

ROLE OF FINE NEEDLE CYTOLOGY IN THE DIAGNOSIS OF HEAD & NECK MASS LESIONSRifat Qureishi¹, M. H. Usmani², U. R. Singh³, Shaunak Valame⁴, Pushpendra Shukla⁵**HOW TO CITE THIS ARTICLE:**

Rifat Qureishi, M. H. Usmani, U. R. Singh, Shaunak Valame, Pushpendra Shukla. "Role of Fine Needle Cytology in the Diagnosis of Head & Neck Mass Lesions". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 19, March 05; Page: 3311-3319, DOI: 10.14260/jemds/2015/478

ABSTRACT: CONTEXT: Although head and neck masses are fairly common clinical presentation, it may be the only, or one of several nonspecific findings in serious illnesses like lymphoma or metastatic cancer. Thus, the need to efficiently differentiate patients with serious illness from those with self-limited disease arises. Fine Needle Aspiration Cytology (FNAC) helps in the early and accurate diagnosis especially where approach for interventional biopsy is limited. **AIMS:** To diagnose various head and neck mass lesions via FNAC and correlating the results with clinical and histopathological diagnosis. **SETTINGS & DESIGN:** The study was conducted in Shyam Shah Medical College and associated Sanjay Gandhi Memorial Hospital, Rewa (MP), on 406 patients who presented with head and neck swellings. **METHODS & MATERIAL:** A complete general and systemic examination was carried out. FNAC was carried out on 406 subjects while biopsy was done for 123 lesions. The predictive value for FNAC was retrospectively correlated with biopsy results. **RESULTS:** In the current study, 372 diagnoses clinically correlated to 406 cytological diagnoses. The most common head and neck swellings were Cervical Lymph Node lesions (346) followed by Salivary Gland lesions(37), while the remaining 23 were other head and neck lesions. Out of the 123 biopsies performed, 111 were correctly diagnosed by FNAC itself. Inflammatory lesions (301) accounted for 86.99% of all cervical lymph node lesions. Demographic profile revealed a higher tendency of malignant lymph node lesions in Males (68.9%) and in the older (>50years) age group (55.6%); benign lesions were more common in the young (<20years) [26.2%]. Similarly, Salivary Gland lesions (37) were mostly benign (32) and had a male predilection. 100% accuracy was achieved in the diagnosis of adenomas. Among other head and neck lesions, Lipomas were most common (30.4%) achieving a cytological accuracy of 80%. Through this study, the Sensitivity (76.67%), Specificity (94.62%), Positive Predictive Value (82.14%) and Accuracy (90.2%) for FNAC was obtained. **CONCLUSION:** FNAC achieved a diagnostic accuracy of 90.2%, and provides the advantage of being less complicated, cheap, and produces a faster result compared to biopsy. Its accuracy, thus, matches histopathology in providing an unequivocal diagnosis.

KEYWORDS: Fine-Needle Aspiration Cytology; Histology; Lymph Nodes; Salivary Glands.

MeSH Heading: Biopsy, Fine-Needle; Histology; Lymph Nodes; Salivary Glands.

INTRODUCTION: Pathology has been synonymous with the study of biopsy material for many years. Fine needle aspiration cytology (FNAC) emerged as a new advanced diagnostic tool only in the latter half of the 20th century.¹ although, in head and neck lesions, biopsy is still the standard procedure; there is a delay in the processing and patient inconvenience. It requires interdisciplinary communication between the clinician, radiologist, and pathologist. On the other hand, FNAC is relatively easy, safe, quick, and repeatable method which allows rapid interpretation of the specimen.

ORIGINAL ARTICLE

Being an office procedure which can be performed with or without the use of a local anaesthetic, it permits an early and efficient treatment planning process.²

Cervical lymphadenopathy is a fairly common clinical presentation. It is often a diagnostic challenge to medical professionals. A person with cervical Lymphadenopathy has swollen lymph glands in the neck. Lymph nodes most often swell in response to infection or inflammation. Less commonly, lymph gland swelling can be a sign of cancer.³ the physician's task is to efficiently differentiate the few patients with serious illness from the many with self-limited disease. Masses located within the region of the head and neck, including salivary gland and thyroid gland lesions can be readily diagnosed using FNAC.⁴

MATERIALS & METHODS: AIMS: To diagnose various head and neck mass lesions via FNAC and correlating the results with clinical and/or histopathological diagnosis.

