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## ORIGINAL ARTICLE

# Role of Fine Needle Aspiration Cytology in Palpable Head and Neck Masses

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### ABSTRACT

**Background And Objective:** This study is done to evaluate the role of FNAC in palpable head and neck masses and also to study their distribution. A correlation was done between cytology and histopathology whenever surgical specimens were available and to assess the accuracy, sensitivity, specificity, positive predictive value and negative predictive value in various head and neck lesions.

**Materials And Methods:** From 620 cases, FNA smears were taken and stained with PAP, MGG and special stains whenever required. FNA results were interpreted and analysed according to the anatomical sites and the lesions were categorized into inflammatory and neoplastic conditions. The cytological findings were compared with those of histopathology wherever available. With the help of K value, the agreement between the methods was determined.

**Results:** Among 620 cases, histopathological correlations were available only in 129 cases. The sensitivity, specificity, predictive value of the positive test, predictive value of the negative test and false negatives of the thyroid lesions which were being detected were 83.33%, 100%, 100%, 97% and 16.66%, respectively. There were no false positives. The diagnostic accuracy of the salivary gland, lymph node and soft tissue lesions were 100%.

**Interpretation and Conclusion:** There was perfect agreement in a majority of the lesions. The technique is simple, safe, convenient and an accurate method for tissue diagnosis. Hence, FNAC is an effective diagnostic tool in the diagnosis of head and neck masses.

**Key Words:** FNAC, histopathology, thyroid, lymph nodes, salivary glands, soft tissue.

**Key Message:** FNAC is an effective diagnostic tool in the diagnosis of head and neck masses.

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### Introduction

Fine needle aspiration cytology (FNAC) is one of the most valuable tests available in the initial assessment of the patient who presents with a mass in the head and neck region or where a recurrence is suspected after previous treatment<sup>1</sup>. It is accurate, inexpensive and quick. The tissues which are most frequently sampled are lymph nodes, thyroid and major salivary glands. The

present study was done to evaluate the role of FNAC in palpable head and neck masses.

### Materials And Methods

FNAC was done on 624 patients who presented with palpable head and neck masses in a tertiary hospital for a period of 2 years from March 2005 to March 2007. Prior to FNAC, the patients were examined in detail, which included the recording of their pertinent clinical history and significant clinical findings. Relevant investigations were carried out as per requirements. After a brief explanation of the technique, an informed consent of the patient was obtained.

FNA was done using a 23 gauge needle fitted to a 10ml disposable syringe. An average of 2

passes was performed and some slides were air dried and stained by the May-Grunwald Giemsa stain. The rest of the slides were fixed in methanol and stained by the Papanicolaou stain. The Zeihl-Neelsen's stain for AFB was done in those cases with lymph node swelling, where the clinical suspicion or diagnosis was tuberculosis and /or in those cases where purulent or cheesy material was aspirated. Surgically excised specimens were available in 129 cases, which were routinely processed and stained with Haematoxylin and Eosin stains.

## Observations

Among the 624 patients, 4 were excluded from the study as the smears were unsatisfactory. The distribution of the 620 cases are given in [Table/Fig 1]. The accuracy of FNAC was verified by histological examination in the 129 patients. Among the 129 patients, 24 were males and 105 were females (M:F ratio =1:4.41). Thyroid gland (71.31%) was the commonest site aspirated, followed by lymph node (22.48%), salivary gland (3.87%) and soft tissue lesions (2.32%).

(Table/Fig 1) Distribution of head and neck cases

Location	Number of cases	Percentage
Thyroid	350	56.45%
Lymph node	230	37.09%
Salivary gland	23	3.70%
Soft tissue	12	1.93%
Miscellaneous	5	0.80%

Patients with a thyroid swelling comprised of 13 males and 79 females and their ages ranged from 18- 73 years. The commonest lesion encountered in the thyroid gland was Nodular goitre, followed by Hashimoto's thyroiditis. Among the malignant neoplasms, Papillary carcinoma was the most common lesion noted. Fifty two cases of histologically proven nodular goitres were correctly diagnosed by the FNA cytology. Out of the fifty two cases, smears from fifty cases were moderately cellular and two were hypocellular. The smears showed follicular cells in clusters which were scattered singly. Forty eight cases had a few cyst macrophages and thick colloid in the background. Four cases showed numerous cyst macrophages in a background of thick and thin colloid.

