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Concordance Study of Fine Needle Aspiration Cytology (FNAC) With Histopathology for Diagnostic Evaluation of Salivary Gland Lesions.

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I. INTRODUCTION:

Fine Needle Aspiration Cytology (FNAC) of suspected salivary gland lesions has an established role in preoperative diagnosis and management of patients[1]. The diseases of salivary gland form an important yet an interesting group of lesions in respect to their diagnosis, treatment and prognosis. Although salivary gland tumors account for 2-6.5% of all head and neck tumors, their superficial location, easy accessibility and high diagnostic accuracy makes FNAC a popular method for evaluating salivary gland tumors[2,3]. Salivary gland tumors can arise from either the major salivary glands (parotid, submandibular and sublingual) or the minor salivary glands which are located throughout the submucosa of the upper aerodigestive tract. Of all primary epithelial tumors, 64-80% occur in parotid glands, 7-11% occurs in the submandibular glands, less than 1% occur in the sublingual glands and 9-23% occur in the minor glands.[4] In the files of Armed Forces Institute of Pathology (AFIP), about 1/3rd of major gland and half of minor gland tumors are malignant. The ratio of malignant to benign tumor is greatest (>2.3:1) in the sublingual gland, tongue, floor of the mouth and retro-molar area.[3] The mean age at presentation for malignant salivary neoplasms is 55 to 65 years while benign lesions typically develop atleast a decade earlier, at a mean age of 45 years.[5]

This study was aimed to examine the cytological details in aspirated smears from salivary gland swellings and to evaluate the efficacy of FNAC in the diagnosis of salivary gland lesions. The histopathological findings were compared wherever possible.

II. MATERIALS AND METHODS:

This study was a prospective study done on 53 cases of salivary gland lesions encountered in Chalmeda Anand Rao Institute Of Medical Sciences Karimnagar, for a period of 2 years (1st October 2012 to 30th September 2014). Aspiration was done at the Department of Pathology after a thorough clinical examination. The slides were immediately fixed in Carnoy's fixative/95% ethanol For Pap and H & E (hematoxylin & eosin) staining, and the rest of the slides were air dried for MGG staining. In cases of fluid aspiration, slides were made from uncentrifuged as well as from centrifuged material. Special stains were performed as and when required. The slides were then examined under the light microscope.

Those cases being operated upon were reported using formalin fixed paraffin embedded H&E slides and followed by comparison of histopathological findings with preoperative cytology findings.

When reporting cytology the lesions were categorized by Milan System for Reporting Salivary Gland Cytopathology and Updates as neoplastic and non-neoplastic[6].

Sensitivity, specificity and diagnostic Accuracy were calculated using standard statistical equations.

III. RESULTS:

Of the total 53 aspirations done, 37 patients underwent surgery and were followed by histopathological diagnosis. These 37 cases were considered as the study group for the present study of cytological and histopathological correlation of salivary gland lesions. The under study patients were of age group ranging from 15-76 years with 12(32.43%) of the cases in between 31-40 years.. Female cases (51.35%) slightly outnumbered the number of male cases (48.65%). The salivary gland lesions were more common in right parotid gland 16(40.63%) followed by right submandibular gland 8(25.00%) compared to left side salivary glands.

Salivary gland lesions were classified into three diagnostic classes revealing 11 non – neoplastic lesions, 20 benign lesions and 6 malignant lesions on histopathological examination. **(Table 1)**

Among non-neoplastic lesions of salivary glands, chronic sialadenitis was the most common lesion seen in the submandibular gland which comprised 9 cases (81.82%) followed by 2 cases (18.18%) of mucocele seen in the minor salivary glands.(**Table2)**

Of the benign neoplastic lesions of salivary glands, Pleomorphic adenoma was the most common lesion seen in the Parotid gland comprising 19 cases (95.00%) (**Fig 1)** with one case of monomorphic adenoma also seen in parotid gland. **(Table 3)**

Among the malignant lesions of salivary glands 2 cases of Polymorphous low grade adenocarcinoma (40.00%), 2 cases of mucoepidermoid carcinoma (33.33%) (**Fig 2**) and 1 case of salivary duct carcinoma (16.67) were seen in the parotid gland.

