

Research Article

Clinicopathological study of salivary gland tumors: An observation in tertiary hospital of central India

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ABSTRACT

Background: The salivary glands are one of the few tissues in the body that are subjected to diverse and heterogeneous range of tumors and tumor like conditions. The relative infrequency of these tumors makes their diagnosis and management quite complicated. Fine needle aspiration cytology (FNAC) is a useful diagnostic procedure which has a recognized role in the evaluation of salivary gland lesions. A pre-operative diagnosis about nature of lesion, whether benign or malignant, will help in making decision about proper management of patient.

Objective: Aim of this study was to know the epidemiology of salivary gland tumors in our region and to evaluate sensitivity, specificity and diagnostic accuracy of fine needle aspiration cytology taking histopathology as the gold standard.

Method: It was prospective observational study conducted in department of pathology in our institute. Total 100 cases were studied with particular reference to age, sex, site, cytologic details & histological types as per WHO classification. FNAC & histopathological examination was done in all cases. Correlation between cytological & histopathological diagnoses was assessed. Diagnostic accuracy of FNAC was evaluated by comparing cytological & histopathological diagnoses.

Results: Parotid gland was the most common site of involvement (70% cases). Maximum number of patients was in age range of 41-50 years & male to female ratio was 0.8:1. Most common benign & malignant tumors were pleomorphic adenoma (69.89% cases) & mucoepidermoid carcinoma (8.60% cases) respectively. On cytology, 93 cases while on histopathology 96 cases were diagnosed as neoplastic. Cytological diagnoses correlated with histopathological diagnoses in 94% cases. Sensitivity, specificity & diagnostic accuracy of FNAC were found to be 96.87%, 100% & 96% respectively.

Conclusion: FNAC in salivary gland masses is fairly reliable for correct preoperative diagnosis. Multiple sampling and special attention to cytologic features should help to minimize errors.

Keywords: Salivary gland tumors, FNAC, WHO classification

INTRODUCTION

The salivary gland tumors constitute less than three percent of all head and neck tumors (Ahmed et al.)¹ and this relative infrequency makes their diagnosis and management quite complicated. Identifying malignancy pre-operatively is crucial as it can have significant impact on management.

Fine needle aspiration cytology is a useful diagnostic procedure which has recognized role in the evaluation of these lesions. Histopathology is the gold standard as it avoids diagnostic pitfalls of FNAC. Aim of study was to know the epidemiology of salivary gland tumors according to WHO classification & diagnostic accuracy of FNAC taking histopathology as the gold standard.

METHODS

It was a single institute prospective study done from July 2011 to October 2013. Prior written consent was taken from all patients and permission from ethical committee was taken. All patients with salivary gland masses presented in ENT OPD of our institute were included in the study. Patients with salivary gland lesions who were diagnosed as inflammatory lesions on FNAC and didn't go for surgery were excluded from the study, since no histopathological material was available for follow up study. Total 100 cases were studied. All patients went for FNAC examination using Hematoxylin and Eosin (H&E), Papaniculou, and May Grunwald Giemsa staining. Data was recorded as number of aspiration attempts, adequacy of smears, and cytomorphologic details. All included patients underwent histopathological examination of the specimen. Grossly, size, surface, encapsulation, cut surface- color, consistency, contents of cystic spaces, hemorrhagic and necrotic areas were examined. Microscopic examination was done with H&E staining. Salivary gland tumors were classified as per WHO classification and comparison was done between FNAC and histopathological diagnosis. Associated pathology if any was also recorded.

RESULTS

Most common presenting complaint was painless swelling. Age range of patients presenting with salivary gland masses was from six years to 80 years. Maximum number of patients (24% cases) was seen in the age range of 41-50 years, as shown in Figure 1. Mean age for benign tumors was 40.36 years while mean age for malignant tumors was 40.76 years. Forty five were male patients and 55 were female patients with the male to female ratio of 0.8:1. Parotid gland was the most common site of involvement in 70% cases followed by submandibular gland in 24% cases out of 100 salivary gland masses, as shown in Figure 2.

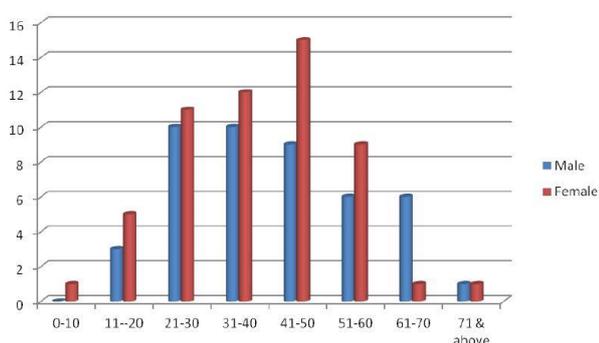


Figure 1: Age & sex wise distribution of salivary gland masses.

