Section: Pathology

Original Research Article

THE CYTOMORPHOLOGICAL SPECTRUM OF VARIOUS PALPABLE LESIONS IN HEAD AND NECK REGION IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Head and neck lesions represent a diverse array of inflammatory, congenital, and neoplastic conditions that pose diagnostic challenges, particularly for Fine Needle Aspiration Cytology (FNAC). These swellings most commonly involve lymph nodes, salivary glands, thyroid, and soft tissues. In India, such lesions significantly contribute to both morbidity and mortality, with malignant conditions—especially metastatic cervical lymphadenopathy—being alarmingly prevalent. Over the past two decades, FNAC has gained prominence as a frontline diagnostic modality owing to its high accuracy, cost-efficiency, and minimally invasive nature. **Aims and Objectives:** To evaluate the cytomorphological spectrum of head and neck swellings using FNAC, determine its diagnostic efficacy, and identify predominant etiologies within the studied population. **Materials and Methods:** This cross-sectional observational study encompassed patients across all age groups presenting with head and neck swellings. Conducted in the Department of Pathology at Mata Gujri Memorial Medical College & LSK Hospital, Kishanganj, Bihar, the study spanned from December 2020 to November 2022. FNAC was performed, and smears were evaluated cytologically. Histopathological correlation was attempted wherever feasible. **Result:** A total of 180 cases were assessed, of which 85% were benign and 15% malignant. The most frequently aspirated site was the lymph node (63.8%, 115 cases). Among these, tubercular lymphadenitis emerged as the most common diagnosis, accounting for 30% (54 cases). However, histopathological verification could only be achieved in a limited number of cases due to poor post-operative follow-up and patient compliance. **Conclusion:** Tuberculosis was identified as the predominant cause of cervical lymphadenitis and the most frequent etiology of neck swellings in this cohort, primarily affecting individuals from socioeconomically disadvantaged backgrounds. Enhancing living standards and public health infrastructure could play a vital role in reducing the burden of tuberculosis. FNAC remains a highly effective initial diagnostic tool for evaluating head and neck lesions, though challenges in histopathological follow-up underscore the need for better patient engagement and healthcare access.

INTRODUCTION

Head and neck lesions represent one of the most diverse and diagnostically challenging groups of swellings encountered in cytopathology. These lesions encompass a wide range of inflammatory, congenital, and neoplastic conditions arising from various anatomical sites and tissue origins. Clinically palpable swellings in this region frequently involve lymph nodes, salivary glands, thyroid gland, and soft tissues, with both non-neoplastic and neoplastic etiologies contributing to their presentation.[1]

In the Indian context, head and neck lesions are commonly observed and constitute a significant contributor to patient morbidity and mortality. Neoplasms originating in this region account for a considerable proportion of cancer cases—approximately 23% of all malignancies in males and 6% in females.[2] The high incidence of such cancers has been attributed to widespread use of tobacco in various forms, poor oral hygiene, betel nut chewing, alcohol consumption, and persistent viral infections such as HPV and EBV.[3,4]

Fine Needle Aspiration Cytology (FNAC) has emerged as an invaluable diagnostic modality for the evaluation of these lesions, especially in resource-

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limited settings where access to advanced histopathological and radiological services may be limited. FNAC enables rapid, safe, and cost-effective assessment with minimal patient discomfort, often allowing for immediate triage, follow-up, and therapeutic planning. Its high sensitivity and specificity, especially when combined with clinical and radiological correlation, have led to its widespread use as a first-line investigation for palpable head and neck swellings.[5,6]

FNAC was first introduced by Martin and Ellis in 1930 for the evaluation of head and neck swellings.[7] Since then, it has evolved into a cornerstone of preliminary diagnostic workup for lesions in this region. However, the diagnostic utility of FNAC depends not only on sample adequacy and cytological expertise but also on the integration of clinical history and imaging findings to arrive at a precise and contextually accurate diagnosis.[8,9]

MATERIALS AND METHODS

Study Design and Setting: This cross-sectional study was conducted in the Department of Pathology at Mata Gujri Memorial (MGM) Medical College and LSK Hospital, Kishanganj, Bihar, over a period of two years, from December 2020 to November 2022.

Sample Size and Sampling Technique: A total of 180 cases were included in the study. The sample size was calculated using the following formula at a 95% confidence level:

$n = z^2 \times p \times q / \alpha^2$

where,

n = the sample size,

z = the standard normal deviation equivalent to 95% level of confidence = 1.96

α = allowable error = 5% (0.05)

p = prevalence = 12% (0.12)

q = 1 – p = (1 – 0.12) = 0.88

n = (1.96)2 x 0.12 x 0.88/(0.05)2

n = 162 + 10% attrition = 162+16.9 = 178.9

n ≈ 179

Therefore, total 180 cases were taken.

