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Original Research Article

FNAC and Histopathological Correlation of Salivary Gland Lesions in a Tertiary Care Hospital in Kanchipuram

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Abstract
Background: *Fine needle aspiration cytology is an economically effective technique which is sensitive and specific in diagnosing salivary gland lesions. However histopathology of salivary gland lesions is still the final and gold standard method to establish diagnosis and to predict prognosis.*
Method: *A prospective observational study of 40 patients with salivary gland lesions was done at Meenakshi medical college and research institute -Kanchipuram from may 2017-july 2018. Of the 40 patients, 31 patients underwent surgery and histopathological correlation was done. Cases only with histopathological correlation were included in calculating diagnostic accuracy .The cytological findings were correlated with histopathological diagnosis to calculate cytology accuracy. The parameters of diagnostic validity of cytological technique in terms of sensitivity, specificity and predictive value were evaluated.*
Results: *Parotid gland was the most commonly involved salivary gland (72.5%). Neoplastic lesions constituted the major bulk of the lesions (33 cases, 82.5%) with benign tumours constituting 75%. The most commonly involved benignlesions was pleomorphic adenoma (90%). Among the non-neoplastic lesions (17.5%), acute sialadenitis was frequently noted. In the present study, the specificity and the sensitivity were found to be 96.42% and 93.54% respectively. The positive predictive value of salivary gland cytology was 100% and negative predictive value was 81.8%.*
Conclusions: *Fine Needle Aspiration Cytology is a safe, reliable, quick, convenient and accurate method of diagnosis and should be considered in first line of investigations of salivary gland lesions.*
Keywords: *FNAC, salivary gland lesion , neoplastic lesions,histopathology.*

Introduction

Salivary gland lesions are composed of group of disorders and can be classified neoplastic or non neoplastic. Fine needle aspiration cytology (FNAC) gained popularity as an effective method for diagnosis of salivary gland lesions[1,3]. There is no fistula formation or capsular disruption which are common in core needle biopsy[4], which gives FNAC more advantage over biopsies .FNAC with clinical and radiological assessment forms the best base for the treatment of the lesion, but histological

examination is always gold standard for diagnosis and staging of salivary gland lesions.[5,6]

Methods

This prospective study was carried out in the cytology division of pathology department Meenakshi medical college and research institute Kanchipuram. 40 patients with salivary gland lesions were studied from May 2017 to July 2018.

Other investigations like Xray and ultrasonogram were done. Computed tomography was done in some cases. FNAC was performed in all cases using 22 gauge needle attached to a 5 cc syringe, smears were prepared and stained with hematoxylin and eosin and cytological analysis was made. Histopathological confirmation was available for 31 cases. For calculating diagnostic accuracy only cases with histopathological correlation were included. hematoxylin and eosin stained were used to stain the FNAC (Fine needle aspiration cytology) slides. The specimens for histopathological study were received in 10%formalin and following that tissue processing, sectioning and staining with H&E has been done and analysed. The cytological analysis was correlated with histopathological diagnosis .the incidence of benign and malignant tumours in relation to age and sex was evaluated. Sensitivity, specificity, diagnostic accuracy and predictive value of FNAC was calculated.

Results

Incidence

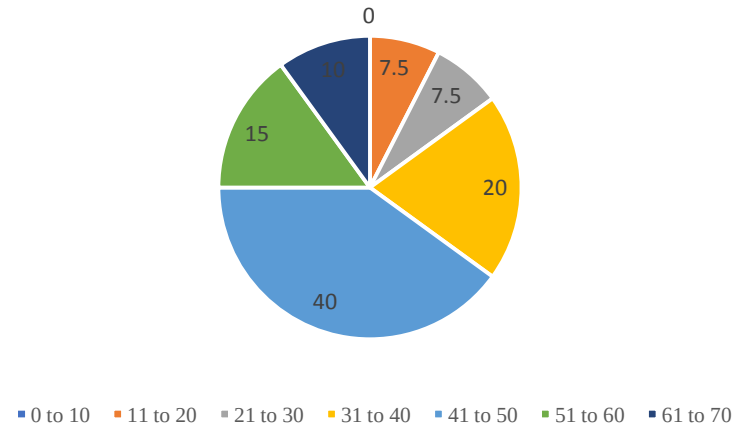
The study showed that out of 40 cases, 25 of the patients were male and the remaining 15 patients were female.

