

DIAGNOSTIC VALUE OF FINE NEEDLE ASPIRATION CYTOLOGY IN DIAGNOSIS OF NON-THYROIDAL NECK MASSES

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ABSTRACT

Objective: To determine the diagnostic value of fine needle aspiration cytology in the diagnosis of non-thyroidal neck masses.

Methodology: This descriptive study was conducted at the Department of ENT, Lady Reading Hospital Peshawar from January to December 2009. Hundred patients with non-thyroidal neck masses fulfilling the inclusion criteria were included in the study. Fine needle aspirations were performed by the same cytopathologist.

Results: The findings were TB 31%, metastatic lymph node 19%, reactive lymphadenopathy 9%, lymphoproliferative disease 11%, pleomorphic adenoma 8%, thyroglossal cyst 5%, carotid body tumour 4%, lipoma and branchial cysts were 3% each, sialolithiasis 2% and one case each of dermoid, sebaceous cyst, adenoid cystic carcinoma, Kikuchi's disease and Ewing's tumour. Correlation of FNAC with biopsy was for TB; true positive, 64.5%, true negative 29.03%, false positive 3.22%, false negative 3.22% and for metastatic lymph node true positive 57.89%, true negative 36.84%, false positive 5.26% and no case of false negative. The diagnostic yield of FNAC was for TB, accuracy, sensitivity, specificity, positive predictive value and negative predictive value were 93.54%, 95.23%, 90%, 95.23% and 90% respectively. Metastatic lymph nodes accuracy sensitivity, specificity, positive predictive value and negative predictive value were 94.73%, 100%, 87.5%, 91.66% and 100% respectively. Overall diagnostic value of FNAC in non-thyroidal neck masses with regard to accuracy, sensitivity, specificity, positive predictive value and negative predictive value were 90%, 90%, 77.42%, 90.41%, 90.41%, and 88.89% respectively.

Conclusion: Fine needle aspiration cytology for non-thyroidal neck masses has equal diagnostic yield to open biopsy.

Key Words: Fine Needle Aspiration Cytology (FNAC), Non-Thyroidal neck masses, Histopathology, Cervical lymph adenopathy.

INTRODUCTION

Neck is a complex structure having multiple organs. Neck mass is a common clinical problem presenting to every Otolaryngologist as a diagnostic dilemma. Knowledge of the various facial spaces and anatomical compartments of the neck helps in the differential diagnosis of non-thyroidal neck masses¹. Fine Needle Aspiration Cytology (FNAC) is a clinical technique used to obtain cells, tissues and/or fluid through a thin needle (22-27G) attached with 10 or 20 ml disposable syringe for the purpose of diagnosis and management of masses². Fine Needle Aspiration Cytology was first performed on large scale at

Memorial Hospital New York by Dr. Hayes Martin during the 1930 and gained popularity throughout the world in 1960^{3, 4}. Pitfalls related to the procedure could be misleading information, non-representativeness of samples, contaminations of samples from adjacent tissues, poorly prepared smears, tumour typing and failure of ancillary technique¹. Fine needle aspiration cytology has also limited role in diagnosing lymphoma and has low yield in cystic lesions^{1,5}. Some of the complications are hematoma formations, needle tract implantation, vascular and local dissemination of tumor cells^{1,5}. De May has summarized the advantages of fine needle aspiration cytology with the acronym SAFE means

Simple, Accurate, Fast and Economical^{4, 5}. The procedure of fine needle aspiration cytology is relatively painless, feasible, suitable in debilitated patient, readily repeatable and useful for multiple lesions^{1, 6}. It can easily differentiate between non-neoplastic and neoplastic lesions and is very useful in deep seated masses of head and neck^{5, 6}. The diagnostic yield of fine needle aspiration cytology can be improved if it is accompanied by radiological guidance like ultrasonography and CT scan⁷. Fine needle aspiration cytology can be used as screening technique in metastatic lymphadenopathy^{4,7}. Partnership between the cytopathologist and interventional radiologist provides the highest quality fine needle aspiration cytology service to patient. New developments in molecular diagnosis will provide the cytopathologist additional avenues of pathologic examination of aspirated material^{4, 8}. The outcome of fine needle aspiration cytology can be improved by proper clinical assessment of lesion, careful procedure and adequate smear preparation⁹.

