# FNAC and Histopathology of Salivary Gland Tumors

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**Abstract**

Accounting for less than 2% of all human neoplasm, salivary gland tumours are relatively uncommon. This is a retrospective study of all salivary gland tumor biopsies received at our referral teaching hospital in Ahmadabad from January 2007 to October 2008. It will be noted that the most common benign neoplastic lesion during the present study as pleomorphic adenoma in the age group of 3nd decade of life (28 cases) followed by 4th decade (20 cases) Malignant lesions are common in age group of 5th decade of life (8 cases) Graphical presentation showing number of benign and malignant cases with their age distribution. Out of 100 cases, histopathological correlation was done in 60 cases. Most of the patients presented between 3rd and 5th decade of life. Males were predominantly affected with Male: Female ratio was 1:04. The commonest benign lesion was pleomorphic adenoma (74%) and the commonest malignant lesion was mucoepidemoid carcinoma (6%), In the present study, the incidence of benign and malignant lesion was 83% and 17% respectively. In the present study, FNAC had 100% accuracy rate for malignant lesion false negative result was obtained in 2(3.33%) cases. Thus, FNAC, in comparison to other methods of biopsy, is readily available, no anaesthesia is required, is a short procedure, reports are rapidly in one or two hours. It is cheap and cost effective, is an O.P.D. Procedure, least traumatic and has 100% patient compliance. It is highly reliable and accurate in expert hands.

**Keywords:** Histopathology, Pleomorphic adenoma, Salivary gland tumour, Tumor

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## Introduction

Accounting for less than 2% of all human neoplasm, salivary gland tumours are relatively uncommon[1,2,3] Their clinical importance, however, far outweighs their relatively low frequency, due to their confounding histological and behavioural diversity as well as their proximity to important head / neck structures that pose

considerable clinical management challenges[3].

Although a variety of etiological factors (radiation, race, smoking, chronic sialadenitis, diet etc) have been implicated in some salivary tumors, most salivary gland neoplasms are idiopathic making it difficult to explain the striking epidemiological differences in their global distribution[1,2,3,4,5]. Parotid tumors, for instance, account for a much lower fraction of salivary gland neoplasms in African series than in Western studies[1-9]

## Materials and Method

This is a retrospective study of all salivary gland tumor biopsies received at our referral teaching hospital in Ahmadabad from January 2007 to October 2008. The teaching hospital is the major tertiary health institution offering histopathology services to the entire Ahmedabad as well as the neighbouring area. (Age, sex, site) were obtained from laboratory records derived from information provided on histology request forms.

Prior to the FNAC, the nature of the tumor and its location in relations into the other structured were determined. FNAC was carried out using standard procedure. All specimens were fixed in Slide was fixed using fixative either 50% ether alcohol mixture or 95% alcohol or cytofix., then processed into paraffin-embedded sections and stained with hematoxylin and eosin. All histology slides were reviewed by the authors, and classified according to the World Health Organization (WHO) histological typing of tumors[10]

## Observation and Results

The present study consists of 100 cases of various salivary gland tumors admitted and treated at the Civil Hospital, Ahmedabad and Pathology Department, B.J.M.C. , Ahmedabad from January 2007 to August 2008.

In all cases, preoperative FNAC was done and preoperative diagnosis was recorded. Out of 100 cases, 60 cases were operated and histopathological correlation was made. The age and sex wise distribution of the cases was carried out as shown in the Table 1 and 2 according to cytopathological findings.

It will be noted that the most common benign neoplastic lesion during the present study as pleomorphic adenoma in the age group of 3nd decade of life (28 cases) followed by 4th decade (20 cases) Malignant lesions are common in age group of 5th decade of life (8 cases) Graphical presentation showing number of

benign and malignant cases with their age distribution.

**Table 1: Age wise distribution of Salivary gland tumors**

| Lesions | 0-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | Total |
|---|---|---|---|---|---|---|---|---|
| Plemorphic adenoma | 2 | 0 | 26 | 20 | 6 | 8 | 2 | 74 |
| wartthin's tumor | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 3 |
| Basal cell adenoma | 0 | 0 | 2 | 0 | 1 | 3 | 0 | 6 |
| Mucopidermoid carcinoma | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 6 |
| Adenoid cystic carcinoma | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 3 |
| Acinic cell carcinoma | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| Squamous cell carcinoma | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 |
| Unclassified malignant | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 4 |
| Total | 2 | 1 | 28 | 24 | 26 | 16 | 3 | 100 |

**Table 6.2: Gender wise distribution of salivary gland lesions**

| Lesions | No. of males | No. of females |
|---|---|---|
| Pleomorphic adenoma | 35 | 39 |
| Warthin's tumor | 2 | 1 |
| Basal cell adenoma | 3 | 3 |
| **Total ( benign )** | **40** | **43** |
| Mycopidermoid carcinoma | 3 | 3 |
| Adenoid cystic carcinoma | 2 | 1 |
| Acinic cell carcinoma | 1 | 1 |
| Squamous cell carcinoma | 2 | 0 |
| Unclassified malignant | 3 | 1 |
| **Total ( malignant )** | **11** | **6** |
| **Total** | **51** | **49** |

During the present study male preponderance is found in all the salivary gland tumors with M-F ratio of 1.04:1. For benign neoplastic lesions M : F ratio is 1:1.07 and for malignant tumors M:F ratio is 1.8:1

Cytological and hitopathological characteristic of tumor shown in table 3 to 6.

