

Study of spectrum of head and neck lesions diagnosed on fine needle aspiration cytology (FNAC)

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Abstract

Background: Fine needle aspiration cytology (FNAC) is a cost effective and minimally invasive diagnostic outdoor procedure for head and neck lesions with high efficacy. **Aims and objectives:** To evaluate the spectrum of head and neck lesions with FNAC, its efficacy and correlating the findings with histopathological diagnosis wherever possible. **Materials and Methods:** Retrospective observational study of 597 patients evaluated with FNAC for head and neck lesions from 2014 January to December 2016. Data were retrieved from the stored reports in Department of Pathology and the results were analyzed. Clinical and radiological details were obtained from patients' file wherever deemed necessary from Medical Record Department of the institute. **Results:** Most common site aspirated were Lymph nodes (64%) followed by Thyroid (18.3%), skin (5.7%) and soft tissue (4.02%). Most common diagnosis in lymph node FNAC was metastatic lymphadenopathy (37.4%) followed by reactive lymphadenitis (31.9%) and granulomatous lymphadenitis (20.4%). Benign lesions were most common among thyroid swellings (70.1%) followed by papillary carcinoma (12.9%). Majority of salivary gland lesions were benign neoplasm (52.4%). Most common skin and soft tissue lesions were epidermal inclusion cyst (52.9%) and lipoma (66.7%) respectively. Histopathological diagnosis was available in 47.2% of cases with 94.7% concordance. **Conclusion:** Head and neck lesions are common superficial lesions that can be easily diagnosed on cytology. It differentiates inflammatory/infection from neoplastic lesions and avoids unnecessary surgeries and expedites the management. FNAC is cost effective and accurate diagnostic procedure and can be recommended as a first line investigation.

Keywords: Cytology, Fine Needle Aspiration Cytology (FNAC), Head and Neck, Swelling

Introduction

Fine needle aspiration cytology (FNAC) is first line investigation in approach towards diagnosis of superficial and deep seated lesions of head and neck. FNAC is particularly relevant in head and neck location because of easy accessibility, rapidity, minimally invasive, accurate and cost effective procedure which is accepted by majority of the patients.

It may help in triage of neoplastic and non-neoplastic lesions and thus helps to avoid unnecessary surgeries in non-neoplastic lesions thus expediting the process of management of malignant lesions [1,2]. It causes minimal trauma to the patient and carries virtually no risk and complications. Swellings within the region of

head and neck, especially salivary gland and thyroid gland lesions can be readily diagnosed using this technique [3, 4]. Spectrum of lesions of head and neck comprises of developmental, inflammatory and neoplastic conditions. The most common sites which are encountered for FNAC in head and neck region are lymph nodes, thyroid, salivary gland, skin and soft tissue swellings. Lesions like carotid body tumours, branchial cyst, thyroglossal cyst, cystic hygroma, pharyngeal pouch and lump of skin appendages are less commonly encountered [2].

FNAC is both diagnostic and therapeutic in cystic swellings [5]. Fine needle aspiration cytology is helpful for the diagnosis of salivary gland tumors where it can differentiate between a malignant and a benign tumor with over 90% accuracy [6].

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FNAC is particularly helpful in the work-up for cervical masses and nodules because biopsy of cervical adenopathy should be avoided unless all other diagnostic modalities have failed to establish a diagnosis [7]. It could be considered as diagnostic procedure of choice in cases of oral carcinoma presenting with neck node metastasis because positive metastatic lymph node on FNAC may avoid biopsy of oral lesions can be avoided if node is positive for metastasis.

In 1930, Martin introduced this technique for evaluation of head and neck lesion and the procedure has since then being used for all palpable swellings [8, 9]. FNAC assessment needs relevant clinical history of patient as well as radiological findings to make plausible diagnosis.

The purpose of this study was to evaluate the wide spectrum of lesions diagnosed on FNAC in patients with head and neck swellings and to know the efficacy of FNAC in diagnosing head and neck lesions.

Material and Methods

Place of study- Department of Pathology, Chirayu Medical College and Hospital. **Type of study-** This was a retrospective observational study.

