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# A Correlative Cytological and Histopathological Study of Lesions of Salivary Gland

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**Abstract:** ***Salivary glands are unique amongst the secretory glands, with most heterogenous group of tumors, exhibiting greatest histological diversity. Objective: The aim of the study was to statistically evaluate the incidence of salivary gland lesions in and around Madurai. To assess the usefulness of cytological study in the diagnosis of salivary gland lesions and to evaluate the accuracy of FNAC studies in correlation with histopathological study. Study design; cross sectional study. Specimens from patients presented with symptoms and signs of salivary gland enlargement (unilateral or bilateral) of Rajaji Hospital, Madurai Medical College, Madurai were included in the study. FNAC was performed in 97 cases, among them, 48 cases had post surgical histopathological correlation. The overall diagnostic accuracy of fine needle aspiration cytology in diagnosing salivary lesions was found to be 86.36%. FNA is a simple, rapid and sensitive technique for the diagnosis of salivary gland lesions. It is a difficult area for the cytopathologist, due to great variety of benign and malignant neoplasms occurring in this site. Sufficiently high accuracy can be achieved by FNA study and this can be a useful guide in making decisions for further management in patients with salivary gland lesions.***

**Keywords:** Fnac, Diagnostic accuracy, Histopathology, Pleomorphic adenoma,Oncocytes, Sialadenitis

## 1. Introduction

Bland Sutton aptly said "Tumors of the salivary gland are a pathological puzzle and a source of unsatisfactory speculation"[1]. Swelling involving the salivary gland may be as a result of inflammation, cyst or neoplasm. The nature of the lesion cannot be determined on clinical examination and therefore pathological examination is required for definite diagnosis in suspected cases of neoplastic disease[2].

Nowadays fine needle aspiration cytology has emerged as an effective and sensitive technique in the diagnosis of lesions of major or minor salivary glands. FNA is virtually risk free, simple, rapid, inexpensive technique and provides the clinician a definite preoperative diagnosis and thus can facilitate further management[3.4].

The usefulness of FNA in salivary gland lesions was first observed by Karolinska group nearly 30 years ago who documented the diagnostic accuracy of FNA in a large series of cases[5].

Salivary glands are generally not subjected to incisional or core biopsy because of the possible risk of fistula, facial nerve injury and tumor implantation in the cases of neoplasms[2,5].

The aim of the study was to statistically evaluate the incidence of salivary gland lesions in and around Madurai. To assess the usefulness of cytological study in the diagnosis of salivary gland lesions

## 2. Materials and Methods

Specimens from patients presented with symptoms and signs of salivary gland enlargement (unilateral or bilateral) of Rajaji Hospital, Madurai Medical College, Madurai were included in the study. Patient's thorough clinical history including the site of swelling, duration, consistency, nature of facial nerve involvement, and status of adjacent lymphnodes were obtained. The cytology smears were wet fixed in isopropyl alcohol for H & E and PAP stains, and air-dried for Giemsa stains. In doubtful cases the sections were submitted for special stains such as Alcian blue and PAS. . The formula for assessing the sensitivity, specificity and diagnostic accuracy is as follows:

| Screening Test Result | Diagnosis | | Total |
|---|---|---|---|
| | Diseased | Not diseased | |
| Positive | True positive (a) | False positive (b) | a + b |
| Negative | False negative (c) | True negative (d) | c + d |
| Total | a + c | b + d | a + b + c + d |

The following formulae are used,

* Sensitivity = $\frac{a}{(a+c)}$ x 100

* Specificity = $\frac{d}{(b+d)}$ x 100

* Accuracy = $\frac{a+d}{(a+b+c+d)}$ x 100

## 3. Observation and Results

In the two-year study period 10442 general biopsy materials were received from Government Rajaji Hospital, Madurai. Among these, 103 cases were from salivary gland lesions. The average incidence of salivary gland lesions in this hospital was 0.98%.

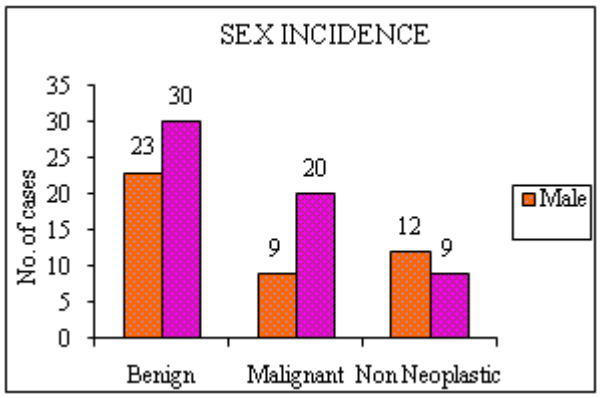
Among the 103 cases, 82 (79.6%) were salivary tumors and 21 (20.4%) were tumor like lesions. Out of these 82 salivary gland tumors, 53 cases were benign tumors. Pleomorphic adenoma was diagnosed in 44 cases, basal cell adenoma in 3 cases, Warthin tumor in 4 cases and oncocytoma in one case. The incidence of benign tumor was 51.45%. 29 were diagnosed as malignant tumors. Mucoepidermoid carcinoma


