

The utility of Fine Needle Aspiration Cytology (FNAC) in the diagnosis of head and neck lesions at tertiary health care level

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DOI: <https://doi.org/10.17511/jopm.2020.i06.04>

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Introduction: FNAC is particularly suitable in the head and neck areas due to its easy accessibility of target sites, minimally invasive nature, excellent patient compliance, and helping of avoidance of surgery in conditions like non-neoplastic, inflammatory, and some tumors. **Aim:** To assess the prevalence of different types of head and neck lesions and to test the utility of Fine Needle Aspiration Cytology (FNAC) in the diagnosis of head and neck lesions. **Material and Methods:** A retrospective study of 224 FNAC of head and neck swellings performed as an outdoor procedure from Jan 2018 to June 2019 at the American International Institute of Medical Sciences (AIIMS), GBH General and cancer hospital, Udaipur, Rajasthan. **Results:** Out of 224 cases, major aspirates were from lymph node 123 (54.91%), followed by skin and soft tissue 42 (18.75%), thyroid 40 (17.85%), salivary gland 13 (5.80%), and Oral cavity 06 (2.67%). Malignant lesions were higher in lymph node 69 (56.09%) and in oral cavity 05 (83.33%). Metastatic carcinoma 66 (53.65%) and lymphoma 03 (2.43%). Colloid goiter 24 (60%), keratinous cyst 27 (64.28%), and Pleomorphic adenoma 04 (30.76%) were common benign lesions in the thyroid, skin and soft tissue, and salivary gland respectively. **Conclusions:** FNAC can be effectively used in the diagnosis and planning management of various head and neck swellings because it is safe, relatively painless, rapid, outdoor procedure and can differentiate benign from malignant lesions and gives clues for occult primaries in metastatic malignancy.

Keywords: Fine Needle Aspiration Cytology (FNAC), Head and Neck lesions, Lymph Node, Thyroid

Corresponding Author	How to Cite this Article	To Browse
Dipti Rameshbhai Patel, Assistant Professor, Department of Pathology, American International Institute of Medical Sciences, GBH General and Cancer Hospital, Udaipur, Rajasthan, India. Email: diptum12388@gmail.com	Patel DR, Chawla SN. The utility of Fine Needle Aspiration Cytology (FNAC) in the diagnosis of head and neck lesions at tertiary health care level. Trop J Pathol Microbiol. 2020;6(6):387-394. Available From https://pathology.medresearch.in/index.php/jopm/article/view/469	

Manuscript Received 2020-06-25	Review Round 1 2020-07-15	Review Round 2 2020-07-31	Review Round 3	Accepted 2020-08-26
Conflict of Interest No	Funding Nil	Ethical Approval Yes	Plagiarism X-checker 6%	Note

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Introduction

A great number of diseases of the head and neck region can manifest as a palpable and /or visible lump. These can also be called swellings, growths, tumors, or lumps. Each disease may have a different mode of presentation. For these reasons, diagnosis often becomes difficult in neck swelling. The lesions of the head and neck region comprised several different congenital, inflammatory conditions, and benign or malignant tumors [1]. In palpable head and neck lesions, the most commonly encountered lesion are lymph nodes, thyroid, and major salivary glands along with other rarely encountered lesions like subcutaneous tissue swellings, lumps of skin appendages, and oral cavity lesions [2]. It greatly influences on planned treatment, when these lesions are early diagnosed and differentiated from inflammatory to neoplastic etiology [3].

The Martin and Ellis introduced the first modern technique of FNAC in 1930 for the evaluation of various palpable lumps and now this technique has become a popular procedure due to its easy accessibility of target sites and minimally invasive nature [4]. FNAC is particularly suitable in the head and neck areas due to its easy accessibility of target sites, minimally invasive nature, excellent patient compliance, and helping of avoidance of surgery in certain conditions like non-neoplastic, inflammatory conditions, and some tumors [5]. FNAC has been found to be a safe, relatively painless, rapid, and highly cost-effective technique. Also, It is an accurate, sensitive, and specific method found by some experienced workers [6]. The advantage of FNAC is that it is an outdoor procedure, requires minimal equipment, causes minimal discomfort to the patient, repeatable to obtain adequate material for cytological analysis, and reduces the rate of the exploratory procedure [7].