Out of 100 aspirates, 93 were diagnostic on first attempt & seven cases required repeat aspiration. On cytology, seven cases were non-neoplastic and 93 cases were neoplastic. Among 93 neoplastic masses, 74 cases were

benign and 19 cases were malignant on cytology. Pleomorphic adenoma (69.89%) was most common benign tumor and mucoepidermoid carcinoma (8.60%) was most common malignant tumor followed by adenoid cystic carcinoma (4.30%), as shown in Table 1. Facial nerve paralysis was seen in three cases of malignant tumors.

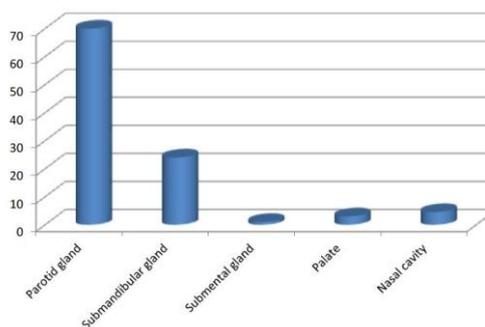


Figure 2: Site distribution of salivary gland masses.

Table 1: Categorization of neoplastic salivary gland masses.

FNAC diagnosis	No. of cases	Percentage
Benign		
Pleomorphic adenoma	65	69.89
Warthin's tumour	3	3.22
Basal cell adenoma	4	4.30
Monomorphic adenoma	1	1.07
Myoepithelioma	1	1.07
Malignant		
Mucoepidermoid carcinoma	8	8.60
Adenoid cystic carcinoma	4	4.30
Acinic cell carcinoma	1	1.07
Adenocarcinoma NOS	1	1.07
Carcinoma ex pleomorphic adenoma	1	1.07
Poorly differentiated carcinoma possibly Squamous cell Ca	1	1.07
Squamous Cell Ca	2	2.15
Metastasis of Squamous cell Ca	1	1.07
Total	93	100

In the present study, salivary gland lesions were studied as per the classification given in second edition of the World Health Organization's Histological Classification of Salivary Gland Tumors, as shown in Table 2. On histopathology, four cases of pleomorphic adenoma were associated with acute sialadenitis and three cases of mucoepidermoid carcinoma were found to be associated with chronic sialadenitis.

Table 2: Classification of salivary gland lesions as per WHO classification.

Histopathology Diagnosis	ICD-O/ SNOMED CODE	No.of cases Available
Benign Lymphoepithelial cyst	72240	1
Sebaceous cyst	33400	1
Mucocele (salivary gland cyst)	33400	2
Pleomorphic adenoma	8940/0	65
Warthin tumour	8561/0	4
Basal cell adenoma	8147/0	4
Myoepithelioma	8982/0	1
Mucoepidermoid carcinoma	8430/3	12

Adenoid cystic carcinoma	8200/3	4
Carcinoma ex pleomorphic adenoma	8941/3	1
Polymorphous low grade adenocarcinoma		1
Squamous cell Ca	8070/3	3
Metastasis of SCC		1
Total		100

On cyto-histopathological co-relation, 94% cases were correctly diagnosed on FNAC as shown in Table 3.

On clinic-histopathologic co-relation, clinically 75% cases were correctly diagnosed as shown in Table 4.

Table 3: Cyto-histopathological correlation.

Histopathology Diagnosis	No.of cases Available	FNAC Diagnosis		Error in cytodiagnosis
		Consistent	Inconsistent	
Benign Lymphoepithelial cyst	1	1	0	-
Sebaceous cyst	1	1	0	-
Mucocele	2	2	0	-
Pleomorphic adenoma	65	65	0	-
Warthin's tumour	4	3	1	Mucocele
Basal cell adenoma	4	4	0	-
Myoepithelioma	1	1	0	-
Mucoepidermoid carcinoma	12	8	4	1. Mucocele 2. mucocele 3. PA 4. Poorly differentiated adenocarcinoma
Adenoid cystic carcinoma	4	4	0	-
Carcinoma ex pleomorphic adenoma	1	1	0	-
Polymorphous low grade adenocarcinoma	1	0	1	Acinic cell Ca
Poorly differentiated carcinoma possibly SCC	1	1	0	0
Squamous cell Ca	2	2	0	-
Metastasis of SCC	1	1	0	-
Total	100	94	6	-

Table 4: Correlation of cytological diagnoses with clinical and histopathological diagnoses.