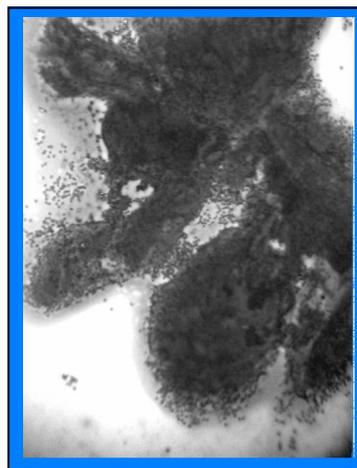
Ten cases of adenomatous hyperplasia were confirmed by histological diagnosis. The smears

were moderately cellular and showed follicular cells in clusters and tissue fragments in nine cases. Fire flares were seen in seven cases. Papillaroid fragments were seen in three cases. The colloid was either scanty or absent in all these cases.

Hashimoto's thyroiditis was detected by the FNA cytology in eleven out of twelve cases. The smears showed large clusters of Hurthle cells and lymphocytes in nine cases. Multinucleate giant cells and epithelioid histiocytes were seen in three cases. Cyst macrophages were seen in one case. The colloid was scant to absent in ten cases. One case showed the presence of thick colloid. Three cases showed fire flares.

Thyroglossal cysts yielded a clear yellow coloured fluid. The smears were hypocellular and showed follicular cells, lymphocytes and cyst macrophages.

Papillary carcinoma of the thyroid was detected by the FNA cytology in nine out of eleven cases. The smears were hypercellular and showed papillary tissue fragments [Table/Fig 2] and syncytial aggregates in six cases. Nuclear grooves were seen in seven cases and intranuclear cytoplasmic inclusions were seen in three cases. Cyst macrophages were seen in three cases. Psammoma bodies were seen in one case. Thick colloid was seen in five cases.

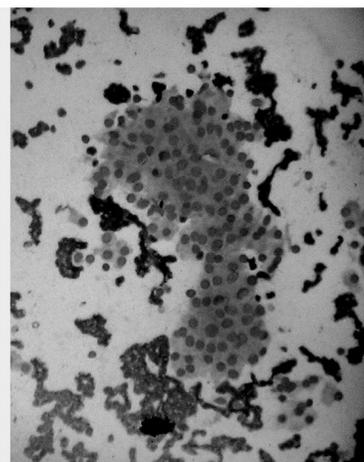


(Table/Fig 2) FNAC smear from a case of Papillary carcinoma thyroid : papillary fragments (MGGx100)

One case, which was suspected for malignancy, showed moderately cellular smears comprising of small papillaroid fragments and numerous cyst macrophages. Few cells with dense cytoplasm and nuclear grooves were seen. The histopathological diagnosis made, was that of papillary carcinoma.

Four follicular adenomas in the series were designated as follicular neoplasms in cytology. Three were moderately cellular and one was hypocellular. The smears showed follicular cells in a repetitive manner and scant colloid in a haemorrhagic background. One case showed syncytial aggregates and microfollicles.

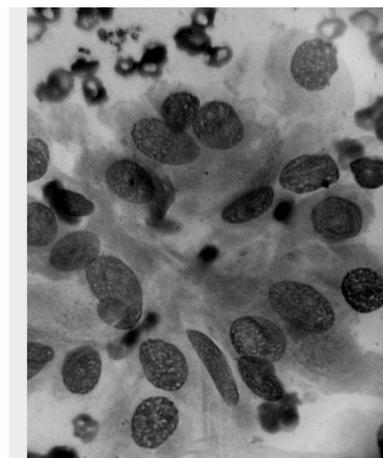
One case of Hurthle cell neoplasm showed hypercellular smears [Table/Fig 3] with predominant Hurthle cells in sheets and clusters and a few follicular cells. Cyst macrophages and colloid were also seen in the background.



