

Cyto-Histopathological Correlations of Head and Neck Swellings In A Rural Hospital In North Maharashtra: Our Experience

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ABSTRACT

Background: The head and neck encompass a relatively small anatomic area. But anatomy and pathology of this region is extremely complex with multitude of congenital, inflammatory or neoplastic lesions. Fine needle aspiration cytology (FNAC) is a simple, feasible, cost effective and minimally invasive procedure. But histopathological examination is more valuable for confirmatory diagnosis in suspected lesions.

Aim: 1. To study the diagnostic accuracy of FNAC by comparative study with histopathological examination. 2. To study the spectrum of non-neoplastic and neoplastic lesions of head neck in rural population.

Methods: A retrospective research study included 363 patients presented with head and neck swellings in a rural hospital from April 2013 to April 2015. Detailed clinical history of patient was noted. Aspirations were done and smears were stained with PAP, Haematoxylin and eosin and Leishman stain. Cytomorphological diagnosis was given. Cyto-histopathological correlations were done in 205 cases.

Result: Out of 363 patients studied, lymph node (39.66%) was the predominant site aspirated followed by thyroid lesions (30.30 %), salivary gland (19.00%), soft tissue and miscellaneous (7.71%). FNAC was inconclusive in 3.30 % cases. A histopathological correlation was done in 56.47% cases. Overall accuracy rate of FNAC was 97.07%. The sensitivity, specificity, positive predictive value, negative predictive value of test was 80.00 %, 98.91 %, 88.88% and 97.86 % respectively.

Conclusion: Though, FNAC is a rapid, cheap diagnostic tool now-a-days, excisional biopsy remains the gold standard for diagnosis of suspected or grey zone of head and neck lesions.

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Introduction

The head and neck area is a complex anatomical structure which includes various non-neoplastic and neoplastic lesions of lymph node, salivary gland, thyroid gland and soft tissue. Proximity of tissues of various types and wide range of primary and metastatic neoplasms are responsible for this site being the most common in FNAC diagnosis.^[1]

FNAC is relatively painless, cheap, repeatable and useful for multiple lesions and has low risk of complications. FNAC is applicable to easily palpable lesions of thyroid, breast, salivary glands, superficial lymph nodes, superficial growth of skin & soft tissue.^[1] Head and neck neoplasms is a major form of cancer in India accounting for 23 % of all cancer in males and 6 % in females.^[2,3] FNAC of head and neck region is a generally well accepted technique with high specificity.^[4] Psychological and economical advantage of an immediate diagnosis in outpatient clinic is obvious. Ancillary techniques done on cytology like flow cytometry, cytogenetic, electron microscopy, cell block preparation, immunocytochemistry have further added a tool in diagnosis. FNAC differentiates non neoplastic lesions from neoplastic lesions thus eliminating need of surgical intervention in these lesions which can be treated conservatively.^[5] But histopathological confirmation is mandatory in suspected, recurrent and neoplastic lesions.

Material and Method

A retrospective study was conducted in Department of Pathology from April 2013 to April 2015 and included 363 patients with head and neck swellings. Outdoor as well as indoor patients with palpable head and neck swellings were referred to cytology department. Detail clinical history and significant findings were noted. After explanation of procedure and taking informed consent of patient, FNAC was done using 10 cc disposable syringe and 22/23 gauge needle taking all aseptic precautions. Both aspiration and non-aspiration techniques were used wherever required. Smears were stained with PAP, Haematoxylin-Eosin stain and Leishman stain. Zeihl-Neelsen staining for acid fast bacilli was done in suspected tubercular lesions. Aspirations taken from various sites include lymph node, thyroid, salivary gland and soft tissue. Cytomorphological diagnosis was given depending upon the pathology. Clinicians were advised excisional biopsy. Excisional biopsy specimens were fixed in 10% neutral buffered formalin processed by paraffin embedding and stained with haematoxylin and eosin stain. Cyto-histopathological correlation was done in those cases.

