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"Fine Needle Aspiration Cytology In Diagnosis Of Salivary Gland Lesions. A Study With Histopathological Comparison".

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Abstract: *Fine needle aspiration cytology (FNAC) is a simple ,accurate ,inexpensive and minimally invasive technique used to diagnose different types of masses[1] . Salivary gland tumours are rare and they account for 2-6.5% of all head and neck neoplasms in adults[1] . Their superficial location ,easy accessibility and high diagnostic accuracy makes FNAC a valuable method for evaluation ,thus appropriate therapeutic management could be planned earlier[2]. The aim of this study was to analyze the sensitivity and specificity of FNAC in the diagnosis of various salivary gland lesions and its correlation with histopathology wherever available and to evaluate the age ,sex and site distribution of salivary gland lesions. 60 patients with salivary gland swelling were studied prospectively over a period of 1 yr . FNAC was done using 10cc syringe and 20-22G needle after taking informed consent of the patient,. Smears were stained with papanicoloau stain and Giemsa stain. Histopathology was assessed on routine H &E stains Out of 60 cases ,43.3% were non neoplastic lesions ,the maximum no. of cases were of chronic sialadenitis. 56.7%cases were neoplastic(58.8% benign and 41.2%were malignant).Pleomorphic adenoma was the most frequent benign neoplasm while acinic cell carcinoma was the most frequent malignant lesion . Maximum cases were seen in parotid (73.3%) followed by submandibular gland (23.3%).Out of 60 cases, histopathology of 32 cases was available. A cytohistologic concordance was achieved in 93.75% of the lesions. There were 2 false negative cases diagnosed on FNAC. The sensitivity and specificity of the method was 93.75% and 100%respectively. FNAC is a safe and reliable technique in the primary diagnosis of salivary gland lesions . FNAC has a high diagnostic accuracy ,though rate of characterization of specific type of tumour is lower ,due to variable cytomorphology . In such cases , histopathology examination may prove to be accurate for diagnosis [2] .*

Key Words*: FNAC, Salivary gland lesions, Sialadenitis ,Pleomorphic adenoma, Acinic cell carcinoma*

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I Introduction

Salivary glands are exocrine organs responsible for production and secretion of saliva and consist of the parotid,

submandibular, sublingual, and the minor glands that are numerous and widely distributed throughout the mouth and oropharynx [3.]Salivary gland tumours are rare and they account for 2-6.5% of all head and neck neoplasms[2]. Their superficial location ,easy accessibility and high diagnostic accuracy makes FNAC a valuable method for evaluation ,thus , appropriate therapeutic management could be planned earlier[2] .Fine needle aspiration cytology (FNAC) is a simple,accurate ,inexpensive and minimally invasive technique used to diagnose different types of salivary gland masses. By cytological examination , lesions can be divided into inflammatory, reactive , benign or malignant. Cytology can clearly distinguish between salivary and non salivary lesions, benign and malignant lesions, so also specific and non specific inflammation[3].

The aim of this study was to analyze the sensitivity and specificity of FNAC in the diagnosis of various salivary gland lesions and its correlation with histopathology wherever available and also to evaluate the age ,sex and site distribution of various salivary gland lesions.

II Material And Methods

The present study was carried out in Department of Pathology , J.K Hospital, Bhopal. 60 patients with salivary gland swelling in paroid ,submandibular and submental region were studied prospectively over a period of 1 yr . FNAC was done using 10cc syringes and 20-22 G needle . Smears were stained with papanicoloau stain and Giemsa stain. Histopathology of 32 cases were available and assessed on routine H & E stains.
The study is approved by medical college ethical committee.
Study design: Prospective.
Study location: This was a tertiary care teaching hospital based study done in department of pathology , at L.N medical college and JK Hospial Bhopal , Madhya Pradesh.

Study duration: 1 year
Sample size: 60 patients.
Subject and selection method: The study was done on patients who presented to J K hospital with salivary gland swelling.
Inclusion criteria: Patients of all ages , and either gender having salivary gland swelling.
Exclusion criteria: Scanty or inadequate aspirate or inconclusive smears on repeat FNAC.
Procedure methodology: After written informed consent was obtained , all patients were clinically evaluated by detailed history ,clinical examination and radiological findings. FNA was performed from different sites of the
salivary gland swelling using a 10mL disposable syringe and 23/24-gauge needle without local anaesthesia. FNA air-dried smears were stained with Giemsa stain and wet smears fixed in 95% ethyl alcohol were stained with Papanicolaou stain. Paraffin embedded tissue sections obtained from salivary gland tissue were stained with haematoxylin and eosin and few special stains were performed whenever required.