(Table/Fig 3) FNAC smear from Hurthle cell adenoma : Hurthle cells in clusters showing anisonucleosis (MGx100)

One case of medullary carcinoma was correctly diagnosed by cytology. The smears were hypercellular and showed tumour cells dispersed singly and in sheets. The tumour cells exhibited fine granular nuclear chromatin and moderate amounts of granular cytoplasm. A few of them had a plasmacytoid appearance. Fragments of hyaline material, lymphocytes, cyst macrophages, focal calcification and scant colloid were seen in the background. The overall accuracy rate for the thyroid series was 96.3%.

Patients with lymph node swelling comprised of 8 males and 21 females and their ages ranged from 2-76 years. Reactive lymphadenopathy was the commonest cause of lymphadenopathy, followed by tuberculous and granulomatous, metastatic lymphadenopathy. The present study did not make any attempt to categorize the type of Reactive lymphadenopathy. All ten cases of tuberculous lymphadenopathy showed moderately cellular smears. There were epithelioid granulomas [Table/Fig 4] in seven cases and caseation necrosis in three cases. The special stain for acid fast bacilli was positive in four cases.



(Table/Fig 4) FNAC smear from Tuberculous lymphadenitis : epithelioid granuloma (MGx400)

One case of suppurative lymphadenitis showed neutrophils in a necrotic background. No granulomas/giant cells were seen. The special stain for AFB showed negative results. This case was confirmed by histological diagnosis.

Four cases of granulomatous lymphadenitis were correctly diagnosed by cytology. The smears showed focal collections of epithelioid cells in association with reactive lymphoid cells. The special stain for AFB showed negative results.

One case of metastatic carcinoma showed tumour cells in sheets and they were dispersed singly. These cells exhibited pleomorphism and

had hyperchromatic nuclei with dense cytoplasm in a necrotic background. This was subsequently confirmed by histopathology.

Smears from Langerhans cell histiocytosis revealed histiocytic cells in clusters and they were dispersed singly. Binucleate and multinucleate forms were of cells were seen along with eosinophils in the background. A subsequent biopsy confirmed the cytological diagnosis. Patients with salivary gland lesions comprised of 3 males and 2 females and their ages ranged from 20-49 years. The commonest benign and malignant tumours reported were Pleomorphic adenoma and Mucoepidermoid carcinoma, respectively. One case of benign cystic lesion of the salivary gland showed cyst macrophages, lymphocytes and stromal fragments in a proteinaceous background. Three cases of pleomorphic adenoma showed moderately cellular smears. Epithelial cells in clusters and sheets were seen in two cases. Fibrillary chondromyxoid ground substances were seen in all the three cases. One case showed plasmacytoid cells with well defined cell borders. Cyst macrophages were seen in one case. One case of mucoepidermoid carcinoma was confirmed by histological diagnosis. The smears were hypercellular and showed cohesive clusters and sheets of tumour cells. Some of the cells had cytoplasmic vacuolization. The background was dirty, with mucus and necrotic debris. The diagnostic accuracy for salivary gland lesions was 100%.

Patients with soft tissue lesions comprised of 3 females and their ages ranged from 13-60 years. One case each of Lipoma, Hamartoma and Spindle cell tumour were cytologically diagnosed and confirmed by histopathology.

The correlation between cytological diagnosis and subsequent histological studies in all the 129 cases is shown in [Table/Fig 5]. In the 129 cases, the sensitivity was 87.5%, the specificity was 100%, the positive predictive value was 100%, the negative predictive value was 98.26% and false negatives were 12.5%.

(Table/Fig 5) Correlation between cytodiagnosis and subsequent histology in 129 cases.

	Malignant cytology	Benign cytology
Malignant histology	14 (true positives)	2 (false negatives)
Benign histology	0 (false positives)	113 (true negatives)

## Discussion

Head and neck masses often pose a challenging diagnostic problem to the clinician. Malignancy remains an important differential diagnosis and neck mass is often the first or the only symptom of this disease. Although surgical biopsy is the commonest method of tissue diagnosis, FNAC is in practice since the 1930s. This method has become popular as a diagnostic step in the evaluation of a head and neck mass [2].

