



Original Research Article

Role of fine needle aspiration cytology (FNAC) in head and neck lesions in coastal population at a tertiary care hospital – A study of 500 cases

Supriya P Savant^{1*}, Vinay Naik², Prakash H M¹¹Dept. of Pathology, Karwar Institute of Medical Sciences, Karwar, Karnataka, India²Dept. of General Surgery, Karwar Institute of Medical Sciences, Karwar, Karnataka, India

ARTICLE INFO

Article history:

Received 17-02-2023

Accepted 30-04-2023

Available online 07-12-2023

Keywords:

FNAC

Swelling

Head and neck

ABSTRACT

Background: Head and neck swellings are a very common presentation encountered by clinicians and patients across all age groups. Various lesions give rise to head and neck lumps. Swellings can arise from soft tissues, lymph nodes, thyroid gland, salivary glands etc. FNAC being minimally invasive, quick and inexpensive helps in differential diagnosis of head and neck masses.

Materials and Methods: A retrospective study was conducted at Karwar institute of medical sciences Karwar from January 2018 to December 2021 in coastal population, to evaluate the role of FNAC in palpable head and neck masses and also to study their distribution and To evaluate the diagnostic accuracy, sensitivity and specificity of FNAC in diagnosing Head and neck lesions and cyto-histopathological correlation (wherever possible). 500 patients with head and neck swelling underwent FNAC. FNAC diagnosis was correlated with detailed clinical history and investigations.

Result: Out of 500 fine needle aspiration procedures 35.6% (178) were of lymph node, 33.8% (169) were of thyroid, 9.6% from salivary gland (48), 17.8% (89) from skin and soft tissue swellings and 3.2% (16) inconclusive.

Conclusion: The present study concluded that most of the swellings in head and neck region are benign and affect females more than males. Overall accuracy rate more than 90% and diagnostic accuracy in differentiating non-neoplastic lesions from neoplastic lesions is well established. Our study found that fine needle aspiration cytology to be an easy, safe, rapid, convenient, least invasive, accurate and relatively complication-free outpatient method for diagnosis of lesions of the head and neck

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1. Introduction

Neck swellings are one of the commonest clinical presentations encountered in surgical and medicine OPDs on day today basis. Fine Needle Aspiration Cytology (FNAC) is a simple and a rapid diagnostic technique and is the first line of investigation in diagnosis. It has gained its popularity as a valuable diagnostic aid because its quick, the early availability of results relatively painless, requires no anaesthetic, the complications of biopsy are avoided

and it can provide cells from the entire lesion as many passes through the lesion can be made while aspirating.¹ With vital structures situated in head and neck region, complete excision biopsy would later lead to mortality and therapeutic biopsy of any malignant mass would later lead to its invasion into deeper tissue, hence these procedures were often fatal.^{2,3}

Evaluation of all the neck should be approached in a step wise manner. Especially in the adult population, these masses can present as only manifestation of a serious and potentially malignant pathology. Swellings in head and neck region include both non-neoplastic and neoplastic lesions

* Corresponding author.

E-mail address: supriyasavant.1826@gmail.com (S. P. Savant).

of thyroid, lymph node, salivary gland, and soft tissue. The differential diagnosis of non-neoplastic lesions can be infectious, inflammatory, congenital, or developmental.⁴ 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.⁵

FNAC is both diagnostic and therapeutic in a cystic swelling. Fine Needle Aspiration Cytology of head and neck lesions is also very useful in differentiating inflammatory lesions that does not require surgical excision from other neoplastic lesions that require surgical management.⁶

Fine Needle Aspiration Cytology differentiates thus eliminating the need of surgical intervention in non-neoplastic lesions which can be treated conservatively. The purpose of this study was to see the frequency and distribution of various pathologies detected on FNAC in patients presenting with head and neck swellings and to evaluate the role of FNAC in their diagnosis.

2. Materials and Methods

Detailed clinical history of all the patients related to head and neck swellings were collected from the data available in records to extract the aetiology and also about past history and relevant family history. FNAC details, such as staining methods and diagnosis was noted in the proforma.