Statistical analysis : The data collected was analysed and entered into Microsoft excel worksheets.The daa was represented in form of bar diagram and pie charts.Sensitivity and specificity of FNAC for the diagnosis of salivary gland lesion was calculated considering Histopathology as a gold standard.

III Result

In the present study, non neoplastic lesions accounted for (26/60= 43.33%), followed by (20/60=33.33%) benign tumours and (14/60=23.33%) malignant tumours.

Commonest gland involved was parotid (74%), followed by submandibular gland (23%) and minor salivary glands (3%) whereas no case of sublingual salivary gland lesion was observed in the present study.

Age range for non neoplastic lesions was 10 years to 49 years with commonest age group being 30 to 39 years. Age range for neoplastic lesions was 20 years to 69 years with commonest age group for benign neoplasms being 50 to 59 years, and, for malignant neoplasms, it was 60 to 69 years. The overall male to female ratio was 2.75 : 1.

In non neoplastic lesions, (Table 1)38 lesions involved the submandibular gland (57.5%, 38/66), 20 lesions involved the parotid gland (30.35%, 20/66), and 8 lesions involved the minor salivary gland (12.1%, 8/66). Chronic sialadenitis was the commonest lesion Figures (61.53%) followed by benign cysts (15.38%,4/26), suppurative sialadenitis (15.38%, 4/26), and sialadenosis(7.69%,2/26).

In benign tumours, pleomorphic adenoma accounted for maximum number of cases (70%.14/20), followed by Warthin's tumour (30%,6/20) .In malignant lesions malignant unclassified was the most common malignant tumour (42.85% ,6/14) followed by acinic cell carcinoma (35.71%,5/14), mucoepidermoid (7.13%,1/14)In the present study, both cytology and histology were carried out in 32 cases only and a correlation was done for sensitivity, specificity, and diagnostic accuracy.The diagnostic accuracy of FNAC for the nonneoplastic lesions, benign tumours, and malignant tumours was 50%, 100%, and 100%, respectively, and overall diagnostic accuracy was 83.3%**.** In nonneoplastic lesions, the specific diagnosis of 4 cases by FNAC was correlated with histopathological findings**.** In benign tumours (14 cases) cytological diagnosis of all cases was consistent with histopathological diagnosis. In malignant group, cytological diagnosis of 14 cases was consistent with histopathological diagnosis.
Overall Sensitivity was 93.75 % and specificity was 100 % respectively.

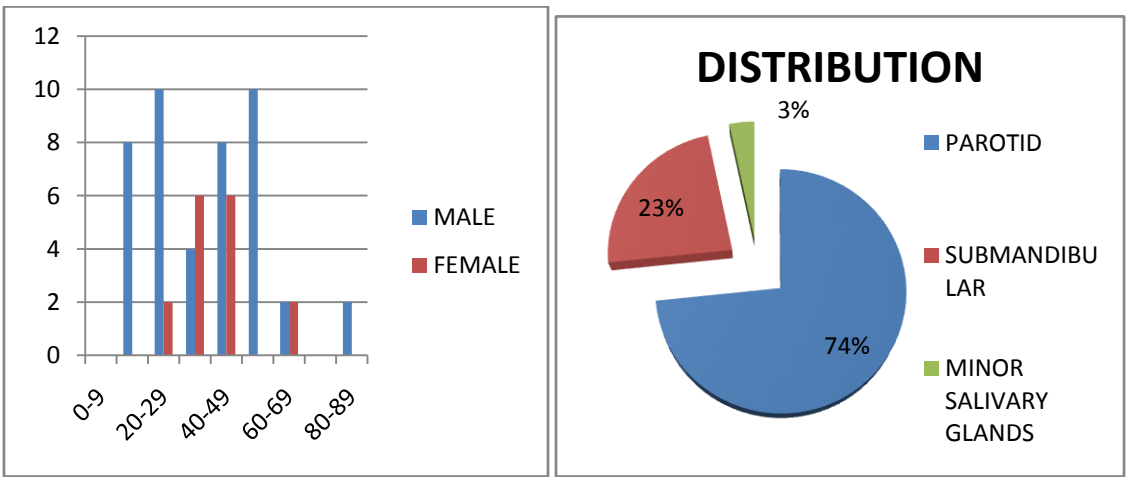


Table 1.FNAC diagnosis of salivary gland swelling.

