

# HEAD AND NECK SWELLING: A CYTOPATHOLOGICAL PERSPECTIVE IN A HOSPITAL BASED STUDY

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## ABSTRACT

### Introduction

Fine Needle Aspiration Cytology is a simple, relatively less painful, cost-effective minimal invasive procedure commonly employed in the evaluation of head and neck swellings. There are limited studies on cytological findings of head and neck swelling in Nepal.

### Objectives

The objective of this study was to study cytological findings of head and neck swellings. This study further intends to classify the nature of the swelling and use standardized international reporting system wherever required.

### Methodology

This is a retrospective hospital-based study done in the Department of Pathology at the Helping Hands Community Hospital, Kathmandu between 1 January 2019 and 31 December 2019. Slides of all FNAC from head and neck swelling done during this period was retrieved and evaluated for the study. Chi-Squared ( $\chi^2$ ) test was used to investigate the significance of epidemiological and cytological parameters.

### Result

Males (56%) had more head and neck swelling than females (44%). The younger age group of less than twenty-five (< 25) years had more frequency of head and swelling followed by the older age group of more than fifty (>50) years. The most common site for Fine needle aspiration was lymph nodes (58%) followed by thyroid swelling (23%). Salivary gland swellings were the least frequent (5%). Of all the swelling, 17% of cases were attributed to malignant causes. Infective/Inflammatory causes (55%) were the most common cause of lymph node swellings. Metastatic carcinoma was more prevalent in the older age group of more than fifty (>50) years with a prevalence of 21% of total cases studies. Most of the thyroid swellings were found to be benign (58%) whereas 16% of thyroid swellings belonged to the malignant category. The total numbers of salivary gland swelling were the least with 55% of cases having benign neoplastic etiology. Diagnosis of developmental anomalies like a thyroglossal cyst, lymphangioma, branchial cyst, though relatively less common (10%) were also made with the help of cytological studies.

### Conclusion

Fine Needle Aspiration is a useful method to differentiate benign and infective cases of head and neck swelling from neoplastic cases.

### KEYWORDS

FNAC, head and neck swelling, lymph node, malignancy, thyroid swelling.



## INTRODUCTION

Swelling on the head and neck region are chief complaints that bring patients to the hospital for Fine needle aspiration (FNA) procedure. Fine needle aspiration cytology (FNAC) is a cytodiagnostic method based on cytomorphological observation of cells obtained using a fine needle. Fine needle aspiration cytology is one of the first lines of investigation in the evaluation of any swelling as it is relatively easy, rapid, cost-effective and minimally invasive procedure.<sup>1</sup> The utility of needle aspiration for diagnostic purposes has been discussed as early as 1847 by Kum.<sup>2</sup> In 1930, Memorial Sloan Kettering centre rediscovered the utility of needle biopsy of head and neck mass but the procedure failed to get popularity as wide bore needle was attributed at that time for seeding of malignant cells. In 1950 the needle size was modified following which the number of morbidities associated with previous procedures showed significant reduction resulting in a resurgence in the use of FNAC.<sup>3</sup>

The head and neck region consist of variable tissue types in close proximity rendering difficulty in incisional biopsy. In addition, wide range of primary and metastatic neoplasm are responsible for head and neck region swelling which makes FNAC more advantageous. The other significant benefits of FNAC include minimal physical and psychological pain, discomfort, elimination of a two-stage procedure for diagnosis and treatment.<sup>4</sup> The objective of this study was to study cytological findings of head and neck swellings. This study further intends to classify the nature of the swelling and use standardized international reporting system wherever required. The purpose of this study was to evaluate the distribution and determine the spectrum of cytological findings inpatients presenting head and neck swellings in a community hospital.

## METHODOLOGY

### Study design, population, and data collection

A retrospective cohort study was conducted on the data obtained on all FNAC performed cases in the Department of Pathology at the Helping Hands Community Hospital, Kathmandu between 1 January 2019 and 31 December 2019. All the FNAC cases performed by the pathologists and imaging guided (Ultra sonogram guided or Computed Tomography Guided) FNA performed by the radiologists from the head and neck masses were included in the study population.