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was diagnosed in 14 cases, adenoid cystic carcinoma in 5 cases, acinic cell carcinoma in 5 cases, carcinoma in Pleomorphic adenoma in 4 cases and PLGA in one case. The incidence of malignant tumors of salivary gland was 28.15%.

In our study, the youngest patient was 13 years old and oldest was 75 years old. The peak incidence of salivary gland neoplasm was noted in the age group of 41-50 years (27.18%), followed by 21-30 years (21.25%). Mean age incidence for benign tumors was 41 years and for malignant tumors was 46.5 years. Most cases in our study were in 5th decade.

Among the 103 cases with salivary lesions, 59 patients were female (57.28%) and 44 patients were male (42.72%). There is a female preponderance with a Male: Female ratio of 1:1.34. Neoplastic lesions were predominantly seen in female and non neoplastic lesions were predominantly seen in male population. (Diagram).




Among the 103 cases of salivary lesions, 60 cases were found in parotid with an incidence of 58.25%. Sub mandibular lesions were observed in 30 cases (29.12%). The other minor salivary glands involvement was observed in 13 cases (12.6%).

In parotid, among the 60 cases, pleomorphic adenoma was the common lesion, with the incidence of 46.6% followed by mucoepidermoid carcinoma, which showed the incidence of 16.7%. In sub mandibular gland, among the non neoplastic lesions, chronic sialadenitis was the most common lesion (incidence 46.6%). In minor salivary glands, malignant tumors predominate the lesions with the incidence of 53.8%.

## 4. Correlation between Cytological and Histopathological Diagnosis

48 patients had undergone FNAC and surgical removal of the salivary gland enlargement (Table 1). In FNAC 26 cases were diagnosed as benign neoplasms. 24 cases were cytologically diagnosed as pleomorphic adenoma of which 19 cases were subsequently confirmed. One case was tuberculous sialadenitis, 3 cases were carcinoma in pleomorphic adenoma and one was found to be Neurofibroma in histopathology. The sensitivity of FNAC in diagnosing pleomorphic adenoma in our series is 86.36% while the specificity is 90.9%. One case of Warthin tumor and one case of oncocytoma were reported and later confirmed in HPE.

Among the malignant lesions 7 cases of mucoepidermoid carcinoma and 2 cases of Acinic cell carcinoma in cytology were confirmed by histopathology. In diagnosing malignant lesions, the sensitivity was 87.5%, the specificity was 100% and the diagnostic accuracy was 97.72%.

Of the 9 cases, which were reported as non neoplastic lesions in cytology, five cases were found to be chronic non specific sialadenitis, one case of tuberculous sialadenitis, one case of actinomycosis of parotid gland and one case as a benign lymphoepithelial cyst in histopathology. One case was reported as cystic lesion in cytology but HPE revealed low grade mucoepidermoid carcinoma.

Among the four unsatisfactory smears, 3 cases were found to be mucoepidermoid carcinoma and one case of pleomorphic adenoma in histopathology. (Table1). The sensitivity was 88.8% , specificity was 97.14% and the diagnostic accuracy was 95.45% in analysing non neoplastic lesions.

**Table 1:** Correlation between Cytological and Histopathological Diagnosis

| FNAC Diagnosis | No. of Cases | Pleomorphic adenoma | HPE Diagnosis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Warthin Tumor | Onco cytoma | Neuro Fibroma | MEC | ACC | Car. in ple.adeno | Non Neoplastic |
| Plemorphic ademoma | 24 | 19 | | | 1 | | | 3 | 1 |
| Warthin tumor | 1 | | 1 | | | | | | |
| Oncocytoma | 1 | | | 1 | | | | | |
| MEC | 7 | | | | | 7 | | | |
| ACC | 2 | | | | | | 2 | | |
| Non Neoplastic | 9 | | | | | 1 | | | 8 |
| Unsatisfactory | 4 | 1 | | | | 3 | | | |
| Total | 48 | 20 | 1 | 1 | 1 | 11 | 2 | 3 | 9 |

## 5. Discussion

Most cases in our study were in 5th decade. He Y et al[6] and Jayaram et al[7] in their studies had higher incidence of cases in 6th decade.

