

## ORIGINAL ARTICLE

## FNAC OF HEAD &amp; NECK LESIONS AND ITS UTILITY IN CLINICAL DIAGNOSIS: A STUDY OF 290 CASES

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## ABSTRACT

**Background:** FNAC (Fine Needle Aspiration Cytology) is a well accepted technique and plays an important role in early diagnosis of head and neck lesions. It is a safe and inexpensive outdoor procedure.

**Material and methods:** This was a retrospective observational study of 290 cases of FNACs done on head and neck swellings performed as an outdoor procedure over a 26-month period from January 2011 to February 2013.

**Results:** Aspirates from head and neck lesions in this study were largely from lymph nodes i.e. 185(64.1%), followed by thyroid lesions 49(16.9%), 21 cases were malignant. The largest subgroup among lymph node was of granulomatous lymphadenitis comprising of 91 cases. Out of 290 cases in this study, histopathological correlation was available in 74/290 (25.51%) cases only and was consistent with the cytological diagnoses in 68(91.8%) cases and inconsistent in 6(8.2%) cases.

**Conclusion:** FNAC serves as a guide to the appropriate therapeutic management whether to locally excise a benign tumor or plan radical surgery and helps as an adjunct to histopathology.

**Keywords:** Head & Neck, FNAC, Cytology

## INTRODUCTION:

Lesions of the head and neck region are routinely encountered by clinicians, in patients across all age groups and diagnoses range from reactive hyperplasia of lymph nodes to malignancies. FNAC as a diagnostic technique to evaluate head and neck lesions was first introduced by Martin in 1930, a procedure which has since rapidly gained acceptance due to the easy accessibility of target sites and the minimally invasive nature of this method.<sup>1</sup> Among the most frequently sampled palpable head and neck lesions are lymph nodes, thyroid and major salivary glands along with other rarely encountered lesions like subcutaneous tissue swellings, lumps of skin appendages and oral cavity lesions.<sup>2</sup>

Cancer is among the ten leading causes of death in India, and head and neck neoplasia in India accounts for 23% of all cancers in males and 6% of all cancers in females.<sup>3</sup> The highest incidence of head and neck neoplasia, in the world, among women has been reported from India. A timely FNAC plays an important role in early diagnosis.<sup>4,5</sup>

FNAC, today is one of the most important diagnostic modalities used universally in the initial as-

essment of patients presenting with palpable head and neck region masses. It is an inexpensive, safe, outdoor procedure, with rapid reporting and requires minimal equipment.<sup>6,7</sup> It also gives added advantage, since this outpatient procedure helps to avoid surgery in non-neoplastic or inflammatory conditions. It is repeatable, reduces the rate of exploratory procedure, and provides an early differentiation of benign from malignant pathology.<sup>7,8</sup>

The present study was undertaken to assess the utility of FNAC in diagnosis of head and neck lesions and to establish the diagnostic accuracy of cytology by comparing with the histopathological diagnosis, in as many cases as possible.

## MATERIALS AND METHODS

The present study was undertaken in the Department of Pathology, Hamdard Institute of Medical Sciences and Research and Hakeem Abdul Hameed Centenary Hospital, New Delhi from January 2011 to February 2013. Those patients who presented with superficially palpable head and neck lesion in Medicine, Surgical, Dermatology and

Dental OPD or admitted in hospital and underwent FNAC were considered as the study group.

This retrospective observational study included 290 cases of FNACs done on head and neck swellings performed as outdoor procedure over a 26-month period. The palpable swelling was fixed with one hand and with all aseptic precautions, 22-23G needle with 10ml syringe was inserted into the swelling and a negative pressure was applied. The aspiration material was smeared on the glass slides and smears made were relevantly stained, including May Grunwald Giemsa, Papanicolaou and Haematoxylin and Eosin (H&E) stains. Lymph node swellings, with purulent or cheesy material as aspirate or with clinical suspicion of tuberculosis were stained by ZN stain. Cytological findings were recorded and patients were advised medical treatment and follow up or biopsy and surgical intervention depending upon the pathology.

The received post-operative surgical specimen was fixed in 10% neutral formalin and subjected to gross examination, processing, paraffin embedding, section cutting, staining by H&E and mounting by DPX. The cytomorphological features of various diseases were studied. FNAC and HPE of the same lesion were correlated where available.

**RESULTS**

A total of 290 patients underwent FNAC of the head and neck region during the study period.

There were 162 (56%) females and 128 (44%) were males (F:M ratio of 1.3:1). The age-wise distribution of the 290 patients in this study is shown at Table1. The age range of the patients in this study was between 2 months to 80 years. 56 (19.3%) cases were recorded in the first decade of life and a peak incidence of 90(31.0%) cases was noted in 21-30 years age group.