The FNAC slides were retrieved and evaluation was done by the primary author. Cases in which the cellular yield was poor and thus inadequate for evaluation were excluded from the study. The patient information report included the demographic information, anatomical location of the swellings, the severity of the case, and the procedure undertaken. The Bethesda system or reporting thyroid cytopathology was adopted while reporting thyroid FNAC and the Milan system for reporting salivary gland cytology was adopted while reporting salivary gland FNAC.<sup>5,6</sup> Findings

were further classified into specific infective/inflammatory, benign, suspicious, and malignant categories.

### Statistical analysis

Data were organized for analysis in Microsoft Excel 2016 (Microsoft Corporation, Redmond, WA, USA) and the exploratory data analysis was performed. For convenience, the patient's age variable was categorized into three groups: younger age group (<25 years), mid-age group (25-50 years), and old-age group (50 years above).

Chi-Squared ( $\chi^2$ ) test was employed to investigate the significance of suitable epidemiological and cytological parameters. The level of statistical significance was set at  $P < 0.05$ . Statistical analyses were conducted using functions available in the packages 'epiR', in R.<sup>7,8</sup> The ethical clearance was obtained from the Helping Hands Community Hospital for the study.

## RESULT

In a one-year study period, there were 154 cases, 87 (56%) males and 67 (44%) females. The younger age group of (< 25 years) were the highest number of cases 64 (41%) followed by the oldest age group 51 (33%) (Table 1).

**Table 1: Distribution of patients based on specified age groups and sex (n = 154).**

Gender		Total cases	Age			Total cases
Male	Female		< 25yrs	25-50yrs	> 50 yrs	
87 (56%)	67 (44%)	154 (100%)	64 (41%)	39 (25%)	51 (33%)	154 (100%)

Details of the location of anatomical location of swellings and number are summarised in Table 2. The most frequent cases were lymph nodes with 90 cases while 36 cases of gland swellings, 9 cases of salivary glands and 19 cases of soft tissues swellings were observed across the time-period.

**Table 2 : Site, gender, age-group wise distribution (n = 154).**

Site	Sex		Age			Total (%)
	Male	Female	< 25years	25-50 years	> 50 years	
Lymph node	56	34	39	22	29	90 (58)
Thyroid gland	14	22	17	13	6	36 (23)
Soft tissues	10	9	7	3	9	19 (12)
Salivary glands	7	2	1	1	7	9 (5)
Total	87	67	64	39	51	154 (100)

The number of enlarged lymph nodes stratified by the description of the type of etiologies in the study period are summarized in Table 3. Infective/Inflammatory etiology which included tubercular lymphadenitis (Figure 1), granulomatous lymphadenitis, suppurative lymphadenitis (Figure 3) and Kikuchi lymphadenitis were the most common findings in younger age groups (< 25 years) whereas malignant cases (Figure 2) which included metastases of adenocarcinoma (Figure 4), squamous cells carcinoma, small round cell carcinoma, undifferentiated carcinoma were the most common findings in older age group (>50 years). Reactive lymphadenitis are those groups



of enlarged lymph nodes which revealed polymorphous lymphoid population of cells suggestive of various stages of maturation, with occasional tingible body macrophages. However, there were no a typical cells or morphological changes like granulomas formation, necrosis on cytologic examination. Regardless of the age, Tubercular lymphadenitis (34%) was the most common cause of lymph node enlargement. The odds of lymph node cases for males was 1.75 (95% CI 0.92 - 3.36) times that of females.

**Table 3.** Number and incidence of enlarged lymph node etiologies stratified by age group (n = 90).

Age groups	Infective/ Inflammatory (%)	Reactive (%)	Malignant (%)	Total (%)
<25 yrs	24 (48)	13 (65)	2 (10)	39 (43)
25-50 yrs	17 (34)	5 (25)	0 (0)	22 (25)
>50 yrs	9 (18)	2 (10)	18 (90)	29 (32)
Total	50 (100 %)	20 (100)	20 (100)	90 (100)

**Table 4.** Number of thyroid swelling categorized based on the Bethesda reporting of thyroid cytology (n = 36).

Diagnostic Category	Interpretation	Number of cases	%
I	Inadequate	4	11
II	Benign	21	58
III	Atypia	0	0
IV	Suspicious for follicular neoplasm	2	6
V	Suspicious for malignancy	3	8
VI	Malignant	6	17
<b>Total</b>		<b>36</b>	<b>100</b>

Of the 50 infective/inflammatory pathologies, 31 cases (62%) had tubercular etiology which was confirmed on the examination of stained slides. The remaining 19 cases (38%) were those of granulomatous lymphadenitis 8 cases (16%), acute suppurative lymphadenitis 8 (16%) cases, and Kikuchi lymphadenitis 3 (6%) cases.

