

## Spectrum of Salivary Gland Lesions with Associated Cytological and Histopathological Correlation

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### Abstract

**Background:** The salivary gland tumors account for 6% of all the head and neck tumors. Salivary gland lesions consist of non-neoplastic lesions and neoplastic lesions. FNAC is most commonly used method to diagnose the salivary gland tumors. The main objective of our study was to analyze the spectrum of salivary gland lesions and to evaluate the efficacy of cytology in diagnosing salivary gland lesions by correlating with histopathological findings. **Methods:** The present retrospective study of 50 cases of FNAC and histopathology of salivary gland lesions was carried out in the department of pathology, Narayana Medical College & Hospital, Nellore, Andhra Pradesh, India, during the period of January 2016 to December 2016. Cytological smears were fixed in ethyl alcohol and then stained with Haemotoxylin & Eosin stains. Salivary gland specimens were fixed in 10% formalin and then stained the paraffin sections by Haemotoxylin & Eosin staining technique. Cytohistopathology correlation was done. **Result:** In our study, age range of salivary gland lesions was from 26 years to 68 years with a mean age of 43.32 years and female to male ratio is 1.5:1. Majority of the salivary gland lesions were noted in 31-40 years age group. Among the 50 cases of salivary gland lesions, 38(76%) cases were benign neoplasms, 7(14%) cases were malignant neoplasms and 5(10%) cases were inflammatory lesion. Among the benign neoplasms, Pleomorphic adenomas were 35 (92.11%) cases and among the malignant neoplasms, mucoepidermoid carcinomas were 4 (57.14%) cases. The overall diagnostic accuracy in salivary gland lesions was 94.67%. **Conclusion:** The high accuracy, sensitivity and specificity of FNAC confirm that preoperative cytology is a useful, quick, reliable diagnostic technique for rapid and early diagnosis in salivary gland lesions. Few rare tumors can be missed on cytology, but clinical correlation can give clue to the diagnosis of malignant neoplasms.

**Keywords:** Salivary Gland Lesions; Cytohistopathological Correlation.

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### Introduction

According to global statistics, the salivary gland neoplasms accounts for 3-10% of all the head & neck neoplasm [1]. Fine needle aspiration cytology of salivary gland neoplasm is most accurate method and harmless to patients [2].

FNAC is the gold standard method for evaluating the salivary gland neoplasm [3]. For diagnosis of

salivary gland lesions, FNAC is the widespread acceptable method [4]. Complication of FNAC is very negligible when compared to biopsy of salivary gland neoplasms which are bleeding, inflammation and facial nerve injury [4,5]. The sex distribution of the malignant salivary gland neoplasm is equal and most of the cases occur in the sixth decade [6]. According to Choudhury et al study, among the 1414 case of salivary gland neoplasms incidence of malignant neoplasm were 3.6% [7].

In the present study, the diagnostic utility of FNAC in salivary gland tumors is studied by correlating the cytological findings with the histopathological findings which helps in early diagnosis and effective therapeutic approach.

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## Material and Methods

The present study was conducted in the department of pathology, Narayana Medical College & Hospital, Nellore, Andhra Pradesh, India, during the period of one year from January 2016 to December 2016. In the present study, 50 cases of salivary gland swellings are included on which cytological and histopathological correlation was done. Cytological smears were fixed in ethyl alcohol and then stained by the Haemotoxylin & Eosin staining technique. Salivary gland surgical biopsy specimens were fixed in 10% formalin and then processed and embedded in paraffin wax. Tissue sections cut from the paraffin wax blocks were stained by the Haemotoxylin & Eosin staining technique.

### Statistical Evaluation

The statistical evaluation to establish sensitivity, specificity and diagnostic accuracy in salivary gland lesions.