NON NEOPLASTIC LESIONS		**NEOPLASM**			
		BENIGN		**MALIGNANT**	
1.CHRONIC SIALADENITIS	**16**	1.PLEOMORPHIC ADENOMA	**14**	1.MALIGNANT UNCLASSIFIED	**06**
2.ACUTE SIALADENITIS	**04**	2.WARTHINS TUMOR	**06**	2.ACINIC CELL CARCINOMA	**05**
3.SIALADENOSIS	**02**			3.MUCOEPIDERMOID	**01**
4.RETENTION CYST	**04**			4.METASTATIC DEPOSITS	**02**
TOTAL	**26**	**TOTAL**	**20**	**TOTAL**	**14**

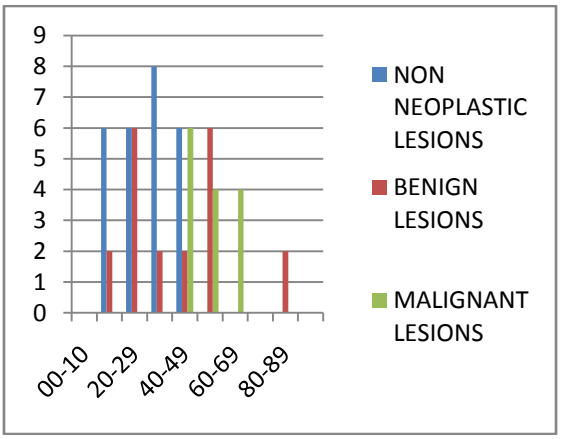
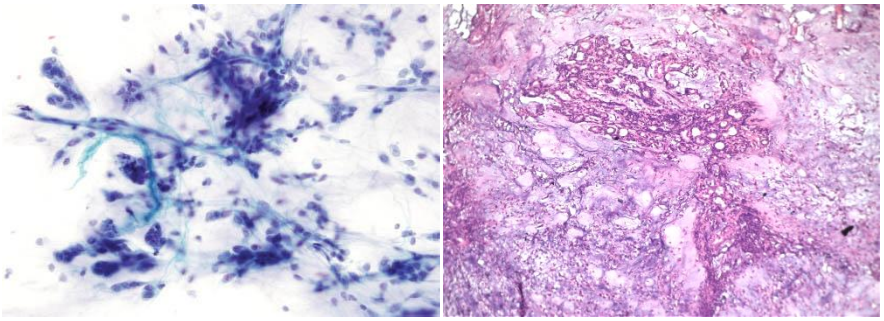


Table 2.Histopathological correlation.

DIAGNOSIS	**TOTAL NO. CASES**	**HISTOLOGY AVAILABLE**	**CYTOPATHOLOGICAL DIAGNOSIS CONFIRMED**	**FALSE POSITIVE**	**FALSE NEGATIVE**
NON NEOPLASTIC LESIONS	26	04	02	00	02
PLEOMORPHIC ADENOMA	14	14	14	00	00
WARTHINS TUMOUR	06	06	06	00	00
ACINIC CELL CARCINOMA	04	04	04	00	00
MALIGNANT UNCLASSIFIED	06	02	02	00	00
MUCOEPIDERMOID CARCINOMA	02	02	02	00	00
METASTATIC DEPOSIT	02	00	00	00	00

Sensitivity 93.75% Specificity 100%.

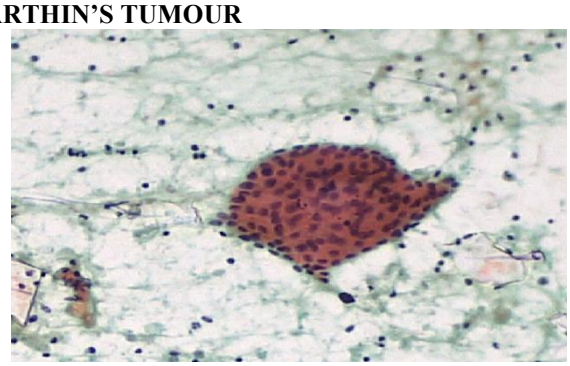
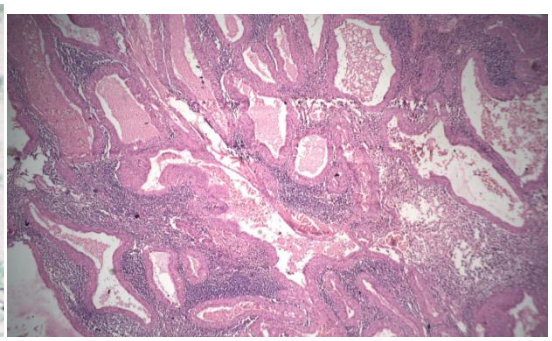
PLEOMORPHIC ADENOMA



