

## Can FNAC Correctly Diagnose Palpable Lesions in Head and Neck Region? A Descriptive Study in a Tertiary Care Hospital

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**Abstract:** Fine needle aspiration cytology is a fast and easy method for diagnosing any accessible lesion. The majority of head and neck mass are usually superficial and easily accessible to needle biopsy. The study was undertaken to evaluate the diagnostic accuracy of FNAC in palpable lesions of head and neck along with an analysis of age, sex, anatomical site of distribution and histopathological correlation. It was an institution based descriptive study with cross-sectional design. The study was conducted in the Department of Pathology, Bankura Sammilani Medical College, Bankura, West Bengal. A total of 3670 patients were included in the study. A brief history and physical examination was taken from the patients. FNAC smears were stained with Leishman-Geimsa and Papanicolaou stain. Zeihl-Neelsen stain was done in suspected cases of tuberculosis. Surgically excised specimens were available in 142 cases, which were processed and stained with Hematoxylin and Eosin stain. Majority age group was 21-40 years and male to female ratio was 1: 1.2. The site of lesion were distributed according to Lymphnode (46.83%), Thyroid (30.5%), Salivary glands (6.64%), and Miscellaneous (16.02%). Histopathological correlation was done in 142 cases and overall accuracy rate of FNAC was 90.14% with sensitivity of 92.8% and specificity of 86.66%. Positive predictive value and negative predictive value were 90.47% and 89.65% respectively. Palpable lesions of head and neck are readily accessible for FNAC, which aid in our diagnosis and hence proper treatment and management of the patient. Supplementation by a histological diagnosis often comes as an additional boon especially in suspicious and malignant cases.

**Keywords:** FNAC, head and neck, histopathology, lymph node, sensitivity, specificity.

## INTRODUCTION

Fine needle aspiration cytology (FNAC) has been around since the first decade of the last century. First used by Grieg and Gray in 1904; they aspirated trypanosomes from patients with sleeping sickness [1]. It was performed on a large scale by Martin and Ellis at Memorial Sloan-Kettering Cancer Center, New York, during the 1930s, but did not gain much encouragement during the ensuing years [2]. In India, FNAC was first introduced during the early 1970s and spread to different parts of the country through formal teaching in the postgraduate curriculum in pathology, conducting workshops and continued medical education (CME) program for pathologists, clinicians and radiologists [3]. FNAC is a fast and easy method of diagnosing any accessible lesion [4, 5]. The technique is relatively painless, produces a speedy result and is inexpensive [6]. The main advantage of FNAC is the avoidance of a surgical biopsy and its attendant risks, which include scarring, potential tumor seeding, increased hospital stay and increased costs [7]. The four fundamental requirements on which the success of FNAB depends

are representativeness, adequacy of the sample, high quality of preparation with relevant and correct clinical/radiological information. These four prerequisites will always remain sine qua non, no matter how sophisticated the supplementary technique [8]. Where incisional biopsies may lead troubles in some sensitive sites, in such circumstances FNAC is a suitable choice, being a minimally invasive technique. A preoperative cytological diagnosis of a primary neoplasm may permit more appropriate surgery. The majority of head and neck mass are usually superficial and easily accessible to needle biopsy [9]. In this context the present study was undertaken to evaluate the diagnostic accuracy of FNAC in palpable lesions of head and neck along with an analysis of age, sex & anatomical site of distribution and histopathological correlation.

## MATERIALS AND METHODS

The present study was conducted in the Department of Pathology, Bankura Sammilani Medical College, Bankura, West Bengal, India, over a span of

three years from January 2015 to December 2017. It was an institution based descriptive study with cross-sectional design. The study was conducted after receiving approval from the Institutional Ethics Committee. All patients presenting with palpable lesions of the head and neck were included in our study. FNA of all these patients was performed without local anesthesia using 23G needle attached to 10 ml plastic disposable syringe. FNA gun was used for suction, as and when required. Help of Ultrasonography was taken in selected cases. Coagulation screening was not routinely performed unless there was a previous risk of bleeding. The procedure was generally well tolerated without any complication. Direct smears were made from the aspirated material. In case of voluminous aspirates, indirect smears were also prepared in addition to the direct smears. Smears were stained with Leishman-Geimsa and Papanicolaou stains and examined under light microscope. Zeihl-Neelsen stain was done in suspected cases of tuberculosis. Surgically excised specimens were available in 142 cases, which were processed and stained with Hematoxylin and Eosin stain.