**Table 1: The age-wise distribution of patients**

Age(in years)	Patients	Percentage
0-10	56	19.3
11-20	55	19.0
21-30	90	31.0
31-40	48	16.6
41-50	19	6.6
51-60	14	4.8
61-70	6	2.1
71-80	2	0.7

**Table 2: Site wise distribution of benign and malignant head and neck lesions**

Site of FNAC	No. (%)	Benign	Malignant
Lymph Node	185 (64.1)	173	12
Thyroid	49 (16.9)	44	5
Salivary Gland	12(4.1)	10	2
Skin & Subcutaneous tissue including scalp	40(13.8)	38	2
Oral Cavity	3(0.7)	3	0
Inadequate	1(0.3)	-	-
Total	290	268	21

**Table 3: Distribution of Head & Neck Lesions according to Cytological diagnosis**

Benign lesions	No. (%)	Malignant lesions	No. (%)
<b>Lymph node</b>			
Reactive hyperplasia	69 (23.8)	Lymphoma	3 (1.0)
Granulomatous lymphadenitis	91(31.4)	Metastatic deposits to lymph node	10 (3.4)
Acute Suppurative	6 (2.0)		
Chronic Necrotizing	6 (2.0)		
<b>Thyroid</b>			
Thyroiditis	18 (6.2)	Papillary carcinoma	4 (1.4)
Colloid goiter	25 (8.6)	Hurthle cell neoplasm	1 (0.3)
Hyperplastic change	1 (0.3)		
<b>Salivary gland</b>			
Sialadenitis	2 (0.7)	High grade malignant epithelial tumor	1 (0.3)
Pleomorphic adenoma	7 (2.0)		
Oncocytoma	1 (0.3)		
Benign lipomatous tumor	1 (0.3)		
<b>Skin &amp; Subcutaneous tissue including scalp</b>			
Tubercular lesion	4 (1.4)	Squamous cell carcinoma	1 (0.3)
Benign lipomatous tumor	14 (4.8)	Malignant epithelial lesion-poorly differentiated carcinoma	1 (0.3)
Cystic lesion	11 (3.8)		
Acute pyogenic abscess	2 (0.7)		
Granulomatous abscess	7 (2.4)		
Inadequate	1 (0.3)		
<b>Oral cavity</b>			
Schwannoma	1 (0.3)		
Benign epithelial lesion	1 (0.3)		
Retention cyst	1 (0.3)		

The largest number of aspirates in this study were from lymph nodes, 185(64.1%), followed by thyroid lesions 49(16.9%). Skin and soft tissue lesions including scalp accounted for 41(14.1%), cases followed by salivary gland lesions 12(4.1%) cases with least number of cases sampled from oral cavity, i.e.3(0.7%) cases as shown at Table 2. Of the total 290 cases with head and neck lesions, 268 (92.1%) cases were non-neoplastic in nature, 21 cases were malignant and 1(0.3%) was inadequate for any definitive opinion.

The detailed distribution of the cytological diagnoses in these 290 cases and the respective percentages is given at Table 3. In the malignant category, carcinoma metastatic to the lymph nodes was the most common type of cancer, seen in 10 cases, and all cases were deposits of squamous cell carcinoma. 49 patients presenting with a swelling in the front of the neck underwent FNAC, of which 4 cases were diagnosed as papillary carcinoma, thyroid. All the 4 cases were subsequently confirmed as papillary carcinoma on histopathological examination. Also, a tumor located in the parotid gland reported as a high grade malignant epithelial lesion on cytology with a possibility of mucoepidermoid carcinoma was later confirmed as a high grade mucoepidermoid carcinoma on histopathology.

**Table 4: Cyto-morphological Pattern of AFB Positivity (43 cases)**

Cytological picture	cases	AFB positive
Epithelioid granulomas with caseous necrosis	47	35
Epithelioid granulomas without caseous necrosis	44	2
Acute suppuration with necrosis	6	2
Necrosis only with chronic inflammatory cells and no granulomas	6	4

The largest subgroup was of granulomatous lymphadenitis comprising of 91 cases. Characteristic epithelioid cell granulomas with associated caseous necrosis was seen in 47/91 cases in this group whereas the remaining 44 cases showed well formed epithelioid granulomas without caseous necrosis. Acid-fast bacilli on Ziehl Neelsen stain were demonstrated in a total of 43 cases in this study, the details of which are given at Table 4.