One case of Polymorphous low grade adenocarcinoma (16.67) (**Fig 3)** was seen in the submandibular gland. (**Table 4)**

On comparing the cytological diagnoses with the histopathological diagnoses following findings were concluded. Out of 10 cases of chronic sialadenitis, 9 were concordant (69.24%) but 1 case turned out as Pleomorphic adenoma on H&E. Two cases of mucocele were concordant (15.38%) however 1 case of infected cystic lesion was diagnosed as salivary duct carcinoma on H&E. Among 19 cases of Pleomorphic adenoma, 18 (90.00%) were concordant and 1 case assesed as benign cystic lesion on FNAC was diagnosed as Monomorphic adenoma on H&E. Out of three cases of polymorphous low grade adenocarcinoma one was diagnosed as pleomorphic adenoma on FNAC. Two cases each of mucoepidermoid carcinoma (50.00%) & low-grade adenocarcinoma (50.00%) were concordant with Histopathological diagnoses. In conclusion the 37 cases that underwent FNAC and then were followed by Histopathological diagnoses 33 were in concordance with histopathological diagnoses. **(Table 5)**

These lesions were further divided into malignant, benign and nonneoplastic lesions and their diagnostic accuracy was calculated.

The sensitivity and specificity of diagnosing malignant lesions on FNAC was 66% and 100% respectively and its positive predictive value and Negative predictive value was 100% and 94% respectively.

The sensitivity and specificity of diagnosing benign lesions on FNAC was 85% and 88% respectively and its positive predictive value and Negative predictive value was 89% and 83% respectively.

The sensitivity and specificity of diagnosing non neoplastic lesions on FNAC was 100% and 88% respectively and its positive predictive value and Negative predictive value was 78.5% and 100% respectively.

IV. DISCUSSION.

In a recent study by Soumendra Mishra et al, 119 FNA were performed and previous cytological findings were compared to subsequent histopathology report[7]. Among 119 FNAs, 2.5% were nondiagnostic, 55.4% were nonneoplastic, 25.2% were benign, 1.7% were SUMP, 2.5% were "suspicious" for malignant neoplasm, and 12.6% were malignant. These percentages are higher in the present study which showed 30% cases as non neoplastic, 54% cases as benign and 16% cases as malignant, as the study has lesser number of study cases.

Study by Ersoz et al[8] showed overall 93% sensitivity and 100% specificity of FNAC for salivary gland lesions and by Gita jayram et al[9] the overall diagnostic accuracy of FNA cytological diagnosis in salivary gland lesions was found to be 73.6%. this was in concordance with our study where overall diagnostic accuracy was 95% for malignant lesions, 86% for benign lesions and 92% for non-neoplastic lesions.

In the study by Singh Nanda, KD Mehta; sensitivity, specificity, positive predictive value, and negative predictive value of FNAC for malignant neoplastic lesions were 84.61%, 86.48%, 68.75%, and 94.11%, respectively, whereas for benign neoplastic lesions, they were 84.61%, 91.66%, 91.6%, and 85%respectively[10]. This was slightly in concordance with our study which showed sensitivity, specificity, positive predictive value, and negative predictive value of FNAC for malignant neoplastic lesions were 66%, 100% 100% and 94%, respectively, whereas for benign neoplastic lesions, they were 85%, 88%, 89%, and 83%respectively

Nettle and Orell[11] diagnosed majority of cases (94%) preceding to surgery correctly on cytology as benign or malignant. The specific diagnosis was made in 95% of benign neoplasms and in 68% of malignant neoplasms with an overall accuracy of 88%.

Ashraf et al[12] reported the same findings with the sex distribution and site of salivary gland lesions, distribution of females & males were almost equal.

In the study by Fernandes et al [13] Out of 88 cases, 68 had swellings in parotid gland (77%), 19 had them in submandibular gland (22.5%) and one had them in hard palate (0.5%) and study by Archana Shetty *et al* which comprised of 56 cases out of which parotid gland (59.37%) was most commonly involved followed in decreasing order of frequency by submandibular gland (34.37%) and minor salivary glands(6.25%)[14].Both these studies were in concordance with our study where 24 cases were in parotid gland (65%), 11 in submandibular gland (30%) and 02 cases in minor salivary gland (05%). Pleomorphic adenoma was the commonest neoplasm seen in their studies similar to the present study.

Shazia *et al* studied total of 80 cases in a 10 year study, out of which 49 (61.25%) were benign and 31 (38.75%) were malignant[15]. This was slightly lower in the present study which showed 20(54%) benign cases and 06 (16%) malignant cases.