SETTINGS & DESIGN: The study was conducted in Shyam Shah Medical College and Associated Sanjay Gandhi Memorial Hospital, Rewa (MP), on 406 subjects. Patients presenting with thyroid swellings were excluded from the study.

MATERIALS & METHODS: The study was conducted in Shyam Shah Medical College and associated Sanjay Gandhi Memorial Hospital, Rewa (MP). The 406 patients included were those referred to the Department of Pathology for FNAC from the OPD or wards of the hospital who presented with head and neck masses.

FNAC was performed using 23 gauge needles mounted on disposable 10 ml plastic syringes. Smears were fixed using 95% Alcohol and were evaluated after staining with Hematoxylin and Eosin (H&E). Smears were also air dried for Giemsa staining.

Excisional biopsy was done on 123 patients for histopathological correlation. Material was fixed in 10% buffered formalin overnight and dehydration was carried out using Alcohol. After blotting and solidification, sections were prepared using rotary microtome. These were stained by H&E.

Standard diagnostic criteria.⁵ was employed for the prospective cases:

1. Cervical Lymph Node Lesions:

- a) Reactive Hyperplasia.
- b) Tuberculosis.
- c) Metastases.

2. Salivary Gland Lesions:

- a) Sialadenitis.
- b) Pleomorphic Adenoma.
- c) Malignant Salivary Gland neoplasm: Acinic cell carcinoma.
- d) Mucoepidermal Carcinoma.
- e) Adenoid cystic carcinoma.

ORIGINAL ARTICLE

Inadequate smear samples were repeated and therefore there were no inadequate smears. Detailed history, demographic and clinical variables and relevant investigations were recorded on the structured proforma. The cyto pathological diagnoses then were compared with the clinical diagnosis and histopathological results of the same excised nodes when available. In cases of discrepancy, histopathologic results were considered the gold standard.

OBSERVATIONS:

Sample	Number	Clinical Accuracy (%)	Histological Confirmation	FNAC Accuracy (%)
Cervical Lymph Node Lesions	346(85.2%)	319(92.2%)	107	99(92.5%)
Salivary Gland Lesions	37(9.1%)	32(86.5%)	10	7(70%)
Other Head & Neck Lesions	23(5.7%)	21(91.3%)	6	5(83.3%)
Total	406	372(91.6%)	123	111(90.2%)

Table 1: Cytological, Clinical and Histopathological Correlation

From the total 406 cases, 372(91.6%) clinically correlated with the cytological diagnosis. The overall accuracy of FNAC with respect to histopathological confirmation was 90.2%.

Diagnosis	Number	Histological Confirmation	FNAC Accuracy (%)
Inflammatory/Benign	301(86.99%)	81	77(95.1%)
a) Tuberculosis	184(53.2%)	51	49(96.1%)
b) Reactive Hyperplasia	51(14.7%)	19	18(94.7%)
c) Inflammation	66(19%)	11	10(90.9%)
Primary Malignant lesion	10(2.89%)	5	4(80%)
a) Non-Hodgkin's Lymphoma	7(2.0%)	2	1(50%)
b) Hodgkin's Lymphoma	3(0.9%)	3	3(100%)
Metastasis	35(10.12%)	21	18(85.7%)
a) Squamous Cell Deposits	27(7.8%)	15	13(86.7%)
b) Adenocarcinoma	8(2.4%)	6	5(83.3%)
Total	346	107	99(92.5%)

Table 2: Cytological and Histopathological Correlation of Cervical Lymph Node Lesions

FNAC of lymph node was accurate 92.5% of cases on histopathological confirmation. The accuracy was highest for Inflammatory/Benign lesions (95.1%) compared to primary malignant (80%) and metastatic (85.7%) lesions.