Result

In present study, out of 1800 patients enrolled for FNAC during study period, 597 patients presented with head and neck swellings. Patients' age ranged from 10 months to 84 years of age with male to female ratio of 1.3:1.

Incidence of lymph node lesions was highest in 382 cases (64 %) followed by thyroid lesion in 109 cases (18.25%), skin lesions in 34 cases (5.7%), soft tissue in 24 (4%) and salivary gland in 21 cases (3.5%). Distribution of lesions with gender distribution was as in Table 1.

Table-1: Distribution of Lesions in Head and Neck FNAC and Gender distribution (Total n=597)

Organ involved	Total cases	Male	Female
Lymph node	382 (64 %)	239	143
Thyroid	109 (18.3 %)	27	82
Skin	34(5.7 %)	22	12
Soft Tissue	24 (4.02%)	16	08
Salivary gland	21(3.5 %)	16	05
Oral and nasal cavity	16(2.7%)	12	04
Parathyroid	02 (0.3%)	01	01
Orbit	01 (0.2%)	00	01
Miscellaneous lesion	08 (1.3%)	06	02
Total	597	339 (56.8%)	258 (43.2%)

The distribution of various sites aspirated and their cytological diagnosis is illustrated in Table 2.

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Table-2: Distribution of lesion of head and neck with cytological diagnosis.

Site	Total cases	Lesions	Cases	%
Lymph Nodes	382	Metastasis	141	36.9%
		Reactive Lymphadenitis	118	30.9%
		Granulomatous	74	19.4%
		Lymphoma	29	7.6%
		Acute inflammation	05	1.3%
		Inconclusive	15	3.9%
Thyroid	109	Benign lesion & Thyroiditis	75	68.8%
		neoplasm	32	29.2%
		Inconclusive	2	1.8%
Salivary Gland	21	Inflammatory	5	23.8%
		Benign neoplasm	11	52.4%
		Malignant	4	19%
		Inconclusive	1	4.8%
Skin	34	Epidermal inclusion cyst	18	52.9%
		Inflammatory lesion	10	29.4%
		Granulation	5	14.7%
		Inconclusive	1	2.9%
Soft Tissue	24	Lipoma	16	66.7%
		Benign spindle cell neoplasm	4	16.7%
		Lymphangioma	1	4.2%
		Chordoma	1	4.2%
		Sarcoma	1	4.2%
		Inconclusive	1	4.2%
Oral Cavity	13	Round cell tumor	1	7.7%
		Mucocoele	1	7.7%
		Squamous cell carcinoma	11	84.6%
Orbit	1	Round cell tumor	1	100%
Parathyroid	2	Parathyroid Adenoma	2	100%
Nasal Cavity	3	Squamous cell carcinoma	2	66.6%
		Metastasis of Renal Cell Carcinoma	1	33.3%
Miscellaneous lesion	8	Benign Cystic lesion	3	37.5%
		Brachial cleft cyst	1	12.5%
		Inflammatory	4	50%
Total	597		597	

Among Lymph node swellings, the highest number of cases were of non-neoplastic lesion (53.6%) of which majority were reactive (31.9%), followed by granulomatous lymphadenitis (78%) and acute lymphadenitis (1.3%). Malignant lesions were 45% of which most common were metastatic carcinomas from different sites mostly squamous in origin followed by hematolymphoid malignancies (7.6%). Out of 29 cases of hematolymphoid malignancy, majority of the cases were Non Hodgkins Lymphoma (20 cases, 69%), followed by Hodgkin's lymphoma (7 cases, 24.1%), one case each of myeloid sarcoma and follicular dendritic cell sarcoma. Fine needle aspiration was inconclusive in 1.3% of cases.

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Amongst the thyroid swellings, FNAC revealed 68.8% of Non-neoplastic lesions including colloid goiter and thyroiditis. Where as neoplastic lesions comprised of 29.4% of which most common tumor diagnosed was papillary thyroid carcinoma (PTC) comprising of total 22 cases, followed by 4 cases diagnosed as follicular neoplasm (3.7%), 3 cases each of medullary thyroid carcinoma and anaplastic carcinoma of thyroid (2.8%). Thyroid lesions had female preponderance with male: female ratio of approximately 1:3.