Dr.Ankur *et al* studied 60 cases of salivary gland lesions. In the benign lesions, 18 were Pleomorphic adenomas, 4 were Warthin's tumors, 1 was myoepithelioma and 1 case of lymphangioma[16]. Our study also had maximum number of pleomorphic adenoma out of 20 benign salivary gland lesions.

Various authors proposed different reporting protocols in classifying the salivary gland lesions, however our study used Milan System for Reporting Salivary Gland Cytopathology and Updates as reporting protocol for cytology diagnosis. **(Table 6)** .

V. CONCLUSION

FNAC has high diagnostic accuracy (89% in present study) which helps in appropriate therapeutic management, whether it is local excision for a benign neoplasm, radical surgery for a malignant neoplasm or alternate treatment. The main advantage of this procedure is that it can be repeated at different sites in a particular lesion.

FNAC is useful as an outpatient diagnostic procedure because of immediate diagnostic results in comparison with the histopathological diagnosis.

The present study has indicated the diagnostic role of fine needle aspiration cytology in salivary gland lesions and its reliability. Re-aspirations and image-guided techniques, coupled with immunocytochemistry, will certainly enhance the diagnostic accuracy.

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Tables

Table 1: Categorization of salivary gland lesions (N=37)

Lesions	Number (%)
Non- Neoplastic lesions	11(29.73)
Benign	20 (54.05)
Malignant	6(16.22)
Total	37(100.00)

Table 2: Histodiagnosis of non-neoplastic salivary gland lesions (N=11)

Histodiagnosis	Parotid Gland Number (%)	Submandibular Number (%)	Sublingual Number (%)	Minor salivary Gland Number (%)
Mucocele (2)	--	--	--	2(18.18)
Chronic Sialadenitis (9)	3(27.27)	6(58.33)	--	--
Total 11(100.00)	3(27.27)	6(58.33)	--	2(18.18)

Table 3: Histodiagnosis of benign neoplastic salivary gland lesions (N=20)

HistodiagnosisNumber (%)	Parotid gland Number (%)	Submandibular gland Number (%)	Sublingual gland Number (%)	Minor salivary gland Number(%)
Pleomorphic Adenoma 19 (95.00)	15(78.94)	4(20.00)	--	--
Monomorphic adenoma 1(5.00)	1(5.26)	--	--	--
Total 20(100.00)	16(80.00)	4(20.00)	--	--

Table 4: Histodiagnosis of malignant salivary gland lesions (N=6)

HistodiagnosisNumber (%)	Parotid gland Number (%)	Submandibulargland Number (%)	Sublingualgland Number (%)	Minor salivary gland Number(%)
Mucoepidermoid Ca 2(33.33)	2(33.33)	--	--	--
Polymorphous Low Grade Adenocarcinoma 3(50.00)	2(40.00)	1(16.67)	--	--
Salivary Gland duct Ca 1(16.67)	1(10.00)	--	--	--
TOTAL 6 (100.00)	5 (83.33)	1 (16.67)	--	--

Table 5: Salivary gland lesions where cytohistopathological correlation not seen, N (%) = 4 (10.81)

Cytodiagnosis	Histopathological diagnosis
Non – Neoplastic	
Chronic Sialadenitis(1)	Pleomorphic Adenoma (1)
Infected cystic lesion(1)	Salivary duct Carcinoma(1)
Neoplastic	
Pleomorphic Adenoma (1)	Polymorphous low gradeAdenocarcinoma(1)
Benign cystic lesion(1)	Monomorphic Adenoma(1)

Table 6: Milan System for Reporting Salivary Gland Cytopathology and Updates

Milan system grading	No. of cases	Cytodiagnosis
Category I	0	-
Category II	14	Chronic Sialadenitis, Mucocele
Category III	00	
Category IVa	19	Pleomorphic Adenoma
Category IVb	00	
Category V	00	
Category VI	04	Mucoepidermoid Carcinoma, Polymorphous low grade Adenocarcinoma, Salivary gland carcinoma