Inclusion Criteria

1. Patients of all age groups with head and neck swellings.

Exclusion Criteria

1. Non Consenting patients.
2. Seriously ill patients.
3. Patients in which FNAC was contraindicated.

Ethical Considerations: Approval for the study was obtained from the Institutional Ethics Committee. Oral consent was obtained from all study participants prior to the procedure.

Methodology: Fine Needle Aspiration Cytology (FNAC) was performed on all cases using a 23-gauge needle attached to a 10 mL syringe. The aspirated material was used to prepare smears. Air-dried smears were immediately stained with Giemsa stain for cytomorphological evaluation. In cases where tuberculosis was suspected, Ziehl–Neelsen (ZN) staining was carried out to detect acid-fast bacilli (AFB).

Statistical Analysis: Data were tabulated, and slides were reviewed wherever necessary. Frequencies and percentages were calculated for various pathological conditions. Correlation with histopathological diagnosis was performed wherever available.

RESULTS

In the present study, a total of 180 patients presenting with head and neck swellings were evaluated using Fine Needle Aspiration Cytology (FNAC). The age of the patients ranged from 1 year to 76 years, with a male-to-female ratio of 1.2:1. Lymph nodes were the most frequently involved site, observed in 115 cases (63.8%), followed by thyroid lesions in 28 cases (15.5%), salivary gland swellings in 13 cases (7.2%), and soft tissue lesions in 10 cases (5.5%). Skin and miscellaneous lesions accounted for 9 (5%) and 5 (2.7%) cases, respectively. Of the total cases, 153 (85%) were diagnosed as benign and 27 cases (15%) as malignant. Tubercular lymphadenitis was the most common cytological diagnosis, comprising 54 cases (30%) among lymph node lesions. However, histopathological correlation could be obtained only in a limited number of cases due to low post-surgical follow-up and patient compliance.

The distribution of cases by anatomical site and nature of lesion is detailed in Table 1.

Table 1: Distribution of Head and Neck Lesions by Site and Nature (n=180)

Site	Total Cases (n)	Benign n (%)	Malignant n (%)
Lymph Nodes	115	84 (73.0%)	31 (27.0%)
Thyroid	28	24 (85.7%)	4 (14.3%)
Salivary Glands	13	11 (84.6%)	2 (15.4%)
Soft Tissue	10	10 (100%)	0 (0%)
Skin	9	8 (88.9%)	1 (11.1%)
Miscellaneous	5	4 (80%)	1 (20%)
Total	**180**	**141 (78.3%)**	**39 (21.7%)**

Table 2: Distribution of Head and Neck Lesions with Cytological Diagnosis

Lesion Category	Diagnosis	Number of Cases (n)	Percentage (%)
Lymph Node Lesions			
	Tubercular Lymphadenitis	54	30.0
	Reactive Lymphadenitis	38	21.1
	Chronic Nonspecific Lymphadenitis	5	2.8

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	Lymphoproliferative Disorders	8	4.4
	Metastatic Carcinoma	10	5.5
Thyroid Lesions			
	Colloid Goiter	10	5.5
	Hashimoto's Thyroiditis	8	4.4
	Lymphocytic Thyroiditis	5	2.8
	Graves' Disease	1	0.6
	Malignancy	6	3.3
Salivary Gland Lesions			
	Pleomorphic Adenoma	9	5.0
	Sialadenitis	6	3.3
	Warthin's Tumor	1	0.6
	Malignancy	3	1.7
Soft Tissue Lesions			
	Lipoma	8	4.4
	Cystic Hygroma	1	0.6
	Branchial Cyst	1	0.6
Skin Lesions			
	Epidermal Inclusion Cyst (EIC)	5	2.8
Miscellaneous Lesions			
	Other Cystic Lesions	5	2.8
Total		**180**	**100%**

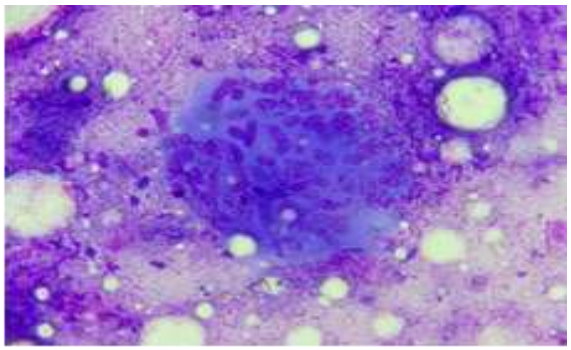

Figure 1: Tubercular lympadenitis: Well- formed epithelioid cell granuloma with lymphoid cells in background (Giemsa X400)