ORIGINAL ARTICLE

Tuberculosis accounted for 53.2% of lesions and FNAC achieved an accuracy of 96.1%. FNAC correlated in 90.1% of cases of inflammation- which comprised 19% of total cases. Reactive Hyperplasia was seen among 14.7% of cases; the FNAC of which diagnosed 94.7% of cases accurately.

Metastases (10.2%) were more frequent than Primary Malignancies (2.9%) and a 100% diagnostic accuracy was achieved in Hodgkin's Lymphoma.

Age (yrs.)	Tuberculosis	Reactive Hyperplasia	Inflammation	Total
0-10	12(6.5%)	28(54.91%)	39(59%)	79(26.25%)
11-20	44(23.9%)	17(33.33%)	18(27.3%)	79(26.25%)
21-30	53(28.8%)	4(7.84%)	5(7.6%)	62(20.59%)
31-40	43(23.4%)	2(3.92%)	1(1.5%)	46(15.28%)
41-50	12(6.5%)	0	1(1.5%)	13(4.32%)
>50	20(10.9%)	0	2(3%)	22(7.31%)
Total	184(61.2%)	51(16.9%)	66(21.9%)	301

Table 3: Age Profile of Benign Cervical Lymph Node Lesions

Reactive Hyperplasia (54.91%) and Inflammation (59%) were most frequently seen in the 0-10yr age group while tuberculosis (28.8%) was highest among the 21-30yr age group.

Age (yrs.)	Primary Malignancy	Metastases	Total
0-10	1(10%)	1(2.86%)	2(4.4%)
11-20	4(40%)	0	4(8.9%)
21-30	0	0	0
31-40	0	3(8.57%)	3(6.7%)
41-50	1(10%)	10(28.57%)	11(24.4%)
>50	4(40%)	21(60%)	25(55.6%)
Total	10(22.2%)	35(77.8%)	45

Table 4: Age Profile of Malignant Cervical Lymph Node Lesions

Metastatic lymph node deposits (77.8%) were more common than Primary malignancies (22.2%). However, primary malignancies had a bimodal age distribution in the 11-20yr age group and >50yr age group (40% each) while metastases were frequent among the >50yr age group (60%).

Lesion	Male	Female	Total
Tuberculosis	99(53.8%)	85(46.2%)	184
Reactive Hyperplasia	31(60.8%)	20(39.2%)	51
Inflammation	41(62.1%)	25(37.9%)	66
Primary Malignancy	7(70%)	3(30%)	10
Metastases	24(68.6%)	11(31.4%)	35
Total	202(58.4%)	144(41.6%)	346

Table 5: Sex Profile of Cervical Lymph Node Lesions

ORIGINAL ARTICLE

Reactive Hyperplasia (60.8%), Inflammation (62.1%), Primaries (70%) and Metastases (68.6%) had an overwhelming male affectation. In all, malignancies were also more common in males (68.88%). Tuberculosis was somewhat comparable between the sexes at 53.8% (Males) and 46.2% (Females). Thus, all cervical lymph node lesions had a male preponderance (58.4%).

Diagnosis		Number	Clinical Accuracy (%)	Histological Confirmation	FNAC Accuracy (%)
Benign	Adenoma	13(35.14%)	11(84.6%)	2	2(100%)
	Inflammation	19(51.35%)	17(89.5%)	6	4(66.67%)
Malignant		5(13.51%)	4(80%)	2	1(50%)
Total		37	32(86.5%)	10	7(70%)

Table 6: Cytological, Clinical and Histopathological Correlation of Salivary Gland Lesions

Most salivary gland lesions were benign in nature (86.5%) and although FNAC correlated with 100% of adenomas on histological confirmation, it only correlated in 60% of inflammatory lesions and 50% of malignancies.

