign (True negative) and 3 cases were diagnosed as malignant on histopathology (false negative) while in 22 malignant cases on FNAC, 21 came out as malignant on histopathology (true positive) and 1 was benign on histopathology (false positive).

The overall diagnostic sensitivity and specificity of FNAC was 87.5% and 98.6% while positive predictive value and negative predictive value were 95.4% and 96.1% respectively. The likelihood ratio for positive and negative test result was 66.5 and 0.13 respectively. To determine the

diagnostic accuracy of FNAC the cytomorphological diagnosis is compared with histopathological result of excised lymph nodes. So the overall diagnostic accuracy was 96% (96/100) while the overall discordance score was 4% (4/100) as shown in Table 2.

The 95% confidence interval of the sensitivity ranged from 66.5% to 96.75% while the specificity range was 91.81% to 99.91%. The positive predictive value (PPV) ranged from 78.2% to 99.19% while the negative predictive value (NPV) from 89.29% to 98.68% as seen in Table 2

Table 2. Comparison of FNAC With Histopathology Along With Different Statistical Parameters

FNAC		Histopathology		
		Malignant	Benign	Total
	Malignant	21	1	22
	Benign	3	75	78
		24	76	100

Parameter	Estimate Lower - Upper 95% CIs	
Sensitivity	87.54%	(66.54, 96.75 ¹)
Specificity	98.65%	(91.8, 99.91 ¹)
PPV	95.45%	(78.20, 99.19 ¹)
NPV	96.15%	(89.29, 98.68 ¹)
Diagnostic Accuracy	96%	
Discordance Score	4%	
Likelihood ratio for positive test result	66.50	(9.43, 468.78 ¹)
Likelihood ratio for negative test result	0.13	(0.04, 0.37 ¹)

DISCUSSION

In this study 100 cases of cervical lymphadenopathy referred for fine needle aspiration cytology were included. The role of fine needle aspiration was established by comparing the cytological diagnosis of FNAC with the histological diagnosis.

In the present study the age was ranging from 1 to 64 years having a mean age of 35.2±2.9 years. Majority of patients were in 3rd to 6th decade which are consistent with the study done by Prasad¹⁵ and in the study of Pandit et al¹⁶ whereas Gupta et al.¹⁷ showed that majority of patients 532(52.3%) were in the age group of 0-20 years.

In our study male were predominating and M:F was 1.9:1. Also Ahmad et al¹¹, Hirachand et al¹⁸ and Prasad¹⁵ in their study had similar results.

In our study 52 (52%) cases were of tuberculous lymphadenitis on FNAC while 26 as non specific or reactive lymphadenitis which is comparable to the study of Khajuria et al¹³, Prasad¹⁵, Hirachand et al¹⁸ and Guru et al¹⁹. All lymph nodes were biopsied and the histopathology was compared with FNAC results. In tuberculous lymph nodes the diagnostic accuracy of FNAC was 96.15% which is similar to the study of Prasad¹⁵ with 100% accuracy while Narang et al²⁰ had 87% accuracy. The diagnostic accuracy in nonspecific or reactive lymphadenitis was 76.9% which is similar to Prasad¹⁵ with 75% accuracy in reactive lymphadenitis. Hafez and Tahoun²¹ had 85% diagnostic accuracy of FNAC while Keith et al²² reported 88 % accuracy & AIMulhim et al²³ who had 100% diagnostic accuracy in reactive lymphadenitis.

On Histopathology of metastatic lymph nodes, all 15 were malignant with 12 cases were of squamous cell carcinoma while each case of adenocarcinoma, malignant melanoma and spindle cell carcinoma was also seen. The diagnostic accuracy in metastatic lymphadenopathy was 100 % which are consistent with the results of Hafez and Tahoun²¹ and the study of Hirachand et al¹⁸ with 100 % accuracy While the studies of AIMulhim et al²³, Ahmad et al²⁴ and Alalwan²⁵ had a diagnostic accuracy of more than 90%. In 7 cases of lymphoma the accuracy was 85.7% which are near to Pandav et al²⁶ with 85.4 % accuracy while Prasad¹⁵ in his study had 100% accuracy.

According to our study the sensitivity, specificity, positive predictive value(PPV) and negative predictive value(NPV) of FNAC in cervical (upper neck) lymphadenopathy was 87.54%, 98.65%,95.45% and 96.15% respectively which are comparable with the study of Rakshan and Rakshan²⁷, Hafez and Tahoun²¹.

The overall diagnostic accuracy of FNAC was 96% in this study which is near to the results of Ahmad et al²⁴ who had 97.6% accuracy. Most of the researchers have documented 85% to 94.4% diagnostic accuracy of FNAC in their studies like by Rakshsan and Rakshsan²⁷ AlAlwan et al²⁵. The study of Hafez and Tahoun²¹ had 82.2% diagnostic accuracy.

So FNAC is an easy and cost effective procedure which alone can help in establishing majority of causes of cervical lymphadenopathy if performed by an expert histopathologist.

CONCLUSION

Fine needle aspiration cytology is less invasive, easy and cheaper tool in workup of cervical lymphadenopathy and is the primary diagnostic tool if compared to histopathology. It can provide the diagnosis in majority of cases in less time if performed by an expert histopathologist. Fine needle aspiration cytology is an easy procedure and should be done first before taking biopsy in cervical lymphadenopathy.

Study Limitation

The FNAC needs to be compared with histopathology which is a gold standard technique.

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AUTHOR'S CONTRIBUTION
 Following authors have made substantial contributions to the manuscript as under

Jamil A, Muhammad R: Concept and design of study, Collection of data, statistical analysis
Naeem S, Rehman S: Writing of manuscript, critical review of manuscript
Abbas A: Analysis and interpretation of data, statistical analysis
Rehman F: Data collection, bibliography

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.