The cytological diagnoses rendered were categorized into four groups – Inconclusive, Benign, Suspicious of malignancy and Malignant. In addition to a cytological diagnoses, the case details of these 3551 patients were recorded which included information about the age, sex and site of FNA.

#### **Statistical analysis**

Analysis of age, sex & anatomical site of distribution was done in percentage and for histopathological correlation- true positive (TP), false positive (FP), true negative (TN) and false negative (FN) formula was used.

#### **RESULTS**

A total of 3670 FNACs were performed in patients presenting with palpable lesions of head and neck. 119 cases were excluded from our study for want of a better smear. The accuracy of FNAC was verified by histopathological examination in 142 cases.

Majority of FNACs performed was seen in the age group 21-40 years (41.96%) and the least in > 60 years (6.02%). Out of 3551 cases, 1607 (45.25%) cases were males and 1944 (54.75%) were females, M:F = 1:1.2. A detailed picture of age distribution of the patients and distribution of cases in various organs with adequacy of aspirates is shown in table-1.

The FNAC result of 3551 cases was distributed according to the site of lesion – Thyroid 1083(30.5%), Lymph node 1663(46.83%), Salivary gland 236(6.64%) and Miscellaneous 569 (16.02%). The lesions were categorized into the following groups – non-neoplastic, benign, suspicious of malignancy and malignant as shown in table-2.

In the lymph node, histopathological correlation was available in 72 cases, of which 65 cases were consistent and 7 cases were inconsistent with the cytological diagnosis as shown in table-4. Different cytological diagnoses were shown in table-3. One case diagnosed as chronic non-specific lymphadenitis on FNAC turned out to be a case of Non-Hodgkin lymphoma on histopathological examination. Three cases which were falsely diagnosed as Lymphoma on cytology were rendered non-neoplastic on histology. Also, three cases which were misdiagnosed as metastatic squamous cell carcinoma on cytology were labeled as infected epidermal cyst on histology.

FNAC diagnoses of different thyroid lesions were shown in table-5. Histopathological diagnosis was available in 23 cases, of which 20 were consistent and 3 inconsistent with FNAC as shown in table-4.

Cytodiagnosis of various salivary gland lesions were presented in table no. 6. Histopathological diagnosis was available in 18 cases, of which 16 cases were consistent and 2 inconsistent with the cytological diagnosis as shown in table no. 4. One case, cytologically diagnosed as pleomorphic salivary adenoma, turned out to be a case of mucoepidermoid carcinoma on histopathological examination. Similarly, an over-diagnosed case of mucoepidermoid carcinoma was diagnosed as pleomorphic salivary adenoma on histology.

The cytological diagnoses of miscellaneous group were shown in table-7. Histopathological diagnosis was available in 29 cases with 27 consistent and 2 inconsistent results as shown in table no. 3. One case of an infected epidermal cyst on histology was over-diagnosed as metastatic squamous cell carcinoma on FNAC.

The overall accuracy rate of FNAC in 142 cases evaluated was 90.14% with sensitivity of 92.8% and specificity of 86.66%. Positive predictive value and negative predictive value were 90.47% and 89.65% respectively.

**Table-1: Distribution of study population according to type of aspiration and age. n= 3670**

Organs aspirated	No. & (%)	No. & (%) of cases with adequate aspirate	No. & (%) of cases with inadequate aspirate	Age 1-20 years	Age 21-40 years	Age 41-60 years	Age > 60
Lymph node	1710 (46.59%)	1663 (97.25%)	47 (2.75%)	615	511	391	146
Thyroid	1115 (30.38%)	1083 (97.13%)	32 (2.9%)	165	645	234	39
Salivary gland	249 (6.78%)	236 (94.78%)	13 (5.22%)	62	111	51	12
Others	596 (16.24%)	569 (95.46%)	27 (4.53%)	188	223	141	17

**Table-2: Distribution of study population according to Cyto-diagnosis type of aspiration and age. n= 3551**

No. of cases with adequate aspirate	Organs aspirated	No. of cases and %	Cyto-diagnosis				No. of cases with available histology
			Non-neoplastic	Benign	Suspicious of malignancy	Malignant	
3551	Lymph nodes	1663 (46.83%)	1202	162	25	274	72
	Thyroid	1083 (30.5%)	306	756	12	09	23
	Salivary glands	236 (6.64%)	210	06	08	12	18
	Miscellaneous	569 (16.02%)	282	276	07	04	29
	Total	3551	2000 (56.32%)	1200 (33.79%)	52 (1.46%)	299 (8.42%)	142 (3.99%)