Among the 290 cases in this study, histopathological correlation was available in 74/290 (25.51%) cases only. Of these 74 cases, histological findings consistent with the cytological diagnoses were seen in 68(91.8%) cases and inconsistent findings in 6(8.2%) cases, details of which are shown at Table 5 and Table 6.

**Table 5: Cyto-histopathological correlation of Head & Neck Lesions**

Site of Lesion	Cytology	Histopathology	Consistent	Inconsistent
Lymph node	185	36	33	3
Thyroid	49	14	12	2
Salivary gland	12	9	9	0
Skin & subcutaneous tissue including scalp	41	14	14	0
Oral cavity	3	2	1	1
Total	290	74	68	6

**Table 6: Cyto-histopathological correlation of Discrepant cases (6 cases)**

Cytological Diagnosis	Histopathological Diagnosis
Reactive LN	Granulomatous lymphadenitis
Reactive LN	Non Hodgkins lymphoma
Reactive LN	Hodgkins lymphoma
Colloid goiter	Follicular carcinoma
Colloid goiter	Poorly differentiated carcinoma, thyroid
Benign epithelial lesion	Polymorphous low grade adenocarcinoma
LN - lymph node	

**DISCUSSION**

FNAC is a valuable diagnostic test in the initial assessment of the patients presenting with a mass

in the head and neck region or when a recurrence is suspected after previous treatment. Various parameters like age distribution, sex predilection, site-wise distribution, nature of the lesion and histopathological correlation wherever possible were evaluated by us and the findings compared with other studies. The largest number of aspirates from head and neck lesions in this study were from lymph nodes i.e. 185(64.1%), followed by thyroid lesions 49(16.9%), while the rest of the sites constituted 55(19%) of the cases. Other studies from the Indian subcontinent have also shown that the most common sites of FNAC of head and neck lesions were the lymph nodes<sup>2,7</sup> However, in a study carried out at a tertiary centre in Southern India the largest number of FNACs were from the thyroid gland constituting 56.45% of the cases.<sup>6</sup>

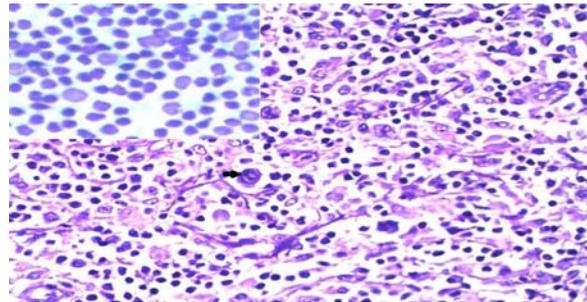
The peak incidence of head and neck mass lesions in this study group was between 21 to 30 years, which is similar to the findings of Setal et al. Significantly, granulomatous /tubercular lymphadenitis was the most common cytological diagnosis in both the present study & the one by Setal et al.<sup>2</sup> Malignancy was reported in 25% of cases by Setal et al and in only 7.6% cases in this study. Similarly, El Hag et al in a study of 225 cases in Saudi Arabia reported reactive lymphadenitis & tubercular lymphadenitis to together account for 54% of the cases and malignant neoplasms to constitute only 13% of cases.<sup>8</sup> At variance is the study by Maniyar et al in which the average age of the subjects was older, the maximum number being in the 51-60 age group with the authors reporting malignancy in 71.69% cases.<sup>7</sup>

An important cause of superficial lymphadenopathy in India is tuberculosis. Various types of cytological appearances have been described in tubercular lymphadenitis which include the following four categories: epithelioid granulomas with caseous necrosis, epithelioid granulomas without necrosis, necrosis only without epithelioid granulomas and polymorphs with necrosis with or without epithelioid granulomas.<sup>9</sup> The combination of FNAC with ZN staining for AFB is of utmost significance as a diagnostic modality in these lesions. We were able to demonstrate the presence of acid fast bacilli on Zeihl Neelsen stain in 43 cases, of which 35 cases showed classical epithelioid granulomas with caseous necrosis, 4 cases were reported as chronic necrotizing lymphadenitis, 2 cases showed acute suppuration with presence of neutrophils and 2 cases showed epithelioid granulomas without caseation. Thus, 23.2% of all enlarged lymph nodes in this study had a tubercular etiology. A study carried out at a referral centre for tuberculosis in New Delhi showed a higher incidence of tubercular lymphadenitis at 55% and overall AFB positivity at 71%.<sup>10</sup>

