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Original Article

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Is Only Fine Needle Aspiration Cytology Justifiable For Salivary Gland Lesion Diagnosis? : 5 Year Medical Institutional Experience

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ABSTRACT

Introduction: Fine needle aspiration cytology (FNAC) is being extensively used for pre- operative diagnosis of salivary gland lesions. It is a simple, safe and cost effective procedure that provides valuable information for planning suitable management. The aim was to study cyto- histo-pathological correlation of salivary gland lesions; to examine sensitivity, specificity and diagnostic accuracy of FNAC of salivary gland lesions.

Method And Material: Present study was a retrospective study comprised of FNAC samples of salivary glands which were verified by histo-pathological diagnosis over a five years period from July 2017 to June 2022 obtained from the archives of Department of Pathology, S.B.K.S.M.I. & R.C., Piparia, Vadodara.

Result: Out of 102 total studied cases, 66 have cyto-histological correlation. On cytological diagnosis commonest lesion was pleomorphic adenoma (46.96%). In non-neoplastic category, inflammatory lesion was common with 27.27% of cases (chronic sialadenitis – 13.63 %, acute sialadenitis -7.57 %, acute on chronic sialadenitis -1.51 % and granulomatous sialadenitis 4.54%). In neoplastic category (malignant neoplasm), there were 2 cases of (3.03 %) epithelial- myoepithelial carcinoma/ mucoepidermoid carcinoma , one (1.51 %) acinic cell carcinoma, adenoid cystic carcinoma and adenocarcinoma each. 2 other cases (3.03 %) were diagnosed as Suspicious of malignancy and one (1.51 %) Positive for malignancy without further typing of tumour. In one case (1.51 %) definitive cytological diagnosis was not possible.

Conclusion: A significant sensitivity, specificity, diagnostic accuracy, positive predictive values was assessed in the present study, thus emphasising the use of FNA for pre-operative management of salivary gland lesions. A careful cytological analysis helps the operating surgeons to have pre-operative data regarding the nature of the lesion. This helps proper planning of treatment and reduces overall cost of treatment and need for hospitalisation.

Key Words: *Fine needle aspiration cytology (FNAC), cyto-histopathological correlation, salivary gland lesions, Cytology, Histology*

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INTRODUCTION

Fine-needle aspiration cytology (FNAC) has now been accepted by head-and-neck surgeons as an outstanding, though challenging, and principal method of evaluating space-occupying lesions (SOL) of the salivary glands**. [1]** Used correctly, it can provide a definitive diagnosis when clinical findings and radiographic studies are not adequate to distinguish non-neoplastic from neoplastic lesions, or benign from malignant tumors. It has advantages over an operative incisional biopsy, which has the potential risk of fistula formation and, in the case of malignant neoplasms, the theoretical possibility of seeding tumor cells.**[2]**

FNA of salivary glands generally address the following questions:

- Is the origin of mass a salivary gland?
- If it is the mass of salivary gland origin, is it neoplastic or non-neoplastic?
- If the mass is neoplastic, is it benign or malignant?
- If the mass is malignant, is it metastatic or primary?
  - If primary, what is the tumor type?
  - If metastatic, what is the site of origin?

The diagnosis rendered by FNA often influences management of the patient and allows for appropriate treatment planning. For example, if a tumor is benign, surgical intervention may be delayed or modified, whereas a malignant neoplasm may call for prompt surgical treatment or irradiation. The diagnosis of lymphoma calls for still other investigative and treatment options.**[3]**

Lesions of the skin and subcutaneous tissues overlying the salivary gland, for example, epidermal inclusion cysts, lipomas, tumors of sweat glands, basal cell carcinomas, or schwannoma, may be mistaken for a salivary gland tumor; lymph nodes within the parotid or peri-parotid region may be the site of metastatic tumor, lymphoma, and inflammatory or reactive processes. It should also be noted that an enlargement of a salivary gland may be caused by a nonneoplastic cyst, reactive intraparotid lymph node, stones, or sialadenitis. **[4]**

Clinical symptoms and signs of salivary gland tumours though present are seen only in 25-35% of cases. **[5]** Due to overlapping clinical and cytological features, there is wide range of sensitivities and specificities of FNAC in salivary gland lesion diagnosis. The purpose of FNAC is not to provide exact diagnosis, but is to provide information by which further management plan can be assessed. **[6]** That is why it is important to always correlate FNA with radiological and clinical features. Histo-pathological examination of excised specimens should be used in combining withFNA and never be replaced by FNA. **[7]**

AIMS

The aim of the study is to study diagnostic utility of FNAC of Salivary gland tumor in a teachingmedical institution.