The incidence of salivary gland lesions were as high as 40% (N=16) in the age group of 41 to 50 followed by 20% (N=8) in the age group of 31 to 40 as mentioned above.(Table 1& Figure 1)

Table 1: Distribution of cases according to age

Age	No of cases	Percentage
0-10	0	0%
11-20	3	7.5%
21-30	3	7.5%
31-40	8	20%
41-50	16	40%
51-60	6	15%
61-70	4	10%

Figure 1:Number of cases in percentage



In our study it was found that Parotid gland was the most commonly involved gland with an incidence of 72.5%, followed by submandibular gland 22.5% (Table 2)

Table 2: Distribution of cases according to site of involvement

Sl.no	Site	Number of cases	Percentage of cases
1.	Parotid gland	29	72.5%
2.	Submandibular gland	9	22.5%
3.	Sub lingual salivary gland	0	0%
4.	Minor salivary gland	2	5%

Neoplastic lesions constituted the major bulk of the lesions (33 cases, 82.5%) with benign tumours constituting 75%. The most commonly involved benign neoplastic lesion was pleomorphic adenoma (90%). Among the non-neoplastic lesions (17.5%), the acute sialadenitis was frequently noted (Table 3). clinical presentations included swelling at the angle of mandible, swelling at submandibular gland and swelling at the infra auricle and preauricle.

Table 3: Distribution and type of lesion by FNAC

S.no	FNAC diagnosis	Parotid	Sub mandibular	Minor salivary glands	Total	Percentage
1	**Non neoplastic** Acute sialadenitis	2	2	0	4	10%
	Chronic sialadenitis	1	2	0	3	7.5%
2	**Neoplastic-Benign** Pleomorphic adenoma	20	5	2	27	65%
	Benign lymphoepithelial cyst	2	0	0	2	5%
	Warthin's tumour	1	0	0	1	2.5%
3	**Neoplastic-Malignant** Mucoepidermoid carcinoma	3	0	0	3	5%

Histopathological correlations were available in 31 cases with 3 cases being the malignant lesions. The acute sialadenitis lesions did not undergo histological examination as it was conservatively managed. 28 cases of non-malignant lesions underwent surgery and available for histological confirmation. (Table 4 and Figure 2)

Table 4 Cytohistological correlation

S. no	Lesion	No of cases	Fnac	Histo	Consistent	Non consistent
1	Non neoplastic Acute sialadenitis Chronic sialadenitis	 4 3	 4 3	 - 3	 - 3	 - -
2	Benign Pleomorphic adenoma	27	27	22	20	2
	Warthin's tumour	01	01	01	01	-
	Benign lymphoepithelial cyst	02	02	02	02	-
3	Malignant Mucoepidermoid carcinoma	3	3	3	3	-

Figure 2A-2J shows the different salivary gland lesion diagnosed by FNAC and their respective histopathology picture.

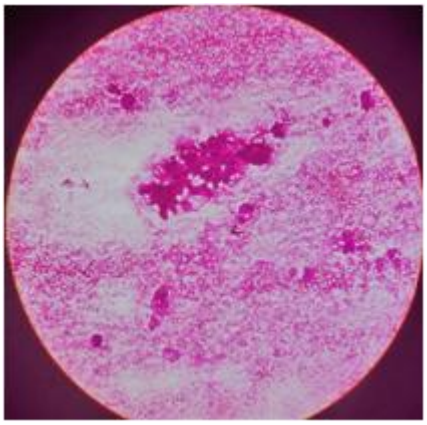


Figure 2A- FNAC picture of Benign lymphoepithelial cyst showing salivary ductal epithelial cell clusters in a background of lymphoid infiltrate

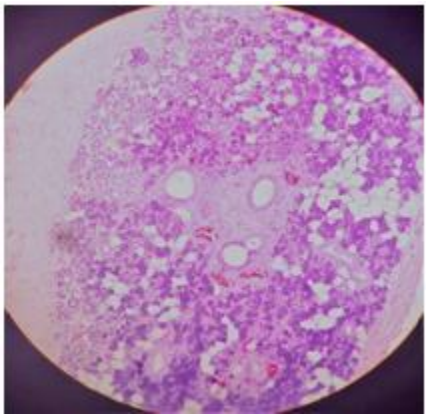


Figure 2B-Histopathology picture of Benign lymphoepithelial cyst shows cystic lining with lymphoid infiltrate