The results of 620 aspirates from head and neck masses have been categorized into inflammatory, benign and malignant lesions. Four aspirates (0.64%) were excluded, as they were inadequate. The incidence of inadequate or unsatisfactory samples in various studies has ranged from 0-25% [3]. Unsatisfactory aspirates were the result of poor handling of the aspirated material and the lack of trained cytopathologists. Inadequacy was also attributable to the small size of the lesions [4].

Two cytologically diagnosed nodular goitres turned out to be papillary carcinoma after they were studied histopathologically. The slides on review revealed follicular cells in clusters and singles in a background of thick colloid. However, no papillary fragments/ nuclear grooves/ intranuclear cytoplasmic inclusions were seen. The causes of false negative results were the poorly cellular sample in a large cystic papillary carcinoma and the thick fibrous capsule. Gagneten stressed the importance of doing multiple aspirations in a thyroid swelling in order to obtain representative samples [1].

One case of thyroglossal cyst was correctly diagnosed and the accuracy was similar to that in the study done by Hsu and Boey [5]. In our study, the patient was 40 years old. It is well known that thyroglossal cyst presents clinically in children, but lesions can also be seen in adults even late in life [4].

The diagnostic errors were most commonly due to inadequate specimens and cystic lesions. One must be careful in committing a false negative diagnostic error in cystic lesions that contain macrophages and scanty material, since these features do not exclude malignancy. Repeat FNAC or thyroidectomy is advised for persistent nodules [5],[6]. Cystic thyroid lesions pose diagnostic difficulties. Cystic change and/or haemorrhage in neoplasms is seen in upto 25% of primary Papillary carcinomas, in 20% of Follicular neoplasms and in 26% of Follicular carcinomas [1]. Recurrent cysts, incompletely decompressed lesions, lesions greater than 3-4 cm in diameter in which aspiration of several areas does not give good evidence of the colloid nodule and lesions in young males, have all been recommended as indications for surgical excision. Intranuclear cytoplasmic inclusions and psammoma bodies detected in up to 83% and 24% of cases of Papillary thyroid carcinoma,[7] were seen in only three cases (33.3%) and one case (11.1%) respectively, in the present study.

One case of Nodular goitre turned out to be Hashimoto's thyroiditis after studying it histopathologically. The slides on review revealed hypocellular smears comprising of few follicular cells and scanty thick colloid. No Hurthle cells/lymphocytes were seen. Jayaram [7], in her study, misdiagnosed two cases as colloid goiters. Hurthle cells and lymphocytes were not present in the smears, which probably are examples of non representative sampling. Hashimoto's thyroiditis was sometimes a problem, since aspirates of that lesion, not uncommonly show a marked proliferation of Hurthle cells or follicular cells in nodular masses. A needle sampling of such an area would yield a cytological picture similar to that of Follicular or Hurthle cell tumour [7].

Follicular and Hurthle cell neoplasms posed no diagnostic problems. Aspirates from hyperplastic areas of some goitres presented a picture similar to that of Follicular neoplasms. This potential cause of misdiagnosis was counteracted in most cases by the sampling of two to three different areas of the thyroid nodule [7]. The major limitation of FNAC in cases of tumour of the

thyroid, is in the evaluation of the nature of the neoplasm, which is done by histopathology.

Literature survey has shown that the FNAC diagnostic accuracy rate in tuberculous lymphadenitis is as high as 90-100%. FNAC coupled with ZN staining for AFB is a very useful diagnostic tool in the diagnosis of tuberculous lymphadenitis. There are problems in arriving at a definitive diagnosis in certain cases of Tuberculous lymphadenitis, when the aspirate shows a polymorphous picture with occasional epithelioid cells, with an absence of Langhan's giant cells or caseous necrosis, making it necessary to resort to excisional biopsy for a definitive diagnosis. This is particularly true in children, in whom a similar picture may be seen in cases of reactive hyperplasia due to viral or Toxoplasma infection, since the mere presence of the epithelioid cells is not diagnostic of any specific condition [8].