Results

The present study included 363 cases of head and neck lesions from various departments as an OPD as well as indoor patient. Age group of patients ranged from 1 year to

75 years. Out of total 2270 cytology patients over a period of 2 years FNAC of head and neck lesions constituted 363 (15.99 %) of cases. Maximum no. of patients were in the age group of 21-30 years (37.23%) followed by 31-40 years (22.40%) and least no. of patients were seen in age group of above 70 years. Out of 363 patients 203 (55.92%) were females and 160 (44.08%) were males. Site wise distribution of head and neck FNAC [Table-1] shows lymph nodes lesion as the predominant site of FNAC followed by thyroid lesions (30.30%), salivary glands (19.00%) and soft tissue (7.71%). FNAC was inconclusive in 12 (3.30%) cases.

Table-1: Distribution of Head & Neck Lesions [Cases=363]

Site	No. of Cases	%
Lymph Node	144	39.66
Thyroid gland	110	30.30
Salivary gland	69	19.00
Soft tissue & miscellaneous	28	7.71
Inconclusive	12	3.30

In 144(39.66%) cases of lymph node lesions, tubercular lymphadenitis (44.44%) was the predominant finding observed followed by reactive lymphadenitis in 52(36.11%) cases. Malignant lesions included 7 cases (4.86%) of metastatic epithelial malignancy and two cases (1.38%) of lymphoma. Histopathological examination done in 76 cases confirmed diagnosis in 73 cases with two false negative and one false positive result. [Table-2] [Figure-1]

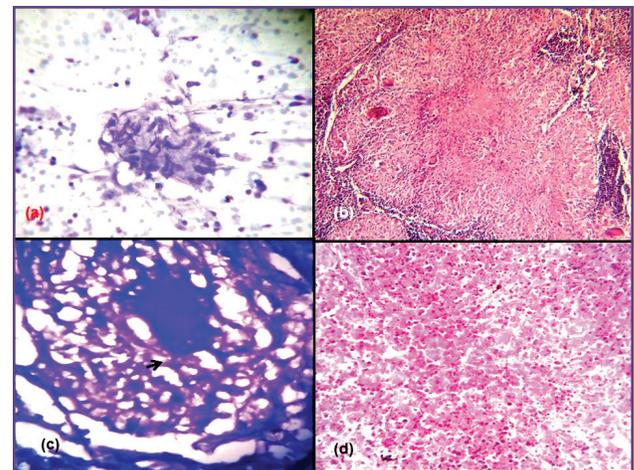


Fig. 1: Lymph node lesions (a) FNAC showing necrotic background with epithelioid cell granuloma (Leishman Stain; x400); (b) HPE -Tubercular Lymphadenitis (H&E; x100); (c) Z.N. Stain- Acid fast bacilli (Z.N Stain; x400) and (d) HPE- Kikuchi's lymphadenitis (H&E; x400).

Table 2: Cytology & Histopathological Co-relation of Various Lymph Node Lesions [N=144]

FNAC Diagnosis		No. of cases	%	HPE Done	Diagnosis Consistent with cytology	HPE Diagnosis Inconsistent with cytology	HPE Diagnosis
Reactive lymphadenitis		52	36.11	2	1	1	RLH- 1 case Granulomatous LN-1
Inflammatory	Nonspecific	19	13.19	5	5	--	Chronic Nonspecific LN-5
	Tuberculosis	64	44.44	59	58	1	Granulomatous LN S/O TB-58 Kikuchi Disease-1
Malignant	Lymphoma	2	1.38	2	1	1	NHL-1 RFH-1
	Metastasis	7	4.86	6	6	--	SCC- 5 & ADC-1
Total		144	100				

RLH- Reactive lymphoid hyperplasia
LN-Lymphadenitis
TB-Tuberculosis
SCC-squamous cell carcinoma
ADC- Adenocarcinoma
RFH-Reactive Follicular Hyperplasia

In salivary glands lesions, sialadenitis was observed in 59.41% of cases. Benign neoplasm included 20 (28.98%) cases of pleomorphic adenoma, four cases (5.79%) of benign lymphoepithelial cyst and one case of basal cell adenoma .3 cases of malignant neoplasms were reported including one case of each of carcinoma ex pleomorphic adenoma, mucoepidermoid carcinoma and anaplastic carcinoma. Histopathological study of 39 cases confirmed cytological diagnosis in 38 cases with one false positive result.[Table-3][Figure-2]