**Table-3: Correlation between FNAC and histopathological diagnosis of lymph node lesions**

Sr. no.	FNAC diagnosis	No. of cases	Percentage	No. of cases with histopathological diagnosis	Consistent	Inconsistent	Histopathological diagnosis
1.	Acute lymphadenitis	253	15.21	5	5	--	Reactive hyperplasia of lymph node(5)
2.	Chronic non-specific lymphadenitis	465	27.96	7	6	1	CNSL(6), Non-Hodgkin lymphoma(1)
3.	Granulomatous lymphadenitis	646	38.84	12	12	--	Tubercular lymphadenitis(12)
4.	Lymphoma	61	3.66	15	12	3	HL(2), NHL(10), CNSL(3)
5.	Metastasis	238	14.31	33	30	3	Metastatic SCC(13), Metastatic adenocarcinoma(17), Infected epidermal cyst(3)
	Total	1663	100	72	65	7	

\*CNSL : Chronic non-specific lymphadenitis

HL : Hodgkin's lymphoma

NHL : Non-Hodgkin lymphoma

SCC : Squamous cell carcinoma

Table-4: Cytohistological correlation

Organs evaluated	No. of cases with histological diagnosis	Cyto-diagnosis	No. of cases	Histopathological diagnosis		Consistency	
				Non-malignant	Malignant	Consistent	Inconsistent
Lymph node	72	Non-malignant (benign & non-neoplastic)	1364	07	02	07	02
		Malignant & suspicious of malignancy	299	05	58	58	05
Thyroid	23	Non-malignant (benign & non-neoplastic)	1062	10	02	10	02
		Malignant & suspicious of malignancy	21	01	10	10	01
Salivary glands	18	Non-malignant (benign & non-neoplastic)	216	13	01	13	01
		Malignant & suspicious of malignancy	20	01	03	03	01
Miscellaneous	29	Non-malignant (benign & non-neoplastic)	558	22	01	22	01
		Malignant & suspicious of malignancy	11	01	05	05	01

**Table-5: Correlation between FNAC and histopathological diagnosis of salivary gland lesions**

Sr. no.	FNAC diagnosis	No. of cases	Percentage	No. of cases with histopathological diagnosis	Consistent	Inconsistent	Histopathological diagnosis
1.	Acute sialadenitis	43	18.22	01	01	---	Abscess(1)
2.	Chronic sialadenitis	58	24.57	05	05	---	Chronic sialadenitis(5)
3.	Cystic lesions	92	38.98	03	03	---	Benign cyst(3)
4.	Granulomatous sialadenitis	17	7.20	---	---	---	---
5.	Benign lesions	6	2.54	05	04	01	Pleomorphic salivary adenoma(4) Mucoepidermoid carcinoma(1)
6.	Malignant lesions	20	8.47	04	03	01	Adenoid cystic carcinoma(2) Mucoepidermoid carcinoma(1) Pleomorphic salivary adenoma(1)
Total		236	100	18	16	02	

**Table-6: Correlation between FNAC and histopathological diagnosis of Thyroid lesions**

Sr. no.	FNAC diagnosis	No. of cases	Percentage	No. of cases with histopathological diagnosis	Consistent	Inconsistent	Histopathological diagnosis
1.	Colloid goiter/Adenomatoid goiter/Cystic nodules	748	69.06	6	5	1	Colloid goiter-5 Follicular adenoma- 1
2.	Autoimmune thyroiditis	295	27.23	2	2	--	Hashimoto's thyroiditis- 1 Lymphocytic thyroiditis- 1
3.	Granulomatous thyroiditis	11	1.01	--	--	--	--
4.	Follicular neoplasm	08	0.73	06	05	01	Follicular adenoma- 3 Follicular carcinoma- 1 Follicular variant of papillary carcinoma- 1 Multinodular goiter- 1
5.	Suspicious of malignancy	12	1.10	05	04	01	Papillary carcinoma- 4 Follicular adenoma- 1
6.	Malignant lesions	09	0.83	04	04	--	Papillary carcinoma- 3 Medullary carcinoma- 1
Total		1083	100	23	20	03	