The two cases in the younger age group (< 25 years) had findings suggestive of malignancy: one Hodgkin lymphoma and the other metastatic papillary thyroid carcinoma. Adult age group were more likely to suffer from malignancy than younger age group ( $\chi^2$  test statistic 11.635; df= 1; p < 0.001). Metastatic adenocarcinoma was the most common finding among the malignant causes. Of 20 malignancy cases, 19 cases revealed features of metastatic carcinoma and a case showed features of primary malignancy as Hodgkin's lymphoma. Metastatic adenocarcinoma was seen in 11 cases followed by squamous cell carcinoma in three cases. All the metastases were present in the elderly age group of >50 cases except for a single case of papillary carcinoma thyroid which was seen in the age group < 25 yrs. Two cases were signed out as positive for malignancy since further categorization could not be done based on cytomorphology alone.

FNAC performed in 36 cases of thyroid swelling, of which 4 (11%) cases were reported as inadequate for evaluation.

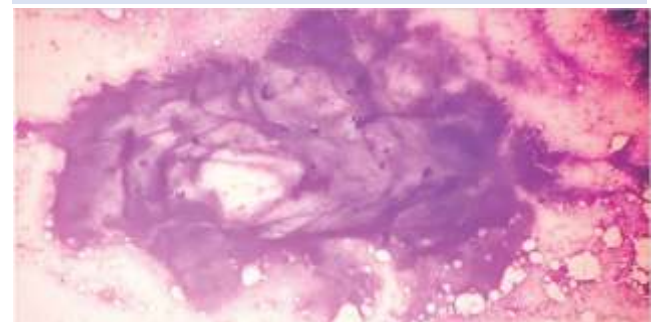
Twenty-one cases of 36 cases (58%) were diagnosed benign which included lymphocytic thyroiditis, nodular colloid goiter, adenomatoid nodule, and subacute thyroiditis. Six cases (16%) were reported as papillary carcinoma thyroid (Fig 5) and three cases (8%) were reported for papillary carcinoma thyroid. Females were more likely to have thyroid swelling compared to males ( $\chi^2$  test statistic 5.924; df= 1; p < 0.01).

**Table 5:** Number of salivary gland swelling categorized based on the Milan system for reporting salivary gland cytology (n = 9).

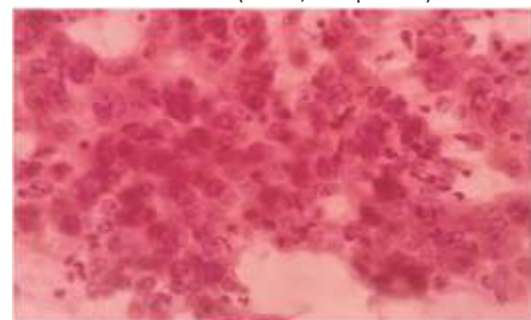
Diagnostic Category	Interpretation	Number of cases	%
I	Non-diagnostic	0	0
II	Non-neoplastic	1	11
III	Atypia of undetermined significance	0	0
IV	Neoplasm	6	67
V	Suspicious	1	11
VI	Malignant	1	11
<b>Total</b>		<b>9</b>	<b>100</b>

