Original Research Article

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FNAC and histopathological correlation of salivary gland lesions: an observational study

Sneha Kakoty^{1*}, Tridip Dutta Baruah², C. P. Ganesh Babu²

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*Correspondence:

Dr. Sneha Kakoty,

E-mail: dr.snehakakoty@gmail.com

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ABSTRACT

Background: Fine needle aspiration cytology (FNAC) is a sensitive and specific and yet an economically effective technique for diagnosis of salivary gland lesions. FNAC of salivary glands has achieved a pivotal role in the diagnosis and management of salivary gland lesions since its induction by Stewart et al in 1933. However, it has always been under scrutiny when compared to histopathology. Histopathology of salivary gland lesions is still the final method to establish diagnosis and predicting prognosis in these lesions.¹

Methods: A prospective observational study of 50 patients with salivary gland lesions was done at Gauhati Medical College and hospital from June 2011 to May 2012. 39 patients underwent histopathological confirmation. Cases with histopathological correlation were included in calculating diagnostic accuracy. The cytological findings were correlated with that of the histopathological diagnosis to obtain the accuracy of the cytological diagnosis. The parameters of diagnostic validity of the cytological technique in terms of sensitivity, specificity and predictive value were evaluated.

Results: Study population included patients of age group ranging from 13-70 years with median age group being 31-40 years (30%). 54% of the affected patients were male with the parotid being the most commonly involved gland (62%). Neoplastic lesions constituted the major bulk of the lesions (39 cases, 78%) with benign tumours constituting 54%. The most commonly involved benign neoplastic lesion was pleomorphic adenoma (22cases, 44%). Among the non-neoplastic lesions (22%), the acute sialadenitis was frequently noted. Histopathological correlations were available in 39 cases with 11 cases being the malignant lesions. The acute sialadenitis lesions did not undergo histological examination. 28 cases of non-malignant lesions underwent the histological confirmation. In the present study, the specificity and the sensitivity were found to be 96.42% and 90.91% respectively. The predictive value of salivary gland cytology was 90.91% and diagnostic accuracy was 94.87%.

Conclusions: Fine Needle Aspiration Cytology is thus a safe, reliable, 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.

Keywords: Diagnostic accuracy, FNAC, Mucoepidermoid carcinoma, Pleomorphic adenoma, Salivary gland lesions, Sensitivity, Specificity

INTRODUCTION

Salivary gland lesions encompass a heterogenous group of disorders and are broadly classified as neoplastic and non-neoplastic. Induction of fine needle aspiration cytology (FNAC) of salivary gland lesions by Stewart et al gained popularity as reliable yet economically effective mode of diagnosis.²⁻⁴ The added advantage of avoidance

¹Department of Pathology, Sree Uthradom Thirunal Hospital, Thiruvananthapuram, India

²Department of Surgery, Mahatma Gandhi Medical College and Research Institute, Puducherry, India

of fistula formation and recurrence following capsular disruption⁵, which are common with incisional or core needle biopsy makes it a perfect tool for initial assessment. FNAC in conjunction with clinical and radiological assessment forms the best base possible for selection of effective managemen.⁶ However, histological examination is still the gold standard for establishing the final diagnosis and staging of salivary gland lesions.¹

METHODS

This prospective observational study was carried out in the cytology division of Pathology Department, Gauhati Medical College and Hospital after obtaining approval from the institute ethical committee. 50 patients with salivary gland lesions were selected during the period from June 2011 to May 2012. Detailed clinical examinations followed by routine hematological and biochemical investigations were carried out in all cases.

Radiological investigation like X-ray ultrasonography were also done. Computer Tomography was done in selected cases. FNAC was performed in all cases by using a 22-gauge needle attached to a 10-cc disposable syringe. Histopathological confirmation was done on 39 cases. Cases which had histopathological correlation were only included in calculating diagnostic accuracy. May-Grunwald Giemsa and Papanicolaou stains were used for staining cytology smears. The specimen for histopathological analysis were received in formalin and following tissue processing, hematoxylin and eosin staining were done. Special stains like periodic acid schiff staining were done in selected cases. The cytological diagnosis was established and was correlated with its histological diagnosis. The incidence of benign and malignant tumors in relation to age and sex was evaluated. The parameters of diagnostic validity of FNAC in terms of sensitivity, specificity and predictive value were evaluated.