FNAC does not give the same architectural detail as histology and it also leads to bloody aspirates in highly vascular organs like the thyroid, but it can provide cells from the entire lesion as many passes through the lesion can be made while aspirating [8]. FNAC is considered the gold standard diagnostic test in the evaluation of a thyroid nodule, and other tests like ultrasound and a Nuclear scan should be used in concurrence with FNAC [9]. Diagnosis of salivary gland tumors can be done by FNAC because it can differentiate between a malignant and a benign tumor with over 90% accuracy [10]. In our

Country, Malignancies in lymph nodes are predominantly metastatic in nature with an incidence varying from 65.7-80.4% and lymphomas range from 2-15.3% among lymph nodes aspirated from all sites [11].

Although the histopathological examination is considered to be the gold standard in diagnosis especially in lymphomas, FNAC may be the only tool for diagnosis and further management of the patients in metastatic malignancy as it gives clues for occult primaries [11]. The Prime objective of the present study was to assess the prevalence of different types of head and neck lesions and to test the utility of FNAC in the diagnosis of head and neck lesions. The main outcome from this analysis that Fine needle aspiration cytology is a safe, relatively painless, and rapid technique that can be used in the diagnosis of various head and neck swellings and helps in planning the management of these lesions.

Material and Methods

Place of the study: Central clinical Laboratory, Department of Pathology, American International Institute of Medical Sciences (AIIMS) and GBH General and Cancer Hospital, Bedwas, Udaipur, Rajasthan (India).

Ethical considerations and permission: Ethical considerations and permission were met through the Institutional ethical committee.

Duration and type of the study: The present retrospective study was conducted over 1 and ½ year period from Jan 2018 to June 2019.

Study subject: Those patients who presented with superficially palpable head and neck lesion in Medicine, Surgical, Dermatology, and Dental OPD or admitted in the hospital and underwent FNAC were considered as the study subject.

Inclusion Criteria: All age groups (1-90 years) of patients of palpable head and neck lesions including oral cavity lesion.

Exclusion Criteria: Patients with inconclusive cytological results and incomplete demographic details were excluded from this study.

Sampling Method: This retrospective study included 224 cases of FNAC done on head and neck swellings performed as outdoor procedure over 1 and ½ year period. The history has been taken from all patients related to head and neck swelling, and

Relevant questions were asked related to the etiological cause along with the present, past, and family history of tuberculosis and history of consumption of tobacco-related products, history of any radiotherapy, or chemotherapy taken in cancer patients. Information from other radiological and laboratory investigations was also noted. Patients were explained about the procedure and its indication. Their written consent was taken. Maximum efforts were been made to reassure the patient as to the safety, simplicity of the procedure, and minimal discomfort.

The area of palpable swelling was cleaned with spirit and then it was fixed with the thumb and index finger of one hand and with all aseptic precautions, a 22-23G needle with 10ml syringe was inserted into the swelling and negative pressure was applied. Aspiration was done from different directions and depth of the swelling and aspiration material was smeared on the glass slides and immediately fixed in 90% alcohol for routine hematoxylin and eosin stain and Pap stain and few were air-dried for Giemsa stain.

The Ziehl-Neelsen (ZN) stain for acid-fast bacilli was done in suspected tubercular lesions. The stained slides were mounted by DPX and examined under the light microscope and reported. Fine Needle Aspiration Diagnosis was correlated with Detail of relevant clinical findings and other investigations like USG neck or CT neck and previous any excision biopsy report. Cytological findings were recorded and patients were advised medical treatment and follow up or biopsy and surgical intervention depending upon the pathology.

Statistical Analysis: Data was recorded in MS office 2007 and analyzed according to age and gender, site of pathology, nature of swelling, and cytological diagnosis. Percentages were calculated for estimating the frequency of various cytological conditions diagnosed on FNAC in patients of head and neck swellings.

