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Fine Needle Aspiration Cytology of Salivary Gland Swellings: Correlation with Histopathology in a Tertiary Care Hospital

Article History:

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Abstract: Background: Fine needle aspiration cytology (FNAC) is a widely used, minimally invasive, and cost-effective first-line diagnostic tool for the preoperative evaluation of salivary gland swellings. This study was undertaken to correlate the cytological diagnosis of salivary gland lesions with histopathology and to determine the sensitivity and specificity of FNAC in distinguishing benign from malignant lesions. **Methods:** This prospective study was conducted in the cytology section of the Department of Pathology, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India, over a two-year period (2015–2016). Fifty patients with salivary gland swellings, irrespective of age and sex, underwent FNAC using a 23-gauge needle; smears were stained with Papanicolaou and haematoxylin and eosin stains. Cytological diagnoses were correlated with histopathological diagnoses on the corresponding surgical specimens, classified per the WHO classification of salivary gland tumours. Sensitivity, specificity, and diagnostic accuracy of FNAC for detecting malignancy were calculated using SPSS version 21.0 (IBM Corp.). **Results:** Of the 50 patients, 28 (56%) were male and 22 (44%) were female, with ages ranging from 1 to 85 years (mean 38.6 ± 16.4 years). The parotid gland was the most frequently sampled site (n=37; 74%), followed by the submandibular gland (n=11; 22%). On FNAC, 26 (52%) lesions were benign, 16 (32%) inflammatory, 5 (10%) cystic, and 3 (6%) malignant. Discordance between cytological and histopathological diagnosis occurred in 4 (8%) cases. FNAC showed a sensitivity of 75%, specificity of 100%, positive predictive value of 100%, negative predictive value of 97.9%, and an overall diagnostic accuracy of 98% for detecting malignancy. **Conclusion:** FNAC is a safe, simple, and economical first-line diagnostic procedure for salivary gland swellings, with good correlation with histopathology, and reliably differentiates benign from malignant lesions. However, entities such as Warthin's tumour, adenoid cystic carcinoma, and mucoepidermoid carcinoma remain recognised diagnostic pitfalls.

Keywords: Fine needle aspiration cytology; Salivary gland; Histopathology; Diagnostic accuracy; Sensitivity and specificity

INTRODUCTION

Fine needle aspiration cytology (FNAC) is a well-established and widely accepted tool for the preoperative diagnosis of salivary gland tumours

because of the ready accessibility of the gland.[1] Salivary gland swellings may arise from a variety of aetiologies, including neoplastic, inflammatory, and cystic processes, and lesions mimicking primary salivary gland tumours may also arise from adjacent structures such as lymph nodes, soft tissue, and skin.[2] FNAC is simple, minimally invasive, and cost-effective, and can be performed on an outpatient basis with minimal discomfort to the patient.

Salivary gland tumours constitute less than 3% of all head and neck tumours, and their age of occurrence spans a wide range, from childhood to beyond the eighth decade of life. In the majority of cases, a specific cytological diagnosis can be achieved, allowing clinicians and patients to make informed decisions regarding further management.[3] However, the wide morphological spectrum of salivary gland lesions, along with overlapping cytomorphological features between certain benign and malignant entities, may pose diagnostic challenges. This study was undertaken to correlate the cytological diagnosis of salivary gland swellings with the corresponding histopathological diagnosis, and to determine the sensitivity, specificity, and overall diagnostic accuracy of FNAC in this setting.

MATERIALS AND METHODS

This prospective study was conducted in the cytology section of the Department of Pathology, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India, over a period of two years (2015–2016). Fifty patients presenting with clinically palpable salivary gland swellings were included, irrespective of age and sex.