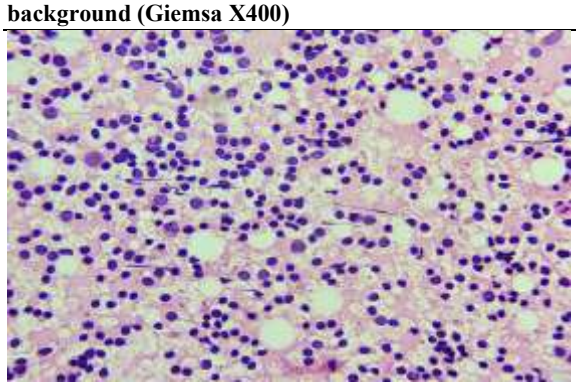

Figure 2: Lymphoproliferative disorder: Predominantly monomorphic population of atypical lymphoid cells (H&E X400)

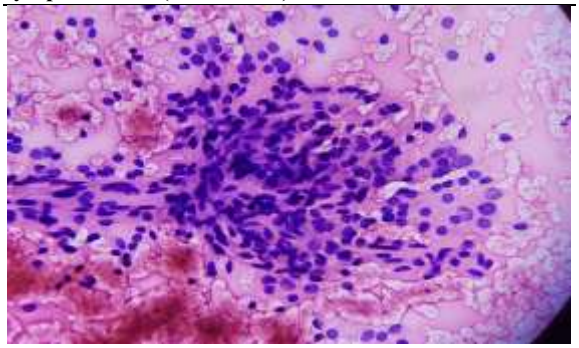

Figure 3: Hashimoto's thyroiditis: Heterogeneous population of follicular cells with Hurthle cell change, abundant lymphocytes, (H&E X100)

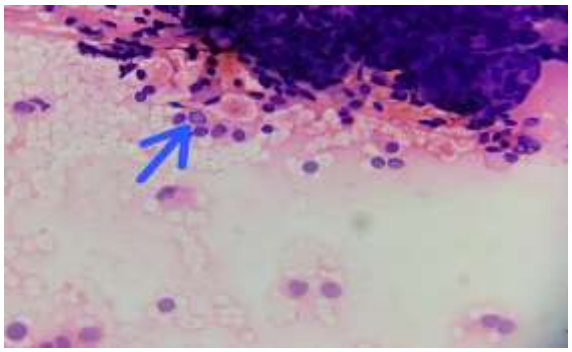

Figure 4: Papillary Thyroid Carcinoma: Follicular cells showing intranuclear cytoplasmic inclusion

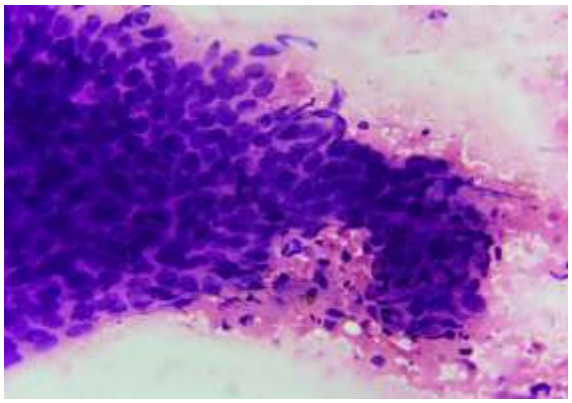

Figure 5: Poorly differentiated metastatic deposits in LN, (GiemsaX400x)

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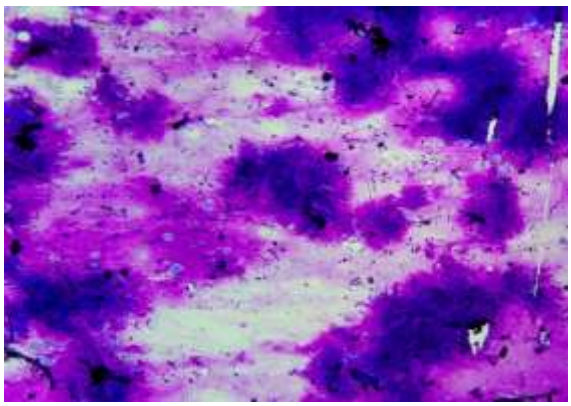

Figure6: Pleomorphic adenoma (Giemsa x 100x)

Histopathological confirmation was achieved in 70 of the 180 cases (38.9%), with cytology and histopathology concordant in 67 of these (95.7%) and discordant in 3 (4.3%). Unfortunately, the remaining 110 cases (61.1%) were lost to follow up—patients did not return for biopsy—precluding definitive histopathological assessment. Table 3 outlines the reasons for the discrepant cases.