2.1. Inclusion criteria

All swellings of head and neck region sent for FNAC from various surgical and medical departments of the hospital were included.

2.2. Exclusion criteria

Head and neck swellings which were less than 1cm and inaccessible were excluded from the study.

2.3. Statistical methods

Statistical method which was used in this study was frequency distribution of all the various parameters using tables. Various percentages were calculated to determine and estimate the frequency of various pathological lesions detected on FNAC in patients with head and neck swelling using statistical analysis.

The present retrospective study was carried out in pathology department of a tertiary care institute from January 2018 to December 2021 and included 500 patients with palpable head and neck swellings from both IPD as well as OPD which were referred to cytology department. Relevant clinical history as well as significant findings were noted. FNAC procedure were explained to the patient and informed consent was taken. FNAC was done taking all aseptic precautions using 22/23-gauge needle and 10 cc disposable syringe. Aspiration as well as non-

aspiration technique were used whenever required. All the smears prepared by pathologist were according to standard guidelines. Wet fixed smears in 95% alcohol were stained with Papanicolaou (Pap) and Haematoxylin-Eosin (H&E) stain while air dried smears were stained with Leishman stain. Special stains like Period acid-Schiff (PAS) stain for suspected fungal lesions as well as Zeihl-Neelsen staining for suspected tubercular lesions was done. Institutional ethical committee clearance was taken.

2.4. Ethics

All procedures performed in the current study were approved by IRB in accordance with 1964 Helsinki Declaration, and its later amendments. Institutional ethical committee approval was obtained prior to the study (IRB approval number: IEC/KRIMS/O/06/2022 dated 11/03/2022).

3. Results

In the present study a total of 500 cases were included. In our study, majority of cases were in the age group of 21 to 30 years. (Table 1). Majority of the cases in our study were females (61.4 %) [males (38.6 %)]. (Table 2).

Table 1: Distribution of patient according to age

Age Group in years	Cases	Percentage (%)
0-10	53	10.6
11-20	91	18.2
21-30	106	21.2
31-40	93	18.6
41-50	66	13.2
51-60	52	10.4
>60	39	7.8
Total	500	100

Table 2: Distribution of patient according to gender

Gender	Cases	Percentage (%)
Male	193	38.6
Female	307	61.4
Total	500	100

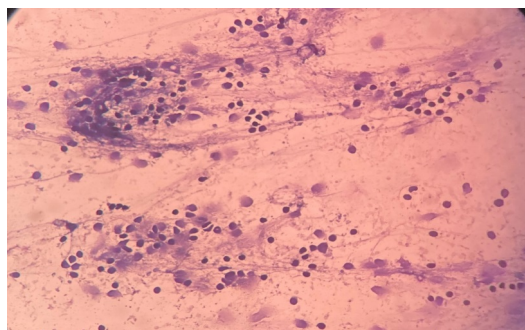
Table 3: Distribution of cases according to tissue involved

Tissue	No. of cases	Percentage (%)
Lymph Node	178	35.6
Thyroid	169	33.8
Salivary Glands	48	9.6
Other	89	17.8
Inconclusive	16	3.2
Total	500	100

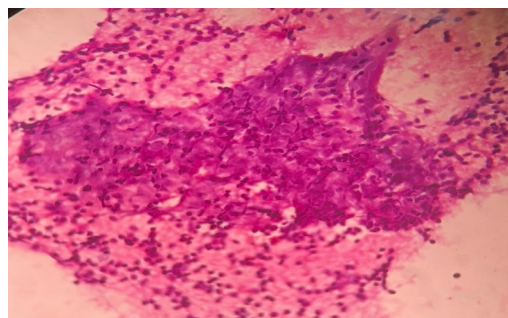
500 cases of palpable head and neck lesions from various departments (including outpatient and inpatients)