FNAC was performed under aseptic precautions after obtaining prior informed consent and recording relevant clinical details. Aspiration was performed using a 10 mL syringe fitted with a 23-gauge needle, and the aspirated material was expressed onto clean glass slides. Both air-dried and wet-fixed (95% ethyl alcohol) smears were prepared and stained by the Papanicolaou method; air-dried smears were additionally stained with haematoxylin and eosin.
Surgical specimens received in the Department of Pathology were fixed in 10% neutral buffered formalin. Gross examination included documentation of lesion size, margins, and consistency. Representative sections of 2–3 mm thickness were processed using an automatic tissue processor, embedded in paraffin, and stained with haematoxylin and eosin. Histopathological typing of tumours was performed according to the World Health Organization (WHO) classification of salivary gland tumours.

Cytological diagnoses were compared with the corresponding histopathological diagnoses, and cases were classified as concordant or discordant. Sensitivity, specificity, positive predictive value, negative predictive value, and overall diagnostic accuracy of FNAC for detection of malignancy were calculated using standard formulae with SPSS version 21.0 (IBM Corp., Armonk, NY, USA).

The study was approved by the Institutional Ethics Committee, Geetanjali Medical College and Hospital, Udaipur (Approval No. IEC/2015/45, dated 12 January 2015), and was conducted in accordance with the Declaration of Helsinki.

RESULTS

A total of 50 patients with salivary gland swellings underwent FNAC during the study period. Of these, 28 (56%) were male and 22 (44%) were female (male:female ratio 1.27:1). The age of patients ranged from 1 to 85 years, with a mean age of 38.6 ± 16.4 years.

The parotid gland was the most common site sampled (n=37; 74%), followed by the submandibular gland (n=11; 22%); the remaining cases arose from minor salivary glands, including the upper lip and oral mucosa (n=2; 4%) (Table 1).

Table 1. Site distribution of salivary gland lesions (n=50)

Site	n	%
Parotid gland	37	74
Submandibular gland	11	22
Minor salivary gland / upper lip / oral mucosa	2	4
Total	50	100

On FNAC, 26 (52%) lesions were diagnosed as benign, 16 (32%) as inflammatory/reactive, 5 (10%) as cystic, and 3 (6%) as malignant (Table 2). Benign lesions on FNAC were most common in the 20–39-year age group, with a male predominance.

Table 2. Distribution of FNAC diagnostic categories (n=50)

FNAC category	n	%
Benign	26	52
Inflammatory / reactive	16	32
Cystic	5	10
Malignant	3	6
Total	50	100

Histopathological correlation was available for all 50 cases. Discordance between the cytological and histopathological diagnosis was observed in 4 (8%) cases (Table 3).

Table 3. Discordant cytohistopathological diagnoses (n=4)

S. No.	Histopathological diagnosis	FNAC diagnosis
1	Warthin's tumour	Reactive lymphoid hyperplasia
2	Warthin's tumour	Reactive lymphoid hyperplasia
3	Adenoid cystic carcinoma	Pleomorphic adenoma
4	Mucoepidermoid carcinoma	Squamous cell carcinoma

Taking histopathology as the gold standard, 4 (8%) of the 50 cases proved malignant on histopathology. FNAC correctly identified 3 of these 4 as malignant (true positives), missed 1 case (adenoid cystic carcinoma read as pleomorphic adenoma — a false negative), and returned no false-positive malignant calls among the 46 histopathologically benign/inflammatory lesions. This gave a sensitivity of 75%, specificity of 100%, positive predictive value of 100%, negative predictive value of 97.9%, and an overall diagnostic accuracy of 98% for the detection of malignancy (Table 4).

Table 4. Diagnostic performance of FNAC in detecting malignancy

Parameter	Value (%)
Sensitivity	75.0
Specificity	100.0
Positive predictive value	100.0
Negative predictive value	97.9
Overall diagnostic accuracy	98.0