Histopathologic Diagnosis	No. of cases available	Clinical Diagnosis				Cytological diagnosis			
		Consistent		Inconsistent		Consistent		Inconsistent	
		No. of cases	%	No. of cases	%	No. of cases	%	No. of cases	%
Non-neoplastic	4	1	1	3	3	4	4	0	0
Benign Neoplasm	74	59	59	15	15	73	73	1	1
Malignant neoplasm	22	15	15	7	7	17	17	5	5
Total Cases	100	75	75	25	25	94	94	6	6

Sensitivity, specificity and diagnostic accuracy of FNAC for neoplasms was found to be 89.58%, 100% and 90% respectively. P value for FNAC between positive and negative cases for neoplasm was found to be 0.001 which was considered highly significant.

DISCUSSION

Only a few recorded analysis of salivary gland tumors based on significantly large number of cases are published from India. The present study involves all cases of salivary gland tumors which presented in ENT OPD of our institute from July 2011 to October 2013.

Age Distribution

Salivary gland tumors were observed in all ages ranged from six to 80 years but the highest incidence was in fifth decade. Similar wide age range has been observed by other authors. Frable and Frable (1991)² reported age range of two to 93 years. Cristallini et al. (1997)³ reported age range of 11-85 years. Stewart et al. (2000)⁴ and Rajwanshi et al. (2006)⁵ reported age range of 20-92 years and nine to 75 years respectively. In the present study the maximum patients (24%) were in the age range of 41-50 years. Ahmed et al. (2002)¹ also observed maximum patients in the age range of 31-40 years. In the present study mean age for benign tumors was 40.36 years and mean age for malignant tumors was 40.76 years. This finding was in accordance with those published in studies of Ahmed et al.,¹ Agarwal et al.,⁶ Potdar et al.⁷ & Thomas et al.⁸

Sex Distribution

The male to female ratio of present study was found to be 0.8:1. Thus the slight female predominance in the present study was in accordance with the study of Frable and Frable (1991),² Stewart et al (2000)⁴ and Rajwanshi et al. (2006).⁵ Cajulis et al. (1997)⁹ and Cristallini et al. (1997)³ observed male preponderance in their study.

Site Distribution

In the present study parotid gland was the most commonly affected site (70%) followed by submandibular gland (24%) and minor salivary glands (5%). submental gland was affected in single case. These findings were in accordance with the studies of Frable and Frable (1991),² Cristallini et al. (1997)³ and Bocatto et al. (1998).¹⁰ In the study by Rajwanshi et al. (2006),⁵ minor salivary gland involvement was more frequent than submandibular gland involvement.

Distribution of benign & malignant tumors:

In the present study 79.56% masses were diagnosed as benign tumors and 20.43% masses were diagnosed as malignant tumors on cytology. This finding was in

accordance with studies of Frable and Frable,² Stewart et al.⁴ and Elagoz et al.¹¹

Classification of salivary gland lesions as per WHO classification

The salivary gland lesions were studied as per the classification given in second edition of the World Health Organization's Histological Classification of Salivary Gland Tumors. This Classification is more extensive and detailed than the previous edition published 20 years ago. The new edition is based on data regarding newly described tumor entities and the behavior and prognosis of the previously classified tumors. Among the carcinomas, various types were distinguished for purposes of recognition, prognosis, and treatment. The term tumor was replaced by carcinoma in the following two entities: acinic cell carcinoma and mucoepidermoid carcinoma. The tumor-like lesions were described in more detail (Gerhard S, Leslie HS 1992).¹²

Associated pathology along with salivary gland tumors

In the present study, four cases of pleomorphic adenoma were found to be associated with acute sialadenitis and three cases of mucoepidermoid carcinoma were associated with chronic sialadenitis. Azzopardi J, Evans D (1971)¹³ in their study found a case of malignant lymphoma of parotid gland associated with Mikulic disease (benign lymphoepithelial lesion). Hyman G, Wolff M (1976)¹⁴ in their study of malignant lymphomas of salivary glands found four cases associated with the lymphoepithelial lesion.

Comparison of cytology diagnosis with histopathology

As observed in Table 3, one case of Warthin's tumor was diagnosed as mucocele on cytology. It was a sampling error. Similar error has been reported by Kljanienco J and Vielh P (1997)¹⁵ where in a study of 71 cases of warthins tumour five showed only cyst material on cytology. On histopathology, the tissue section showed epithelial cells with oncocytic features surrounded by lymphoid stroma as shown in Figure 3.