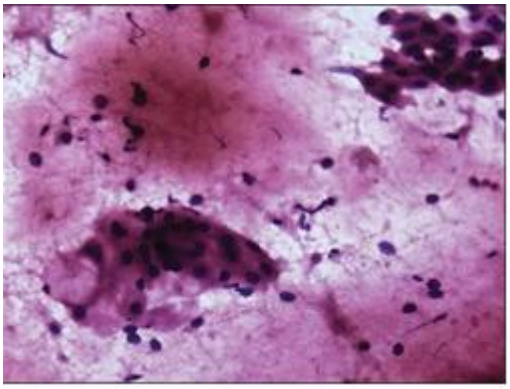


Figure 2C- FNAC picture of mucoepidermoid carcinoma showing mucous cells and epidermoid cells

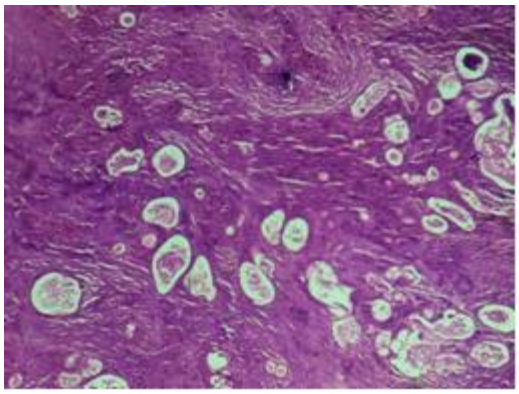


Figure 2D- Histopathology of mucoepidermoid carcinoma Showing mucinous cystic components and epidermoid components

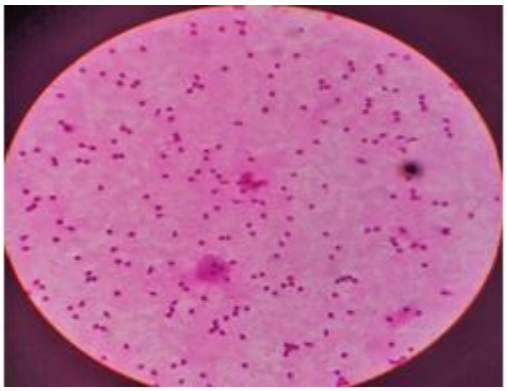


Figure 2E- FNAC of warthin's tumor showing scattered oncocytic cells in a background of lymphocytes and murky fluid

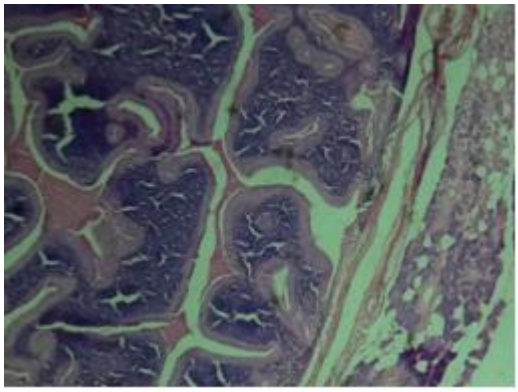


Figure 2F- Histopathology picture of warthin's tumor showing cystic spaces lined by bilayered oncocytic epithelium with underlying lymphoid tissue.

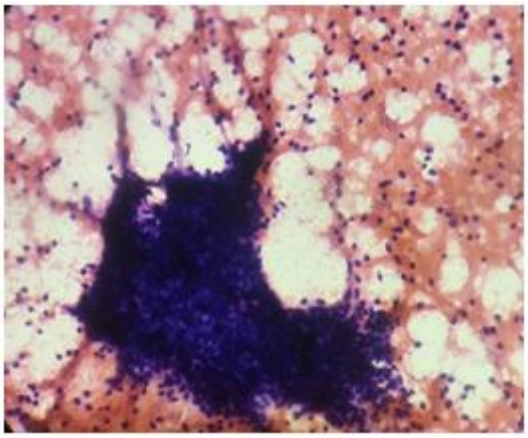


Figure 2G-FNAC of chronic sialadenitis showing small fragment of salivary gland ductal epithelial cells in a background of lymphocytes.