(a) **(b)**

a)This is a pap stained slide showing the fibrillary myxoid stroma with embedded myoepithelial cells .
b)The myxochondroid areas show pink hyaline to fibrous stroma embedded in blue myxoid background. The myoepithelial elements form clusters in a haphazard manner

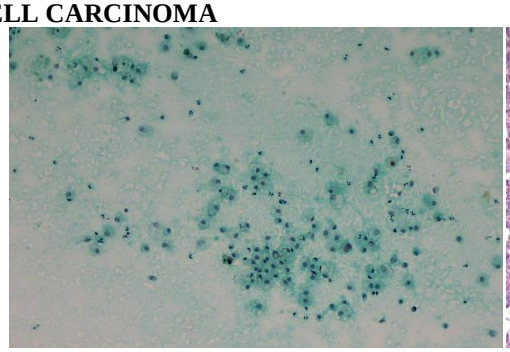
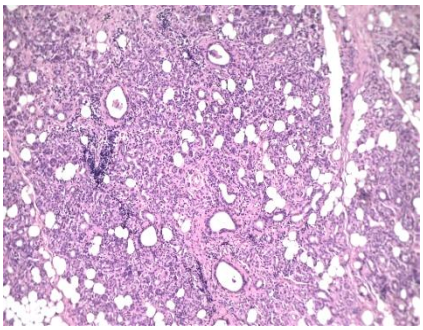
WARTHIN'S TUMOUR

(a) **(b)**

a)Cohesive cluster of monomorphic oncocytic epithelial cells with lymphoid cells in background .
b)The tumor consists of papillary formations lined by tall columnar cells enclosing a dense lymphoid population with or without lymphoid follicles.

ACINIC CELL CARCINOMA

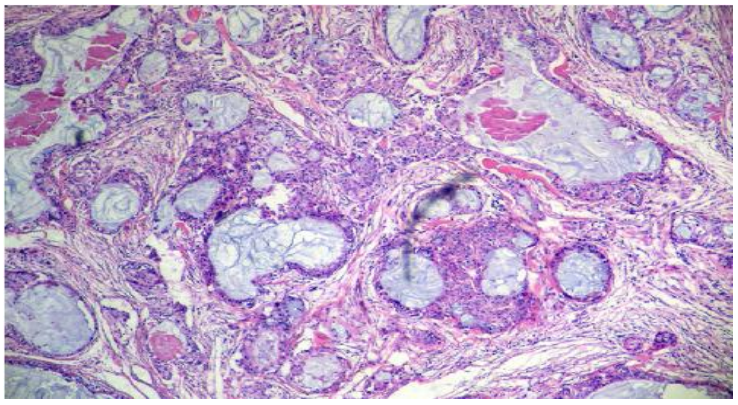



(a) **(b)**

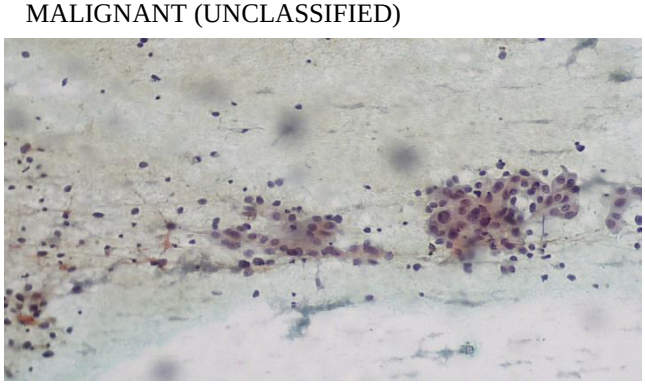
a)Tumour cells arranged singly and in cohesive cluster .Polygonal shaped,with foamy cytoplasm, nuclei is hyperchromatic with increased n:c ratio
b)Most of the tumor cells demonstrate fine serous cytoplasmic granules. Some tumor cells with a clear cytoplasm are also note