Table 4: Distribution of various lymph node lesions

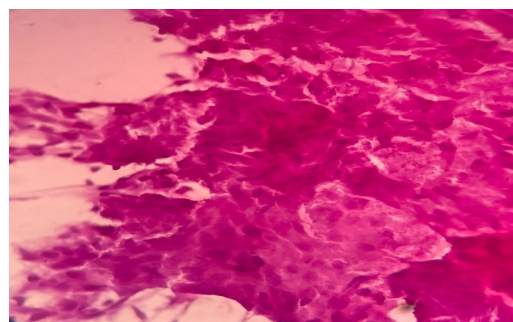
Lesion	No. of cases	Percentage (%)
Reactive Lymphadenitis	102	57.30
Granulomatous Lymphadenitis	23	12.92
Suppurative Lymphadenitis	30	16.85
Necrotising Lymphadenitis	04	2.25
Lymphoproliferative disorders	02	1.12
Lymphoma	02	1.12
Metastasis	15	8.43
Total	178	100

**Figure 1:** FNAC of lymph node showing reactive lymphadenitis (Pap Stain, 40x)**Table 5:** Distribution of various thyroid lesions

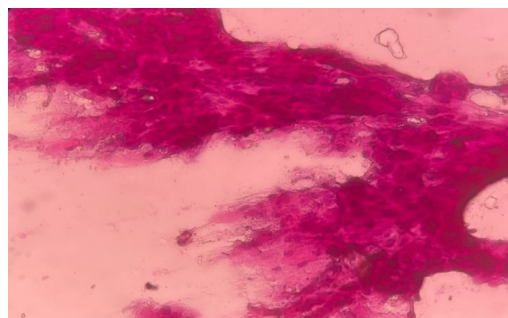
Lesion	No. of cases	Percentage (%)
Cystic Nodule	16	9.47
Thyroglossal Cyst	03	1.78
Colloid Goitre	89	52.66
Lymphocytic Thyroiditis	48	28.40
Benign thyroid lesion	05	2.96
Follicular Neoplasm	03	1.78
Suspicious	01	0.59
Papillary Thyroid Carcinoma	03	1.78
Medullary Carcinoma	01	0.59
Total	169	100

**Figure 2:** FNAC of lymph node showing epithelioid cell granuloma (H&E stain 40x).**Table 6:** Distribution of various salivary gland lesion

Lesion	No. of cases	Percentage (%)
Sialadenitis	22	45.83
Sialadenosis	06	12.5
Pleomorphic adenoma	11	22.92
Warthin's	01	2.08
Benign salivary gland lesions	05	10.42
Suspicious	01	2.08
Acinic cell carcinoma	01	2.08
Metastasis	01	2.08
Total	48	100

**Figure 3:** FNAC of lymph node showing metastatic squamous cell carcinoma. (H&E stain 40x)**Table 7:** Distribution of other lesions

Lesions	No. of cases	Percentage (%)
Lipoma	38	42.7
Epidermoid Cyst	22	24.72
Benign spindle cell lesion	12	13.48
Skin adnexal rumour	01	1.12
Benign cystic lesion	01	1.12
Benign inflammatory lesion	14	15.73
Basal cell carcinoma	01	1.12
Total	89	100

**Figure 4:** FNAC of salivary gland showing epithelial and myoepithelial cells embedded in fibrillary stroma -benign pleomorphic adenoma (H&E stain 40x)

were included in the present study. Age group of patients ranged from 1 year to 76 years. Maximum no. of patients was in the age group of 21-30 years (21.2%) followed by 31-40 years (18.6%) and lowest no. of patients were seen in age group of above 60 years (7.8%)(Table 1). Out of 500 patients 307(61.4%) were females and 193(38.6%) were males. (Table 2).

Site wise distribution of head and neck FNAC [Table-3] shows 178 lymph nodes lesion as the predominant site of FNAC (35.6%) followed by thyroid lesions (33.8%), salivary glands (9.6%) and other soft tissue lesions in the neck(17.8%). FNAC was inconclusive in 16 (3.2%) cases.