**Table 6.** Number of soft tissue swelling cases present in different anatomical regions of the head and neck (n = 19).

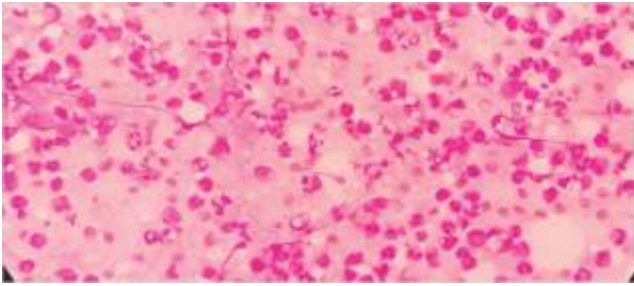
Types of soft tissue swelling	Number of cases	%
Thyroglossal cyst	7	37
Lymphangioma	4	21
Branchial cyst	4	21
Schwannoma	2	11
Granulomatous lesion	1	5
Epidermoid cyst	1	5
Total	19	100



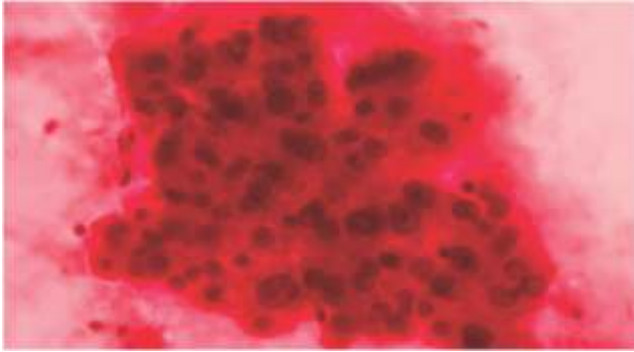
**Figure 1:** Tubercular lymphadenitis showing extensive areas of caseous necrosis. (MGG, 10X power)



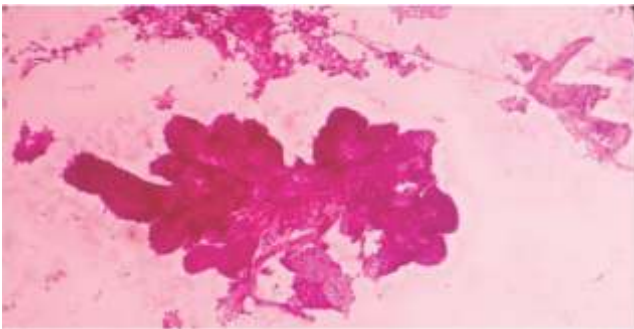
**Figure 2:** Malignant cells suggestive of metastatic carcinoma (Pap, High Power)



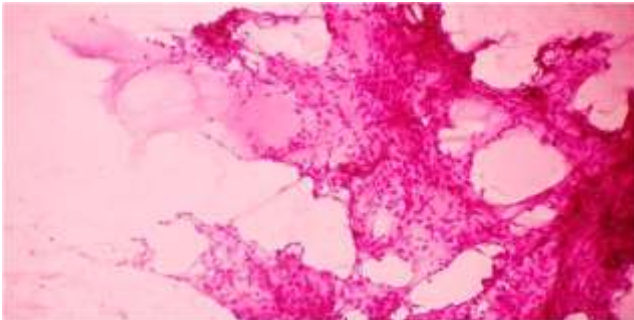
**Figure 3:** Suppurative lymphadenitis showing neutrophils and its debris. (MGG, Intermediate Power)



**Figure 4:** Metastatic tumor cells in lymph node. (Pap, High Power)



**Figure 5:** Papillary arrangement of tumor cells in papillary carcinoma thyroid. (Pap, Low Power)



**Figure 6:** Myxoidstroma with bland cells in pleomorphic adenoma (Pap, Low Power).



**Figure 7:** Granuloma (Pap, Intermediate Power)

## DISCUSSION

The study illustrates the utility of FNAC at various anatomical locations. The majority of FNA specimens were obtained from the lymph nodes followed by thyroid swelling. The results from this study accords with previous studies that obtained majority of aspirates from the lymph nodes for FNAC.<sup>9</sup> Consistent with the literature, this research found that adults have higher incidence of malignancy.<sup>10</sup> This is likely due to the habit of smoking and tobacco chewing.