TP = True positive FP = False positive

TN = True negative FN = False negative

$$\text{Sensitivity} = \frac{\text{TP}}{\text{TP} + \text{FN}} \times 100$$

$$\text{Specificity} = \frac{\text{TN}}{\text{TN} + \text{FP}} \times 100$$

$$\text{Diagnostic Accuracy} = \frac{\text{TP} + \text{TN}}{\text{TP} + \text{TN} + \text{FP} + \text{FN}} \times 100$$

## Result

Among the 50 cases of salivary gland lesions, 18 cases (36%) were noted in 31-40 years age group, 12 cases (24%) were noted in 41-50 years age group, 8 cases (16%) were noted in 61-70 years age group, 7 cases (14%) were noted in 21-30 years age group and 5 cases (10%) were noted in 51-60 years age group. In our study, age range of salivary gland lesions from 26 years to 68 years with a mean age of 43.32 years.

Among the 50 cases of salivary gland lesions, 30 cases (60%) were noted in females and 20 cases (40%) were noted in males and females to males ratio is 1.5:1.

In our study, incidences of salivary gland lesions were predominance in females than males.

Among the 50 cases of salivary gland lesions, 36 cases (72%) were noted in Parotid glands, 9 cases (18%) were noted in Submandibular glands and 5 cases (10%) were noted in minor salivary glands. In our study, incidences of salivary gland lesions were predominant in Parotid glands, followed by Submandibular glands and minor salivary glands. Among the 36 cases of Parotid gland lesions, 29 cases were benign neoplasms, 4 cases were malignant neoplasms and 3 cases were inflammatory lesion. In our study, benign neoplasm were predominant than malignant neoplasms and inflammatory lesions. Among the 9 cases of Submandibular lesion, 6 cases were benign neoplasms, 2 cases were inflammatory lesions and one case were malignant neoplasms. In our study, benign neoplasms were predominant than inflammatory lesions and malignant neoplasms. Among the 5 cases of minor salivary gland lesions 3 cases were benign neoplasms and 2 cases were malignant neoplasms. No cases of inflammatory lesions noted in our study. In our study, benign neoplasms were predominant than malignant neoplasms (Table 1).

Among the 38 cases of benign neoplasms, 35 cases (92.11%) were Pleomorphic adenoma, 2 cases (5.26%) were Basal cell adenoma and one case (2.63%) was Warthins tumor. In our study, Pleomorphic adenoma were predominant than Basal cell adenoma and Warthins tumor. Among the 38 cases of benign neoplasms, 29 cases (76.32%) were noted in Parotid gland, 6 cases (15.79%) were noted in Submandibular glands and 3 cases (7.90%) were noted in minor salivary glands (Table 2).

Among the 35 cases of Pleomorphic adenoma, 27 cases were noted in Parotid glands, 6 cases were noted in Submandibular glands and 2 cases were noted in minor salivary glands. Among the 2 cases of Basal cell adenomas, one case were noted in Parotid gland and another case were noted in minor salivary gland. One case of Warthins tumor was noted in Parotid gland only (Table 2).

Among the 7 cases of malignant neoplasms, 4 cases (57.14%) were Mucoepidermoid carcinoma, 2 cases [28.57%] were Adenoid cystic carcinoma and one case (14.29%) was Acinic cell carcinoma. In our study, Mucoepidermoid carcinoma were predominant than Adenoid cystic carcinoma and Acinic cell carcinoma. Among the 4 cases of Mucoepidermoid carcinomas, 3 cases were noted in Parotid glands and one case was in Submandibular gland. Among the 2 cases of Adenoid cystic carcinomas, one case was noted in

Parotid gland and another case was noted in minor salivary gland. One case of Acinic cell carcinoma was noted in Parotid gland (Table 3).

In our study, both cytology and histopathology were carried out in 50 cases and correlation was done to know the sensitivity, specificity and diagnostic accuracy of FNAC in preoperative diagnosis of salivary gland lesions. The diagnostic accuracy of FNAC for non-neoplastic lesions, benign neoplasms and malignant neoplasms were 100%, 92% and 92%

respectively. The overall diagnostic accuracy was 94.67%. In non-neoplastic lesions, the diagnosis of all cases by FNAC correlated with histopathological findings. Out of 38 cases of benign neoplasms diagnosed on cytology 36 cases correlated with histopathology. Two cases reported as Pleomorphic adenoma on cytology turned out to be Adenoid cystic carcinoma on histopathology. In the malignant neoplasms cytological diagnosis of all 7 cases were correlated with histopathological diagnosis (Table 4).