OBJECTIVES

1. To compare cytological findings of salivary gland lesions with their correspondinghistological diagnosis.
2. To evaluate sensitivity, specificity, diagnostic accuracy and positive predicted values of FNAC in diagnosing salivary gland lesions with an emphasis on discordant cases.

MATERIAL AND METHOD

Present study was a retrospective study comprised of 66 FNAC samples of salivary glands which were verified by histo-pathological diagnosis over five years period from July 2017 to June 2022 obtained from the archives of Department of Pathology, S.B.K.S.M.I. & R.C., Piparia, Vadodara.

The clinical information and the cytological and histo-pathological reports of patients were also retrieved after obtaining permission from the Head of the department. Details pertaining to age, gender, the location of lesion and radiological diagnosis were obtained from FNAC/ biopsy request forms.

Written informed consent had been obtained from each patient, prior to each FNAC procedures. FNAC had been performed with a 22G needle attached to a 20 ml disposable plastic syringe. Formerly, the obtained sample had been mounted on glass slides and smeared. Multiple smears had been prepared and stained by H & E and Papanicolaou (Pap) stains. Cytological diagnoses based on the FNA smears were categorized into threecategories namely non-neoplastic, neoplastic and non-diagnosed.

The gold standard for diagnosis in present study was based on the histo-pathological results obtained from the subsequent biopsy. All the corresponding excision biopsies were received in fixative, 10% buffered formalin. After thorough gross examination, representative biopsy bits were given for tissue processing and stained with H&E stain. The biopsy based diagnosis was categorized into non-neoplastic and neoplastic (benign and malignant) by expert pathologists.

The diagnostic value of FNAC in comparison with histopathology was calculated for benign and malignant neoplasm using the following formulae:

Specificity = (True Negative × 100) / (False Positive+True Negative).Sensitivity = (True Positive × 100) / (False Negative+True Positive).

Diagnostic Accuracy = (True Negative + True Positive) × 100/(True Positive + TrueNegative + False Positive + False Negative).

Positive predictive value = (True Positive × 100) /(False Positive + True Positive)

INCLUSION CRITERIA

All the patients referred to cytology section of Department of Pathology (S.B.K.S.M.I. & R.C., Piparia, Vadodara) clinically having palpable salivary gland swelling were included in study.

EXCLUSION CRITERIA

Cases reported as unsatisfactory were excluded from this study.
Where there was absence of cyto-histo-pathological correlation.
Patients those who were not willing to give consent.
Patients with cervical swelling except salivary gland origin

RESULT

A 5 years study was conducted from July 2017 to June 2022. Salivary gland lesions FNAC were performed in the Department of Pathology, S.B.K.S.M.I. & R.C., Piparia, Vadodara; who were followed up with corresponding biopsy

examination were included in the study.

Out of 102 total studied cases, 66 have cyto-histological correlation. The present study was conducted in 66 cases. Commonest age group involved was 30-39 years with 30.3% of cases and majority of cases with salivary gland malignant lesions presented in the 5th decade. Commonest site affected was parotid gland (54.54%), subsequently submandibular gland (42.42 %) and minor salivary gland (3.03%). Overall male to female ratio was 1.64:1.

On cytological diagnosis commonest lesion was pleomorphic adenoma (46.96%). Table 1 demonstrates cytological diagnosis of salivary gland lesions.

In non-neoplastic category, inflammatory lesion was common with 27.27% of cases (chronic sialadenitis – 13.63 %, acute sialadenitis -7.57 %, acute on chronic sialadenitis -1.51 % and granulomatous sialadenitis 4.54 %).

In neoplastic category (malignant neoplasm), there were 2 cases of (3.03 %) epithelial- myoepithelial carcinoma/ mucoepidermoid carcinoma , one (1.51 %) acinic cell carcinoma, adenoid cystic carcinoma and adenocarcinoma each. 2 other cases (3.03 %) were diagnosed as Suspicious of malignancy and one (1.51 %) Positive for malignancy without further typing of tumour. In one case (1.51 %) definitive cytological diagnosis was not possible.

Table 1: Cytological diagnosis of salivary gland lesions.