RESULTS

The study showed 27 of the involved patients were males with M: F ratio being 1.17:1. The incidence of the salivary gland lesions were as high as 30% in the age group of 31 to 40 years followed by 20% each in the age group of 21 to 30 years and 41 to 50 years (Table 1).

Table 1: Age distribution of cases.

Age group distribution	No. of cases	Percentage
0-10	0	0
11-20	7	14
21-30	10	20
31-40	15	30
41-50	10	20
51-60	6	12
61-70	2	4

Age distribution of cases between 13-70 years. The maximum numbers of patient belonged to the age group between 31-40 years.

Parotid gland was the most commonly involved gland with an incidence of 62 % followed by the submandibular glands with almost equal involvement over both sides (Table 2).

Table 2: Distribution of cases based on location.

Salivary gland involved	No. of cases	P	ercentage	Т	otal
Parotid (31)	Right	15	30		62
	Left	16	32		62
Submandibular (16)	Right	9	18		32
	Left	7	14		32
Sublingual (0)	Right	0	0		0
	Left	0	0		0
Minor salivary gland	3	6		6	

Minor salivary glands were involved in 6% cases however, no lesions were found in the sublingual glands. The FNAC of the lesions demonstrated 54% cases were benign (27 cases) with pleomorphic adenoma (44%) being the commonest lesion. 24% cases were demonstrated to be of malignant nature followed by non-neoplastic lesions (22%). The mucoepidermoid carcinoma was the most commonly encountered malignant neoplasm (16%) (Table 3).

Among the non-neoplastic lesions, 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.

Non-neoplastic lesions were more common in the age group of 31 to 40 years (45.45%). The neoplastic benign lesions were spread along a bigger age distribution with maximum incidence in 30 to 40 age group. However, malignant lesions were primarily noted in the age group of 51 to 60 years (Table 4).

The histological analysis was available for 39 cases of which 4 cases were non-neoplastic chronic sialadenitis, 24 cases of benign neoplastic lesions and rest 11 cases of malignant neoplasm. Of the benign group, all 22 cases of pleomorphic adenoma were available for histological analysis. Rest 2 cases included the others group (nonspecific fatty and blood elements were obtained in FNAC) which were diagnosed as Sialo lipoma and Sialolipohemangioma on histology.

Out of the 12 malignant cases, the adenoid cystic carcinoma case was not available for histological analysis. On cytohistopathological correlation, results of 2 cases with one each from benign and malignant group were found to be inconsistent. 1 case of pleomorphic

adenoma turned out to be mucoepidermoid carcinoma (False negative for malignancy) while, the case of Ca ex pleomorphic adenoma was diagnosed as pleomorphic

adenoma (False positive for malignancy) on histology (Table 5).

Table 3: Distribution and type of lesions by FNAC.

FNAC diagnosis	Parotid	SM	MSG	Total	Percentage
Non-neoplastic lesion (11)					
Acute sialadenitis	5	1	0	6	12
Chronic sialadenitis	1	4	0	5	10
Benign tumours (27)					
Pleomorphic adenoma	16	4	2	22	44
Myoepithelioma	1	0	1	2	4
Oncocytoma	1	0	0	1	2
Others	2	0	0	2	4
Malignant tumours (12)					
MEC	5	3	0	8	16
Acinic cell Ca	2	0	0	2	4
Adenoid cystic Ca	0	1	0	1	2
Ca ex pleomorphic adenoma	0	1	0	1	2

Table 4: Distribution of salivary gland lesions according to age group.