METHODOLOGY

This descriptive study was conducted at the department of Ear, Nose, Throat, Head and Neck Surgery, Postgraduate Medical Institute Lady Reading Hospital Peshawar from Jan. 2009 to Dec. 2009. It included 100 cases of neck masses of non-thyroidal origin and convenient (non-probability) sampling technique was employed. The patients of any age and either sex with non-thyroidal neck masses presented to out-patient department (OPD) or admitted in E.N.T department were included in this study. The Patients with traumatic, acute inflammatory neck swelling and with neck abscess were excluded from study. The diagnostic criteria for non-thyroidal neck mass were triple assessment i.e clinical, radiological and tissue diagnosis. A detailed history was taken and thorough

examination was done. Mucosal lining of upper aero-digestive tract was examined and systemic examination was carried out. Routine investigations were performed in all cases. Ultrasonography, computed tomography and MRI were done where indicated. An informed consent was taken. Those patients in whom fine needle aspiration cytology results were inconclusive were reassessed with open biopsy. Open biopsy was taken under local or general anesthesia and the specimens were examined by the same histopathologist. The statistical analysis was performed using the statistical program for social sciences (SPSS version 11). The frequencies and percentages were presented for qualitative variables and Mean \pm SD were presented for quantitative variables. Sensitivity, specificity, positive predictive value and negative predictive value were calculated for fine needle aspiration cytology taking histopathologic examination as gold standard.

RESULTS

Our study included 100 cases of non-thyroidal neck masses constituting 56 male and 44 female, with male: female ratio of 1.27:1 (Figure 1). The age of the patients ranged from 03-75 years with mean age of $30.55 \pm$ S.D 19.88 years. Most of the patients presented in 2nd and 3rd decade followed by the 1st and 5th decade of life (Figure 2). These patients were from low, middle and high socioeconomic strata of society. The main complaint of these patients was neck-masses which were of non-thyroidal origin with duration from 1 to 8 months with average of 4.5 months duration. The size of the swelling ranged from 2 - 7.2 cm with mean $4.40 \pm$ S.D 1.93 cm. The distribution of various diseases in non-thyroidal neck masses were as that main bulk of the diseases were TB (31%) followed by metastatic lymph adenopathy

Figure 1: Sex-Wise Distribution of Patient (n=100)

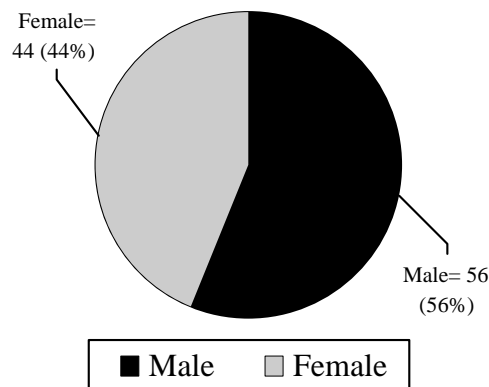
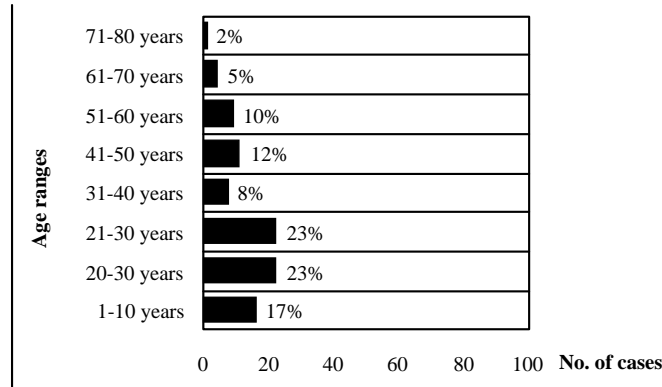


Figure 2: Age-wise Distribution of Patients (n=100)**Table 1: Distribution of Diseases in Non –Thyroidal Neck Masses on FNAC (n=100)**