Sr. No	**Category**	**No. of cases**	**% of cases**
1	**Non- diagnostic**	**02**	**3.03**
2.	**Non- neoplastic**		
	A . Inflammatory	**18/66**	**27.27**
	Chronic sialadenitis (CS)	**09**	**13.63**
	Acute sialadenitis (AS)	**05**	**7.57**
	Acute on chronic sialadenitis (ACS)	**01**	**1.51**
	Granulomatous sialadenitis (GS)	**03**	**4.54**
	B. Cystic	**02**	**3.03**
3.	**Neoplastic**		
	Benign	**36/66**	**54.54**
	-Pleomorphic adenoma (PA)	**31**	**46.96**
	-Warthin's tumor (WT)	**02**	**3.03**
	-Basal cell adenoma (BCA)	**01**	**1.51**
	Oncocytoma (On)	**01**	**1.51**
	Malignant	**08/66**	**12.12**
	Mucoepidermoid carcinoma (MEC)/ Epithelial-myo-epithelial carcinoma	**02**	**3.03**
	Acinic cell carcinoma (ACC)	**01**	**1.51**
	Adenoid cystic carcinoma (ADCC)	**01**	**1.51**
	Adenocarcinoma (ADC)	**01**	**1.51**
	Suspicious for malignancy	**02**	**3.03**
	Positive for malignancy	**01**	**1.51**
	Total	**66**	**100**

Milan system of categorization of salivary gland lesions (Table 2) showed majority of lesions incategory IV (54.54 %). [8]

Table 2: Milan system for cytological grading of salivary gland lesions:

Category	No. of cases	% of cases
I. Non-diagnostic	02	3.03
II. Non-neoplastic	18	27.27
III. Atypia of undetermined significance	00	00
IV. Benign Neoplasm	36	54.54
V. Suspicious for malignancy	02	3.03
VI. Malignant	08	12.12

Cytohistopathological correlation (Table 4) done in these 66 cases. There revealed 01 false positive case where cytological diagnosis of acinic cell carcinoma was confirmed to be pleomorphic adenoma on histopathology. There were 06 false negative cases. 2 were cystic lesions on cytology which diagnosed as low and intermediate case of mucoepidermoid carcinoma (MEC); 2 inflammatory cases on cytology were diagnosed as Warthin's tumor and pleomorphic adenoma and 2 pleomorphc ademoma were diagnosed as low grade MEC and Adenoid cystic carcinoma on histopathology.

Overall sensitivity, specificity, diagnostic accuracy and positive predictive value of FNAC in diagnosing salivary gland lesions was found to be 57.1%, 98%, 89.39% and 88.88% respectively.

Following is histopathological examination. (Table 3) On histological examination also, commonest lesion was found to be pleomorphic adenoma (46.96%). Table 4 describes cyto- histo-pathological correlation of salivary gland lesions.

Table 3: Histo-pathological diagnosis of salivary gland lesions.

Sr. No	Category	No. of cases	% of cases
1.	**Non- neoplastic/ Inflammatory**	**15/66**	**22.27**
2.	**Neoplastic**		
	Benign	**38/66**	**57.57**
	-Pleomorphic adenoma (PA)	**31**	**46.96**
	-Warthin's tumor (WT)	**5**	**7.57**
	-Basal cell adenoma (BCA)	**1**	**1.51**
	Oncocytoma (On)	**1**	**1.51**
	Malignant	**13/66**	**24.24**
	Mucoepidermoid carcinoma (MEC) Low grade Intermediate grade	 **7** **2**	 **10.60** **3.03**
	Acinic cell carcinoma (ACC)	**1**	**1.51**
	Adenoid cystic carcinoma (ADCC)	**1**	**1.51**
	Adenocarcinoma (ADC)	**1**	**1.51**
	Salivary duct carcinoma	**1**	**1.51**
	Total	**66**	**100**

Table 4: Cyto-histo-pathological correlation of salivary gland pathologies.

Sl. No.	Cytological diagnosis	Histopathological diagnosis
1.	Non-diagnostic (02)	Warthin's tumor :02
2.	Inflammatory / Sialadenitis (18)	Sialadenitis :16 Warthin's tumor :01 Pleomorphic adenoma :01
3.	Cystic lesion (01)	Intermediate grade muco-epidermoid carcinoma :01 Low grade muco-epidermoid carcinoma :01
4.	Pleomorphic adenoma (31)	Pleomorphic adenoma :28 Low grade muco-epidermoid carcinoma :02 Acinic cell carcinoma :01
5.	Basal cell adenoma (01)	Pleomorphic adenoma :01
6.	Suspicious for malignancy (02)	Low grade mucoepidermoid carcinoma :02
7.	Positive for malignancy (01)	Low grade mucoepidermoid carcinoma :01
8.	Epithelial- myoepithelial carcinoma/ Mucoepidermoid carcinoma (02)	Mucoepidermoid carcinoma :01 Salivary duct carcinoma :01
9.	Acinic cell carcinoma (01)	Pleomorphic adenoma :01

DISCUSSION

FNAC helps to distinguish salivary gland lesions into following major category- non neoplastic and neoplastic(benign and malignant). FNAC has been widely accepted also as an excellent diagnostic modality as it is reliable, inexpensive and easy to perform.