Out of 178 (35.6%) cases of lymph node lesions, reactive lymphadenitis (Figure 1) (57.30%) was the predominant cause of lymphadenopathy followed by granulomatous lymphadenitis in 23(12.92%) cases (Figure 2). In malignant lesions, metastatic epithelial malignancy (Figure 3) was the predominant finding (8.43%) and two case (1.12%) of lymphoma was found. (Table 4)

Amongst 169 cases of thyroid lesions, Colloid Goitre was the predominant cause of thyroid swelling (52.66%). Inflammatory lesions including Hashimoto's thyroiditis, chronic lymphocytic thyroiditis was found in 48 (28.40%) cases. In malignant lesions three cases (1.78%) of papillary carcinoma was observed (Table 5).

In salivary glands lesions, sialadenitis was observed in 22 (45.83%) of cases. Benign neoplasm included 11(22.92%) cases of pleomorphic adenoma (Table 4) and one case of Warthins tumour, 1 case of suspicious, acinic cell carcinoma and metastasis each (Table 6).

FNAC of soft tissue and miscellaneous constituted 89 cases with varied pathological lesions like lipoma being the commonest (42.7%), epidermal cyst (24.72%), benign spindle cell lesion (13.48%) and malignant neoplasms including basal cell carcinoma (Table 7).

4. Discussion

Head and neck neoplasm constitute one of the most common cancers in India accounting for 23% of all cancer in males and 6% in females^{7,8} and approximately 5% all childhood neoplasms.⁹ A wide plethora of conditions give rise to head and neck swellings. FNAC, technique evaluates superficial masses of head and neck in the outpatient department, its simple, quick and cost- effective causes minimal trauma to the patient.¹⁰⁻¹² It aids in early differentiation of benign from malignant pathology and greatly influences in planned treatment. It reduces the cost of hospitalization to the patients It can be both diagnostic and therapeutic usage in cystic swellings.⁶

The present study was a retrospective study of 4 years period in a tertiary care hospital. This study was done to find out frequency of variety of pathologies in head and neck swelling and to find out accuracy of FNAC as a rapid

diagnostic tool in outdoor patients. Our study also compares its findings with various national and international studies published in the literature. The present study included patients from all age groups. There were 193 male and 307 female patients Majority of patients were females with male to female ratio of 1:1.59.(Table 2) Females out-numbered males in our study and was comparable with study done by Sanghvi AKB et al.¹³ and Kapoor S et al.¹⁴

Out of 500 fine-needle aspiration procedures, 33.8% were of thyroid, 35.6% were of lymph node, 9.6% from salivary gland, and 17.8% from soft tissue and miscellaneous swellings. There were 3.2% cases in which diagnosis was not possible (Table 3). The causes of unsatisfactory aspirates were smaller lesions, poor handling of material, cystic lesions and inadequate aspirate. Thyroid nodules can be cystic or partially cystic.¹⁵ Approximately, 9.47% of thyroid nodules were cystic and benign in our study.¹⁵ The differential diagnoses for various non-malignant cystic lesions in head and neck region include branchial cleft cysts, granulomatous infection, epithelioid-cystic lymphadenitis, Warthin's tumour, and thyroid cysts.¹⁶ Rarely, aspirates from the FNA may exclusively consist of benign-appearing, squamous cells leading to unsatisfactory smears.¹⁷ Immunohistochemistry can also be used to aid in the diagnosis of thyroid cysts which shows overlapping cytological features. In both PTC and adenomatoid nodule, there is positivity for TTF-1, thyroglobulin, and PAX8.¹⁸ Incidence of inadequate reports ranged from 0 to 10 % in various studies in the literature comparable with our study in which it was 3.2% cases.

In the present study Predominant site of FNAC was lymph node lesions (35.6%) followed by thyroid gland (Table 3). Similar results were also reported by Sharma et al¹⁹ and Ahmad T et al.²⁰ The most common diagnosis obtained in our study was of reactive lymphadenitis in 57.30% (102 cases) of cases (Table 4). Reactive Lymphadenitis (Figure 1) was seen in all the age groups followed by suppurative and granulomatous lymphadenitis (Figure 2). Study done by Sreedevi et al²¹ is also comparable with our study where out of 304 cases studied 50% of head neck lesions were from lymph node, in that common lesion seen was reactive lymphadenitis. Carcinomas metastatic to lymph nodes (Figure 3) were the most common type of malignancy followed by lymphoma. In these present study malignant neoplasms, epithelial metastasis was found in 15 cases (8.43%) and two cases of lymphoma was found. All cases showed metastatic squamous cell carcinoma. HPV testing was not done in our study however HPV-negative head and neck SCC are often moderately or well-differentiated, with preservation of stratification and keratinization when compared to HPV positive head and neck SCC.²²