In 110 (30.30%) cases of thyroid lesions, 28(25.45%) of cases of inflammatory lesions including Hashimoto's thyroiditis, chronic lymphocytic thyroiditis were reported. Benign neoplastic lesions constituted 74.53% of cases. In malignant lesions two cases (1.81%) of papillary carcinoma

were observed. Out of 68 cases cyto-histopathological correlation was found in 66 cases with two false negative results. [Table-4]

FNAC of soft tissue and miscellaneous constituted 28 cases (7.71%) with varied pathological lesions like lipoma (25.00%), epidermal cyst (46.42%), benign adnexal tumor (3.57%) and malignant neoplasms including squamous cell carcinoma, basal cell carcinoma, malignant melanoma and metastatic epithelial neoplasm. [Table-5] [Figure-3]

Diagnosis consistent with cytology was available in all 24 cases. A cyto-histopathological correlation was done in 205 (56.47%) cases. Histological diagnosis found consistent with cytology in 199 (97.07%) cases while inconsistent with cytology in 6 (2.93%) cases.

Table 3: Cytology & Histopathological Co-relation Of various Salivary gland lesions [n= 69]

Salivary gland lesions	No. of cases	%	HPE Done	Diagnosis Consistent with cytology	HPE Diagnosis Inconsistent with cytology	HPE Diagnosis
Inflammatory						
1.Acute sialadenitis	14	20.28	2	2	–	Acute sialadenitis-2
2. Chronic sialadenitis	27	39.13	9	9	–	Chronic sialadenitis-9
Benign						
1.Pleomorphic adenoma	20	28.98	20	20	–	Pleomorphic adenoma-20
2.Benign lymphoepithelial lesion	4	5.79	4	4	–	Benign lymphoepithelial cyst-4
3.Basal cell Adenoma	1	1.44	1	1	–	Basal cell Adenoma-1
Malignant						
1.Carcinoma ex pleomorphic adenoma	1	1.44	1	1	--	Carcinoma ex pleomorphic adenoma-1
2.Mucoepidermoid carcinoma	1	1.44	1	--	1	Pleomorphic adenoma with squamous metaplasia-1
3.Anaplastic carcinoma	1	1.44	1	1	--	Anaplastic carcinoma-1
Total	69	100				

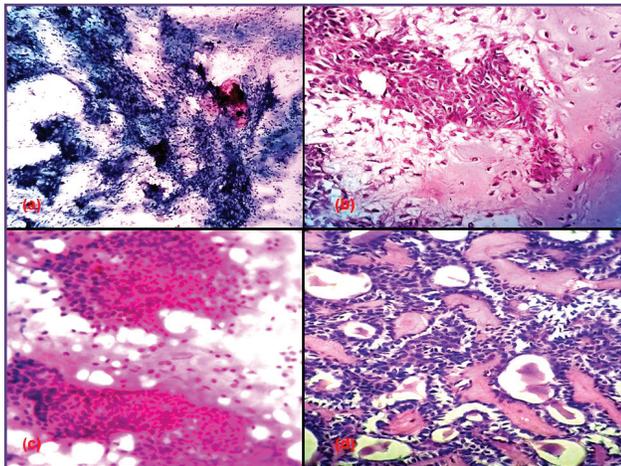


Fig. 2: Salivary gland lesions (a) FNAC showing benign pleomorphic adenoma (Pap Stain; x100); (b) HPE- benign pleomorphic adenoma (H&E; x400); (c) FNAC showing basal cell adenoma (Pap Stain; x100) and (d) HPE-basal cell adenoma (H&E; x400) .