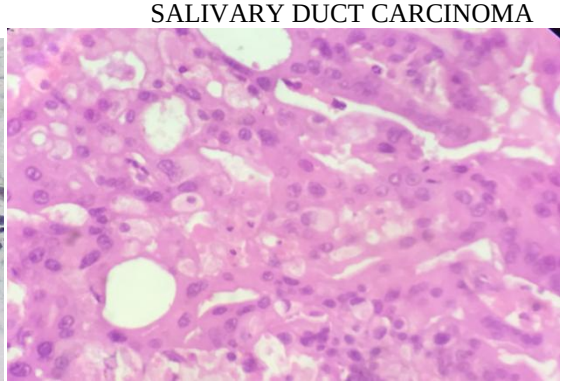
MUCOEPIDERMOID CARCINOMA

A predominance of uni- or multilocular cystic mucinous components with intermediate cells.



MALIGNANT (UNCLASSIFIED) SALIVARY DUCT CARCINOMA



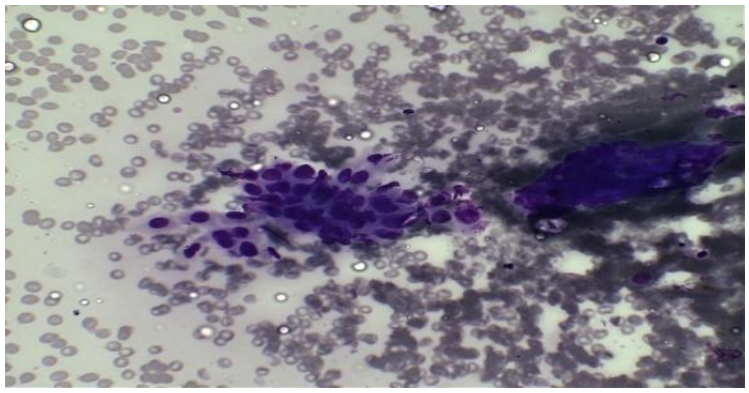


(a) ***(b)***

a)Cohesive clusters of atypical cells having high n:c ratio, course granular chromatin and prominent nucleoli

b)The cribriform tumor units

Metastatic deposits



Neoplastic cells in small groups which are highly pleomorphic with high n:c ratio moderate cytoplasm and coarse chromatin .

IV Discussion

In the diagnosis of salivary gland lesions, FNAC has gained the popularity as diagnostic tool due to its low cost and safe procedure with minimal risk to the patient and aid the clinician s in the management planning.[3]The male predominance observed in the study similar to that reported in by Cristallini et al[4].Considering all lesions, parotid gland is most frequently involved ,followed by submandibular and minor salivary glands which is consistent with other studies[4,5,6,7].In non neoplastic lesions ,the maximum no. of cases were of chronic sialadenitis followed by benign cyst, acute sialadenitis and sialadenosis.

As most of the non- neoplastic lesions were treated conservatively , histological correlation was available in only 15.38% of cases . 2 cases correlated with cytological diagnosis whereas 2 showed discordance.

Two cases reported as non neoplastic lesions on FNAC turned out to be low grade mucoepidermoid carcinoma and acinic cell carcinoma. The lesion was misdiagnosed as the distinction between the well differentiated acinic cell carcinoma and sialadenosis may be difficult. The tumor was predominantly cystic and aspiration yielded only the mucous so the diagnosis of low grade mucoepidermoid carcinoma was missed.

In the present study 2 cases of metastatic deposits of squamous cell carcinoma were diagnosed cytologically in submandibular gland which is in concordance with other studies that have also shown the highest incidence of metastasis of squamous cell carcinoma in salivary gland.

In 4 cases ,the FNAC diagnosis was broadly given as malignant (unclassified) out of which 2 cases turned out to be salivary duct carcinoma.

COMPARISON WITH OTHER STUDIES [4,5,6,7]

AUTHORS	YEAR OF STUDY	SENSITIVITY (%)	SPECIFICITY (%)
Cristallini et al	**1997**	**97.64**	**98.43**
Contucci et al	**2003**	**57.20**	**100**
Cohen et al	**2004**	**80.00**	**79.0**
Nanda et al	**2011**	**84.60**	**86.48**
Present study	**2015-2016**	**93.75**	**100**

V Conclusion

FNAC is a safe and reliable technique in the primary diagnosis of salivary gland lesions .
FNAC has a high diagnostic accuracy ,though rate of characterization of specific type of tumour is lower, due to variable cytomorphology .
In such cases , histopathology examination may prove to be accurate for diagnosis.
The high accuracy ,sensitivity and specificity of FNAC confirm that preoperative cytology is

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