A total of 21 cases of salivary gland lesions were aspirated, which accounted for 3.5% of total Head and Neck- swellings with male predominance. Most common lesions were benign (47.6%) and comprised 6 cases of pleomorphic adenoma, 2 cases of sialadenosis, and 2 benign lymphoepithelial lesions.

Malignant neoplasms were second most common and comprised of Adenoid cystic carcinoma (3 cases) and one case each of mucoepidermoid carcinoma, acinic cell carcinoma, and carcinoma- ex- pleomorphic adenoma. There were 4 cases diagnosed as inflammatory lesions of which 3 cases showed features of chronic sialadenitis and one case was of acute sialadenitis.

Thirty four cases of skin lesions located in head and neck region were aspirated, of which the most common lesion was epidermal inclusion cyst (52.9%) followed by other inflammatory lesions (29.4%). Five cases of malignancy were diagnosed of which three cases were of scar recurrence inknown case of oral squamous carcinoma and one case each of subcutaneous deposits of thyroid carcinoma and primary squamous cell carcinoma of skin.

Soft tissue lesions were also aspirated of which lipoma was most common (66.7%) and was followed by benign spindle cell neoplasm (16.7%) and one case each of lymphangioma, chordoma, malignant spindle cell sarcoma. Thirteen cases of intraoral lesions were also aspirated composed of 8 cases of squamous carcinoma, 3 cases of pleomorphic adenoma and one case each of mucocele and round cell tumor which was later diagnosed as primitive neuroectodermal tumor.

Other sites which were also aspirated were orbit (1 case of rhabdomyosarcoma), two cases of parathyroid adenoma, 3 cases of nasal cavity (two cases of squamous carcinoma and one case was of metastasis of renal cell carcinoma). There were 2 cases of thyroglossal cysts, 2 cases of Paraganglioma, one case of branchial cleft cyst and 3 inflammatory lesions whose site of origin cannot be ascertained.

Histopathological diagnosis was available in 47.2% of cases of which cytology was concordant with histopathology in 94.7% of cases and was discordant in 5.6%. Histopathological correlation with cytological diagnosis was as in Table 3 while reason for discordant cases was as in Table 4.

Table-3: Cyto- histopathological correlation of Head and neck lesions.

Organ involved	Total cases	Histopath diagnosis available	Concordant	Discordant
Lymph node	382	182	176	6
Thyroid	109	50	47	3
Skin	34	7	6	1
Soft Tissue	24	12	10	2
Salivary gland	21	10	9	1
Oral Cavity	13	11	11	0
Nasal Cavity	03	3	3	0
Parathyroid	02	2	1	1
Orbit	01	1	1	0
Miscellaneous lesion	08	4	3	1
Total	597	282 (47.2%)	267 (94.7%)	15 (5.3%)

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Table-4: Distribution of cyto– histopathological discordant cases and reasons.

	Site of FNAC	Cytological Diagnosis	Histological Diagnosis	Type of error
Case 1	Lymph Node	Acute Lymphadenitis	Cystic metastasis of squamous cell carcinoma	Sampling
Case 2	Lymph Node	Granulomatous	Metastatic signet ring adenocarcinoma	Interpretation
Case 3	Lymph Node	Granulomatous	Hodgkin's lymphoma	Interpretation
Case 4	Lymph Node	Reactive	Low grade Non Hodgkins Lymphoma	NA as biopsy was advised to rule out NHL
Case 5	Lymph Node	Reactive	Kikuchi like necrotizing lymphadenitis	Sampling
Case 6	Lymph Node	Reactive	Granulomatous	Sampling
Case 7	Thyroid	PTC	Hyperplastic Goitre	Interpretation
Case 8	Thyroid	PTC	Goitre with degeneration	Interpretation
Case 9	Thyroid	Hyperplastic Goitre	PTC	Sampling
Case 10	Parathyroid	Follicular Neoplasm of Thyroid	Parathyroid Adenoma	Improper clinical details
Case 11	Skin	Inflammatory lesion	Scar recurrence of SCC	Sampling
Case 12	Soft Tissue	Benign spindle cell lesion	Angiosarcoma	Interpretation
Case 13	Soft Tissue	Malignant spindle cell sarcoma	Ancient Schwannoma	Interpretation
Case 14	Salivary Gland	Adenoid cystic carcinoma	Pleomorphic adenoma	Interpretation
Case 15	Miscellaneous	PTC	Paraganglioma	Interpretation