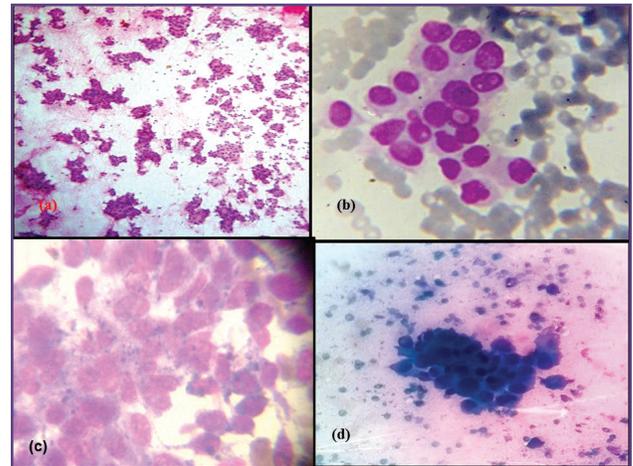


Fig. 3: (a) FNAC of thyroid gland showing follicular lesion (H&E; x100); (b) FNAC showing papillary carcinoma of thyroid (Leishman Stain; x400); (c) FNAC showing malignant melanoma (Leishman Stain; x400) and (d) FNAC showing squamous cell carcinoma of soft tissue (Pap Stain; x400)

Table 4: Cytology & Histopathological Co-relation Of various Thyroid lesions [n= 110]

Thyroid lesions	No. of cases	%	HPE Done	Diag. Consistent with cytology	HPE Diag. Inconsistent with cytology	HPE Diagnosis
Inflammatory	28	25.45	5	5	–	Thyroiditis-5
1.Colloid /nodular goitre	54	49.09	45	44	1	Colloid/nodular goiter-44 Follicular adenoma-1
2.Hurthle cell neoplasm	10	9.09	5	5	–	Hurthle cell Neoplasm-5
3.Thyroglossal cyst	8	7.27	5	5	–	Thyroglossal cyst-5
4.Follicular neoplasm	8	7.27	6	5	1	Follicular adenoma-5 Follicular carcinoma-1
5.Papillary carcinoma	2	1.81	2	2	–	Papillary carcinoma-2
Total	110	100				

Table 5: Cytology & Histopathological Co-relation Of soft tissue & miscellaneous lesions [n=28]

	No. of cases	%	HPE Done	Diagnosis Consistent with cytology	Diagnosis Inconsistent with cytology	HPE Diagnosis
Benign						
1.Lipoma	7	25.00	7	7	–	Lipoma-7
2.Epidermal cyst	13	46.42	12	12	–	Epidermal cyst-12
3.Benign adnexal tumor	1	3.57	-	–	–	–
Malignant						
1.Squamous cell carcinoma	4	14.28	3	3	–	Squamous cell carcinoma-3
2.Basal cell carcinoma	1	3.57	1	1	–	Basal cell carcinoma-1
3.Malignant melanoma	1	3.57	1	1	–	Malignant melanoma-1
4.Metastatic epithelial tumor	1	3.57	–	–	–	
Total	28	100				

Discussion

Head and neck neoplasm constitute a major form of cancer in India accounting for 23% of all cancer in males and 6% in females^[2,3] and approximately 5% all childhood neoplasms.^[6] Increased prevalence of malignancies may be due to use of various forms of tobacco in our country. Lesions of head and neck include variety of developmental, inflammatory and neoplastic lesions.

In 1930, Martin and Ellis described and first introduced the technique of FNAC for diagnosis of organ lesion.^[7] The two fundamental requirements on which success of FNA depends are representative sample and high quality of preparation. These two prerequisites will always remain a sine qua non, no matter how sophisticated supplementary techniques.^[1]

The present study was carried out over a period of 2 years find out the diagnostic accuracy of FNAC by comparative study with histopathological diagnosis and also compares its findings with various national and international studies published in the literature.[Table-6] Majority of patients were females with male to female ratio of 0.78:1 and the study included patients of all age group. Similar results of female preponderance were also reported by Muddegowda et al^[8], Sharma et al^[11] and Ahmad T et al.^[13]

In our study predominant site of FNAC was lymph node lesions (39.66%) followed by thyroid gland. Similar result reported by various studies. [Table-6] In lymph node lesions tubercular lymphadenitis was the most common pathological findings followed by reactive lymphadenitis which is in concordance with Bhagat et al^[9], Sharma et al^[11], Ahmad T et al^[13] and El Haq et al^[4]. In malignant neoplasms, epithelial metastasis was found in 7 cases (4.86 %) and two cases of lymphoma were found. Out of six cases five confirmed metastatic squamous cell carcinoma and one case of metastatic adenocarcinoma histopathologically.

