OPEN ACCESS

Saudi Journal of Medical and Pharmaceutical Sciences
Abbreviated Key Title: Saudi J Med Pharm Sci
ISSN 2413-4929 (Print) | ISSN 2413-4910 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article **Pathology**

Cytomorphological Pattern of Salivary Gland Lesions on FNAC & Correlation with Histological Findings

Lt Col Mostare Khondoker[1*], Lt Col Wasim Selimul Haque[2], Prof Col (Rtd) SK Jaynul Islam[3]

[1]Classified Specialist in Pathology, Combined Military Hospital, Sylhet, Bangladesh
[2]Classified Specialist in Pathology, CO 81 Field Ambulance, Bangladesh
[3]Classified Specialist in Pathology, BIRDEM General Hospital, Dhaka, Bangladesh

DOI: https://doi.org/10.36348/sjmps.2025.v11i07.001 | **Received:** 13.05.2025 | **Accepted:** 18.06.2025 | **Published:** 01.07.2025

***Corresponding author:** Lt Col Mostare Khondoker
Classified Specialist in Pathology, Combined Military Hospital, Sylhet, Bangladesh

Abstract

Background: Salivary gland lesions encompass various non-neoplastic and neoplastic conditions with overlapping clinical presentations, posing diagnostic challenges. Fine Needle Aspiration Cytology (FNAC) serves as a minimally invasive, cost-effective technique for the preliminary assessment of such lesions. Still, its accuracy must be validated against histopathological examination, the gold standard for definitive diagnosis. ***Objective:*** This study aimed to evaluate the cytomorphological patterns of salivary gland lesions diagnosed through FNAC and to correlate these findings with corresponding histopathological results. ***Methods:*** A retrospective cross-sectional study was conducted at the Department of Histopathology and Cytopathology, Armed Forces Institute of Pathology, Dhaka Cantonment, from January 2014 to September 2015. A total of 55 cases with both FNAC and histopathological reports were analyzed. Data were statistically evaluated using SPSS version 11.0. ***Results:*** Among the 55 cases, submandibular gland lesions were most common (45.45%), followed by parotid (38.18%) and minor salivary glands (16.36%). FNAC identified 23 non-neoplastic (41.82%) and 32 neoplastic lesions (58.18%), including 19 benign and 13 malignant tumors. Histopathology confirmed 22 non-neoplastic and 33 neoplastic cases. Pleomorphic adenoma was the most frequent benign tumor, and mucoepidermoid carcinoma was the most common malignancy. Concordance between FNAC and histology was observed in 72.7% (40/55) of cases. FNAC demonstrated 92.9% sensitivity, 97.6% specificity, and high overall diagnostic accuracy. ***Conclusion:*** FNAC is a valuable first-line diagnostic tool in evaluating salivary gland lesions, with high sensitivity and specificity. However, certain limitations—particularly in distinguishing low-grade malignancies and some benign lesions—underscore the importance of histopathological confirmation in inconclusive or suspicious cases.

Keywords: Fine Needle Aspiration Cytology, Salivary Gland Lesions, Cytomorphology, Histopathological Correlation.

INTRODUCTION

Salivary gland lesions encompass a broad spectrum of non-neoplastic and neoplastic conditions, ranging from benign entities such as sialadenitis to malignant tumors like mucoepidermoid carcinoma. These lesions often present with overlapping clinical features, making accurate diagnosis through clinical examination alone challenging. [1-3] As such, a reliable and minimally invasive diagnostic technique is essential to facilitate early detection and appropriate management. Fine Needle Aspiration Cytology (FNAC) has emerged as a vital diagnostic tool in this regard, offering preliminary insights into the nature of salivary gland swellings.

FNAC is a cost-effective, rapid, and safe outpatient procedure that helps differentiate between benign and malignant lesions, thus aiding in planning surgical intervention or conservative management. Its utility has been well-documented in preoperative evaluation, reducing the need for more invasive diagnostic procedures. [4-6] However, the salivary glands pose unique cytological challenges due to their anatomical complexity and the diverse histological subtypes of lesions they harbor. These factors can occasionally result in diagnostic dilemmas and sampling errors.