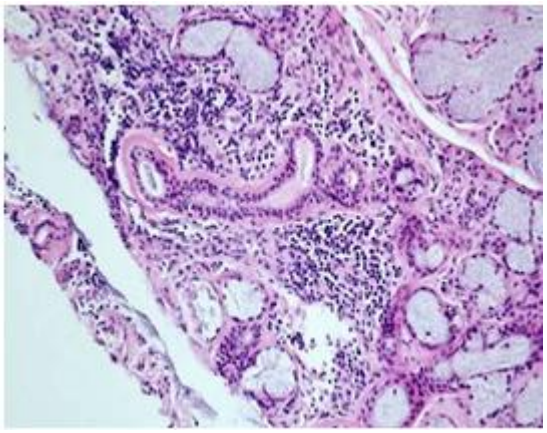


Figure 2H-Histopathology of chronic sialadenitis showing salivary gland acini surrounded by lymphocyte infiltrate

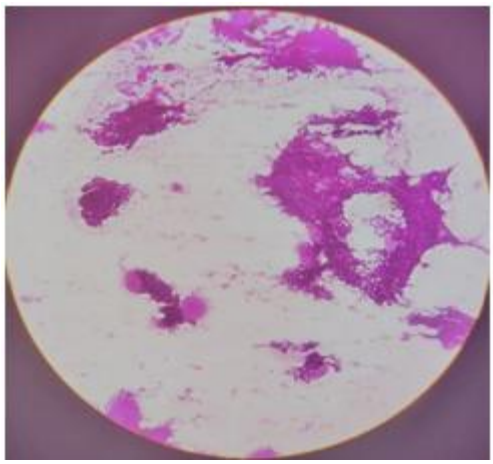


Figure 2I-FNAC picture of pleomorphic adenoma showing cellular smear of epithelial cells and fibro myxoid stroma

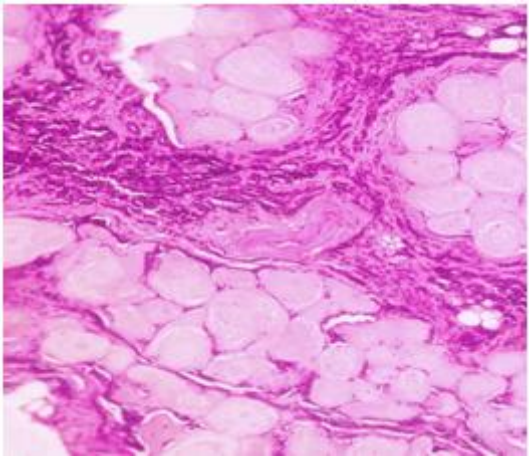


Figure 2J- histopathology diagnosis turned out to be adenoid cystic carcinoma showing cribriform pattern and perineural invasion (arrow mark)

The FNAC of the lesions demonstrated 75% cases were benign (30 cases) with pleomorphic adenoma (90%) being the commonest lesion. 7.5% cases were demonstrated to be of malignant nature with mucoepidermoid carcinoma being the most commonly encountered malignant neoplasm. Among the non-neoplastic lesions(17.5%), both acute and chronic sialadenitis almost presented in equal frequency, however, acute sialadenitis of parotid glands were more common to chronic sialadenitis which involved the submandibular glands.

The histological analysis was available for 31 cases of which 3 cases were non-neoplastic chronic sialadenitis, 24 cases of benign neoplastic lesions and rest 4 cases of malignant neoplasm. Of the benign group, all 21cases of pleomorphic adenoma were available for histological analysis. Rest 3 cases included 1warthin'stumor and 2 benign lymphoepithelial cyst

In all3 malignant cases, cyto histopathological correlation was consistent. 1 case of pleomorphic adenoma turned out to be adenoid cystic carcinoma (False negative for malignancy), while a case of basal cell adenoma was diagnosed as pleomorphic adenoma on cytology.