Results

A total of 224 patients had undergone FNAC of the head and neck lesion during the study period from Jan 2018 to June 2019. Out of the 224 cases, 133 (59.37%) cases were male and 91 (40.62%) cases were female (M: F ratio- 1.4:1). The age range of the patients in this study was between 1 to 90 years. The highest numbers of cases were recorded in the fifth and sixth decades of life with 47

(20.98%) cases and 40 (17.85%) cases respectively. Among the age group of 41-50 years, 28 (59.57%) cases were male and 19 (40.42%) cases were female noted (Table-1).

Out of 224 cases, the largest number of aspirates were from lymph nodes 123 (54.91%), followed by skin and soft tissue 42 (18.75%). Thyroid lesions accounted for 40 (17.85%) cases followed by salivary gland lesions 13 (5.80%) cases and oral cavity lesions 6 (2.67%) cases (Table 2).

Table -1: Distribution cases according to age and sex.

Age (years)	Male	Female	Total (%)
1-10	07	00	07 (3.12%)
11-20	11	08	19 (8.48%)
21-30	20	18	38 (16.96%)
31-40	17	17	34 (15.17%)
41-50	28	19	47 (20.98%)
51-60	25	15	40 (17.85%)
61-70	15	12	27 (12.05%)
71-80	09	02	11 (4.91%)
81-90	01	00	01 (0.44%)
Total	133 (59.37%)	91 (40.62%)	224 (100%)

Table-2: Distribution of head and neck swelling according to the site of pathology.

Site of pathology	Number	Percentage
Lymph node	123	54.91
Thyroid gland	40	17.85
Salivary gland	13	5.80
Skin and soft tissue	42	18.75
Oral cavity	06	2.67
Total	224	

Out of 224 cases, 139 (62.05%) cases were benign and 85 (37.94%) cases were malignant. In lymph node aspirates, the malignant lesion was higher 69 (56.09%) cases as compared to benign one noted 54 (43.90%) cases. Malignant cases were also high in the oral cavity accounted for 05 (83.33%) and benign 01 (16.66%) case (Table 3).

Table-3: Distribution of benign and malignant head and neck lesions according to the site of FNAC.

Site of FNAC	No	Benign (%)	Malignant (%)
Lymph node	123	54 (43.90%)	69 (56.09%)
Thyroid gland	40	33 (82.5%)	07 (17.5%)
Salivary gland	13	10 (76.92%)	03 (23.07%)
Skin and soft tissue	42	41 (97.61%)	01 (2.38%)
Oral cavity	06	01 (16.66%)	05 (83.33%)
Total	224	139 (62.05%)	85 (37.94%)

Table-4: Distribution of head and neck lesion according to cytological diagnosis.

Site of pathology	Benign lesions	No (%)	Malignant lesions	No (%)
Lymph node (Total-123)	Acute suppurative lesion	07 (5.69%)	Lymphoma	03 (2.43%)
	Reactive lymphadenitis	24 (19.51%)	Metastatic carcinoma	66 (53.65%)
	Granulomatous lymphadenitis	13 (10.56%)	a-Metastatic squamous cell carcinoma	54 (43.90%)
	Tuberculous lymphadenitis	10 (8.13%)	b-Metastatic adenocarcinoma	12 (9.75%)
Thyroid gland (Total-40)	Thyroglossal cyst	05 (12.5%)	Papillary thyroid carcinoma	04 (10%)
	Colloid Goiter	24 (60%)	Medullary carcinoma	02 (5%)
	Grave's disease	01 (2.5%)	Follicular carcinoma	01 (2.5%)
	Hashimoto thyroiditis	03 (7.5%)		
Salivary gland (Total-13)	Sialadenitis	03 (23.07%)	Mucoepidermoid carcinoma	02 (15.38%)
	Sialadenosis	01 (7.69%)		
	Warthin tumor	02 (15.38%)	Adenoid cystic carcinoma	01 (7.69%)
	Pleomorphic adenoma	04 (30.76%)		
Skin and soft tissue (Total-42)	Non-neoplastic cyst	02 (4.76%)	Basal cell carcinoma	01 (2.38%)
	Keratinous cyst	27 (64.28%)		
	Acute suppurative Inflammation (abscess)	02 (4.76%)		
	Granulomatous inflammation associated with actinomycosis	01 (2.38%)		
	Lipoma	09 (21.42%)		