To overcome these limitations, correlation with histopathological examination remains essential, as it serves as the gold standard for definitive diagnosis.

Histology provides detailed architectural patterns, cellular features, and tissue context that may not always be discernible in cytological preparations. Therefore, comparing FNAC findings with histological results allows for the assessment of FNAC's diagnostic accuracy, sensitivity, specificity, and predictive values.

Several studies have explored this cytological-histological correlation, revealing varying degrees of concordance [7-8]. While FNAC has shown high accuracy in diagnosing pleomorphic adenomas and Warthin tumors, it may have lower sensitivity in detecting low-grade malignancies or lesions with cystic components. Identifying cytomorphological features such as cell arrangement, background matrix, nuclear atypia, and mitotic activity plays a critical role in improving diagnostic reliability.

OBJECTIVE

This study aims to evaluate the cytomorphological patterns of various salivary gland lesions obtained through FNAC and compare them with their corresponding histopathological findings.

METHODOLOGY

Study Design: This research was conducted as a retrospective cross-sectional analysis.

Study Setting: The study took place in the Department of Histopathology and Cytopathology at the Armed Forces Institute of Pathology (AFIP), Dhaka Cantonment.

Study Period: Data were collected over a period from January 2014 to September 2015.

Study Population:

The study included patients who underwent Fine Needle Aspiration Cytology (FNAC) for salivary gland swellings at AFIP during the study period. FNAC procedures were performed by experienced cytopathologists, while surgical decisions—including the necessity for biopsy—were made by surgical specialists based on clinical assessment and cytological findings. A total of 55 patients who had both preoperative FNAC and subsequent histopathological examination were selected for final analysis.

Sampling Method: Purposive sampling was used to select cases for inclusion in the study.

Sample Size: Out of 125 FNAC procedures performed within the study timeframe, 55 cases involving swellings of major and minor salivary glands with corresponding postoperative histopathological reports were included.

Inclusion Criteria

- Patients of any age or sex who underwent FNAC for salivary gland swellings at AFIP and received operative treatment were included.

Exclusion Criteria: Cases were excluded if they involved:

1. Lymph node swellings
2. Inadequate cytological samples
3. Patients who declined consent to participate in the study

Ethical Considerations

The study was conducted with prior approval and informed consent from all participants. Participation was voluntary, with the option to withdraw at any time without any impact on patient care. Confidentiality and anonymity of patient data were strictly maintained throughout the research process.

Statistical Analysis

Data were analyzed using SPSS version 11.0 for Windows. Findings were summarized and presented through appropriate tables and graphical formats as necessary.

RESULTS

Most of the cases were in the age group of 20-29 yrs, followed by 40-49 years. There were 08 cases over 60 years.

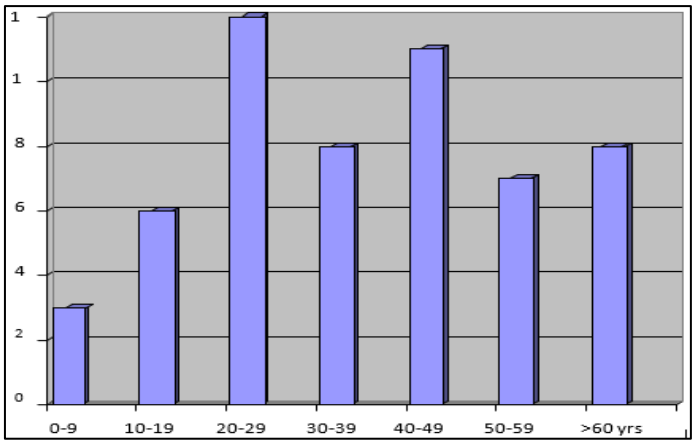

Figure 1: Age distribution of the Study Group

Of the 55 cases analyzed, the majority of salivary gland lesions were located in the submandibular gland, accounting for 45.45% (25 cases). The parotid gland was involved in 38.18% (21 cases) of cases, while lesions in the minor salivary glands constituted 16.36% (9 cases). This distribution highlights the predominance of submandibular gland involvement in the studied population.