Table 3: Distribution of Cyto–Histopathological Discordant Cases and Reasons

Case No.	Site of FNAC	Cytological Diagnosis	Histological Diagnosis	Type of Error
1	Lymph Node	Reactive	Kikuchi-like necrotizing lymphadenitis	Sampling
2	Lymph Node	Reactive	Granulomatous lymphadenitis	Sampling
3	Thyroid	Papillary thyroid carcinoma (PTC)	Hyperplastic goitre	Interpretation

DISCUSSION

Fine Needle Aspiration Cytology (FNAC) functions as a rapid and minimally invasive diagnostic modality for the preliminary assessment of head and neck swellings, particularly those that are superficial and readily accessible. Its advantages encompass being an outpatient procedure that obviates the need for sedation or anesthesia, is minimally uncomfortable, and can be executed within minutes. This stands in stark contrast to the more protracted, intricate, and invasive nature of traditional biopsy techniques.

In the current study, the lymph node emerged as the most frequently aspirated organ (63.8%), with tubercular lymphadenitis identified as the predominant diagnosis. This observation is congruent with findings from studies conducted by Meenai et al,[10] and Patel et al,[11] both of which also documented a significant incidence of lymph node involvement in head and neck lesions. Conversely, other investigations, such as those by Padia and Dhokiya,[12] have indicated reactive lymphadenitis as the most prevalent diagnosis.

A comparative analysis of various head and neck lesions, derived from analogous studies, is delineated in Table 4.

Table 4: Comparative Distribution of FNAC Findings in Head and Neck Lesions

Study	Lymph Node	Thyroid	Salivary Gland	Soft Tissue
Meenai et al.	64.0%	18.3%	3.5%	4.0%
Padia and Dhokiya	64.0%	18.7%	2.9%	12.9%
Patel and Chawla	54.9%	17.9%	5.8%	18.8%
Kaur et al.	52.9%	33.5%	9.5%	4.1%
Present Study	63.8%	15.5%	7.2%	5.5%

In our study, lymph node aspirates constituted the majority of cases (63.9%), with tubercular lymphadenitis being the most prevalent diagnosis (30%). This finding aligns with several studies conducted in different regions of India, where tuberculosis remains a significant health concern. For instance, Chand et al,[13] reported tubercular lymphadenitis in 56.99% of cases, followed by reactive lymphoid hyperplasia (35.23%) and acute suppurative lymphadenitis (4.14%). Similarly, Naz and Sharma14 observed tubercular lymphadenitis in 35.5% of cases, with reactive lymphadenitis at 26.22% and metastatic lymphadenopathy at 6.38%. In another study by Jain et al,[15] tubercular lymphadenitis was found in 40% of cases, reactive lymphoid lesions in 30%, and metastatic malignancies in 15%. The distribution of lymph node cytological diagnoses across various studies is summarized in Table 5.

Table 5: Comparison of results in Lymph-node Lesion

Lesion category	Chand et al. (%)	Naz & Sharma (%)	Jain et al. (%)	Present Study (%)
Tubercular Lymphadenitis	56.99	35.5	40	30.0
Reactive Lymphadenitis	35.23	26.22	30	21.1
Chronic Nonspecific Lymphadenitis	3.6	-	12.5	2.8
Lymphoproliferative Disorders	-	-	1.25	4.4
Metastatic Carcinoma	8.1	6.38	15	5.5
Inconclusive	-	-	-	5.23

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In our study, lymph node aspirates constituted the majority of cases (63.8%), with tubercular lymphadenitis being the most prevalent diagnosis, observed in 30% of cases. This high incidence aligns with findings from other regions in India, reflecting the persistent burden of tuberculosis in the country. For instance, Chand et al,[13] reported tubercular lymphadenitis in 56.99% of cases, while Naz and Sharma,[14] observed it in 35.5% of cases. Jain et al,[15] also documented a 40% incidence of tubercular lymphadenitis in their study.