**Table 1:** Distribution of different Salivary gland lesions according to the site

S.no	Site involved	Non-Neoplastic lesions	Benign Neoplasms	Malignant Neoplasms	Total number
1.	Parotid gland	3	29	4	36(72%)
2.	Submandibular gland	2	6	1	9(18%)
3.	Minor salivary glands	-	3	2	5(10%)
	Total	5(10%)	38(76%)	7(14%)	50(100%)

**Table 2:** Cytological Spectrum of Benign neoplastic lesions in various salivary glands

S. No	Benign tumor	No of cases in Parotid glands	No. of cases in Submandibular glands	No. of cases in Minor salivary gland	Total number of cases
1.	Pleomorphic adenoma	27	6	2	35(92.11%)
2.	Basal cell adenoma	1	-	1	2(5.26%)
3.	Warthins tumor	1	-	-	1(2.63%)
4.	Schwannoma	-	-	-	-
5.	Monomorphic adenoma	-	-	-	-
6.	Myoepithelima	-	-	-	-
	Total	29(76.32%)	6(15.79%)	3(7.90%)	38(100%)

**Table 3:** Cytological Spectrum of Malignant neoplastic lesions in various salivary glands

S. No	Malignant tumor	No. of cases in Parotid glands	No. of cases in Submandibular glands	No. of cases in Minor salivary glands	Total no. of cases
1.	Muco epidermoid carcinoma	3	1	-	4(57.14%)
2.	Adenoid cystic carcinoma	-	-	2	2(28.57%)
3.	Acinic cell carcinoma	1	-	-	1(14.29%)
4.	Malignant mixed tumor	-	-	-	-
5.	Adeno carcinoma	-	-	-	-
6.	Polymorphous low grade adenocarcinoma	-	-	-	-
7.	Lymphoepithelial carcinoma	-	-	-	-
	Total	4(57.14%)	1(14.29%)	2(28.57%)	7(100%)

**Table 4:** Cyto-Histopathological correlation of salivary gland lesions

S. No	Histopathological Diagnosis	Total No. Of cases	Diagnosed on cytology	Accuracy
1.	Pleomorphic adenoma	33	33	100%
2.	Warthin's tumor	1	1	100%
3.	Basal cell adenoma	2	2	100%
4.	Adenoid cystic carcinoma	4	2	50%
5.	Mucoepidermoid carcinoma	4	4	100%
6.	Acinic cell carcinoma	1	1	100%
7.	Non-neoplastic lesions	5	5	100%

## Discussion

Fine needle aspiration cytology gives useful information regarding salivary gland swelling, is it neoplastic lesion or non neoplastic lesion and in neoplastic lesions, is it benign neoplasm or malignant neoplasm. Preoperative diagnosis of salivary gland tumor type is helpful for clinicians in the management and planning of surgery. The salivary gland lesions have overlapping morphological patterns in many of the benign and malignant neoplasms of the salivary gland. This makes them one of the difficult areas in cytopathology.

In our study, Pleomorphic adenoma and Mucoepidermoid carcinoma were the most common benign and malignant neoplasms respectively. These findings were similar to other studies [8, 9, 19]. In our study most commonly noted benign neoplasms were Pleomorphic adenoma. These findings were similar to other studies [9, 19]. In our study most commonly noted malignant neoplasms were Mucoepidermoid carcinoma. These findings were similar to other studies [10, 11, 12, 19].

Cytological criteria to diagnose the Pleomorphic adenoma are cohesive group of epithelial cells with bland nuclei & myoepithelial cells with bland nuclei. Background shows chondromyxoid matrix material. Cytological criteria to diagnose the Warthins tumor are cohesive 2- and 3- dimensional groups of oncocytic tumor cells with distinct cell borders and scattered background lymphocytes. Individual tumor cells are uniform, and have enlarged round nuclei with a distinct nucleolus. Cytological criteria to diagnose the Basal cell adenoma are solid pattern, tubular pattern and trabecular pattern of two populations of Basaloid cells with bland nuclei and peripheral palisading. Squamous morules and intercellular matrix globules.