Table-1: Distribution of location of 55 cases

Site	No of cases	percent
Parotid gland	21	38.18%
Sub mandibular gland	25	45.45%
Minor salivary gland	09	16.36%
Total	**55**	**100%**

Among the 55 salivary gland lesions evaluated cytopathologically, 23 cases (41.82%) were diagnosed as non-neoplastic, including sialadenitis, tuberculosis, abscess, and benign cystic lesions. Neoplastic lesions accounted for 32 cases (58.18%), of which 19 (34.54%) were benign and 13 (23.63%) were malignant. Among the benign neoplasms, pleomorphic adenoma (8 cases) and Warthin tumor (5 cases) were most common, followed by spindle cell lesions, schwannoma/myoepithelioma, and one case each of benign cystic lesion and minor salivary gland neoplasm. Malignant lesions included cases suspicious for malignancy (6), mucoepidermoid carcinoma (3), acinic cell carcinoma (2), adenoid cystic carcinoma (1), and metastatic carcinoma (1). This distribution underscores the predominance of neoplastic over non-neoplastic lesions, with a higher incidence of benign tumors compared to malignant ones.

Table 2: Cytopathological diagnosis of salivary gland lesions

Non neoplastic		**Neoplastic**			
Sialadenitis	14	Benign		Malignant	
Benign cystic lesion		Pleomorphic adenoma	08	Suspicious for malignancy	06
Tuberculosis	03	Warthin tumor	05	Mucoepidermoid carcinoma	03
Abscess		Spindle cell lesion	02	Acinic cell carcinoma	02
	03	Schwannoma/ myoepithelioma	02	Adenoid cystic carcinoma	01
		(-)ve for malignancy	01	Metastatic carcinoma	01
	03	Minor salivary gland tumor	01		
Total	**23**		**19**		**13**

Histopathological evaluation of the 55 salivary gland lesions revealed that 22 cases (40%) were non-neoplastic, including sialadenitis (12 cases), benign cystic lesions (3), tuberculosis (3), and abscesses (3). Neoplastic lesions comprised 33 cases (60%), of which 21 (38.18%) were benign and 12 (21.82%) were malignant. Among the benign tumors, pleomorphic adenoma was the most common (9 cases), followed by Warthin tumor (6), schwannoma/myoepithelioma (2), spindle cell lesion (2), and a single case each of minor salivary gland tumor and heterotopic gastric mucosa. Malignant neoplasms included mucoepidermoid carcinoma (8 cases), acinic cell carcinoma (2), and one case each of adenoid cystic carcinoma and adenocarcinoma.

Table 3: Histopathological diagnosis of salivary gland lesions

Non neoplastic		**Neoplastic**			
Sialadenitis	12	Benign		Malignant	
Benign cystic lesion	03	Pleomorphic adenoma	09	Mucoepidermoid carcinoma	08
Tuberculosis	03	Warthin tumor	06	Acinic cell carcinoma	02
Abscess	03	Spindle cell lesion	02	Adenoid cystic carcinoma	01
Giant cell tumor	01	Schwannoma/myoepithelioma	02		
		Minor salivary gland	01		
		Heterotrophic gastric mucosa	01	Adeno carcinoma	01
total	**22**		**21**		**12**

Among the 55 cases analyzed, 40 showed concordant cytological and histological diagnoses, while discrepancies were noted in several cases. Of the 14 cases initially diagnosed as sialadenitis on FNAC, 12 were confirmed histologically, while one was later diagnosed as Warthin tumor and another as giant cell tumor. Among three cases reported as mucoepidermoid carcinoma cytologically, only two were confirmed, while one was histologically identified as pleomorphic adenoma. Of the six cases cytologically suspicious for malignancy, five were confirmed as mucoepidermoid carcinoma, and one as acinic cell carcinoma. A single

case diagnosed as acinic cell carcinoma on FNAC turned out to be mucoepidermoid carcinoma on histology. Additionally, one cytologically negative case was later confirmed to be heterotrophic gastric mucosa, and one case of metastatic carcinoma was accurately identified histologically. These discrepancies highlight the limitations of FNAC in distinguishing certain salivary gland neoplasms and emphasize the importance of histopathological correlation for definitive diagnosis.