Reactive lymphadenitis was the second most common diagnosis in our study, accounting for 21.1% of cases. This is consistent with the findings of Naz and Sharma,[14] who reported a 26.22% incidence, and Jain et al,[15] who observed it in 30% of cases. Metastatic carcinoma was identified in 5.5% of our cases, which is lower compared to the 8.1% reported by Chand et al,[13] and the 15% observed by Jain et al.[15] The lower incidence in our study may be attributed to the demographic and referral patterns specific to our institution.

The sensitivity and specificity of FNAC for diagnosing metastatic lymph nodes have been reported to be high, with sensitivity ranging from 97.9% to 100% and specificity nearing 100%. This underscores the reliability of FNAC as a diagnostic tool in evaluating lymphadenopathy.

In our study, 1.3% of lymph node aspirates were inconclusive, primarily due to hemorrhagic samples, which can obscure cytological details and hinder accurate diagnosis.

Thyroid lesions constituted 15.5% (28 out of 180) of all FNAC cases in our study. This proportion aligns closely with findings from other studies, such as the 17.9% reported by Patel and Chawla.[11] FNAC has demonstrated high diagnostic accuracy in thyroid pathology. For instance, a study by Baloch et al,[16] reported a sensitivity of 92.8% and specificity of 94.2% for FNAC in thyroid lesions, emphasizing its efficacy in distinguishing benign from malignant conditions. In our cohort, benign lesions such as colloid goiter and thyroiditis were predominant, while papillary thyroid carcinoma (PTC) was the most common malignancy identified.

Salivary gland lesions accounted for 7.2% of FNAC cases in our study, a figure higher than the 3.5% reported by Meenai et al,[10] FNAC has proven to be a valuable diagnostic modality for salivary gland lesions, offering high diagnostic accuracy. A study by Kambale et al,[17] demonstrated that FNAC could reliably differentiate between neoplastic and non-neoplastic salivary gland lesions, with an overall accuracy of 93.4%. Pleomorphic adenoma was the most commonly diagnosed benign neoplasm in our study, consistent with findings from other research.

Soft tissue lesions constituted 5.5% of FNAC cases in our study, aligning closely with the 4.0% reported by Meenai et al,[10] FNAC serves as an effective initial diagnostic approach for soft tissue swellings, facilitating the differentiation between benign and malignant lesions. A study conducted at a tertiary cancer referral center in India reported a diagnostic accuracy of 92.4% for FNAC in soft tissue tumors, with sensitivity and specificity of 95% and 84.21%, respectively. In our cohort, lipomas were the most common benign lesions identified.

Skin and subcutaneous lesions accounted for 5%, with epidermal inclusion cysts being the most frequent diagnosis (55.88%).

Histopathological correlation was available in 67 cases, with a concordance rate of 95.5%. Three cases (4.5%) exhibited cyto-histopathological discordance. Two of these were lymph node aspirates initially diagnosed as reactive lymphadenitis but later confirmed as Kikuchi-like necrotizing lymphadenitis and granulomatous lymphadenitis, respectively, on histology, likely due to sampling errors. The third case involved a thyroid lesion misdiagnosed as papillary thyroid carcinoma (PTC) on cytology, which was later identified as hyperplastic goitre on histological examination, indicating an interpretative error. These findings highlight the importance of adequate sampling and careful cytological evaluation to minimize diagnostic discrepancies. Implementing radiologically guided FNAC, especially for deep-seated or ill-defined lesions, and adhering to strict cytological criteria can enhance diagnostic accuracy and reduce the incidence of false-positive and false-negative results.

CONCLUSION

Reflecting on the diverse cases encountered in our practice, it becomes evident that lymph nodes are the most frequently aspirated sites, with tubercular lymphadenitis emerging as the predominant lesion in our clinical setting. Fine-needle aspiration cytology (FNAC) has consistently proven to be a straightforward, swift, and cost-effective diagnostic modality, adept at distinguishing between neoplastic and non-neoplastic lesions. Its application has facilitated timely diagnoses and management, thereby circumventing unnecessary invasive procedures. Based on these experiences, we advocate for FNAC as the initial investigative approach for patients presenting with head and neck swellings, ensuring optimal diagnostic and therapeutic outcomes.

While fine-needle aspiration cytology (FNAC) is a well-established diagnostic tool, conducting this study in Kishanganj, Bihar, offers valuable insights specific to this region, Kishanganj. The district's healthcare infrastructure is still developing, with limited access to advanced medical facilities. By analyzing FNAC cases in this setting, the study highlights the diagnostic challenges and disease patterns unique to such under-resourced areas, thereby contributing to more effective healthcare strategies tailored to similar populations.

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