Mean age incidence for benign and malignant tumors was 41 years and 46.5 years respectively. It correlates with the study of AFIP registry[8], which showed 46.1 years for benign tumors and 47.1 years for malignant tumors.


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In the present study there is a female preponderance with a Male: Female ratio of 1:1.34. Das DK et al[9] and Anjali et al[10] showed a higher incidence cases in male population.

In the present study, most of the salivary gland tumors are found in parotid region (64.63%) followed by submandibular (19.51%) and 15.85% in minor salivary glands. Comparison is given in table 2.

**Table 2:** Distribution of Salivary Gland Neoplasms with Comparison

| S.No | Study | Parotid | Submandibular | Minor |
|---|---|---|---|---|
| 1 | Anjali et al 2002[10] | 64.3% | 30.8% | 4.8% |
| 2 | Maheswari et al 2004[11] | 73.4% | 20.2% | 6.3% |
| 3 | Present study 2006 | 64.6% | 19.51% | 15.85 |

Mixed tumors represent 45% to 74% of all benign and malignant salivary gland tumors, about 50% of all parotid neoplasms and about 75% of the benign tumors from all salivary gland sites[8]. In our study in parotid, among the 60 cases, pleomorphic adenoma was the common lesion, with the incidence of 46.6% followed by mucoepidermoid carcinoma, which showed the incidence of 16.7%.

Recently FNAC is becoming a widely recognized practical and useful technique in the diagnosis of salivary gland lesions. The technique is simple and rapid, and no expensive instruments are needed. The cytological diagnosis is rapid and eliminates the need for surgical procedures. Moreover it is safe and well tolerated by most of the patients.

The sensitivity, specificity, diagnostic accuracy in diagnosing benign neoplasms in the present study were found to be 88%, 94.3% and 90.9% respectively. The low sensitivity was due to false negative reporting of 3 malignant tumors as benign lesions in cytology as the malignant foci was missed in aspiration. Viguer et al[12] also had the sensitivity and specificity of 92.6% and 98.4% respectively.

The cytologic variations in FNAC of pleomorphic adenoma must be considered in order to avoid important errors in diagnosing salivary gland lesions. Sampling and interpretation errors are the reason. This can be avoided by taking adequate samples and aspirations from multiple sites[3,4].

In diagnosing malignant lesions, the sensitivity was 87.5%, the specificity was 100% and the diagnostic accuracy was 97.72%. One case of Mucoepidermoid carcinoma was false negatively diagnosed as cystic lesion in cytology. 3 cases in cytology yield no cellular material and was reported unsatisfactory. Low grade Mucoepidermoid carcinoma is usually cystic and the aspirate yields mucoid fluid and sparse cellularity with no obvious malignant nuclear features. These aspirates often lead to false- negative interpretations. So, the cystic aspirates should be interpreted with caution[13,14].

Among the non neoplastic lesions, 8 cases were found to be non neoplastic and one was false negatively given as cystic lesion and was found to be mucoepidermoid carcinoma. The sensitivity was 88.8% and the specificity was 97.14%. The diagnostic accuracy was 95.45%.

The overall diagnostic accuracy of fine needle aspiration cytology in diagnosing salivary lesions was found to be 86.36% which correlates with the studies, conducted by Jeyaram et al[7], Nettle & Orell[15,16] and Maheswari et al[11]. The comparative study is shown in table no.3

**Table 3:** Comparative Study of Diagnostic Accuracy of Various Authors

| S.No | Name of the Author | No. of Cases | Diagnostic Accuracy |
|---|---|---|---|
| 1 | Jeyaram et al[7] | 141 | 73.6% |
| 2 | Nettle & Orell[15] | 106 | 88 % |
| 3 | Maheswari et al[11] | 76 | 90.7% |
| 4 | Present Study | 48 | 86.36% |

## 6. Conclusion

FNA is a simple, rapid and sensitive technique for the diagnosis of salivary gland lesions. It is a difficult area for the cytopathologist, due to great variety of benign and malignant neoplasms occurring in this site.

In our experience, we feel, however, that sufficiently high accuracy can be achieved by FNA study and this can be an useful guide in making decisions for further management in patients with salivary gland lesions.

In an era where advances in technology have added enormously to the burden of healthcare costs and facilities like ultrasound, sialography, CT sialography and immune markers are available to aid the diagnosis of salivary gland tumors. The continued and accelerated use of the FNA cytology has reduced the costs and has released significant resources for alternate uses, a matter, that the pathologist can feel justifiably proud of.

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