Age (yrs.)	Inflammation	Benign	Malignant	Total
0-10	3(15.8%)	0	1(20%)	4(10.81%)
11-20	3(15.8%)	2(15.39%)	0	5(13.51%)
21-30	2(10.5%)	2(15.39%)	0	4(10.81%)
31-40	1(5.3%)	6(46.15%)	1(20%)	8(21.62%)
41-50	2(10.5%)	0	0	2(5.41%)
>50	8(42.1%)	3(23.08%)	3(60%)	14(37.84%)
Total	19(51.35%)	13(35.14%)	5(13.51%)	37

Table 7: Age Profile of Salivary Gland Lesions

While inflammatory (42.1%) and malignant (60%) lesions were more common among the >50 year age group, benign lesions were mostly seen in the 31-40 year age group.

Lesion	Male	Female	Total
Inflammation	11(57.9%)	8(42.1%)	19
Benign	4(30.77%)	9(69.23%)	13
Malignant	4(80%)	1(20%)	5
Total	19(51.35%)	18(48.65%)	37

Table 8: Sex Profile of Salivary Gland Lesions

Inflammation (57.9%) and Malignancy (80%) of salivary glands had a significant male predilection, while benign lesions (69.24%) were more common in females.

ORIGINAL ARTICLE

Diagnosis	Number	Histological Confirmation	FNAC Accuracy (%)
Dermoid Cyst	6	1	1(100%)
Epidermal Cyst	2	-	-
Sebaceous Cyst	8	-	-
Lipoma	7	5	4(80%)
Total	23	6	5(83.3%)

Table 9: Cytological and Histopathological Correlation of Other Head and Neck Lesions

Other head and neck lesions that FNAC accurately diagnosed were Dermoid cyst (100%) and Lipoma (80%).

Age (yrs.)	Cysts	Lipoma	Total
0-10	4(25%)	0	4
11-20	0	0	0
21-30	4(25%)	1(14.3%)	5
31-40	3(18.75%)	5(71.4%)	8
41-50	0	1(14.3%)	1
>50	5(31.25%)	0	5
Total	16(69.6%)	7(30.4%)	23(100%)

Table 10: Age Profile of Other Head and Neck Lesions

Cysts were more frequently seen in the >50 year group (31.25%), while lipomas were most frequent in the 31-40yr age group(71.4%).

Lesion	Male	Female	Total
Cysts	13(81.25%)	3(18.75%)	16
Lipoma	6(85.7%)	1(14.3%)	7
Total	19	4	23

Table 11: Sex Profile of Other Head and Neck Lesions

Both, cysts (81.25%) and lipomas (85.7%) were more common among males.

Cytology	Histopathology		Total
	Benign	Malignant	
Benign	88	7	95
Malignant	5	23	28
	93	30	123

Table 12: Final Comparative Analysis between Cytology and Histopathology

ORIGINAL ARTICLE

Thus, the diagnostic reliability of cytopathology in comparison to histopathology in the differentiation of malignant from benign head and neck masses can be summarised as:

1. Sensitivity 76.67%.
2. Specificity 94.62%.
3. Positive Predictive Value 82.14%.
4. Negative Predictive Value 92.63%.
5. Accuracy 90.2%.
6. Discordance 9.8%.

DISCUSSION: Overall accuracy of cyto diagnosis in the present study was 90.2%. Similarly, Hafez⁶ achieved a diagnostic accuracy of 82.2% while Babu⁷ achieved a diagnostic accuracy of 91%.

The accuracy of the various cervical lymph node diagnoses found in the current study is compared with other studies as shown in the following table:-

Diagnosis	Present Study	Hafez ⁶
Reactive Hyperplasia	94.7%	85%
Granulomatous lymphadenitis	96.1%	70%
Necrotising lymphadenitis	90.1%	83.3%
Metastases	90.4%	100%
Non-Hodgkins Lymphoma	50%	75%
Hodgkins Lymphoma	100%	77.8%

Table 13: Comparison of the accuracy of various cervical lymph node lesions with Hafez et al⁶

Other studies have shown diagnostic accuracy for Metastasis to vary between 87-97.9% and 82% for lymphomas.^{8,9}

The proportion of each benign cervical lymph node lesion was higher than that found by Pandav.¹⁰ Our study found tubercular lymphadenitis, reactive hyperplasia and inflammation in 53.2%, 14.7% and 19% respectively; while their study showed the same in 38%, 22% and 11% respectively.