Figures

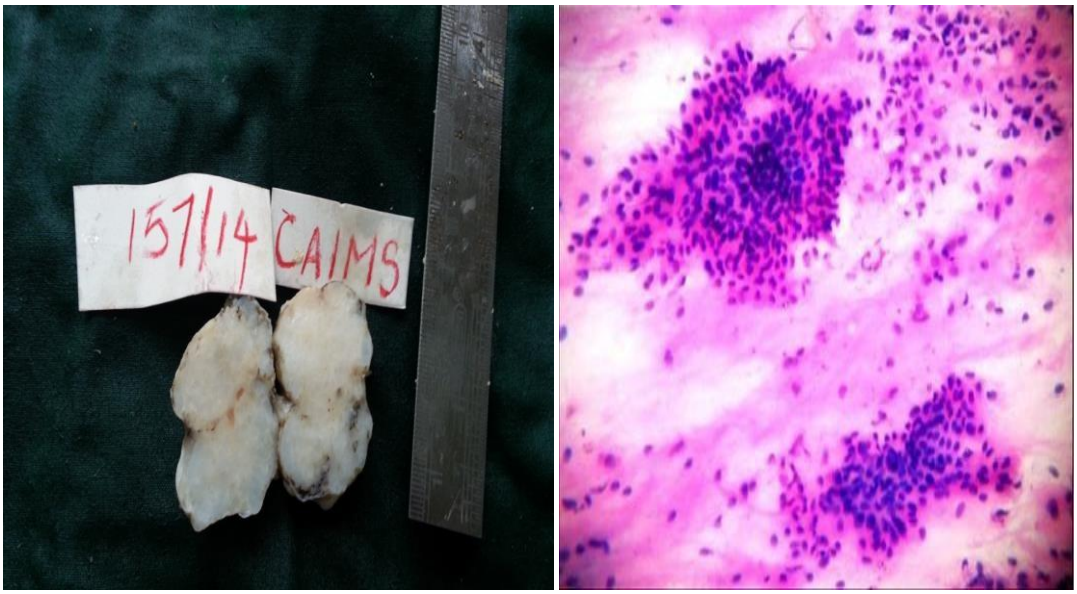

Fig 1 : Pleomorphic adenoma showing bimodal population of cells against the chondromyxoidbackground (H&E, 10x)

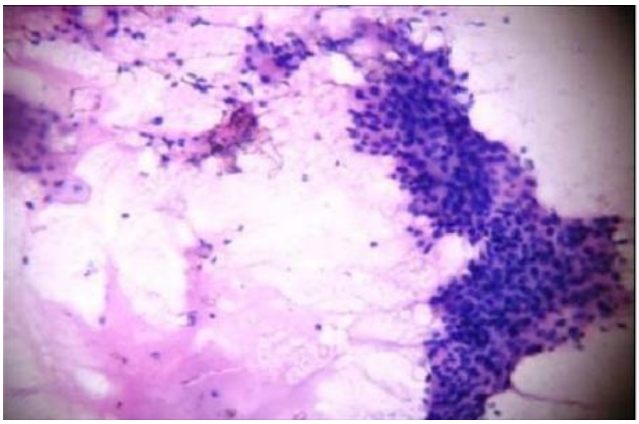

Fig 2: Cellular smear of mucoepidermoid carcinoma (MEC) showing predominantly intermediatecells in sheets in a dirty mucoid (H&E, 10x)

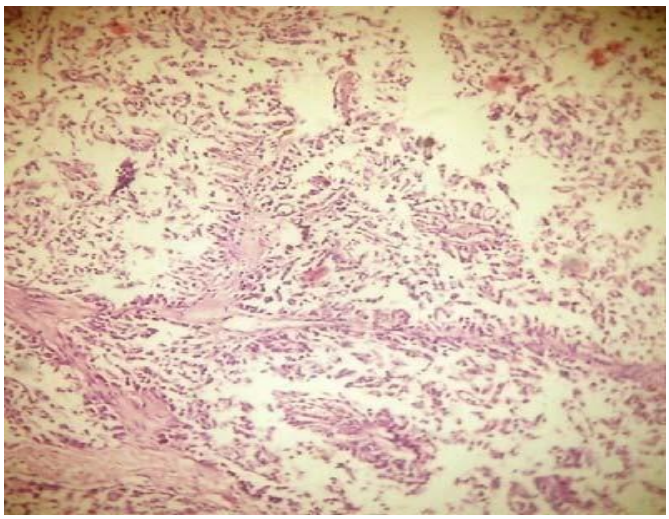

Fig 3 Polymorphous Low Grade Adenocarcinoma Tumour Cells Arranged In Papillary Pattern And In Diffuse Sheets, H&E, X 100x