In the present study, malignant neoplastic lesion of salivary gland was commonly seen in the 5^{th} decade and the finding was comparable to that observed by Choudhury et al and Tessy et al in their respective studies. [9,10] Male:female ratio in the present study was 1.64:1. Omhare et al and Saldanha et al in their respective studies found M:F ratio of 1.67:1 and 1.4:1. [11,12]Commonest site of involvement in the present study was parotid gland with 54.54% of cases which correlated well with study done by Todase et al and Kakoty et al. [13,14] Commonest lesion was pleomorphic adenoma both on cytology and histopathology (46.96 % each); which was also observed by Arul et al in their respective study.[15] Majority of cases (54.54%) belonged to Milan grading system of IV , which was similar to study done by Vishwanathan et al with 31.4% of cases.[16] Overall sensitivity, specificity, diagnostic accuracy and positive predictive value was 57.1%, 98%, 89.39% and 88.88% respectively . In a study done by Zerpa et al, sensitivity, specificity, negative predictive value , diagnostic accuracy, and positive predictive value was 57.1%, 95.1%, 96.3%, 92.22% and 50% respectively.[16]

In present study, 01 case of chronic sialadenitis was diagnosed as Warthin's tumor on histopathology; because on aspirate predominance of lymphocytic infiltrate was seen with presence of occasional ductal epithelial cells and lack of apocrine epithelium.

02 cases of cystic lesion were diagnosed as low and Intermediate grade mucoepidermoid carcinoma on histopathology; which might have occurred due to aspiration of mucoid paucicellular material on FNA.

2 cases of pleomorphic adenoma were diagnosed as low grade mucoepidermoid carcinomabecause mucoid material in the background was mistaken for chondromyxoid matrix and inadequate cellular elements aspirated. Another case of Pleomorphic adenoma was diagnosed as acinic cell carcinoma; false negative diagnosis occurred due to increased cellular component, scant chondromyxoid matrix and absence of nuclear atypia. 01 case each of basalcell adenoma and acinic cell carcinoma, were both diagnosed as pleomorphic adenoma onhistopathology. Absence of chondromyxoid matrix and presence of scanty myoepithelial cells onFNA in a case of pleomorphic adenoma can be easily mistaken for basal cell adenoma. Cellular pleomorphic adenoma with scant chonromyxoid matrix causes diagnostic dilemma and may be mistaken for acinic cell carcinoma on FNA.

01 case on FNA was just diagnosed as positive for malignancy, as repeated aspiration yielded scant to moderate cellularity with many atypical cells which could not be typed further. 02cases on FNA was diagnosed as Suspicious of

malignancy because of aspiration of scant fluid like material which on cytology displayed few atypical cells. Aspirated fluid was poor in cellularity and had degenerated epithelial cells, histiocytes and inflammatory cells. 01 case of epithelial- myoepithelial carcinoma/ mucoepidermoid carcinoma was diagnosed as salivary duct carcinoma on histopathology. 02 case was non-diagnostic on FNA because of many lymphocytes and absence of ductal/ acinar cells; and on histopathology was confirmed to be Warthin's tumor.

CONCLUSION

Salivary gland lesions are fairly common in occurrence and are amenable to FNAC analysis without any significant complications. Since FNAC is a low cost day care procedure, devoid of any anesthesia, it is preferred as an initial choice of investigation for salivary gland lesions. Overlapping clinical and cytological features of salivary gland lesions, causes diagnostic dilemma. However a significant sensitivity, specificity, diagnostic accuracy, positive predictive value were assessed in the present study, thus emphasising the use of FNA for pre-operative management of salivary gland lesions. In summary, a careful cytological analysis helps the operating surgeons to have pre-operative data regarding the nature of the lesion. This helps proper planning of treatment and reduces overall cost of treatment and need for hospitalisation.

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