Two cases of Reactive lymphadenopathy diagnosed cytologically, proved to be Kikuchi's lymphadenitis after histopathological studies. The slides were reviewed to look for the typical cytomorphological features. There were no necrotic debris or plasmacytoid monocytes. Few clusters of histiocytes were seen. The special stain for AFB showed negative results. Tong et al. [9], in their study, had a similar problem.

Smears from Catscratch disease did not show typical cytological features. Literature survey showed that the cytology in early lesions of Cat scratch disease may be nonspecific, with a mixture of lymphocytes, immunoblasts, macrophages, plasma cells and neutrophils [10]. Characteristic granulomas with peripherally palisading epithelioid histiocytes and centrally located neutrophils and an associated polymorphic cell population, are observed in Cat scratch disease. Cytological appreciation of the suppurative granulomas can be expected in FNA of the intermediate and the advanced lesions. The cytological differential diagnosis includes any disease in which epithelioid cells and/or granulomas occur. [10].

One case diagnosed by cytology as Reactive lymphadenopathy proved to be Castleman's

disease after histopathological studies. The plasma cell lesion represents an earlier, more active stage and the hyaline vascular type represents a later stage. The cytological characterization of Castleman's disease may be difficult[11].

Among the salivary gland lesions, the parotid was the most commonly involved gland. Our observation is similar to that of Cristallini et al.[12] and Cajulis et al.,[13]. Among benign tumours, pleomorphic adenoma was the commonest tumour and among the malignant tumours mucoepidermoid carcinoma was the most common one. This finding is similar to that of Fernandes et al.[14]. The overall diagnostic accuracy was 100%. Review of literature shows that the accuracy has ranged from 80.4 to 98% [14].

One case of Lipoma was correctly diagnosed by cytology. One case of Hamartoma diagnosed by cytology proved to be Capillary haemangioma after histological studies. One case of Spindle cell tumour which was suspected to be malignant turned out to be malignant peripheral nerve sheath tumour. FNAC usually faces no problem in distinguishing high grade soft tissue sarcomas from benign lesions. However, borderline and low grade lesions are susceptible to be missed. Accurate typing and grading of the tumour is not possible in many cases by FNAC alone. Almost all studies on soft tissue tumours have reported this limitation of FNAC [15].

The present study highlights certain limitations of the procedure in the head and neck region, namely:

- Typing the various Reactive lymphadenopathies [9],[10],[11].
- To categorize the borderline and malignant soft tissue tumours [15].

- To differentiate Colloid goiter from the Follicular variant of papillary carcinoma [1].

On comparing the results of the present series with other workers [Table/Fig 6], it can be said that the results of this study are favourable with those published in literature and are fairly accurate.

(Table/Fig 6) Comparison with other studies

Site	Author	Aspirations	Overall accuracy	Specificity	Sensitivity
Head and neck	Podoshin et al., <sup>16</sup>	-	85.4%	-	87%
	Young et al., <sup>17</sup>	634	94.5%	-	-
	Amedee and Dhurandhar, <sup>18</sup>	-	95%	-	-
	El Hag et al., <sup>19</sup>	225	98%	100%	95%
	Thomsen and associates <sup>20</sup>	-	93%	-	-
	Mobley and associates <sup>21</sup>	89	96.6%	97.1%	94.4%
	Present study	129	96.7%	100%	87.5%

## Conclusion

Fine Needle Aspiration Cytology is a rapid, convenient and accurate method of tissue diagnosis that can be done on an out patient basis. FNAC offers a simple method of diagnosis of neoplastic and non neoplastic lesions of the head and neck. The procedure is safe and free from complications and is well tolerated by the patients. There is no need of anaesthesia and speedy results are obtained. It serves as a complementary diagnostic procedure to histopathological examination. There was almost perfect agreement between the cytological and histological findings and there was fairly good accuracy. There were only two false negatives and no false positives in our study. Hence, we conclude that Fine Needle Aspiration Cytology is a highly effective diagnostic procedure in the diagnosis and management of palpable head and neck masses.

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