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Research Article

Diagnostic Accuracy Of Fine Needle Aspiration Cytology in Salivary Gland Neoplasms

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Abstract:

Introduction- Evaluation of diagnostic accuracy of fine needle aspiration cytology (FNAC) in salivary gland neoplasms. Materials and method – this is a crossectional study provides analysis of 82 salivary neoplasms out of 244 salivary FNAC during the period September 2011 to august 2014. All non neoplastic lesions were excluded from the study.All age group and both sex were included. FNAC results were reviewed, the morphology of individual cells and their patterns in the smears were studied in detail and diagnosis were made. Histopathological studies were done whenever possible and were considered the gold standard. Results – The study included 82 cases, male to female ratio was 1.2 :1 ; commonly involved age group was 20 to 40 years. Fiftyfive cases (67.07%) were diagnosed as benign, 27 cases (32.93%) as malignant tumors. Pleomorphic adenoma(59.76%) was most common benign neoplasms and mucoepidermoid carcinoma(23.17%) was most common malignant neoplasms. Parotid was most frequently involved gland(63.41%).Benign tumors common in parotid gland malignant tumors common in submandibular gland.Diagnostic accuracy was found to be 94.87% with false negative rate 5.1%.

Conclusion – FNAC of salivary gland proved to be a highly accurate initial diagnostic test for preoperative evaluation of salivary neoplasms.

Key words:- FNAC, salivary, neoplasms, histopathology, diagnostic accuracy.

INTRODUCTION

A swelling in the salivary gland region often presents a diagnostic challenge because of its site of origin and tissue specific diagnosis.[1] Salivary gland neoplasms are rare, and they account for 2-6.5% of all head and neck tumors.[2] In case of salivary gland lesions use of fine needle aspiration cytology (FNAC) is mainly to distinguish salivary lesions from non-salivary lesions, separating non neoplastic from neoplastic lesions, categorizing neoplasms into benign and malignant, determining the site of origin i.e whether the tumour has arisen from salivary gland or it is metastatic.[3,4,5,6] According to the literatures diagnostic accuracy for benign tumour ranges from 72% to 98% while for malignant tumour ranges from 64% to 98.4%.[3,6,7]A study reported that FNA reduces operative intervention by 65% in submandibular masses and by 35% in parotid masses.[6,8]

Salivary glands are not generally subjected to incisional or core needle biopsy because of the possible risk of fistula formation, damage to facial nerve or tumor implantation through disrupted capsule. Therefore fine needle aspiration(FNA) become more popular in establishing a preoperative diagnosis in case of neoplastic salivary gland lesions.

Aim of this study is to evaluate the diagnostic accuracy of fine needle aspiration cytology in salivary gland neoplasms with cytomorphological pattern analysis.

MATERIALS AND METHODS

This is a cross- sectional study that provides cytomorphological analysis of salivary gland neoplasms at tertiary centre for a period of three years (from September 2011 to August 2014). Ethical clearance was obtained from hospital administration and informed consent was taken from all patients. All total 82 neoplastic lesions out of 244 salivary FNAC(both neoplastic and non neoplastic lesions)were analyzed. All cases within age group 0 to >60 years , both sexes were included in the study and all non tumorous benign lesions and inconclusive aspirates were excluded from the study.

FNAC was performed using a 22 gauge needle . An average two passes was performed and minimum 4 slides were prepared. Two slides were air dried and stained by Giemsa stain, while the remaining two slides were fixed in equal parts of ether alcohol mixture and then stain with PAP (Papanicolau) stain. Smears showing enough cellular material to provide a diagnosis were considered satisfactory. In this study FNAC results were correlated with histological findings, whenever available.

All data collected were thoroughly cleaned and entered in to MS-Exel spread sheet and analysis were carried out. Statistical analysis was done to find out the diagnostic accuracy of the FNAC.

RESULTS

Total 82 salivary gland neoplasms are analysed in the study.