DISCUSSION

FNAC of the salivary gland is a widely accepted, sensitive, and specific technique for the diagnosis of both neoplastic and non-neoplastic lesions.[4] Pleomorphic adenoma outnumbers all other salivary gland neoplasms and constitutes about 60–70% of all salivary gland tumours.[5] Most cases of pleomorphic adenoma are readily identified because of their characteristic biphasic pattern, comprising epithelial/myoepithelial cells admixed with fibromyxochondroid stroma in varying proportions, ranging from predominantly epithelial to predominantly stromal patterns. This wide morphological spectrum can occasionally lead to diagnostic difficulty; when the epithelial component predominates in the aspirate, pleomorphic adenoma may be confused with monomorphic adenoma, myoepithelioma, or adenoid cystic carcinoma, and careful cytomorphological evaluation is required to differentiate these entities.[6,7]

In the present study, benign lesions predominated (52%), followed by inflammatory/reactive lesions (32%), cystic lesions (10%), and malignant lesions (6%), with the parotid gland being the most frequently involved site (74%), consistent with the known predilection of salivary gland neoplasms for the parotid gland. The overall diagnostic accuracy of FNAC for malignancy (98%) and its high specificity (100%) in the present series are in keeping with the well-documented reliability of FNAC as a first-line triage tool for salivary gland swellings, although the sensitivity (75%) reflects the recognised difficulty in cytologically identifying certain low-grade or morphologically overlapping malignancies such as adenoid cystic carcinoma.

Discordance in the present study was largely related to Warthin's tumour, which was misdiagnosed as reactive lymphoid hyperplasia in two cases, likely due to overlapping cytomorphological features between the lymphoid and oncocytic epithelial components, particularly when the epithelial component is scant or degenerated. Similarly, adenoid cystic carcinoma and mucoepidermoid carcinoma, both of which show a wide morphological spectrum, remain recognised pitfalls in salivary gland cytology, particularly in low-grade or predominantly cystic variants that can mimic

benign lesions.

The present study has certain limitations, including the relatively small sample size and its single-centre design, which may limit the generalisability of the findings. Larger multi-centric studies with longer follow-up would help further validate the diagnostic accuracy of FNAC across the spectrum of salivary gland lesions.

CONCLUSION

FNAC is a simple, safe, minimally invasive, and cost-effective procedure for the initial evaluation of salivary gland swellings and shows good overall correlation with histopathology. It reliably distinguishes benign from malignant lesions in the majority of cases, thereby assisting clinicians in appropriate management planning. However, certain entities such as Warthin's tumour, adenoid cystic carcinoma, and mucoepidermoid carcinoma remain recognised pitfalls, and cytological findings in such lesions should be interpreted with caution, with a low threshold for histopathological correlation when clinical or cytological findings are equivocal.

BIBLIOGRAPHY

1. Singh A, Haritwal A, Murali BM. Correlation between cytology and histopathology of the salivary gland. Australas Med J. 2011;4(2):66-71.
2. Chan MK, McGuire LJ. Cytodiagnosis of lesions presenting as salivary gland swelling: a report of seven cases. Diagn Cytopathol. 1992;8:439-43.
3. Tessy PJ, Jayalekshmy PS, Cicy PJ, et al. Fine needle aspiration cytology of salivary gland lesions with histopathological correlation. Int J Healthc Biomed Res. 2015;3:91-9.
4. Akhter J, Hirachand S, Lakhey M. Role of FNAC in the diagnosis of salivary gland swellings. Kathmandu Univ Med J (KUMJ). 2008;6:204-8.
5. Auclair PL, Ellis GL. Major salivary glands. In: Silverberg SG, DeLellis RA, Frable WJ, editors. Principles and Practice of Surgical Pathology and Cytopathology. 3rd ed. New York: Churchill Livingstone; 1997. p. 1460-6.
6. Klijanienko J, Vielh P. Fine needle sampling of salivary gland lesions: cytology and histology correlation of 412 cases of pleomorphic adenoma. Diagn Cytopathol. 1996;14:195-200.
7. Stewart CJ, Hamilton S, Brown IL, MacKenzie K. Salivary epithelial-myoepithelial carcinoma: report of a case misinterpreted as pleomorphic adenoma on fine needle aspiration (FNA). Cytopathology. 1997;8(3):203-9.