Oral cavity (Total-6)	Retention cyst	01 (16.66%)	Squamous cell carcinoma	04 (66.66%)
			Mucoepidermoid carcinoma	01 (16.66%)

Out of 123 lymph node aspirates, malignant lesions were 69 (56.09%) cases and benign lesions were 54 (43.90%) cases (Table-3). Incidence of malignant lesions was higher in lymph node as compared to benign one (Table-3). In malignant lesions of lymph node aspirates, 03 (2.43%) cases were lymphoma and 66 (53.65%) cases were metastatic malignancy noted. Metastatic squamous cell carcinoma was in 54 (43.90%) cases and metastatic adenocarcinoma was in 12 (9.75%) cases. In benign lesions, reactive lymphadenitis was the most common cytological findings in 24 (19.51%) cases followed by Granulomatous lymphadenitis in 13 (10.56%) cases and tuberculous lymphadenitis in 10 (8.13%) cases. Acute suppurative lesion accounted for 07 (5.69%) cases (Table 4).

Out of 40 thyroid aspirates, 33 (82.5%) cases were benign and 07 (17.5%) cases were malignant (Table-3). Colloid goiter was the most common cytological diagnosis in 24 (60%) cases. Thyroglossal cyst accounted for 05(12.5%) cases, Hashimoto thyroiditis in 03 (7.5%) cases, and Grave's disease in 01 (2.5%) cases. In malignant cases, papillary thyroid carcinoma accounted for 04 (10%) cases followed by medullary carcinoma in 02 (5%) cases and Follicular carcinoma in 01 (2.5%) cases (Table 4).

Out of 13 cases of the salivary gland, 03 (23.07%) cases were of Sialadenitis, 01 (7.69%) was of Sialadenosis and 02 (15.38%) cases were of Warthin tumor. Pleomorphic adenoma was the most common lesion in 04 (30.76%) cases. In malignant cases, Mucoepidermoid Carcinoma accounted for 02 (15.38%) cases followed by Adenoid cystic Carcinoma in 01 (7.69%) cases (Table 4).

Out of 42 skin and soft tissue lesions, benign were 41 (97.61%) cases and malignant was 01 (2.38%) case (Table-3). Keratinous cyst and infected Epidermal Inclusion cyst was the most common lesion in 27 (64.28%) cases followed by lipoma in 09 (21.42%) cases. Non neoplastic cyst was 02 (4.76%) cases, Acute suppurative Inflammation (abscess) was 02 (4.76%) cases. 01 (2.38%) case was of Granulomatous inflammation Associated with actinomycosis noted. 01 (2.38%) case was of Basal cell carcinoma (Table 4).

Out of 6 oral cavity lesions, 01 (16.66%) case was

Benign and 05 (83.33%) were malignant lesions (Table-3). In malignant lesions, 04 (66.66%) were Squamous cell Carcinoma and 01 (16.66%) case was Mucoepidermoid carcinoma noted. In benign lesions, 01 (16.66%) case was the Retention cyst found (Table 4).

Discussion

The present study was undertaken to assess the incidence and nature of various head and neck swellings by FNAC. FNAC results from 224 patients with head and neck masses were reviewed and analyzed. The results were analyzed according to age, gender, site of pathology, nature of swelling, and cytological diagnosis.

In the present study, the peak age group was 5 the decades (41-50 years) constituting 20.98% of all patients of head and neck lesions. The Study conducted by Solanki Piyush K et al [12] observed that head and neck lesions were relatively common in the second decades and fifth decades constituting 22% and 22% respectively out of 100 cases.

In the present study, 133 (59.37%) cases were male and 91 (40.62%) were female and the male to female ratio was 1.4:1. In the study of Jandu and Webster et al [13] M: the F ratio was 1.3:1 and in the study of Cheng and Dorman [14], it was 1.5:1 which are comparable to the present study.