On final analysis of the present series, there were 3 malignant tumours on cytological diagnosis of which histopathological correlation were available in 3 cases with false positive as 0 and true positive

as 3 cases. Similarly, there were 37 cases of benign lesions (both non-neoplastic lesion and benign tumours 1) of which histopathological correlation were available in 28 cases
with false negative as 1 and true negative as 27 cases for malignancy. The fraction of patients with malignant tumours detected by positive cytology (sensitivity) was 93.54%.
The fraction of patients with benign lesions who were correctly identified by negative cytology (specificity) was 100%. The positive predictive value of salivary gland cytology was 100% with negative predictive value of 81.8%

Discussion

FNAC has an important place in the preoperative diagnosis of salivary gland lesions. Cytological diagnosis can help in formulating the treatment strategy in recurrent and inoperable malignancies without undergoing biopsy. This choice is motivated by the increased sensitivity and specificity with high diagnostic accuracy.[7]
The ease to perform an effective FNAC as an outpatient procedure with a 22-gauge needle with least complications add to the advantage of FNAC over open biopsy. The adequacy of materials obtained by FNAC in the present study was as high as 100%[7-13] which is quite comparable to the various studies performed in the past, Smears showed moderate to hyper cellularity in 92 % cases except for some which were cystic lesions.[6-8] repeat FNAC was suggested for cystic lesions.
The age and sex distribution has been well established in literature with slight male preponderance. The increased incidence of malignant neoplastic lesions in the late 40s and 60s with benign lesions affecting the early40s was reconfirmed from the present study.[14-16] Most of the series results were consistent with this study in terms of the site predilection except for Frable et al and Lingen which had demonstrated lesions in the sublingual glands also.[12,17] The cytological diagnosis with definitive histopathological correlation were available in 31 cases, however, the cytological diagnosis alone for all the 40 cases had a high specificity and sensitivity in the present series.
Unoccasionally, presence of nuclear pleomorphism of epithelial cells, irregular, multilobate and even bizarre nuclei in smears of pleomorphic adenoma may create confusion with carcinoma ex pleomorphic adenoma.[6]Also, presence of central core of homogeneous pink basement membrane material surrounded by small basaloid cells in pleomorphic adenoma should be approached cautiously as it can be a case of adenoid cystic carcinoma shown by this study. These cases need confirmation by open biopsy.
The present study confirms the increased incidence of benign neoplastic lesions compared to its malignant lesions in salivary gland. Howeverall lesions in the minor salivary glands were benign in nature. Some of the common salivary glands lesions such as, polymorphous lowgrade adenocarcinoma, epithelial myoepithelial carcinoma etc were not encountered in the present study. These facts need reconfirmation as the present study has the limitation of duration of one year inspite of an effective study population.
The present study demonstrated sensitivity as 93.54% and specificity as 96.42%. The positive predictive value of salivary gland cytology was 100% with negative predictive value of 81.8 % with diagnostic accuracy of 94.87%. These findings were in coherence with various studies like Filopoulos et al and others (Table 5).[7,14] The simple nature of the FNAC procedure with high diagnostic yield and minor complications such as focal bleeding makes it a primary diagnostic tool of salivary gland lesions. The danger of neoplastic cells seedling by NAC has been refuted by many studies with long follow up.[18] Complications are rare and high diagnostic accuracy has made FNAC preferable than surgical biopsies.

Table 5-Reported results of different studies of salivary gland lesions diagnosis by FNAC

S.NO	Author,year	No.of cases	Sensitivity	Specificity	Accuracy
1	Filopoulos et al,1998	121	95%	98%	97%
2	Boccato et al,1998	554	98%	98%	97%
3	Kilijienko et al,1999	1253	94%	94%	97%
4	Caujilis et al 1997		91%	96%	-
5	Viguer et al,1997	212	86%	99%	-
6	**Present study**	40	93.54%	96.42%	94.87%

Conclusion

Fine needle aspiration cytology is a safe, reliable and yet economically effective technique in diagnosing salivary gland lesions. It is a quick, convenient and accurate method of diagnosis and should be considered as one of the first line of investigations in the evaluation of salivary gland lesions. It has a high degree of diagnostic yield and sensitivity and thereby excluding the need for open biopsy. However, for final diagnosis, histopathological examination is still gold standard.

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Conflict of interest – None declared.
Ethical Approval- Not required.

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