Wilkinson found metastasis in 90% of all lymph node biopsy in their study while the remaining 10% were lymphomas.¹¹ similarly, this study revealed metastasis in 77.8% and primaries in 22.2%

Kataria.¹² found male preponderance in tuberculosis lymphadenitis (75%) and malignancies (66.67%). Likewise, this study revealed similar results with 53.8% tubercular lymphadenitis and 68.9% malignancies prevailing in the male sex.

While Hafez.⁶ observed that the peak incidence of benign and malignant lesions in the 3rd & 5th decades respectively, our study showed peak incidence of benign lesions in the 0-10 & 11-20year and malignant lesions in the >50year age group respectively.

Among salivary gland lesions, FNAC accuracy was 50% for malignancies in the current study, while Babu.⁷ achieved 75% accuracy while Sengupta.¹³ achieved an accuracy of 96.07%

Cystic, inflammatory and malignant lesions were 35.14%, 51.35% and 13.51% respectively; similar to Sengupta's.¹³ observations of 25.25%, 54.45% and 20.3% respectively. Frequency of

ORIGINAL ARTICLE

salivary gland lesions were highest in the >50 year age group, similar to Sengupta.¹³ who found maximum number (39.3%) in the 51-60 year age group. In the current study, males slightly outnumbered females in the ration of 1.05:1; opposite to the Senguptas.¹³ study in which females outnumbered males by a ratio of 1.15:1

Among the other lesions of the head and neck, lipomas were most common, being seen in 7/23 cases; similar to Roy¹⁴ who found lipomas in 22/70 cases.

On the whole, this study on FNAC arrived at results that are similar to earlier conducted studies, as depicted below:

Parameter	Current Study	Hafez. ⁶	Sengupta. ¹³	Jain. ¹⁵
Sensitivity	76.67%	90.9%	87.5%	92.8%
Specificity	94.62%	67.2%	97.6%	93.9%
Positive Predictive Value	82.14%	82.6%	87.5%	81.2%
Negative Predictive Value	92.63%	81.3%	97.6%	98.4%
Accuracy	90.2%	82.2%	96.07%	-
Discordance	9.8%	17.8%	-	-

Table 14: A comparison of various parameters of FNAC between other studies and current study

Thus, studies have revealed a higher Specificity than the Sensitivity of FNAC in the diagnosis of malignant head and neck mass lesions. However, these studies similarly show a higher Negative over a Positive predictive value in the diagnosis of malignant lesions. With an accuracy of 90.2%, our study also acknowledges FNAC to be a highly reliable technique for the pre-operative diagnosis of head and neck masses.

RECOMMENDATIONS: Despite its limitations and pitfalls, FNAC appears as a good first line method for investigating the cases of cervical lymphadenopathy. FNAC used in conjunction with clinical findings, radiological and laboratory investigations can be a cost effective method. Our study also showed FNAC of lymph nodes to be an accurate tool in the diagnosis of lymph node malignancies and can effectively classify salivary gland lesions into cystic, inflammatory and neoplastic lesions. Overall, the accuracy of FNAC in identifying lesions was reasonably good and comparable to the alternative of biopsy.

Hence, in our country, where resources are low, FNAC provides a cost-effective, quick and painless alternative to the gold standard biopsy. Its accuracy in many situations, when applied by experienced and well trained practitioners, matches that of histopathology and should be regarded as an extremely valuable complement to it and is itself becoming just indispensable.