Discussion

FNAC is a rapid diagnostic test in the initial assessment of the head and neck lesions which are superficial and easy to access. It has inherent advantage of being an outpatient procedure, does not require sedation or anaesthesia, minimally painful and takes only few minutes to perform compared to time consuming, complicated and invasive biopsy procedure [10].

Comparative evaluation of various head and neck lesions was done with other similar studies as in Table 5.

In this study, most common organ aspirated was lymph-node (64%) and most common diagnosis was metastatic lymphadenopathy which is in discordance with other authors [10-12] who reported reactive lymphadenitis and Valiya LG [13] who reported granulomatous lymphadenopathy as most common lesion. The distribution of lymph node cytological assessment in various studies was as in Table 6.

Table-5: Comparison of results of FNAC of head and neck studies

Study	Lymphnode	Thyroid	Salivary Gland	Soft Tissue
Nanik J (10)	64.3%	17.5%	4.8%	13.5%
Kishor H.et.al.(11)	39.58%	31.25%	18.75%	7.29%
Sreedevi P (13)	50.32%	44.07%	3.28%	2.3%
Present study	63.98%	18.25%	3.5%	14.3%

Table-6: Comparison of results in Lymph-node Lesion.

Lesion	Valiya LG [13]	Kishore H. [11]	Sreedevi P [12]	Present Study
Reactive lymphadenitis	28.79%	35.08%	51.63%	28.53%
Non-specific inflammation	19.13%	12.80	9.15	3.4%
Granulomatous lesions	30.12	47.36	27.4	18.84%
Metastasis	19.80	3.50	5.88	36.38%
Lymphoma	2.16	0.87	5.88	7.59%
Inconclusive	-	-	-	5.23%

This difference is probably due to the fact that our hospital is a tertiary care centre with well-established oncology unit hence the high rates of referral of cancer patients. Most common primary formetastatic lesion was found to be oral cavity and upper respiratory tractsquamous cell carcinoma followed by duct carcinoma breast. The sensitivity of FNAC for metastatic lymph nodes varies from 97.9% to 100% with nearly 100% specificity [14 ,15]. Indians account for highest in take of multiple types of tobacco products leading to high incidence of carcinoma oral cavity/ pharynx, esophagus and larynx[16]. Out of total 382 lymph node aspirated, there were 1.3 % aspirate which was inconclusive and most common reason was hemorrhagic aspirate.

Histopathological correlation was available in 182 cases and the cytological diagnosis was discordant in mere 3.2% of cases. Two cases were cytologically diagnosed as granulomatous lymphadenitis and turned out to be malignant. One case was metastatic signet ring cell adenocarcinoma where the confusion was due to presence of granulomas along with signet ring cells resembling macrophages of sarcoidosis. And other case was Hodgkin's lymphoma and is a known tumor to be associated with granulomas. Careful search for presence of Reed Sternberg cells should be done. On reviewing the smears of FNAC, the smears were hemorrhagic with few granulomas. On careful screening the smears also showed few eosinophils and occasional mononuclear cells and was considered as interpretation and screening error. Three discordant cases were due to sampling error and the smears on review also don't show any representative cells. One case was diagnosed as reactive but in this case biopsy was advised to rule out low grade lymphoma because of the presence of monomorphic cell population. Thus, with proper technique and careful study, FNA of lymph nodes isa simple tool in the diagnosis of reactive, granulomatousas well as metastatic lesions and help detect occult primary malignancies inpatients. In our study, female preponderance was observed in thyroid lesions with similar to 1:4 by Rathod GB [17]. Benign thyroid lesions including inflammatory were more common (70.64%) similar to Rathod GB [17] and Kishore HS [11].

