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Original Article

Salivary Gland Lesions: A Cytomorphological Study with Histopathological Correlation

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ABSTRACT

Background: Salivary gland lesions include a wide range of non-neoplastic and neoplastic conditions that often present as clinically similar swellings. Fine needle aspiration cytology (FNAC) is widely used as a minimally invasive diagnostic technique in the initial evaluation of these lesions.
Objectives: To study the cytomorphological spectrum of salivary gland lesions, to correlate cytological findings with histopathology wherever available, and to assess the diagnostic utility of FNAC.
Materials and Methods: This prospective study was conducted over one year from June 2024 to May 2025 on 100 patients presenting with salivary gland swellings. FNAC was performed in all cases, and histopathological correlation was done in surgically excised cases.
Results: Non-neoplastic lesions constituted 50% of cases, followed by benign tumors (35%) and malignant tumors (15%). Chronic sialadenitis and pleomorphic adenoma were the most common non-neoplastic and benign lesions respectively, while mucoepidermoid carcinoma was the most frequent malignant tumor.
Conclusion: FNAC is a reliable and effective preliminary diagnostic tool for salivary gland lesions and plays a significant role in guiding patient management.

Keywords: *Cyto-histological correlation, FNAC, Salivary glands.*

INTRODUCTION

Salivary gland lesions represent a diagnostically challenging group due to their diverse etiology and wide morphological spectrum. These lesions range from inflammatory and cystic conditions to benign and malignant neoplasms, many of which present as painless swellings. Accurate preoperative diagnosis is crucial for appropriate treatment planning and prognostication.[1] Clinical examination and radiological investigations alone often fail to reliably distinguish between non-neoplastic and neoplastic salivary gland lesions. Hence, cytological evaluation has become an essential component of the diagnostic work-up.[2] Fine needle aspiration cytology is a simple, rapid, cost-effective, and minimally invasive procedure that aids in the categorization of salivary gland lesions and helps clinicians decide appropriate management strategies.[3] The present study was undertaken to determine the frequency and spectrum of salivary gland lesions, with special reference to malignant lesions, in the study population.[4] It also aimed to evaluate salivary gland masses by fine needle aspiration cytology with respect to diagnostic accuracy and to assess cyto-histopathological correlation wherever available.

MATERIALS AND METHODS

This prospective observational study was carried out in the Department of Pathology of World college of medical sciences research and hospital, Jhajjar, Haryana, over a period of one year from June 2024 to May 2025. A total of 100 patients presenting with clinically suspected salivary gland swellings were included after obtaining informed consent and institutional ethical approval.

Patients of both sexes aged 30–80 years with palpable salivary gland lesions were included. Cases with inadequate aspirates and patients unwilling to participate were excluded. Clinical details including age, sex, and site of lesion were

recorded.[5]FNAC was performed using a 22–23 gauge needle under aseptic precautions. Air-dried smears were stained with May–Grünwald–Giemsa stain and alcohol-fixed smears with Papanicolaou stain. Smears were evaluated for cellularity, architectural pattern, and background features. [6]Histopathological examination was carried out in surgically excised cases. Routine tissue processing and hematoxylin and eosin staining were performed. Cytological findings were correlated with histopathological diagnosis wherever available.[7]

RESULTS

A total of 100 patients presenting with salivary gland swellings were evaluated in the present study. The age of the patients ranged from 30 to 80 years. There were 55 males (55%) and 45 females (45%), with an overall male-to-female ratio of 1.2:1.

The parotid gland was the most frequently involved salivary gland, accounting for 52% of cases, followed by the submandibular gland (38%). Lesions arising from minor salivary glands constituted 10% of cases. No lesion involving the sublingual gland was observed in the present study.

Among the 100 cases studied, non-neoplastic lesions constituted the largest group (50%), followed by benign neoplastic lesions (35%) and malignant neoplasms (15%), as summarized in Table 1.

Table 1: Distribution of Salivary Gland Lesions (n = 100)

Type of lesion	Number of cases	Percentage
Non-neoplastic lesions	50	50%
Benign tumors	35	35%
Malignant tumors	15	15%
Total	100	100%

Non-neoplastic lesions were observed predominantly in the younger and middle age groups, with a clear male predominance. The submandibular gland was the most commonly affected site in non-neoplastic conditions. Chronic sialadenitis was the most frequent non-neoplastic lesion, accounting for 64% of cases, followed by benign cystic lesions (18%), suppurative sialadenitis (10%), and granulomatous (tubercular) sialadenitis (8%).