**Table3: The case study carried out by cytological and histolpathogical methods**

| Sr. No | Methodology applied | No. of cases |
|---|---|---|
| 1 | Cytopathology | 100 (100%) |
| 2. | Histopathology | 60 (60.0%) |

**Table 4: showing site wise distribution of the cases (FNAC) under study.**

| Sr.No. | Site | No. of cases | |
|---|---|---|---|
| | | Benign | Malignant |
| 1 | Period gland | 65 | 9 |
| 2 | Submandibular gland | 17 | 7 |
| 3 | Minor salivary glands | 1 | 1 |
| 4 | Total | 83 | 17 |

**Table 5: showing site wise distribution of the case by histological diagnosis**

| No. | Site | Histopathology | | % |
|---|---|---|---|---|
| | | Benign | Malignant | |
| 1 | Period gland | 43(71.66%) | 5(08.33%) | 80.00 |
| 2 | Submandibular gland | 8(13.33%) | 2(03.33%) | 16.67 |
| 3. | Minor salivary glands | 1(01.66%) | 1(01.66%) | 3.33 |
| 4. | Total | 52 | 8 | 100.00 |

The result of site wise distribution of salivary gland tumors (histological) shows preponderance for parotid gland.

For malignant lesion, minor salivary glands and Sub-mandibular gland were more affected relatively.

In present study maximum number of follow up cases is of pleomorphic adenoma (48). For malignant lesion maximum number of follow up cases is of mucoepidermoid carcinoma (4)

Table 7 shows diagnostic errors of FNAC. In present study FNAC diagnosis of one case of Pleomorphic adenoma was basal cell adenoma histologically and one case of unclasssified malignant lesion was mucoepidermoid carcinoma histologically. These two diagnoses are taken as correct diagnosis, because our aim was to differentiate between benign and malignant lesion by FNAC.

**Table 6: showing the correlation of 60 cases of cytopathology and histopathology.**

| Histopathology diagnosis / Cytopathology diagnosis | No. of cases | Plemorphic adenoma | Warthin's tumor | Basal Cell adenoma | Mucopidermoid carcinoma | Adenoid cystic carcinoma | Acinic cell carcinomia | Squamous cell carcinoma |
|---|---|---|---|---|---|---|---|---|
| Plemorphic adenoma | 48 | 45 | 0 | 1 | 1 | 1 | 0 | 0 |
| wartthin's tumor | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Basal cell adenoma | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Mucopidermoid carcinoma | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 0 |
| Adenoid cystic carcinoma | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Acinic cell carcinoma | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Squamous cell carcinoma | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Unclassified malignant | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Total | 60 | 45 | 1 | 4 | 6 | 2 | 1 | |

**Table 7: Showing the summary of diagnostic errors encountered**

| Sr No. | Cytopathological diagnosis | Histopathological diagnosis |
|---|---|---|
| 1 | Pleomorphic adenoma | Basal cell adnoma |
| 2. | Pleomorphic adenoma | Mucopidermoid carcinoma |
| 3. | Pleomorphic adenoma | Adnoid cystic carcinoma |
| 4. | Unclassified malignant | Mucoepidermoid carcinoma |

## Discussion

Salivary gland lesions are relatively uncommon even though broad spectrum of entities is being encountered. Only stray reports of the series have appeared in the literature. 100 cases of FNAC of salivary gland tumors are taken in the present study. The results were obtained compared with those of previous studies of well known workers in this field and the significant differences and similarities in results are discussed below.

In our study, among the salivary gland tumors parotid gland was the most commonly involved in74% of cases, consistent with the study of Shafkat et al83 and Tanaka et al84.

**Table 8: Site was distribution of salivary gland tumors**

| Study name | Total | Period | Submandibular (%) | Minor salivary Glands (%) |
|---|---|---|---|---|
| Das DK et al81 | 712 | 323(45.3) | 343(48.17) | 7(0.98) |
| Shafkat et al82 | 100 | 70(70) | 18(18) | 12(12) |
| Shaha et al83 | 160 | 84(52.5) | 70(43.75) | 6(3.75) |
| Tanaka et al84 | 124 | 93(75) | 31(25) | - |
| Stewart et al85 | 341 | 212(62.17) | 124(36.36) | 5(1.46) |
| Our study | 100 | 74(74) | 24(24) | 2(2) |

Among benign tumors, pleomorphic adenoma was the commonest and among malignant tumors mucoepidermoid carcinoma was common in our study. These findings are consistent with study of GC Fernades et al[11].