In the present study, the largest numbers of aspirates were from lymph nodes 54.91%, followed by Skin and soft tissue 18.75%, thyroid 17.85%, and salivary gland 5.80% and oral cavity 2.67% noted.

The study of Shaan Khetrpal et al [15] noted that the largest number of cases from lymph node lesions 64.1% and the least number of cases were from oral cavity 1.03% which is comparable to the present study.

Table-5: Comparison of the site-wise distribution of head and neck lesions between the present study and other studies.

Studies	Lymph nodes%	Skin and Soft tissue%	Thyroid %	Salivary gland %
Present study	54.91%	18.75%	17.85%	5.80%
Amit M et al [7]	56.37%	19.2%	10.90%	11.44%
Goswami R et al [16]	53.8%	22.1%	16.9%	7.1%
Modi P et al [17]	64.9%	12.1%	16.1%	6.8%

Table-5 [7,16,17] shows the comparison of the present study with other studies on the basis of the distribution of head and neck lesions. It is noted that maximum aspirates are from lymph nodes in head and neck lesions, followed by Skin and Soft tissue, thyroid, and salivary gland lesions. In the present study, 62.05% cases were benign and 37.94% cases were malignant, which is comparable to the study of Tobih JE et al [18] who observed benign lesions 59.0% and malignant lesions 41.0%.

FNAC is a simple, safe, painless, rapid, and cost-effective technique that can be performed as an outdoor procedure to diagnose and to differentiate various benign and malignant lesions. In the present study, Among 123 lymph node lesions, 56.09% were malignant lesions and 43.90% were benign lesions. This is correlated with the study of Pramod Chandra pathy et al [19] who found 51.27% malignant and 48.27% benign. Similar findings were also noted in the study of Steel et al [20] in which 59% were malignant and 34% were benign. In the present study, metastatic carcinoma was most common in 53.65% cases followed by primary lymphoma in 2.43% cases and metastatic squamous cell carcinoma was the most common metastatic malignancy in 43.90% followed by metastatic adenocarcinoma in 9.75% which is correlated with the study of Pramod Chandra Pathy et al [19] who reported metastatic lesions 88.1% and primary lymphoma 11.98% and metastatic squamous cell carcinoma 50.77% and metastatic adenocarcinoma 18.87%. In the present study, reactive lymphadenitis was most common in benign lesions 19.51% followed by granulomatous lymphadenitis 10.56% and Tubercular lymphadenitis 8.13% which is similar to the study of Jadhav DS et al [21] noted 32.62%, 24.03%, and 14.16% of cases respectively. Similar findings were also reported by Ajay Singh Thakur et al [22] with 30.04% reactive lymphadenitis and 17.96% granulomatous lymphadenitis and 11.44% Tubercular lymphadenitis.

In the present study, the cytological smear of metastatic squamous cell carcinoma was richly cellular and showed tight cohesive clusters of malignant squamous epithelial cells which were highly pleomorphic with high N:C ratio, hyperchromatic nuclei, and prominent nucleoli. The background showed necrotic debris, keratinous material, and lymphoglandular bodies. The cytological smear of metastatic adenocarcinoma showed a glandular pattern of arrangement of cells

With a round hyperchromatic nucleus and a moderate amount of vacuolated cytoplasm. The present study observed that Few cases of the metastatic squamous cell carcinoma were arising from upper aerodigestive tract cancer and few cases were recurrence cases noted in operated cancer patients of oral cavity region. FNAC not only confirms the presence of metastatic malignancy but also gives clues for primary malignancy so it takes considerable value in assessing disease staging and documentation of recurrence.

FNAC helps as a guide to the appropriate therapeutic management to either locally excise a benign tumor or plan radical surgery or other alternative treatment modalities in case of malignancy. In the present study, among thyroid lesions, Colloid Goiter was the commonest benign lesion comprising 60% which is correlated with the study of Rashmi Rekha Goswami et al [16] found 67.3% and the study of Dr. Kusum Borsaikia [23] found 62.50% and study of Apoorva KP et al [24] found 64.5%. In the present study, Papillary carcinoma was highest 10% in a malignant lesion which is similar to the study of Rashmi Rekha Goswami et al [16] noted 5.4% and the study of Chauhan Savitri et al [25] noted 3.1%.