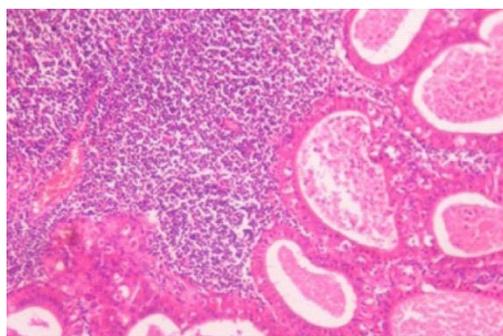


Figure 3: Tissue section from parotid gland: Epithelial cells with oncocytic features surrounded by lymphoid stroma (HE 10x): Warthin tumour.

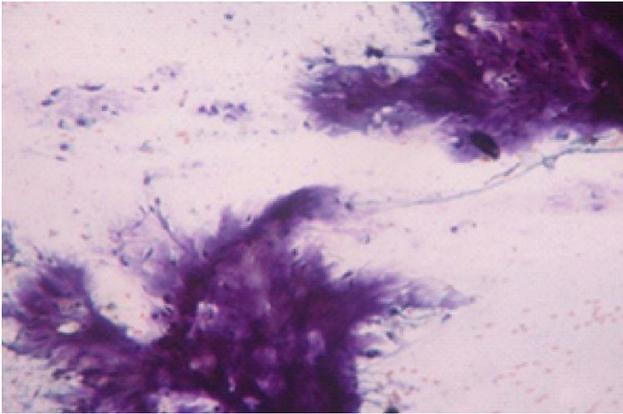


Figure 4: Cytology smear from parotid gland: Poorly cohesive clusters of cells with chondromyxoid stroma (PAP 10x): Pleomorphic Adenoma.

Four cases of mucoepidermoid carcinoma were misdiagnosed as two cases of mucocele, one case as pleomorphic adenoma and fourth case as poorly differentiated adenocarcinoma on cytology. Out of these four cases, in cases of mucocele, it was a sampling error. One case which was misdiagnosed as pleomorphic adenoma on FNAC, showed poorly cohesive clusters of cells with chondromyxoid stroma as shown in Figure 4. There was focal cellular atypia, not enough to warrant malignancy. The presence of few atypical cells is compatible with pleomorphic adenoma and as a general rule a few atypical cells in classic pleomorphic adenoma should not be regarded as evidence of malignancy (Cajulis et al., 1997).⁹ While on histopathology of the same case, tissue section showed sheets of squamous and intermediate cells with areas of mucin as shown in Figure 5. In case of poorly differentiated adenocarcinoma on cytology, smears showed sheets and clusters of poorly cohesive cells with moderate amount of cytoplasm and round to oval pleomorphic nuclei with prominent nucleoli as shown in Figure 6 while on histopathology tissue section showed similar picture as shown in Figure 5.

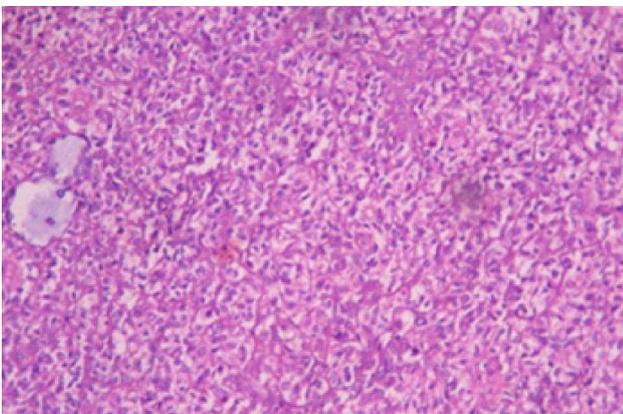


Figure 5: Tissue section from parotid gland: Sheets of squamous and intermediate cells with areas of mucin (HE 10x): Mucoepidermoid carcinoma.