BIBLIOGRAPHY:

- Orell SR, Sterrett GF, Walters NI, Whitaker D. Manual atlas of fine needle aspiration cytology. 2nd ed. Edinburgh: Churchill Livingstone; 1992. p. 37-61.
- Wakely PE Jr, Kneisl JS. Soft tissue aspiration cytopathology. Cancer 2000; 90:292-8.
- Celeste NP. (1996).Williams JF. Fine needle aspiration biopsy of the head and neck. USA: Butterworth Heinemann;p 1-13.

ORIGINAL ARTICLE

4. Gamba PG, Messineo A, Antonello LM, Boccato P, Blandamura S, Cecchetto G. (1995). Simple exam to screen superficial masses, FNAC. *Med Pediatr Oncol.* 24: 97–99.
5. Orell SR, Sterrett GF, Whitaker D. *Fine Needle Aspiration Cytology.* 4th ed. Churchill Livingstone; 2005.
6. Hafez NH, Tahoun NS. Study of fine needle aspiration cytology (FNAC) as a diagnostic tool of cervical lymphadenopathy. *Journal of the Egyptian National Cancer Institute; Volume 23, Issue 3, September 2011, Pages 105–114.*
7. Babu G S, Ramesh G, Kashyap B, Suneela S, Hiremath S S, Murgud S. Cytohistopathological evaluation of the cervical lymph nodes by fine needle aspiration cytology. *J Cranio Max Dis* 2014; 3:101-5.
8. Alam K, Khan A, Siddiqui F, Jain A, Haider N, Maheshwari V. Fine needle aspiration cytology (FNAC): A handy tool for metastatic lymphadenopathy. *Int J Pathol* 2010; 10:2.
9. Khajuria R, Goswami KC, Singh K, Dubey VK. Pattern of lymphadenopathy on fine needle aspiration cytology in Jammu. *JK Sci* 2006; 8:157-9.
10. Pandav AB, Patil PP, Lanjewar DN. Cervical lymphadenopathy – diagnosis by F.N.A.C., a study of 219 cases. *Asian J Med Res.* (2012); 1(3): 79-83.
11. Wilkinson AR, Mahore SD, Maimoon SA. FNAC in the diagnosis of lymph node malignancies: a simple and sensitive tool. *Indian J Med Paediatr Oncol.* 2012 Jan-Mar; 33(1): 21–24.
12. Kataria P, Sachdeva M, Singh NK. FNAC as a diagnostic tool for the diagnosis of cervical lymphadenopathy. *Bull. Environ. Pharmacol. Life Sci.;* Volume 1 [8] July 2012: 72 – 75.
13. Sengupta S, Roy A, Mallick MG, Kundu B, Das SK, Das S. F.N.A.C of Salivary Glands. *Indian Journal of Otolaryngology and Head and Neck Surgery* Vol. 54 No. 3, July - September 2002: 184-8.
14. Roy S, Manna AK, Pathak S, Guha D. Evaluation of Fine Needle Aspiration Cytology and Its Correlation with Histopathological Findings in Soft Tissue Tumours. *Journal of Cytology* 2007; 24 (1): 37-40.
15. Jain R, Gupta R, Kudesia M, Singh S. Fine needle aspiration cytology in diagnosis of salivary gland lesions: A study with histologic comparison; *Cyto journal.* 2013; 10: 5.

AUTHORS:

1. Rifat Qureshi
2. M. H. Usmani
3. U .R. Singh
4. Shaunak Valame
5. Pushpendra Shukla

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Pathology, SSMC Rewa, M. P.
2. Associate Professor, Department of General Medicine, SSMC Rewa, M.P.
3. HOD, Department of Pathology, SSMC Rewa, M. P.

FINANCIAL OR OTHER

COMPETING INTERESTS: None

4. Post Graduate Student, Department of General Medicine, SSMC Rewa, M. P.
5. Assistant Professor, Department of General Surgery, SSMC Rewa, M. P.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. M. H. Usmani,
F-25, Doctors Colony,
Rewa, M. P. – 486001.
E-mail: drmanzar@rediffmail.com

Date of Submission: 10/02/2015.
Date of Peer Review: 11/02/2015.
Date of Acceptance: 23/02/2015.
Date of Publishing: 04/03/2015.