Cytological criteria to diagnose the low grade mucoepidermoid carcinoma are hypocellular aspirate with sheets of tumor cells showing squamoid cells, mucus cells and intermediate cells with mild pleomorphic nuclei. Histocytes and muciphages and thick mucoid material in the background of lymphocytes will be seen. Cytological criteria to diagnose the Adenoid cystic carcinoma are spheres, cylinders, branching tubules and crowded 3-D groups of Basaloid cells with angulated, pleomorphic nuclei.

Background shows metachromatic matrix. Cytological criteria to diagnose the Acinic cell carcinoma are solid pattern, microcystic, papillary cystic and follicular pattern of large polygonal cells with uniform round eccentric nuclei and delicate vacuolated cytoplasm.

Histopathological criteria to diagnose the Pleomorphic adenoma are sheets, clusters and tubular structures of tumor cells enveloped by myoepithelial mantles submerging in a chondromyxoid stroma. Tubules lumen showing PAS-positive diastase-resistant eosinophilic colloid-like material. Histopathological criteria to diagnose the Basal cell adenoma are solid sheets, islands, trabecular pattern and tubular pattern of Basaloid cell with peripheral palisading showing bland nuclei. Histopathological criteria to diagnose the Warthins tumors are papillae and glands typically lined by double layer of columnar oncocytic luminal cells and basal layer of cuboid cells with underlying lymphoid stroma.

Histopathological criteria to diagnose the low grade Mucoepidermoid carcinoma are solid sheets, cystic pattern of squamoid cells, intermediate cells and mucinous cells with bland nuclei. Stroma showing inflammatory cells and extracellular mucin. Histopathological criteria to diagnose the Adenoid cystic carcinoma are cribriform pattern, tubular pattern and solid pattern of tumor cells with eosinophilic hyaline material within the cystic spaces. Perineural invasion is a common finding. Histopathological criteria to diagnosis the Acinic cell carcinoma are solid pattern of polygonal cells traversed by very delicate blood vessels. Tumor cells contain very fine basophilic granules with foamy cytoplasm and regimenting of nuclei.

In our study, sensitivity, specificity and diagnostic accuracy of salivary gland lesions were 87.96%, 92.04% and 94.66% respectively. In Jayaram et al study [13], sensitivity, specificity and diagnostic accuracy of salivary gland lesions were 90%, 95% and 73.6% respectively which is nearly correlated with sensitivity and specificity in our study, but diagnostic accuracy is lower than our study. In Piccioni et al study [14], sensitivity, specificity and diagnostic accuracy of salivary gland lesions were 81%, 90% and 97% respectively which is nearly correlated with specificity and diagnostic accuracy in our study, but sensitivity is lower than our study. In Stow et al study [15], sensitivity, specificity and diagnostic accuracy of salivary gland lesions were 86.94%, 92.3% and 92.3% respectively which is nearly correlated with our study. In Lukas et al study [16], sensitivity, specificity and diagnostic accuracy were 89.2%, 85% and 97.2% respectively which is nearly correlated with our study.

In Rehman et al study [17], sensitivity, specificity and diagnostic accuracy were 78%, 53.28% and 88.57% respectively which is nearly correlated with diagnostic accuracy, but sensitivity, specificity is lower than our study. In Panchal Upasana et al study [18], sensitivity, specificity and diagnostic accuracy were

89.29%, 91.67% and 86.21% which is nearly correlated with our study. In Thangam R et al study [19], sensitivity, specificity and diagnostic accuracy were 80%, 94.74% and 91.66% respectively which is nearly correlated with specificity and diagnostic accuracy in our study, but sensitivity is lower than our study.

### Conclusion

The high accuracy, sensitivity and specificity of FNAC confirm that preoperative cytology is a useful, quick, reliable diagnostic tool for rapid and early diagnosis in salivary gland lesion. Majority of the benign and malignant neoplasms can be diagnosed with FNAC and avoid unnecessary surgeries in non-neoplastic inflammatory conditions of salivary glands. Few rare tumors can be missed on cytology, but clinical correlation can give clue to the diagnosis of malignant neoplasms.

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