Table 4: Cytological lesion discordant with histological findings

FNA diagnosis	Histological diagnosis								
		Sial adenitis	PSA	Warthin tumor	Mucoepi dermoid CA	Acinic cell CA	Adeno CA	Giant Cell tumor	Hetero trophic gastric mucosa
Sialadenitis	14	12		01				01	
Pleomorphic Adenoma	08		08						
Warthin tumor	05			05					
Suspicious For malignancy	06				05	01			
Mucoepidermoid carcinoma	03		01		02				
Acinic cell carcinoma	02				01	01			
(-)ve for malignancy	01								01
Metastatic CA	01						01		
Total	**40**	**40**							

Of the 55 cases, FNAC classified 42 as benign, with 41 cases confirmed as benign on histopathology (true negatives) and 1 case revealed to be malignant (false negative). Among the 13 cases diagnosed as malignant by FNAC, 12 were histologically confirmed (true positives), while 1 case turned out to be benign (false positive).

Table 5: Correlation of FNA diagnosis with final histopathology

FNAC diagnosis	Histopatholpgical diagnosis	
Benign (42)	Benign	Malignant
Malignant (13)	41(TN) 1(FP)	1(FN) 12(TP)

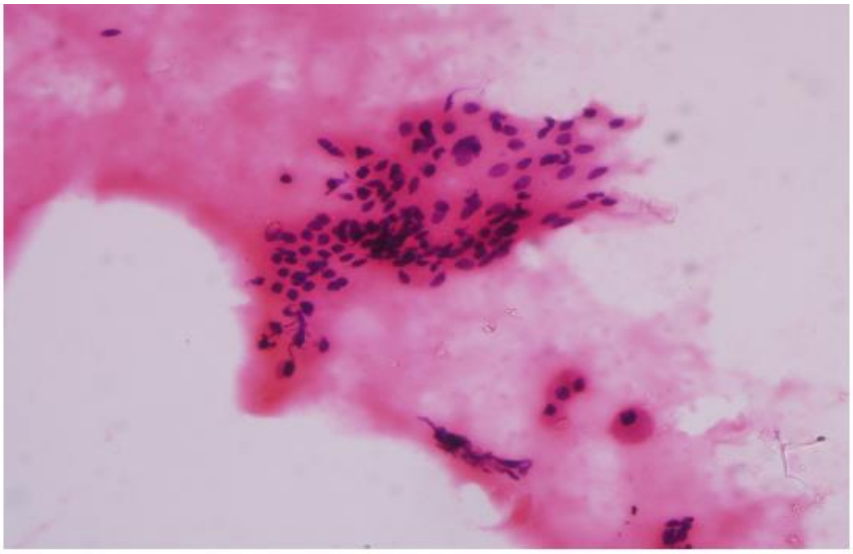

Figure 2: Cytological features of false positive case; Resemble low grade Mucoepidermoid carcinoma

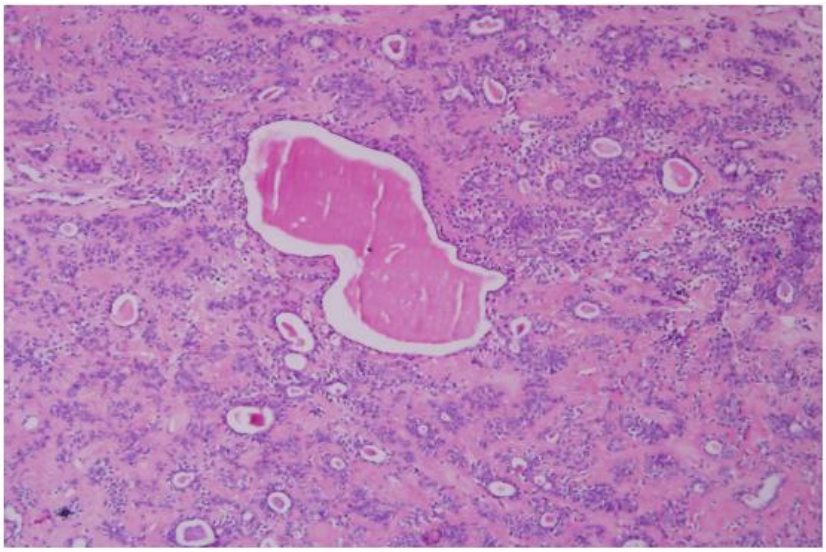

Figure 3: Histology confirm this case as pleomorphic salivary adenoma (H&E stain, 40x)