Papillary Thyroid carcinoma (PTC) was most common thyroid malignancy in our study similar to other authors [11,13,17]. Valiya LG [13] also concluded thatsurgical intervention for a purely diagnostic purpose can be avoided in majority of thyroid lesions with cytological assessment. FNA serves dual role of diagnostic and the rapeutic in cystic thyroid lesions. In our study FNAC of salivary glands, Pleomorphic adenoma was most common lesionsimilar to Bhagat VM. [18]. However, studies by Kishor SH [11], Valiya LG [13] and Rathod GB [17] had different observation with inflammatory and reactive lesions comprising the majority. In our study oral lesion constitutes 13 cases diagnosed on FNAC. We got 11 (84.61%) cases of Squamous cell carcinoma, followed by mucocele 1(7.69%) and 1 case of round cell tumor (7.69%). Similar results were found in a study done by Gupta N et al[19] which states salivary gland tumor and Squamous cell carcinoma are the most common lesion in the oral cavity.

In present study epidermal inclusion cyst was the most common lesion (55.88%) on FNAC done on skin lesion. It is followed by inflammatory lesion (29.4%). Same results were also generated by a study done by Bhagat VM et al [18] and Sreedevi P. [12]. In our study soft tissue swellings, showed lipoma as a predominant lesion.It is followed by 1 case of each Lymphangioma (4.16%), spindle cell neoplasm (4.16%), chordoma (4.16%) and sarcoma (4.16%) almost similar to miscellaneous lesions studied by Kishore SH [11] where epidermal cyst was 57.14% and lipoma was 23.8%.

In our study we found 1 case of round cell tumor on FNAC from orbit. In present study, 3 cases of nasal cavity FNAC were done and two of them showed Squamous cell carcinoma and 1 case showed metastasis of Renal cell carcinoma.2 cases of Parathyroid FNAC was done, which showed primary hyperplasia and was associated with brown tumor of bone with lytic lesions.

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Histopathological correlation was evaluated in 47.2% of available cases for which a 94.7% concordance was observed. FNA of head and neck lesions has high histopathological concordance rate of over 90% as observed by Nanik J [10] and Kishor SH [11] as well. Fifteen cases had discordant diagnosis, careful interpretation, radiological guided cytological assessment where in lesions were deep and ill defined, necessary and careful examination may have avoided the wrong diagnosis. Inconclusive findings were observed in 3.35% cases probably causes were non-cooperative patients especially pediatric population, small ill-defined small swellings, scanty aspirate, dry tap, haemorrhagic aspirates and non-representative sampling mostly in deep neck swelling. Inflammatory /reactive and benign lesion comprised 58.29% cases in our study thus FNAC can help avoid unnecessary surgical biopsy and its attendant risks along with disadvantages such as scarring, greater duration of hospital stays and increased costs [20].

Conclusions

The present study concludes that Lymph node is the organ which is aspirated most and metastasis is the predominant lesion in our set-up. FNAC is simple, quick and cheap diagnostic tool to differentiate between neoplastic and non-neoplastic lesions and helps avoid unnecessary surgical intervention. We recommend FNA as first line investigation in swellings of head and neck for best diagnostic and therapeutic approach.

What this study adds to existing knowledge? This is a tertiary care centre study based in capital city of central Indian state. It adds to the demographic knowledge of head and neck lesions as well as increased prevalence of metastatic lesion in lymph nodes compared to similar studies in other parts of India. Oral and upper respiratory tract can present as lymph node swellings in head and neck region and timely diagnosis of such lesions on FNA, a simple procedure which can be carried out in peripheral regions and villages in health camps can decrease the morbidity and mortality significantly.

Contribution

	Study conception and design	Acquisition of data	Analysis and interpretation of data	Drafting of manuscript	Critical revision:
Author 1	Yes	yes	yes	yes	yes
Author 2	yes	yes	yes	yes	yes
Author 3	yes	yes	yes	yes	yes
Author 4	yes			yes	yes
Author 5	yes			yes	yes

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