S. No	Disease	No. of Cases	% age
1	Tuberculosis (TB)	31	31%
2	Metastatic Lymph node	19	19%
3	Reactive hyperplastic lymph node	9	9%
4	Pleomorphic adenoma	8	8%
5	Hodgkin's disease	6	6%
6	Thyroglossal cyst	5	5%
7	Non-Hodgkin's lymphoma	5	5%
8	Carotid body tumour	4	4%
9	Branchial cyst	3	3%
10	Lipoma	3	3%
11	Sialolithiasis	2	2%
12	Sebaceous cyst	1	1%
13	Dermoid cyst	1	1%
14	Adenoid cystic carcinoma	1	1%
15	Kikuchi's disease	1	1%
16	Ewing's tumour	1	1%
TOTAL		100	100%

Table 2: Correlation of FNAC with Biopsy in Non-Thyroidal Neck Disease (n=100)

S. No	Disease	True Positive	True Negative	False Positive	False Negative	Total
1	Tuberculosis	20	9	1	1	31
2	Metastatic lymph node	11	7	1	0	19
3	Reactive hyperplastic lymph node	5	2	1	1	9
4	Pleomorphic adenoma	5	2	0	1	8
5	Hodgkin's disease	5	0	1	0	6
6	Non-Hodgkin's lymphoma	4	1	0	0	5
7	Thyroglossal cyst	3	1	1	0	5
8	Carotid body tumour	1	2	1	0	4
9	Lipoma	3	0	0	0	3
10	Branchial cyst	2	0	1	0	3
11	Sialolithiasis	2	0	0	0	2
12	Dermoid cyst	1	0	0	0	1
13	Sebaceous cyst	1	0	0	0	1
14	Adenoid cystic carcinoma	1	0	0	0	1
15	Kikuchi's disease	1	0	0	0	1
16	Ewing's tumour	1	0	0	0	1

Table 3: Table of frequency of diseases

Test Result (FNAC)	GOLD STANDARD TEST (BIOPSY)		
	Disease	No Disease	Total
Positive	66	7	73
Negative	3	24	27
Total	69	31	N=100

Table 4: The Diagnostic Value of FNAC

S. No	Disease	Accuracy	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
1	Tuberculosis	93.54%	95.23%	90%	95.23%	90%
2	Metastatic lymph node	94.73%	100%	87.5%	91.66%	100%
3	Reactive hyperplastic lymph node	77.77%	83.33%	66.66%	83.33%	66.66%
4	Pleomorphic adenoma	87.5%	83.33%	100%	100%	66.66%
5	Hodgkin's disease	83.33%	100%	0%	83.33%	0%
6	Non-Hodgkin's lymphoma	100%	100%	100%	100%	100%
7	Thyroglossal cyst	80%	100%	50%	75%	100%
8	Carotid body tumour	75%	100%	66.66%	50%	100%
9	Lipoma	100%	100%	0%	100%	0%
10	Branchial cyst	66.66%	100%	0%	66.66%	0%
11	Sialolithiasis	100%	100%	0%	100%	0%
12	Dermoid cyst	100%	100%	0%	100%	0%
13	Sebaceous cyst	100%	100%	0%	100%	0%
14	Adenoid cystic carcinoma	100%	100%	0%	100%	0%
15	Kikuchi's disease	100%	100%	0%	100%	0%
16	Ewing's tumour	100%	100%	0%	100%	0%
	OVERALL	90%	90%	77.42%	90.41%	88.89%

(19%) and lymphoproliferative diseases were 11 % (Table 1). The correlation of Fine needle aspiration cytology with biopsy in Non-Thyroidal Neck Disease is shown (Table 2). The frequency of diseases in this study is shown (Table 3). The diagnostic yield of FNAC in our study for various diseases is as under (Table 4)