Males are more commonly affected than females, M:F = 1.2: 1 (table1) . Most commonly involved age group was 21 to 40 years(table1). Highest relative frequency(Fr) of salivary gland neoplasms in 21-40 years age group was 0.365 with simple frequency (F) 30 and percentage of frequency (F%) 36.500. Benign tumors (67.07%) are more common than malignant tumors (32.93%) (B:M =2.4:1).

Table 1: Number of Salivary Gland neoplasms for different age groups in males and females

Salivary gland neoplasms		
Age in years	**Number of cases**	
	Male	**Female**
0 to 20	4	6
21 to 40	15	15
41 to 60	15	12
More than 60	12	3
Sum	**46**	**36**
Mean	**11.5**	**9**
SD	**±5.196**	**±5.477**
SEM	**±2.598**	**±2.738**
N	**4**	**4**

Out of 55 benign tumors, 49(89.09%) were pleomorphic adenoma, 5 (9.09%) cases were myoepithelioma and 1(1.82%) warthin tumours. Pleomorphic adenoma(fig3,6) was most commonly encountered benign neoplasm commonly occurring in parotid gland. Among malignant tumours (N=27) maximum numbers of cases comprised of mucoepidermoid carcinoma 19(70.37%) (fig4,7) followed by adenoid cystic carcinoma 4(14.81%), acinic cell carcinoma 3(11.11%)(fig5) and carcinoma ex pleomorphic adenoma 1(3.70%).(table2),(fig1) Out of 52 parotid glands tumours, 37(71.15%) were benign and 15 (28.85%) were malignant.

Table 2: Distribution of various neoplastic lesions in different salivary glands.

Cytological diagnosis	Various neoplasms involving different type of salivary glands			
	Parotid	Submandibular	Sublingual	Minor salivary gland
Pleomorphic adenoma	34	11	01	03
Myoepithelioma	02	03	00	00
Warthin tumour	01	00	00	00
Mucoepidermoid carcinoma	09	10	00	00
Adenoid cystic carcinoma	03	00	00	01
Acinic cell carcinoma	02	01	00	00
Carcinoma ex pleomorphic adenoma	01	00	00	00
SUM	52	25	1	4
Mean	7.429	3.571	0.143	0.571
SD	±12.040	± 4.860	±0.378	±1.134
SEM	±4.550	1.836	±0.142	±0.428

Out of 25 submandibular glands tumours, 14(56%) were benign and 11 (44%) were malignant. Benign tumours are more common in parotid gland (71.15%) and malignant tumours are relatively more common in submandibular gland (44%). Among all salivary glands parotid is the most frequently affected gland (63.41%).

Histopathological examinations(HPE) were available in 39 cases. In 37 cases histopathological diagnosis was consistent with cytological diagnosis(table3)(fig2).

Table 3: Cytological and histological correlation of salivary gland tumors

Histopathology consistency with cytodiagnosis				
Cytodiagnosis	**Cyto positive cases N=82**	**Histo Pathology Available cases N=39**	**HPE consistent with cytodiagnosis**	**HPE inconsistent with cytodiagnosis**
Pleomorphic adenoma	49	26	24	02
Myoepithelioma	05	02	02	00
Warthins	01	01	01	00
Mucoepidermoid carcinoma	19	07	07	00
Adenoid cystic carcinoma	04	02	02	00
Acinic cell carcinoma	03	01	01	00
Ca. Ex pleomorphic adenoma	01	00	00	00
SUM			**37**	**02**
Mean			**5.286**	**0.286**
SD			**±8.558**	**±0.756**
SEM			**±3.234**	**±0.285**

Two cases were inconsistent (false negative, 5.4%). No false positive cases were encountered. Out of two inconsistent cases which were cytologically diagnosed as pleomorphic adenoma (FN=2) one turned out as carcinoma ex pleomorphic adenoma and another adenoid cystic carcinoma on histopathology. All total there were 27 true negative cases (cytologically benign, histologically benign), 10 true positive cases (cytologically malignant and histopathologically malignant) 2 inconsistent (FN) diagnosis (cytologically benign histologically malignant).