Age group	Acute Sialader	nitis Chr	onic Sialadenitis		Total Cases	Percentage
0-10	0	0			0	0
11-20	0	0			0	0
21-30	2	0			2	18.18
31-40	2	3			5	45.45
41-50	2	1			3	27.27
51-60	0	1			1	9.1
61-70	0	0			0	0
Age group	Pleomorphic adenoma	Myoepithelioma	Oncocytoma	Others	Total cases	Percentage
0-10	0	0	0	0	0	0
11-20	4	0	1	1	6	22.22
21-30	6	0	0	0	6	22.22
31-40	7	1	0	0	8	29.62
41-50	2	1	0	1	4	14.82
51-60	3	0	0	0	3	11.12
61-70	0	0	0	0	0	0
Age group	MEC	Acinic cell Ca	Adenoid cystic Ca	Ca ex PA	Total cases	Percentage
0-10	0	0	0	0	0	0
11-20	1	0	0	0	1	8.33
21-30	2	1	0	0	3	25
31-40	0	0	1	0	1	8.33
41-50	2	0	0	0	2	16.67
51-60	2	1	0	1	4	33.34
61-70	1	0	0	0	1	8.33

On final analysis of the present series, there were 12 malignant tumours on cytological diagnosis of which histopathological correlation were available in 11 cases with false positive as 1 and true positive as 10 cases. Similarly, there were 38 cases of benign lesions (both non-neoplastic lesion and benign tumours) 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 90.91%.

The fraction of patients with benign lesions who were correctly identified by negative cytology (specificity) was

96.42%. The predictive value of salivary gland cytology

was 90.91% with diagnostic accuracy of 94.87%.

Table 5: Showing cytohistopathological correlation.

Cytological diagnosis (50)	No. of cases	Cases with histopathological correlation(39)	Consistent	Not consistent
Non-neoplastic lesions (11)				
Acute sialadenitis	6	-	-	-
Chronicsialadenitis	5	4	4	-
Benign tumours (27)				
Pleomorphic adenoma	22	22	21	1
Myoepithelioma	2	-	-	-
Oncocytoma	1	-	-	-
Sialolipoma	1	1	1	-
Sialolipohaemangioma	1	1	1	-
Malignant tumours (12)				
MEC	8	8	8	-
Acinic cell Ca	2	2	2	-
Adenoid cystic Ca	1	-	-	-
Ca ex PA	1	1	-	1

DISCUSSION

FNAC has acquired an important place in the preoperative diagnosis of palpable masses of salivary gland lesions. Cytological diagnosis alone can help in formulate the treatment strategy especially in recurrent and inoperable malignancies without undergoing open 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% which is quite comparable to the various studies performed in the past⁷⁻¹³ smears showed moderate to hyper cellularity in 92 % cases except for four cases which were cystic lesions. ^{6,8} A repeat FNAC must be considered from these cystic lesions once adequately aspirated in the first instance provided sialolipohemangioma or any such vascular lesions has been excluded.

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 50s with benign lesions affecting the late 30s and early 40s 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 39 cases, however, the cytological diagnosis alone for all the 50 cases had a high specificity and sensitivity in the present

series. One case each of sialolipoma and sialolipohemangioma described in the others category (Table 3) could not be definitively diagnosed on FNAC due to presence of nonspecific abundant fat cells along with blood elements and unremarkable salivary gland acini. These cases can only be confirmed definitively on open biopsy. Thus, a strong level of suspicion combined with clinical and radiological correlation prior to FNAC can aid in citing a probable diagnosis via FNAC.

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 goblet cells or squamous metaplasia in pleomormic adenoma should be approached cautiously as it can be a case of low grade mucoepidermoid carcinoma as shown by this study. These cases need confirmation by open biopsy.

The present study reconfirms the increased incidence of benign neoplastic lesions compared to its malignant counterpart. However, contrary to belief, all lesions in the minor salivary glands were benign in nature. Some of the common salivary glands lesions such as sialoadenosis, benign lymphoepithelial lesions, various cysts, basal cell adenoma, basal cell adenocarcinoma, 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 90.91% and specificity as 96.42%. The predictive value of salivary

gland cytology was 90.91% with diagnostic accuracy of 94.87%. These findings were in coherence with various studies.^{7,14} The simple nature of the procedure with high diagnostic yield with minor complications such as focal bleeding in few cases establishes its role in primary diagnosis of salivary gland lesions. The danger of neoplastic cells seedling by FNAC has been refuted by many studies with long follow up.¹⁸ Complications are rare and high diagnostic accuracy has made this technique preferable to traditional surgical biopsy.

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 obviating the need for open biopsy. However, for final diagnosis, histopathological examination is still necessary for reconfirmation in the present era.

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institutional ethics committee

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