DISCUSSION

Fine needle aspiration cytology has become established as an investigation of choice in the diagnosis of non-thyroidal neck masses as it is minimally invasive, does not violate neck, very accurate in most cases and helps in initiation of prompt and appropriate treatment¹⁰. In our study the diagnosis of Tuberculous lymphadenopathy was the most common (31%) of all patients. The diagnosis was based upon the presence of lymphocytes, macrophages, histiocytes of epithelioid type forming cohesive clusters and multinucleated giant cells of Langhan with central caseation. The accuracy of tuberculous lymphadenopathy in the study is 93.54%, which is comparable to the study conducted by Al-Mulhim AS et al¹¹ showing the accuracy of 93%. The sensitivity ,specificity,

positive predictive value and negative predictive values for Tuberculosis were 95.23% , 90%, 91.01% and 89.33% respectively which are comparable to the study of El Hag IA et al¹² having sensitivity and specificity of 97% and 93% respectively. The results of our study are also comparable to other national and local studies of Malik GA et al¹³, Hussain et al¹⁴, Ghazanfar A et al¹⁵, Javaid M and colleagues¹⁶, Khajaria R et al¹⁷. Tuberculosis is the commonest cause of cervical lymphadenopathy in young age people and in the developing countries and should be considered in every case of granulomatous lymphadenopathy unless proved otherwise. The second most common finding of our study was metastatic lymphadenopathy with frequency, accuracy, sensitivity and specificity of 19%, 94.73%, 100% and 87.5% which are comparable to the studies conducted by Al-Mulhim AS et al¹¹ having frequency and accuracy of 91% and 93%, Sheahan P¹⁸ study with sensitivity and specificity of 90% and 95% , El Hag IA¹² study reported accuracy ,sensitivity and specificity of 92.13%, 90.56% and 93% and Sreaton NJ¹⁹ study having accuracy ,sensitivity and specificity of 98.1%, 100%, 98.7%

respectively. The diagnostic yield of FNAC for lymphoproliferative disease in our study with regard to accuracy, sensitivity and specificity was of 91.65%, 100% and 56% respectively which are in keeping with results of Sreaton NJ¹⁹ having accuracy, sensitivity and specificity of 98.7%, 98.3% and 95% respectively. Our results are also comparable with those of international studies conducted by Hag LA et al¹², Khajuria R¹⁷ and local studies conducted by Javaid M et al¹⁶. In our study lymph node hyperplasia was 9% having diagnostic yield in terms of accuracy, sensitivity and specificity of 77.77%, 83.33% and 66.66% which are comparable to the results of Bajwa M²⁰ study having accuracy, sensitivity and specificity of 80.1%, 79.5% and 70.1% respectively. The next common observation of our study was pleomorphic adenoma with diagnostic yield accuracy, sensitivity and specificity of 87.5%, 83.33% and 100% which are comparable to the study of Khajuria R¹⁷ with accuracy, sensitivity and specificity of 84.2%, 81.25% and 95.6% respectively. Other rare disease diagnosed on FNAC in our study were Thyroglossal cyst, Carotid body tumour, Lipoma, Branchial cyst and one case each of Dermoid cysts, Sebaceous cyst, Adenoid cystic carcinoma, Kikuchi's disease and Ewing's tumour. The overall diagnostic yield of Fine needle aspiration cytology in diagnosis of non-thyroidal neck masses in our study in terms of accuracy, sensitivity, specificity, Positive predictive value and Negative predictive value of 90%, 90%, 77.42%, 90.41% and 88.89% respectively is comparable to the studies conducted by Mahbod G¹⁰, Sheahan P¹⁸, Hussain M¹⁴, Al-Mulhim AS¹¹ and in Khajuria R¹⁷. The statistical analysis shows P value of 1.00 in all these cases which suggests that both Fine needle aspiration cytology and Open biopsy have comparable results as the difference between the two methods is not significant.

CONCLUSION

It is concluded from our study that FNAC is a primary diagnostic tool for non-thyroidal neck masses because it is simple, safe, quick, reliable, inexpensive, accurate, minimally invasive, cost effective and suitable for a developing country like Pakistan and can differentiate inflammatory conditions from neoplastic one and can be performed as outpatient procedure. Its pitfalls can be minimized by developing expertise and utilizing accessory techniques.

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