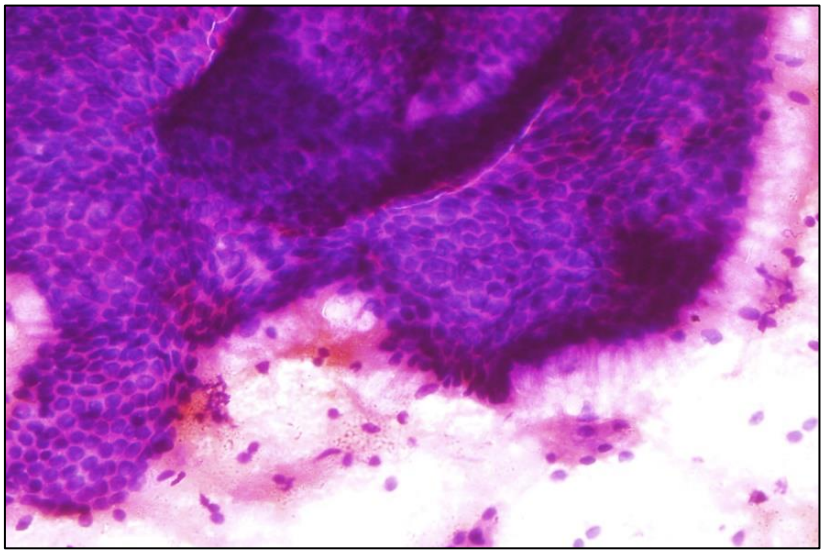

Figure 4: Cytology of suspicious lesion, (-ve) for malignancy

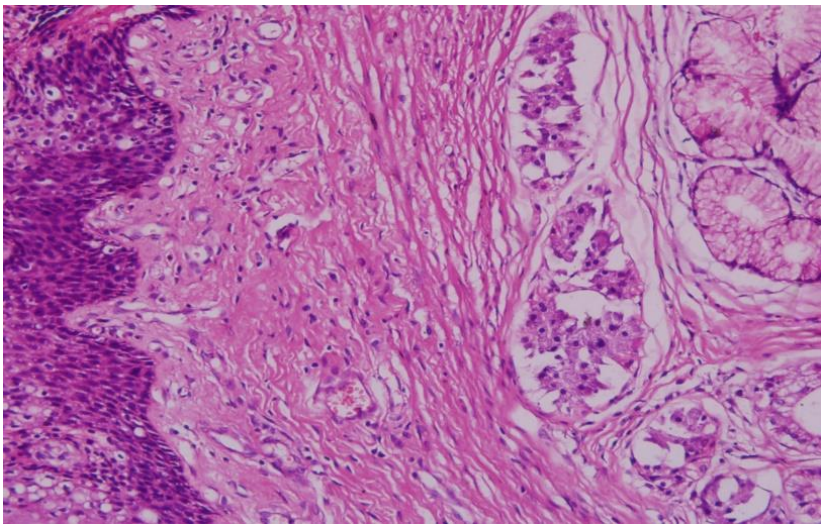

Figure 5: Histology confirm Heterotrophic gastric mucosa (H&E stain, 40x)