Diagnostic accuracy of salivary gland neoplasm was found to be 94.87% with false negative rate (5.1%).

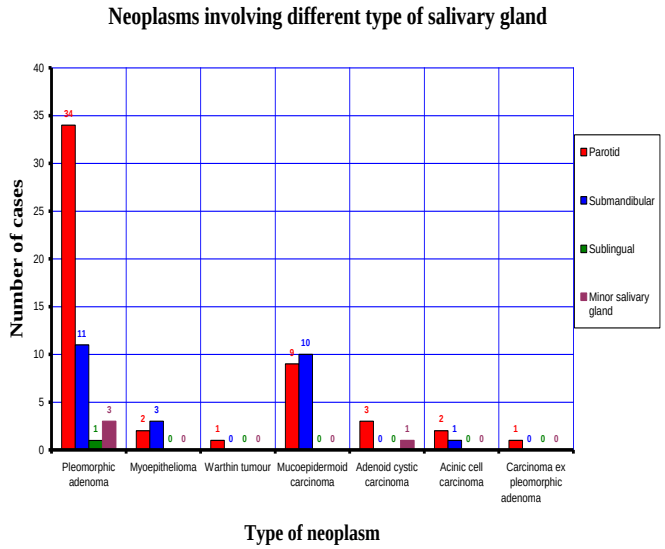

Fig.1: Various type of neoplastic lesions involving different type of salivary gland.

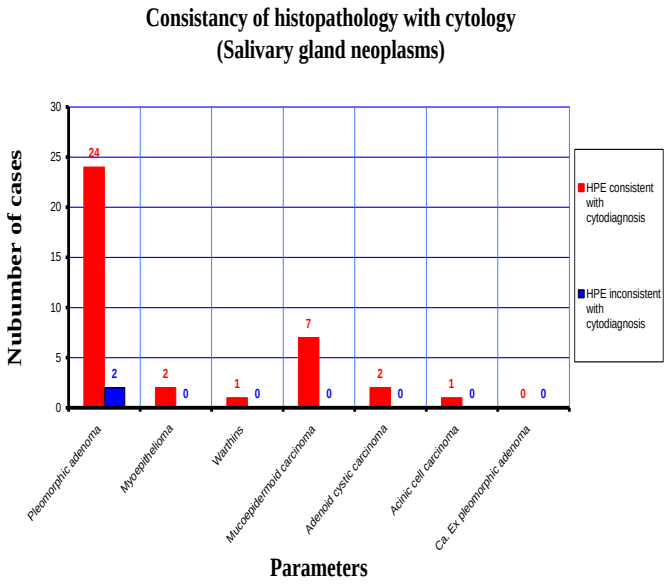

Figure 2 : Histopathological consistency with cytological diagnosis of various neoplastic lesions involving different type of salivary gland