In present study, peak incidence for benign tumors was in 3rdand 4th decade of life,

while peak incidence for malignancy was in 5th decade of life, consistent with the study of GC Fernandes[11] and Shafkat Ahmad et al[12].

**Table 9: Comparison of false negative and false positive diagnosis by FNAC in various studies.**

| | False Negative | False Positive |
|---|---|---|
| Jan IS et al[13] | 6(4.5%) | 1(0.76%) |
| S R Orell et at[14] | 8(2.46%) | 1(0.30%) |
| Cannan et al[15] | 3 (1.98%) | 0(0%) |
| Our study | 2 (3.33%) | 0(0%) |

As far as malignancy was concerned, no false positive report was given by FNAC in the present study. False negative results in the present study were 2 (3.33%) Values of false negative cases in percentage range from 1.98% to 4.5 % and for false positive range from 0 to 0.76% in various studies shown in above table. So findings of our study are quite comparable with that of others.

In present study 100 cases of FNAC were taken out of which 60 cases were conrrelated in histopathology. Remaining cases were referred to higher centres for excision or radiotheraby so it was difficult to follow up and hence cannot be correlated.

**Table 10: Comparison of diagnostic accuracy for benign tumors of salivary glands by FNAC in various studies**.

| | Diagnostic accuracy |
|---|---|
| S Elagoza et al[16] | 91.0% |
| Stewart et at[17] | 97.0% |
| Nettle et al[18] | 95.0% |
| Our study | 86.1% |

Diagnostic accuracy for benign neoplastic lesion of salivary glands ranges from 91.0% to 97.0% in various studies. In our study the accuracy is of 96.1% which was comparable with other studies.

**Table 11: Comparision of diagnostic accuracy for malignant lesion of salivary gland by FNAC in various studies.**

| | Diagnostic accuracy (%) |
|---|---|
| Das DK et al[19] | 91.1 % |
| Jan IS et al[13] | 94.4% |
| Cannon et al[15] | 100% |
| Shafkat et al[12] | 100% |
| Out study | 100% |

**Table 12: Comparison with other studies for sensitivity, specificity and diagnostic accuracy of salivary gland tumors by FNAC**

| Various Authors | No. of cases with histopatho confirmation | Diagnostic accuracy | Sensitivity | Specificity |
|---|---|---|---|---|
| Shintani[20] | 43 | 93.00% | 88.90% | 94.10% |
| jayaram[21] | 57 | 87.70% | 80.90% | 94..30% |
| Qizilbash[22] | 146 | 98.00% | 87.50% | -- |
| Cristallini- EG[23] | 63 | 97.90% | 97.60% | 98.45% |
| Young[24] | 59 | 96.60% | 87.50% | 100.00% |
| Bono[25] | 79 | 80.40% | 85.70% | 100.00% |
| O Dwyer[26] | 341 | 90.00% | 73.00% | 94.00% |
| GC Fernandes[11] | 32 | 87.50% | 90.30% | 80.00% |
| Our series | 60 | 96.66% | 80.00% | 100.00% |

As shown in the table above, diagnostic accuracy ranges from 80% of 98% in different studies carried out worldwide and in our country. Our study shows diagnostic accuracy of 96.66% which correlates well with the study carried out by Young et al.

The sensitivity ranges from 73% to 93% in different studies and our study shows sensitivity of 80.00% which correlates well with the study carried out by Jayaram et al.

The specificity ranges from 80% to 100% in different studies and our study shows specificity of 100% and these observations are consistent with that of the results in study carried out by Young et al and Bono et al.

## Conclusion

In the present study, pre-operative Fine Needle Aspiration Cytology results were compared with the histopathological reports in the 60 cases with salivary gland tumors. Efforts are made to find out the accuracy of FNAC in the salivary gland tumors. The commonest benign lesion was pleomorphic adenoma (74%) and the commonest malignant lesion was mucoepidemoid carcinoma (6%). In the present study, the incidence of benign and malignant lesion was 83% and 17% respectively. In the present study, FNAC had 100% accuracy rate for malignant lesion. False negative result was obtained in 2(3.33%) cases. Thus, FNAC, in comparison to other methods of biopsy, is readily available, no anaesthesia is required, is a short procedure, reports are

rapidly in one or two hours. It is cheap and cost effective, is an O.P.D. Procedure, least traumatic and has 100% patient compliance. It is highly reliable and accurate in expert hands.

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