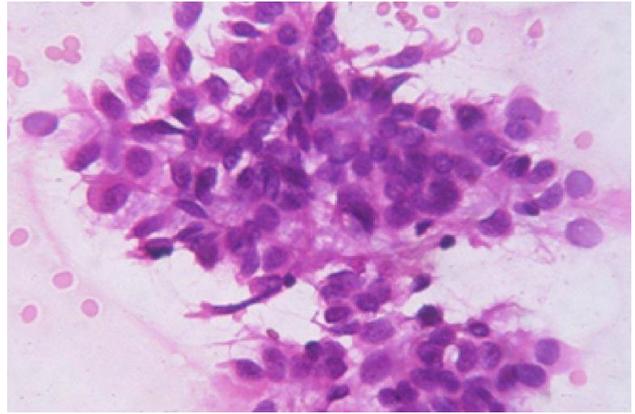


Figure 6: Poorly Differentiated Epithelial malignancy possibly Adenocarcinoma (HE 40x).

One case of polymorphous low grade adenocarcinoma (PLGA) was misdiagnosed as acinic cell carcinoma on cytology. The smears showed clusters of cells with abundant, fragile, finely vacuolated cytoplasm and bland nuclei as shown in Figure 7 while on histopathology, tissue section showed microglandular arrangement of tumor cells with areas of mucin as shown in Figure 8.

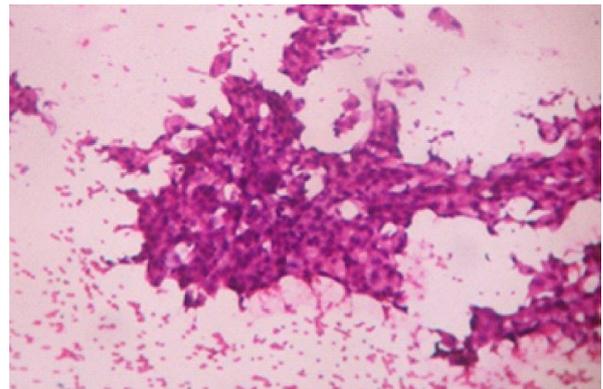


Figure 7: Cytology smear from parotid gland: Clusters of cells with abundant, fragile, finely vacuolated cytoplasm and bland nuclei (HE 10x): Acinic cell carcinoma.

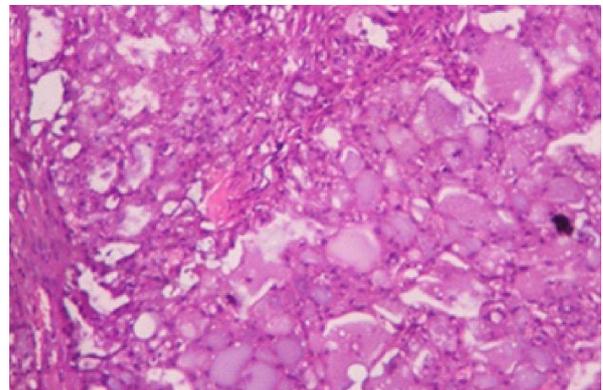


Figure 8: Tissue section from parotid gland: Microglandular arrangement of tumor cells with areas of mucin (HE 10x): PLGA).

Evaluation of sensitivity, specificity and diagnostic accuracy

The ability of FNAC was evaluated to discriminate between non-neoplastic and neoplastic masses. Sensitivity, specificity and diagnostic accuracy of FNAC for neoplasms were found to be 96.87%, 100% and 96% respectively. As shown in Table no. 5, the sensitivity and specificity in the present study was comparable with Frable and Frable (1991),² Bocatto et al. (1998)¹¹ and Akhter et al. (2008).¹⁶ The diagnostic accuracy in the present study was in accordance with the study of Frable and Frable (1991),² Bocatto et al. (1998),¹¹ Das et al (2004)¹⁷ and Stow N et al (2004).¹⁸

Table 5: Comparison of sensitivity, specificity and diagnostic accuracy of FNAC for neoplasms with various studies.

Authors	Year	Sensitivity (%)	Specificity (%)	Diagnostic accuracy (%)
Frable and Frable ²	1991	93.3	99	96.4
Bocatto et al ¹¹	1998	98	98	97
Das et al ¹⁷	2004	94.6	75	91
Stow N et al ¹⁸	2004	86	96	92.5
Akhter et al ¹⁶	2008	90	100	-
Present study	2013	96.87	100	96

CONCLUSION

To conclude, FNAC in salivary gland masses is fairly reliable for correct preoperative diagnosis. It is safe, minimally invasive, inexpensive and office procedure and provides diagnosis within hours. Overall it has shown high sensitivity, specificity and diagnostic accuracy. Inherent heterogeneity of salivary gland masses giving rise to varied cytomorphologic pictures and sampling errors are responsible for wrong diagnosis. However, multiple sampling and special attention to cytologic features should help to minimize errors.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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