**Table-7: Correlation between FNAC and histopathological diagnosis of Miscellaneous lesions**

Sr. no.	FNAC diagnosis	No. of cases	No. of cases with histopathological diagnosis	Consistent	Inconsistent	Histopathological diagnosis
1.	Epidermal cyst	265	11	11	---	Epidermal cyst(11)
2.	Thyroglossal cyst	17	03	03	---	Thyroglossal cyst(3)
3.	Adnexal lesions	63	06	05	01	
4.	Lipoma	213	03	03	---	Lipoma(3)
5.	Suspicious of malignancy/Malignant lesions	11	06	05	01	Malignant SCC(3) Metastatic adenocarcinoma(2) Infected epidermal cyst(1)
	Total	569	29	27	02	

\*SCC: squamous cell carcinoma

## DISCUSSION

The present study was conducted in the Department of Pathology, Bankura Sammilani Medical College, Bankura, West Bengal. The complications of this procedure may be bleeding, infection, nerve injury, swelling and bruising of the area in which the procedure was performed [10, 11]. The percentages of unsatisfactory aspirates in our study was 3.24%, which was far below what was reported by Smallman LA *et al.*, Sismanis A *et al.*, (9.3-15%) and Guvanti B *et al.*, (6%) [12-14].

In our present study, maximum number of FNAC done was from Lymph-node (46.83%) followed by Thyroid (30.5%), Miscellaneous (16.02%) and Salivary gland (6.64%). Richa Sharma *et al.*, [9] was found that Lymph-node (60.8%), Thyroid (24%), Salivary gland (11.2%) and Miscellaneous (4%). Agarwal *et al.*, in 400 cases found the incidences to be - Lymph-node (40.5%), Thyroid (43.5%), Salivary gland (7.5%) and Miscellaneous (8%) [15]. The result of Peter *et al* was Lymph-node (61%) followed by Thyroid (21%), Salivary gland (16%) and Miscellaneous (2%) [16]. Our present study was very similar to that of Agarwal *et al.*, [15]. The commonest lesion of lymph node on FNAC in our study was granulomatous lymphadenitis (tubercular lymphadenitis). Our finding is corroborated by the findings of Richa *et al.*, [9] and Tilak *et al.*, [17]. Tuberculosis of lymph node presents as three distinctive patterns on cytology as described by Metre and Jayaram [18]. While the first two patterns show well formed and/or degenerating epithelioid granulomas in a background of lymphoid cells and/or cheesy material, the third pattern, because of the presence of viable and degenerating neutrophils in a necrotic background may be dismissed as acute suppurative lymphadenitis. Thus, Zeihl-Neelsen staining should be performed on all aspirates from cases suspected of tuberculosis [19]. In our study 646 aspirates from lymph-nodes were diagnosed cytologically as granulomatous lymphadenitis. 42 cases out of 646 were advised for surgical excision and histopathological examination. Only 12 patients

submitted their corresponding specimen samples and were confirmed positive on histopathological examination. Histopathological findings were 100% consistent with the cytological diagnosis of tubercular lymphadenitis. Our findings correlates with that of Richa *et al.*, [9] and Shyamala Bhaskaran *et al.*, [20]. Three false positive cases of metastatic carcinoma were diagnosed on FNAC which were rendered as infected epidermal cyst on histology. Sources of false positive diagnosis are associated with irradiation or tuberculosis [21, 22] and insufficiently fixed and/or partly air dried cells in Papanicolaou stained smears, giving an impression of malignancy [23]. A mistaken diagnosis of metastatic squamous carcinoma may be rendered in aspirates from a branchial cyst, because clinically and cytologically it closely resembles a cystic metastasis of well differentiated squamous carcinoma [19].

One case of chronic nonspecific lymphadenitis turned out to be a case of Non-Hodgkin's lymphoma on histopathology. Similarly three cases were over-diagnosed as lympho-proliferative/ lymphoma on FNAC. FNAC is generally not considered a suitable technique for the primary diagnosis of malignant lymphoma [24, 25]. The primary diagnosis of lymphoma and its classification must be made on an adequate tissue biopsy. This will not only enable accurate typing of the disease, but ensure that material for lymphoid cell markers and electron microscopy is available.

In our present study 30.5% were aspirated from the thyroid gland. Out of those, 733 cases were females and 350 cases were males. Female: male ratio was 2.09:1. The female: male ratio in our study was lesser than what was found by Charry [26] (27) 4: 1 and Pranesh Prasad 5: 1 [27].