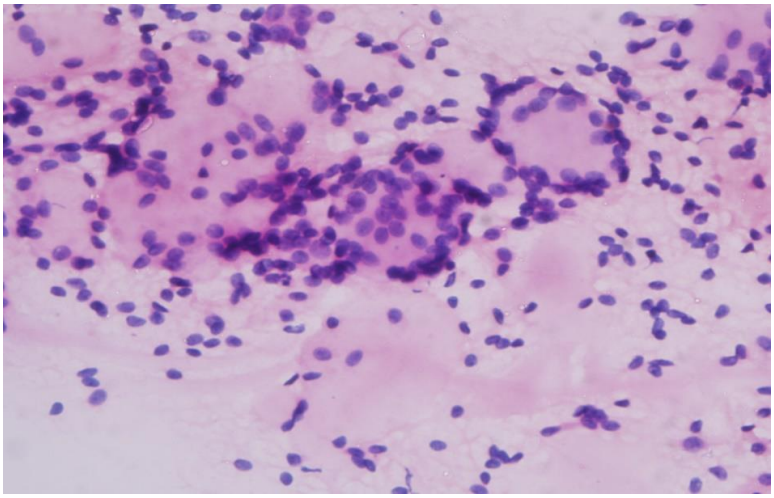

Figure 6: Cytology of acinic cell carcinoma (H&E stain, 40x)

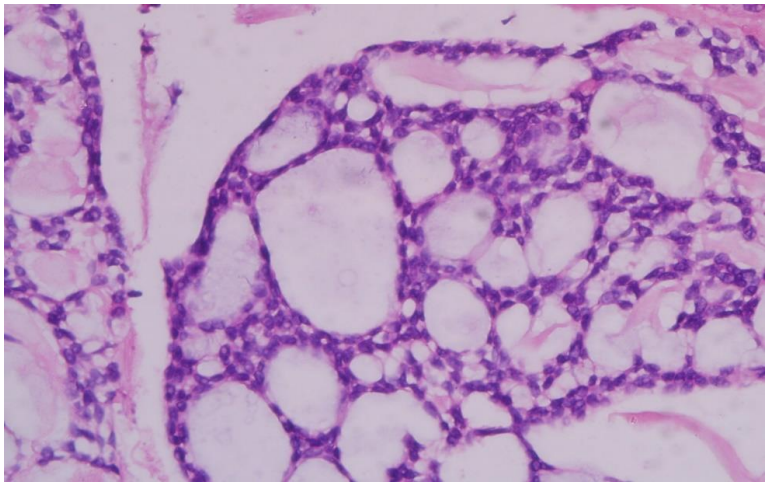

Figure 7: Histology of acinic cell carcinoma (H&E stain, 40x)

DISCUSSION

In the present study, most patients with salivary gland lesions were within the 20–29-year age group, followed by those in the 40–49-year range, with 8 patients over the age of 60. This age distribution is comparable to findings where a peak incidence was also observed in the third and fourth decades of life. [9]

Regarding lesion location, our study found the submandibular gland to be the most commonly affected site (45.45%), followed by the parotid gland (38.18%) and minor salivary glands (16.36%). This pattern differs from most published literature, where the parotid gland is typically the most frequently involved site. For instance, studies reported a predominance of parotid gland lesions. [10] The higher submandibular gland involvement in our study could reflect regional, demographic, or referral bias in the study population.

Cytopathologically, non-neoplastic lesions accounted for 41.82% of cases, while neoplastic lesions made up 58.18%, with benign tumors being more common than malignant ones. This aligns with studies who also observed a predominance of benign neoplasms in salivary gland lesions. [11] Pleomorphic adenomas emerged as the most common benign neoplasm in our study, which is consistent with global data, including studies. [12] On the malignant spectrum, mucoepidermoid carcinoma was the most frequent, again echoing findings in existing literature.

When comparing cytological and histopathological diagnoses, our study demonstrated a high concordance rate, with 40 out of 55 cases showing matching results. FNAC showed excellent diagnostic accuracy, with 41 true negatives, 12 true positives, 1 false negative, and 1 false positive. This finding is in line with studies in salivary gland lesions. [13] However, certain discrepancies were noted, such as sialadenitis misdiagnosed as neoplasm or vice versa, highlighting the occasional difficulty in distinguishing inflammatory from neoplastic processes cytologically.