More no. of metastasis in lymph node is due to consumption of tobacco in various forms in our area leading to high incidence of malignancy in aerodigestive tract.

FNAC of thyroid lesions revealed colloid/nodular goiter (49.09%) as the predominant finding in benign lesion followed by inflammatory lesions consisting of Hashimoto's thyroiditis, chronic lymphocytic thyroiditis. Two cases of papillary carcinoma were detected which were confirmed on histopathology. Muddegowda et al^[8] and Rathod et al^[12] also found thyroid lesions as the predominant site of FNAC in their study with colloid goiter as the predominant finding. Female preponderance was observed in FNAC of thyroid lesion in our study with similar findings reported by Rathod et al^[12] and Muddegowda et al.^[8]

In salivary gland lesions acute and chronic sialadenitis together comprised 59.41% followed by pleomorphic adenoma in 20 cases (28.98%) , benign lymphoepithelial cyst in four cases (5.79%) and basal cell adenoma in one case. Three cases of malignant neoplasms were reported including one case of each carcinoma ex pleomorphic adenoma, mucoepidermoid carcinoma and anaplastic carcinoma. However the case reported as mucoepidermoid carcinoma on cytology turned out to be pleomorphic adenoma with squamous metaplasia on histopathological examination. Sharma et al^[11] and Rathod et al^[12] found inflammatory lesions as the commonest findings followed by benign neoplasms including pleomorphic adenoma while Bhagat et al^[9] found benign pleomorphic adenoma as the predominant salivary gland lesion in his study.

Benign lesions comprised of 13 cases (46.42%) of epidermal cyst, 7 cases (25.00%) of lipoma and one case (3.57%) of benign adnexal tumor were commonest findings in soft tissue and miscellaneous lesions .Seven cases of malignant neoplasms comprising of 4 cases of squamous cell carcinoma and one case of each basal cell carcinoma,

Table-6: Comparison of Results of Various National and International Studies

	Our study 2015	Muddegowda et al ^[8] [2014]		Bhagat VM et al ^[9] [2013]	Mohmed MH ^[10] [2013]	Sharma R ^[11] [2012]	Rathod G ^[12] [2012]	Ahmad T ^[13] [2008]	El Haq ^[4] [2003]	Kamal F ^[14] [1996]
No. Of Patients	363	100	100	701	37	125	200	50	225	847
M:F ratio	0.78:1	0.29:1	0.53:1	-----	---	0.64:1	1.43:1	0.47:1	---	
Predominant site	Lymph Node	Thyroid	Thyroid	Lymph Node	Lymph Node	Lymph Node	Thyroid	Lymph Node	Lymph Node	Lymph Node
Malignant Neoplasm (%)	5.78	07	16	20.68	5	16	15	14	13	11
Benign neoplasm (%)	14.87	8	9	6.56	6	12	12.5	8	9	1
Inconclusive	3.30	2	3	10	0	3.2	4.5	8	8	1.3

malignant melanoma and metastatic epithelial tumor to scalp was reported. Bhagat et al ^[9] reported neoplastic lesions in 63% cases with lipoma as the predominant benign tumor and squamous cell carcinoma as the commonest malignant neoplasm.

In 3.30 % of cases cytology was inconclusive. The causes of unsatisfactory aspirates were smaller lesions, poor handling of material, inadequate aspirate. Incidence of inadequate reports ranged from 0 to 10 % in various studies in the literature.