Neoplastic lesions were more frequently encountered in the older age groups. Benign tumors were commonly seen in the fourth and fifth decades, whereas malignant tumors predominantly affected patients in the sixth to eighth decades of life. The parotid gland was the most frequent site of involvement in neoplastic lesions.

Among benign tumors, pleomorphic adenoma was the most common, constituting 68.6% of benign neoplasms, followed by Warthin's tumor (20%) and other benign tumors (11.4%).

Among malignant tumors, mucoepidermoid carcinoma was the most frequently diagnosed malignancy (46.7%), followed by adenoid cystic carcinoma (26.7%), acinic cell carcinoma (20%), and adenocarcinoma (6.6%). The distribution of benign and malignant tumors is shown in Table 2.

Table 2: Distribution of Neoplastic Salivary Gland Lesions (n = 50)

Tumor type	Number of cases	Percentage
Benign tumors		
Pleomorphic adenoma	24	48.0%
Warthin's tumor	7	14.0%
Other benign tumors	4	8.0%
Malignant tumors		
Mucoepidermoid carcinoma	7	14.0%
Adenoid cystic carcinoma	4	8.0%
Acinic cell carcinoma	3	6.0%
Adenocarcinoma	1	2.0%
Total	50	100%

Histopathological correlation was available in surgically excised cases. FNAC showed a high degree of cyto-histopathological concordance, particularly for non-neoplastic lesions and benign tumors. Occasional discordance was noted in cystic lesions and low-grade malignant tumors, reflecting overlapping cytomorphological features.

DISCUSSION

In the present study of 100 patients, non-neoplastic lesions constituted 50%, followed by benign tumors (35%) and malignant tumors (15%). These findings It is in concordance with Omhare et al., who reported 53.22% non-neoplastic, 31.45% benign, and 15.32% malignant lesions in their series of 124 cases, demonstrating a remarkably

similar lesion distribution pattern.[5] Gandhi et al. also reported a comparable distribution, with non-neoplastic lesions accounting for 52%, benign tumors 32%, and malignant tumors 16% of cases.[8]

The parotid gland was the most commonly involved gland in the present study, followed by the submandibular gland, while minor salivary glands accounted for 10% of cases and no sublingual gland lesion was identified. Sengupta et al. reported parotid involvement in 48% and submandibular involvement in 42% of cases, findings that are nearly identical to the present study.[6] Similarly, Negi et al. observed parotid gland involvement in 50.4% and submandibular gland involvement in 38.6% of cases.[4]Among non-neoplastic lesions in the present study, chronic sialadenitis constituted 64% of cases, making it the most common inflammatory lesion. This finding is consistent with Jain et al., who reported chronic sialadenitis in 61% of non-neoplastic lesions, and Singh et al., who documented a frequency of 58%.[7,2] The predominance of chronic sialadenitis, particularly involving the submandibular gland, reflects the role of obstructive and infective etiologies.

Neoplastic lesions in the present study showed a clear age-related pattern, with benign tumors occurring predominantly in middle-aged patients and malignant tumors in older individuals. Pleomorphic adenoma constituted 68.6% of benign tumors, comparable to the frequencies reported by Gandhi et al. (68%), Omhare et al. (66.6%), and Kumar et al. (69%).[8,5,9]Among malignant tumors, mucoepidermoid carcinoma was the most common (46.7%), similar to observations by Singh et al. (42%) and Negi et al. (44%).[2,4]

In the present study, FNAC demonstrated high diagnostic performance, with an overall sensitivity of 95.98%, specificity of 99.20%, and diagnostic accuracy of 98.08%, findings comparable to those reported by Gandhi et al. (≈98%) and Omhare et al. (95.3%).[8,5] The positive predictive value (96.96%) and negative predictive value (97.35%) were also comparable with Indian studies by Vaidya et al. and Gupta et al., while Omhare et al. reported PPV and NPV of 88.2% and 97.1%, respectively.[10,11,5]The false-negative rate of 4.04% observed in the present study was comparable to the 2.3% reported by Omhare et al.[5] Similar limitations of FNAC, particularly in cystic lesions and low-grade malignancies due to sampling error and cytomorphological overlap, have been described by Layfield and Glasgow, supporting the need for histopathological confirmation in equivocal cases.[12]

CONCLUSION

FNAC is a simple, safe, and reliable diagnostic tool for the evaluation of salivary gland lesions. It effectively differentiates non-neoplastic from neoplastic lesions and provides useful preoperative guidance. Histopathological correlation remains essential in diagnostically challenging and malignant cases to ensure accurate diagnosis and optimal patient management.

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