Notably, misdiagnosis was most common in cases of mucoepidermoid carcinoma and acinic cell carcinoma, which were sometimes mistaken for benign lesions or vice versa. Mucoepidermoid carcinoma and pleomorphic adenoma need to be differentiated as it is a recognized pitfall. Sometimes the intermediate cell

population of mucoepidermoid carcinoma were closely resembled the basal or myoepithelial cells of pleomorphic adenoma. Such overlaps in cytological features have been discussed by other studies, who emphasized the limitations of FNAC in detecting low-grade malignancies. [10,11] Our findings reinforce the necessity of histopathological correlation, particularly in suspicious or inconclusive cytology results.

CONCLUSION

The study of the cytomorphological patterns of salivary gland lesions on FNAC and their correlation with histological findings demonstrates that FNAC is a reliable and minimally invasive diagnostic method for the initial evaluation of salivary gland swellings. A wide spectrum of lesions was identified, ranging from non-neoplastic inflammatory conditions like sialadenitis and tuberculosis to benign tumors such as pleomorphic adenoma and Warthin tumor, as well as malignant neoplasms like mucoepidermoid carcinoma and acinic cell carcinoma. The overall concordance between FNAC and histopathology was high, reinforcing the diagnostic utility of FNAC in categorizing salivary gland lesions. However, certain discrepancies, particularly in differentiating between reactive and neoplastic lesions or low-grade malignancies, emphasize the need for histopathological confirmation in ambiguous or suspicious cases. These findings underscore the importance of correlating cytomorphological features with clinical and histological data to ensure accurate diagnosis and effective patient management.

REFERENCE

1. Mavec P, Eneroth CM, Franzen S, Moberger G, Zajicek J. Aspiration biopsy of salivary gland tumours. Correlation of cytologic reports from 652 aspiration biopsies with clinical and histologic findings. Acta oto-laryngologica. 1964;58(1-6):471-84.
2. Franzen S, Zajicek J. Cytologic diagnosis on aspirates from 1000 salivary gland tumours. Acta Otolaryngol. 1970;224:168-72.
3. Shaha AR, Webber C, DiMaio T, Jaffe BM. Needle aspiration biopsy in salivary gland lesions. Am J Surg. 1990;160:373-6.
4. Orell SR, Kilijanienko J. Head and Neck; Salivary Glands. in: Orell SR, Sterrett GF, eds. Orell and Sterrett's Fine Needle Aspiration Cytology. 5th ed. Edinburg: Churchill Livingstone; 2012:53-77.
5. Orell SR. Head and Neck; Salivary Glands. In: Orel SR, Sterrett GF, Walters MN, Whitaker D, eds. Orell and Sterrett's Manual and Atlas Fine Needle Aspiration Cytology. 3rd ed. Edinburg: Churchill Livingstone; 1999:38-72.
6. Cajulis RS, Gokaslan ST, Yu GH, Frias-Hidvegi D. Fine needle aspiration biopsy of the salivary glands. Acta cytologica. 1997;41(5):1412-20.
7. Tewari M, Shukla HS, Kumar M, Sharma OP. Non neoplastic salivary gland disease with reference to minor salivary gland tuberculosis. Indian J Surg. 2003;65(2):168-71.
8. Sismanis A, Merriam JM, Kline TS, Davis RK, Shapshay SM, Strong MS. Diagnosis of salivary gland tumours by fine needle aspiration biopsy. Head and Neck Surg. 1981:3(6):482-9.
9. Persson PS, Zettergren L. Cytologic diagnosis of salivary gland tumours by aspiration biopsy. Acta Cytol. 1973;17:351-64.
10. Lindberg LG, Ackerman M. Aspiration cytology of salivary gland tumours. Diagnostic experience from 6 years of routine laboratory work. Laryngoscope. 1976;86:584-94.
11. Frable MA, Frable WJ. Fine-Needle aspiration biopsy revisited. Laryngoscope. 1982;92(12):1414-8.
12. Contucci AM, Corina L, Sergi B, Fadda G, Paludetti G. Correlation between fine needle aspiration biopsy and histologic findings in parotid masses. Personal experience. Acta Otorhinolaryngol Ital. 2003;23(4):314-8.