In the present study, out of total skin and soft tissue lesions, Keratinous cyst most common 64.28% followed by lipoma 21.42% which is similar to the findings of Kishor et al [26] where the epidermal cyst was 57.14% and lipoma was 23.8%. A similar study of Rashmi Rekha Goswami et al [16] where epidermal cyst 40.6% and lipoma 23.9%.

This technique requires minimal equipment and no anesthesia, causes minimal discomfort to the patient and it has high diagnostic accuracy in salivary gland lesions. In the present study, in salivary gland lesions, Pleomorphic adenoma was the most common benign lesion noted 30.76% and Mucoepidermoid carcinoma 15.38% noted in the present study which is comparable to various studies of Solanki Piyush K et al [12] noted 30% and 10% respectively and Rashmi Rekha Goswami et al [16] noted 43.5% and 11.3% respectively. In oral cavity lesions, Squamous cell Carcinoma was a common malignant lesion seen in 04(66.66%) cases. Few cases of it involved buccal mucosa and few involved tongues. 01(16.66%) case of Mucoepidermoid carcinoma involved hard palate. The study of Sakarwal et al reported that Squamous cell Carcinoma was the most common malignant lesion in the oral cavity accounted 79.31% [27].

Limitations

01. The present study is hospital-based and not community-based therefore the prevalence of diseases may vary due to patient selection bias.
02. False-positive diagnoses can be resulted by regenerative epithelial hyperplasia and squamous metaplasia in sialadenitis.
03. False-negative diagnoses can occur due to faulty technique, Central cystic, hemorrhage, or necrotic area which are devoid of diagnostic cells, Small foci of neoplastic lesion nearby reactive non-neoplastic mass, highly fibrotic lesion, and interpretative error. False-negative diagnosis is most commonly seen in mucoepidermoid carcinoma because cystic fluid dilutes the tumor cells or because the bland looking tumor intermediate cells are misinterpreted as benign cells.
04. Typing of reactive lymphadenitis can't be done by FNAC.
05. Definitive diagnosis is not always possible which requires histopathological confirmation in certain conditions like lymphoma.

Conclusion

The present study concluded that a wide range of diseases of the head and neck region can be manifested as swelling/lump or mass and they can be diagnosed by fine-needle aspiration cytology. The present study found that reactive lymphadenitis, keratinous cyst, and colloid goiter are a common cause of head and neck swellings. The current study also indicates that metastatic carcinomas are important and common causes of cervical lymphadenopathy compared to reactive lymphadenitis. Mainly Metastatic squamous cell carcinoma attend the major malignant lesion in this tertiary care center may be due to increased incidence of squamous cell carcinoma of an upper aero-digestive tract in this region. The study also concluded that FNAC not only confirms the presence of metastatic malignancy but also provides clues for primary malignancy so it helps in assessing disease staging.

At last, the present study confirms that FNAC can be effectively used in the diagnosis and planning management of various head and neck swellings because it is safe, relatively painless, rapid, outdoor procedure and can differentiate benign from malignant lesions, gives clues for occult primaries in

Metastatic malignancy and avoids unnecessary surgeries. Thus, FNAC can be recommended as the best initial work up in the diagnosis and management of head and neck swellings.

What does the study add to the existing knowledge

This study provides the knowledge that despite certain limitations of FNAC, It can be used as an effective tool to differentiate benign lesions from malignant lesions as well as to confirm metastatic malignancy thereby it will become helpful to clinicians, surgeons, and on-surgeons for planning treatment modalities and assessing disease staging.

Author's Contribution

Dr. Dipti R Patel: Literature search and review, collected all data, performed data analysis, and prepared the manuscript.

Dr. Shiv Nandan Chawla: Guided in the discussion and conclusion part and edited the article.

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