Thyroid lesions were the next commonest site for FNAC in our study (Table 5). Female preponderance was observed

in FNAC of thyroid lesion in our study with similar findings reported by Rathod et al.²³ Colloid Goitre is the commonest thyroid gland lesion in our study comparable with study done by Sanghvi AKB et al¹² and Rathod et al.²³

In salivary gland lesions acute and chronic sialadenitis together comprised 45.83 % followed by pleomorphic adenoma (Figure 4) in 11 cases (22.92%), sialadenosis in six cases (12.5%), Warthin's tumour in one case, Benign salivary gland lesions in 5 cases (10.42 %) (Table 6). Two cases of malignant neoplasms were observed including one case of acinic cell carcinoma and other being metastasis. Rathod et al²³ found inflammatory lesions as the commonest findings followed by benign neoplasms including pleomorphic adenoma while Bhagat et al²⁴ found benign pleomorphic adenoma as the predominant salivary gland lesion in his study.

In soft tissue and miscellaneous lesions benign lesions were commonest finding including 38 cases (42.7%) of lipoma, 22 cases (24.72%) of epidermal cyst, 12 cases (13.48%) of benign spindle cell lesion, one case (1.12%) of benign adnexal tumour and one case of malignant neoplasms that was basal cell carcinoma. Bhagat et al¹⁸ reported neoplastic lesions in 63% cases with lipoma as the predominant benign tumour and squamous cell carcinoma as the commonest malignant neoplasm. (Table 7)

Cyto-histopathological correlation was possible in only 135 cases (27 %). Out of which 121 benign cases had cyto-histopathological correlation. Among benign cases, Cytomorphological diagnosis was in concordance with histopathological diagnosis in 115 cases (95.04%) while 5 cases showed false negative results and 1 false positive result. Five cases reported on cytology as reactive lymphadenitis turned out to be tubercular lymphadenitis on histopathological examination. One case reported as follicular neoplasm on FNAC turned out to be Nodular goitre on Histopathology.

Out of the malignant cases reported on cytology, in 14 cases cytological diagnosis was consistent histopathological diagnosis. Cyto-histopathological correlation was done by Sharma et al¹⁹ 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 al²⁵ studied cyto-histopathological correlation in 55 out of 154 cases with overall diagnostic accuracy rate of 92.75%, sensitivity of 90.91% and specificity of 93.18%.

In this study overall accuracy rate of FNAC was 97.99% with sensitivity of 96.26%, specificity of 99.72%, and positive predictive value of 99.23% and negative predictive value of 98.64%.

5. Conclusion

The present study concluded that most of the swellings occurring in the head and neck region are benign in nature and affect females more frequently than males.

Metastatic carcinoma was the most commonly encountered malignancy encountered whereas colloid goitre was the most common benign pathology observed in our study. Overall accuracy rate more than 90% and diagnostic accuracy in differentiating non-neoplastic lesions from neoplastic lesions is well established. Our study found that fine needle aspiration cytology to be an easy, safe, rapid, convenient, least invasive, accurate and relatively complication-free outpatient method for diagnosis of lesions of the head and neck.

6. Conflict of Interest

None.

7. Source of Funding

None.

Acknowledgments

None.

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Author biography

Supriya P Savant, Assistant Professor  <https://orcid.org/0000-0002-0248-5131>

Vinay Naik, Assistant Professor  <https://orcid.org/0000-0002-3963-4831>

Prakash H M, Associate Professor  <https://orcid.org/0000-0003-4378-6552>

Cite this article: Savant SP, Naik V, Prakash H M. Role of fine needle aspiration cytology (FNAC) in head and neck lesions in coastal population at a tertiary care hospital – A study of 500 cases. *Panacea J Med Sci* 2023;13(3):658–663.