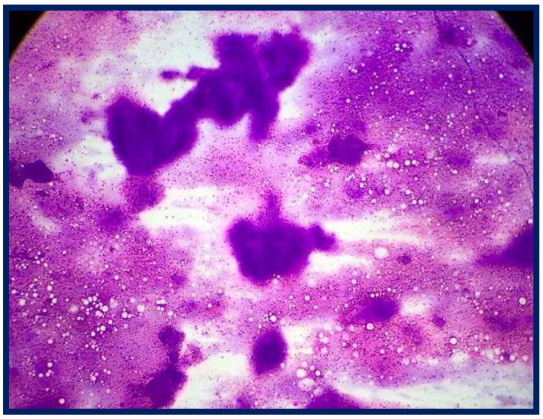

Fig.3: Cytological smear of pleomorphic adenoma of salivary gland (MGG X100

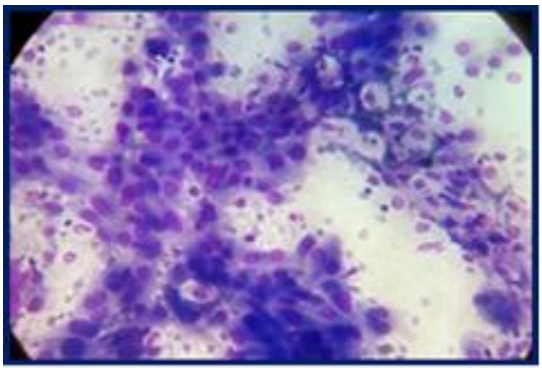

Fig.4: Cytological smear of mucoepidermoid carcinoma of salivary gland(MGG X400

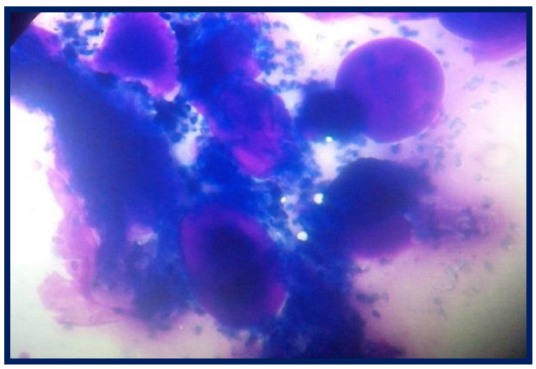

Fig.5: Cytological smear of adenoid cystic carcinoma of salivary gland(MGG X400)

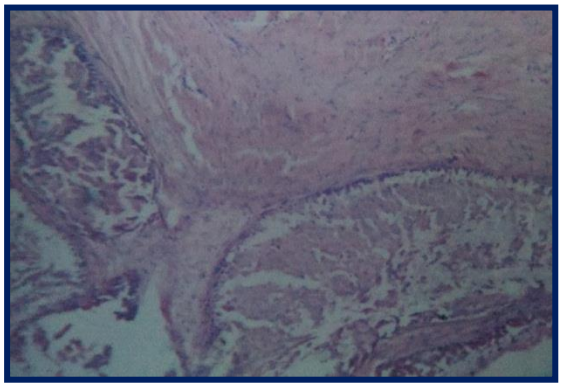

Fig.6: Tissue section from pleomorphic adenoma salivary gland (H&E X400)

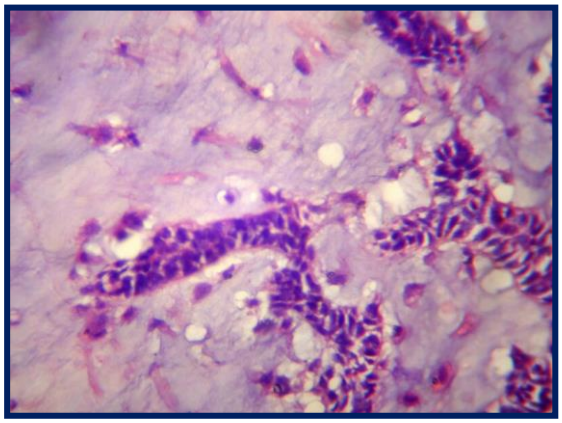

Fig.7: Tissue section from mucoepidermoid carcinoma salivary gland (H&E X100)

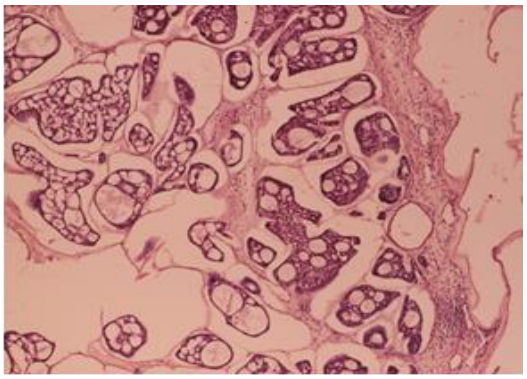

Fig.8: Tissue section from adenoid cystic carcinoma of salivary gland (H&E X100)