Cyto-histopathological correlation was done in only 205 cases (56.47%). Out of 330 benign lesions in 187 cases only cyto-histopathological correlation was possible. Cytomorphological diagnosis was in concordance with histopathological diagnosis in 183 cases (97.86%) while 4 cases showed false negative results. One case reported on cytology as reactive lymphadenitis turned out to be tubercular lymphadenitis on histopathological examination. The probable reason may be focal epithelioid granuloma was missed during aspiration hence multiple passes in various directions is necessary to avoid false negative result. Another case reported on cytology suggestive of NHL was confirmed as reactive follicular hyperplasia on histopathology. Differentiation between lymphoma and follicular hyperplasia is very difficult on cytology and require biopsy for primary diagnosis. One more case reported as tubercular lymphadenitis on cytology turned out to be Kikuchi's lymphadenitis on histopathological examination. On the basis of findings of necrotic background, epithelioid histiocytes cytological diagnosis of granulomatous lymphadenitis suggestive of tuberculosis was offered. Characteristics features like central necrotic debris, peripheral palisading histiocytes, plasmacytoid monocytes and immunoblast suggest Kikuchi's lymphadenitis on cytology. Other case reported as a follicular neoplasm of thyroid on cytology turned out to be follicular carcinoma on histopathological examination. This is one of the known limitations of FNAC in thyroid follicular lesions and both lesions can not be differentiated cytologically. One case of nodular colloid goiter turned out

to be follicular adenoma histopathologically. The probable cause of this discrepancy was due to aspiration of follicular focus from nodular goiter. Hence multiple passes from different areas avoid such discrepancy.

Out of 18 malignant cases reported on cytology, in 16 cases cytological diagnosis was consistent with histopathological diagnosis. One case reported as mucoepidermoid carcinoma on cytology turned out to be pleomorphic adenoma with squamous metaplasia on histopathological examination. So presence of metaplastic squamous cells on cytology should raise suspicion of this entity while reporting.

In this study overall accuracy rate of FNAC was 97.07% with sensitivity of 80.00 %, specificity of 98.91 %, and positive predictive value of 88.88% and negative predictive value of 97.86 %.

Cyto-histopathological correlation was done by Sharma et al ^[11] in 71 cases out of 125 cases with sensitivity of 89.28%, specificity of 90.69%, positive predictive value of 85% and negative predictive value of 90.14%. Tilak et al ^[15] studied cyto-histopathological correlation in 55 out of cases 154 with overall diagnostic accuracy rate of 92.75%, sensitivity of 90.91% and specificity of 93.18%. Maniyar et al ^[16] studied cyto-histopathological correlation in 92 (23.90%) cases out of 385. Out of these 92 cases, in 79(85.87%) cases histopathology diagnosis was consistent with cytology while in 13(14.13%) cases cyto-histopathological diagnosis were different. Cyto-histopathological correlation was done by Fernandez H et al ^[17] in 129 cases out of 620 cases with sensitivity of 83.33%, specificity of 100%, positive predictive value of 97% and negative predictive value of 97%. [Table 7] In most of the national studies including our study inflammatory and non-neoplastic lesions were the predominant cause of head and neck masses while neoplastic lesion were the commonest finding in various international studies.

The present study highlights the limitations of FNAC in diagnosis of thyroid follicular lesions, borderline and grey zone lesions of lymph node and soft tissue. A histopathological examination is mandatory for

Table- 7 –Comparison of various studies

Author study	No. of Cytology cases	HPE Done	Sensitivity %	Specificity %	Accuracy rate of FNAC %
Sharma et al [11] 2012	125	71	89.28	90.69	90.14
Tilak et al [15] 2002	154	55	90.91	93.18	92.75
Maniyar et al [16]2013	385	92	98.46	100	98.91
Fernandez H et al [17] 2009	620	129	83.33	100	100
Our study ,2015	363	205	80.00	98.91	97.07

confirmatory diagnosis of such lesions. Non-neoplastic lesions remain the predominant cause of palpable swellings in our locality which is comparable with other studies.

To avoid or minimize false positive results various factors including regenerative changes, metaplasia and others should be taken into considerations while reporting. False negative results may be due to cystic change, necrotic and hemorrhagic areas revealing no diagnostic cellular yield. Repeat FNAC of solid areas or adjacent area may minimize false negative results in such cases. In this study it is observed that though FNAC is a rapid, cost effective, highly accurate and feasible first line diagnostic tool in management of head and neck swellings histopathological confirmation is required for especially for neoplastic lesions to avoid false negative results and proper management of patient.

Conclusion

Though FNAC is a rapid, cheap diagnostic tool nowadays with overall accuracy rate more than 90 %, excisional biopsy remains the gold standard for diagnosis of head and neck neoplastic lesion. To obtain maximum diagnostic accuracy cyto histopathological correlation is must.

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Competing Interests

None

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