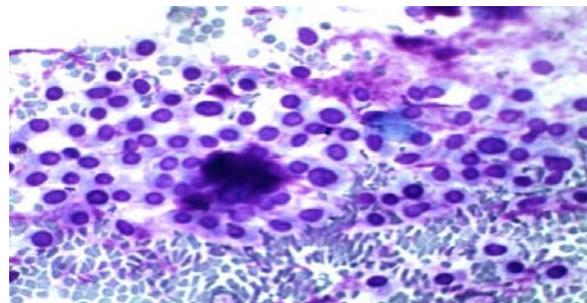
Out of 185 lymph node swellings subjected to FNAC, 36 were biopsied and in 33 cases both cytological and histological diagnoses were consistent with each other. Three cases in which the cytology and histopathology did not correspond were 1 case each of Non Hodgkins Lymphoma & Hodgkins lymphoma which were diagnosed as reactive on aspirate cytology (Fig 1) and 1 case of tubercular lymphadenitis which showed scattered epithelioid cells with a reactive background on cytology and was reported as reactive lymph node.

The presence of atypical mononuclear cells, a background infiltrate of eosinophils, and hypocel-

lularity of aspirates disproportionate to lymph node size are all clues which must alert the cytopathologist to the possibility of Hodgkins lymphoma have been described by other workers<sup>11</sup> On reviewing the cases, atypical mononuclear cells with prominent eosinophilic nucleoli which had been overlooked were noted in the Hodgkins lymphoma case, and immunoblastic cells which were mistaken for macrophages were noted in the case of non Hodgkins lymphoma.



**Figure 1: Microphotograph showing , Hodgkins Lymphoma with RS cells (Arrow) in a cervical lymph node (H&E,40 X), diagnosed as reactive on FNAC, (Giemsa, 40X) (inset).**



**Figure 2: Microphotograph showing cytology smear of pleomorphic adenoma, salivary gland. (Giemsa, 40X)**

Fine-needle aspiration plays an indispensable role in the evaluation of euthyroid patients with a thyroid nodule. It reduces the rate of unnecessary thyroid surgery for patients with benign nodules and appropriately triages patients with malignancy to the required surgery. Additionally, the method may serve a therapeutic function since the aspiration of fluid in cysts may be followed by involution of the lesion.<sup>12</sup> Among benign thyroid lesions, colloid goiter comprising 25 cases was the most common pathology. 18 cases of thyroiditis and 1 case of thyroid hyperplasia were the other benign thyroid etiologies reported, thus highlighting how the cytological diagnosis of benign disease contributes to a

reduction in the number of unnecessary surgical procedures in such cases.

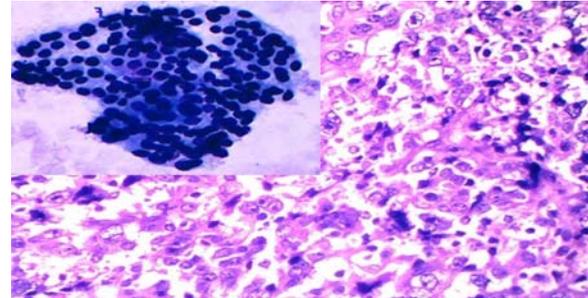
Out of a total of 49 cases of thyroid FNAC, 14 were available for histopathological correlation. 12 cases showed consistent findings on histopathology and 2 cases were found to be inconsistent on comparing cyto-histological features. The 2 inconsistent cases showed features of colloid goiter on cytology, of which 1 was reported as follicular carcinoma and 1 case was finally diagnosed as poorly differentiated carcinoma of thyroid (Fig 2). 4 cases were diagnosed as papillary carcinoma, thyroid and all the 4 cases were subsequently confirmed as papillary carcinoma on histopathological examination. Mazeh et al in a study of cytohistologic correlation of thyroid nodules stated that the cytologic diagnosis of papillary carcinoma is highly predictive of thyroid cancer. They also observed that the predictive value of FNA drops considerably when dealing with follicular carcinoma and reported a false positive rate of 13% in FNA declared benign lesions of follicular origin.<sup>13</sup> These findings corroborate with the findings of the present study in which inconsistent features were seen in one case of follicular carcinoma and one case of poorly differentiated carcinoma and all the cases of papillary carcinoma showed consistent cyto-histological correlation.