DISCUSSION

Salivary gland neoplasms are relatively uncommon but their various clinical presentation, different morphologic configuration and relative unpredictable prognosis make them interesting and continue to attract significant medical attention. In this study salivary gland tumours are common in 21-40 years which is similar to the findings of Dilip K Das[1]et al, Neveen Tahoun[9],Chetna Jain,[10] Vaishali H Anand.[11] Sex ratio or M:F ratio was 1.2:1 . It is similar to other authors.[1,9-11] In this study we found benign tumours are common in 21-40 years which is similar with other authors .[9-11] Malignant tumours are common in 41-60 years which is similar to other studies done by G C Fernandes and Vaisali H Anand.[11]

Ratio of benign and malignant tumours is 2.03:1. Findings are comparable with Neveen Tahoun and Noha Ezzat[9] (1.5:1), Vaishali Anand[11](4.9:1) and Shilpa H. Gandhi[12](3.5:1). Most common benign tumour is pleomorphic adenoma and most common malignant tumour is mucoepidermoid carcinoma. These findings are similar with other authors.[1,2,12,13]

Commonly involved salivary gland was parotid (63.41%) , this finding is comparable with Chetna Jain[10](54.28%); Silpa H Gandhi et al [12](60.1%); Vaishali H Anand [11](74%).

In this study, benign tumours are more common in parotid gland (71.15%) and malignant tumours are relatively more common in submandibular gland (44%). It is comparable to the study done by Wahidizzaman et al.[13]Two false negative (5.4%) cases were encountered without any false positive case. Out of 2 false negative (FN) cases (both were cytologically diagnosed as pleomorphic adenoma), one came out to be carcinoma ex pleomorphic adenoma another one adenoid cystic carcinoma on histopathology. A cellular pleomorphic adenoma with squamous metaplasia and cellular atypia on FNAC needs to be differentiated from carcinoma ex pleomorphic adenoma and mucoepidermoid carcinoma. In case of carcinoma ex pleomorphic adenoma history of rapid growing tumour of long standing and obvious nuclear atypia along with benign looking area may help in proper cytological diagnosis.

Again cellular pleomorphic adenoma with abundance of hyaline materials may ; be confused with adenoid cystic carcinoma. But careful history and malignant nuclear characteristic, hyaline globule, stromal structure surrounded by epithelial cells can differentiate the malignant lesions from benign ones. Diagnostic accuracy(DA) was found to be 94.87% with false negative rate (5.1%). Our findings are comparable with Vaishali Anand[12](DA 100%), D.K. Das et al[1](DA 91.1%), Patric et al[14](DA 90%), N.Tahoun[10](DA 92%).

False negative (F.N) rate of present study (5.1%) was comparable with SR Orell[3] (F.N- 2.46%); Vaisali H Anand[12](F.N-3.33%).

This study point out the utility of FNAC in rapid preoperative diagnosis of salivary gland neoplasms along with frequency and cytomorphological pattern analysis .Fine needle aspiration cytology (FNAC) is a rapid, easily available, cost effective, outdoor procedure with high diagnostic accuracy. It is a very valuable diagnostic technique where other facilities like histopathology immunohistochemistry(IHC) molecular analysis are not easily available and costly . In our region most of the patients come from lower socioeconomic background and they are very much unaware of their diseased condition, and most of the time come to the hospital when it is already late. In those situations FNAC is invaluable. Few false negative diagnosis do occur and to avoid this we should view the slides with caution and a second opinion should be taken whenever necessary. However more studies are necessary with application of ancillary technique like immunohistochemistry (IHC) and molecular analysis for more accurate diagnosis.

CONCLUSION

Fine needle aspiration cytology is most valuable method for initial assessment of salivary gland neoplasms with high diagnostic accuracy. Its result provide valuable information to the surgeon in preoperative diagnosis of various benign and malignant tumors. It should be use in each and every case of salivary mass for planning of operative procedure and post operative management.

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