Another interesting finding is that females were more likely to have thyroid swelling compared to males. The finding was in consistent with Raina *et al.* and Kamra *et al.* who have demonstrated that genetic and environmental factors play role in thyroiditis in females.<sup>11,12</sup>

Clinical and radiological examination findings of head and neck masses are not always sufficient to decide on the further line of management. Cytological examination of the material obtained by FNA might prove to be an effective tool in deciding further line of management of these swelling. FNAC procedure is reported to have 76.5% specificity and 78% sensitivity for identifying malignant lateral cervical lesions.<sup>13</sup> Regarding sensitivity and specificity of FNAC, a study reported sensitivity of 89% and specificity of 57% in neck lymph nodes, 64% sensitivity and 100 % specificity in salivary gland swelling, 62% sensitivity and 86% specificity in thyroid gland swelling.<sup>14</sup> The overall accuracy ratio, specificity, sensitivity, negative predictive value and positive predictive value of FNAC in the diagnosis of head and neck masses were 83%, 85%, 81%, 84%, 83% respectively.<sup>15</sup>

The study further supports the idea that FNA followed by biopsy has high overall accuracy.<sup>16</sup> It has a wide array of uses and provides confidence to confirm malignancy even in a clinically suspicious lesion though it should be noted that procedures require experienced cytopathologists for perfect execution.

In this study, males were predominant over females which agree with those obtained by previous studies.<sup>17,18</sup> In contrast to this, study by Singh *et al.* reported female predominance in their study.<sup>19</sup>

Akhavan-Moghadam *et al.* reported 41% malignant cases, 19% cases benign neoplasm and 40% cases non-neoplastic.<sup>20</sup> This finding broadly supports the work of other studies in this area where metastatic carcinoma to lymph nodes was the most common type of malignancy.<sup>21</sup>

FNA of a thyroid nodule is indicated in various situation such as patient with clinical symptoms of thyroid cancer, nodules >1 cm with at least two ultrasound criteria of malignancy.<sup>22</sup> According to the guidelines developed by Perros *et al.* FNA is also indicated when nodules of any size with extracapsular extension or indeterminate cervical lymph nodes, nodules of any size in a patient with a history of neck radiation, history of well-differentiated thyroid cancer in more than two first degree relatives, medullary thyroid carcinoma or multiple endocrine neoplasias (MEN) TYPE 2, increased calcitonin level.<sup>22</sup>

The sensitivity of thyroid carcinoma detection is approximately 60-90% (in some cases up to 100%) and the specificity of 60-100% in the hand of an experienced cytologist.<sup>23</sup> The molecular genetic analysis of the FNA specimen will further improve the diagnostic accuracy with the identification of additional genes involved in the pathogenesis of thyroid cancer.

Reporting of salivary gland cytology has been a challenging job because of the resemblance of neoplastic cells to normal salivary gland element, the heterogeneous nature of salivary gland lesion, the overlap between benign and malignant lesions, presence of cystic component and oncocytic metaplasia.<sup>24</sup> Reports have shown chronic sialadenitis as the most common non-neoplastic lesion with the overall accuracy of FNAC to be 83.8% with 77.7% sensitivity and 86.3% specificity.<sup>25</sup> In a more recent study, the diagnostic sensitivity was 94%, specificity was 97% and the accuracy was 95%.<sup>26</sup>

The use of FNA - a method of aspiration biopsy cytology continues to grow throughout the world. Improvements in using imaging and ultrasound have fuelled the growth of FNAC among both interventional radiologists and clinicians.<sup>27</sup> In future, molecular genetics methods will probably extend the diagnostic range of FNA beyond what is currently achievable with classic cytology.

## CONCLUSION

Fine needle aspiration cytology being simple quick cost-

effective minimal invasive relatively less painful procedure has proven to be quite a useful tool in the investigation of head and neck region swelling which poses more challenge due to not so easy anatomical terrain for an incisional biopsy study. It has the diagnostic ability to differentiate between inflammatory, benign malignant processes and thus aid in further management effectively.

## LIMITATION OF THE STUDY

The FNAC itself has its own limitations to make specific diagnosis as mentioned above in the discussion. Tissue biopsy is still considered the gold standard to make a final diagnosis in the evaluation of any swelling on the body.

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## CONFLICT OF INTEREST

None

## FINANCIAL DISCLOSURE

None

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