Maximum incidence of thyroid lesion was found in the age group 21- 40 years, which correlates with the study by Charry [26] and Guvanti *et al.*, [14]. Histological diagnosis was available for 23 cases, of which 86.95% were consistent and 13.05% proved to be

inconsistent. Maximum cases 748 (69.06%) were cytologically diagnosed as colloid goiter/ adenomatoid goiter/ cystic nodules followed by auto-immune thyroiditis 295 (27.23%). This finding was similar to the findings in studies by Gunvanti *et al.*, [14] and Richa Sharma *et al.*, [9].

One cytologically diagnosed case of colloid goiter turned out to be follicular adenoma on histology. Mehdi *et al.*, [28] in their study observed that, two cases, one of colloid cyst and another of colloid goiter on FNAC, turned out to be follicular adenoma on histology. The cytological appearances in colloid goiter form a continuum which merge with those of follicular adenoma, and in this grey area, cytological criteria alone cannot reliably distinguish between the two [29]. Hajdu [30] reported that colloid goiter may be difficult to differentiate from adenoma cytologically as also follicular adenoma from follicular carcinomas. Also, Lowhagen *et al.*, [31] advocated that a cytological report should only state that a follicular neoplasm is present, with no implication of its benign or malignant nature.

One cytologically diagnosed case of follicular neoplasm turned out to be multinodular goiter on histology, while another case, reported as suspicious of malignancy on cytology, was diagnosed as follicular adenoma on histology.

In the present study, FNAC of salivary gland was performed on 236 cases. A histopathological diagnosis was available for 18 cases, which showed a consistency of 88.89% and inconsistency of 11.11%. Maximum cases (92 cases, 38.98%) were cytologically diagnosed as cystic lesion. Histology for the same was available for 3 cases and showed a consistency of 100%.

Cytologically, diagnosed as pleomorphic salivary adenoma, histopathology for the same was available for 5 cases, with a consistency and inconsistency of 80% and 20% respectively. One case of pleomorphic salivary adenoma with squamous metaplasia was cytologically misdiagnosed as mucoepidermal carcinoma. Aspiration of mucoid fluid may suggest a possibility of low grade mucoepidermoid carcinoma, hence multiple sampling is important to overcome the problems due to selective sampling. Epithelial metaplasia, mainly squamous and oncocytic, is often seen in pleomorphic adenoma. Goblet cells are sometime present and squamous metaplasia can be a prominent feature [32].

Our study showed a 100% accuracy rate for chronic sialadenitis, cystic lesions and adenoid cystic carcinoma, 80% for pleomorphic salivary adenoma and 50% for mucoepidermoid carcinoma. Our results were very comparable to studies by Parijathan *et al.*, [33] and Richa Sharma *et al.*, [9].

569 FNACs were also performed apart from lesions of lymph node, thyroid and salivary gland, with an available histological diagnosis in 29 cases. Maximum cases were diagnosed cytologically as epidermal cyst (265 cases) followed by lipoma (213 cases). 100% accuracy rate was seen in cases of epidermal cyst, thyroglossal cyst and lipoma, followed by 83.33% in cases of metastatic epithelial malignancies. One case of an infected epidermal cyst was misdiagnosed as metastatic epithelial lesion on cytology.

In our study of 3551 FNACs from head and neck region over a span of 3 years, histopathological diagnosis was available for 142 cases. The lesser number of biopsy available can be attributed to lesser patient awareness and compliance, better private setups and availability of similar government setups in the neighbouring district and state capital. The overall accuracy of FNAC in our study was 90.14% with sensitivity of 92.8%, specificity of 86.66%, positive predictive value of 90.47% and negative predictive value of 89.65%. Our findings correlate well with the studies by Tilak *et al.*, [25] and Richa Sharma *et al.*, [9].

## CONCLUSION

FNAC offers an excellent first line method for the investigation and diagnosis of palpable lesions of head and neck region. It can be performed as an outpatient department procedure and accurate diagnosis can be made even in a less sophisticated laboratory. Obviating the need for surgery, less pain and no anesthesia involved, makes this procedure quite patient friendly; not to mention the lesser costs involved. As very rightly stated by Koss [34] "thin needle aspiration biopsy is a procedure whose time has come, and that pathologists not already versed in the technique will come under increasing and compelling pressure to provide it".

Hence, we can safely conclude that FNAC is an accurate, simple, quick, cost effective and patient friendly procedure when it comes to palpable lesions of head and neck.

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