Among the salivary gland lesions, pleomorphic adenoma (Fig 3) was the commonest lesion with 7 cases, followed by sialadenitis, 2 cases and 1 case each of oncocytoma and benign lipomatous lesion. We reported a single case as a high grade malignant epithelial tumor which on excision biopsy was confirmed to be a high grade mucoepidermoid carcinoma. Other Indian authors have also reported pleomorphic adenoma to be the most common benign tumor and mucoepidermoid carcinoma as the commonest malignant tumor in their series.<sup>2,6</sup> 9 out of 12 cases of salivary gland FNAC were available for histopathological correlation and in all of them the cyto-histological correlation was consistent. Fernandes et al also noted a diagnostic accuracy of 100% among salivary gland lesions in their study.<sup>6</sup>

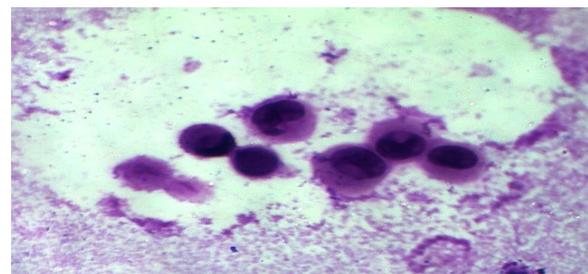
Benign lipomatous lesions constituted 14 out of a total of 38 cases, thus forming the majority of non neoplastic lesions of skin and subcutaneous tissue. Amongst the 2 malignant lesions 1 case each of squamous cell carcinoma (Fig 4) and malignant epithelial lesion, poorly differentiated were reported on FNAC. Both the cases were confirmed to be squamous cell carcinoma on histopathology. A study conducted by Maniyar et al showed 10

benign and 7 malignant cases of soft tissue lesions<sup>7</sup>. All the 14 cases available for histopathology showed consistent findings.

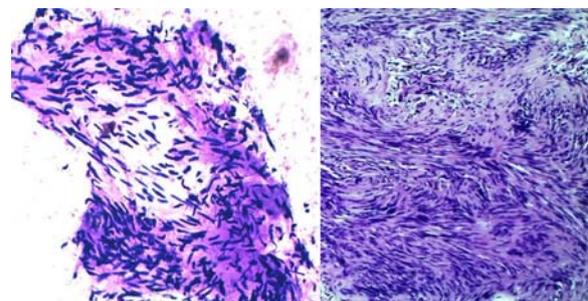
This study also included three FNACs done on mass lesions in the oral cavity. One case was a lingual swelling which was reported as a schwannoma and subsequently confirmed on histopathology (Fig 5).



**Figure 3: Microphotograph showing poorly differentiated carcinoma thyroid (H & E, 40X), diagnosed as colloid goitre on FNAC, Giemsa, 40 X (inset)**



**Figure 4: Microphotograph showing squamous cell carcinoma (Giemsa, 40X)**



**Figure 5 : Microphotograph taken from lingual schwannoma with nuclear palisading, elongated nuclei and tapering ends, diagnosed both on cytology (Giemsa, 40X) and histopathology (H & E, 10 X)**

A firm swelling in the hard palate was reported as a benign epithelial lesion on FNAC. It was excised

and a histopathological diagnosis of polymorphous low grade adenocarcinoma of the minor salivary glands was rendered. The tumor was characterized by tubular, papillary and papillary cystic areas with single cell type and no mitotic activity. In a review of 341 cases of salivary gland cytology Stewart et al reported that most false negative results were caused by sampling error especially in cystic tumors or due to a misinterpretation of uncommon neoplasms.<sup>14</sup> Other workers have also shown that FNAC is an unsatisfactory technique in low grade neoplasms.<sup>15</sup>

In 74/290 cases of head and neck swellings in this study, cytological diagnoses consistent with the histological findings were seen in 68(91.8%) cases and inconsistent findings in 6(8.2%) cases. Maniyar et al reported cyto-histopathological consistent diagnoses in 85.87% cases and 14.13% cases in which the cytological and histopathological diagnoses were different, which is comparable.<sup>7</sup> Also, 74 cases were available for histopathological correlation in this study and the sensitivity and specificity of the same were evaluated to be 93.24% and 100% respectively. These findings are comparable with those of Fernandes et al who reported an overall diagnostic accuracy of 96.7% with specificity of 100% and sensitivity of 87.5%.<sup>6</sup>

## CONCLUSION

FNAC stands as a rapid, convenient and accurate outpatient method of diagnosis of accessible lesions especially of the head and neck, besides being safe and relatively free from complications. An almost perfect agreement between the cytological and histological findings with a sensitivity of 93.24% and specificity of 100% was evaluated in this study. FNAC thus serves as a complementary diagnostic procedure to histopathological examination. It also helps as a guide to the appropriate therapeutic management to either locally excise a benign tumor or plan radical surgery or other alternative treatment modalities in case of malignancy. Hence, we conclude that FNAC is an excellent preliminary test and a useful adjunct to histopathology.

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