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Cytological and Histopathological Correlation of Salivary Gland Lesions

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Abstract
Introduction: *Salivary gland lesions are the most commonly involved head and neck swellings ranging from reactive inflammatory to neoplastic, which may be benign or malignant.Though histopathological diagnosis is gold standard for confirmation of fine needle aspiration cytology (FNAC) findings, FNAC is an excellent first-line tool in providing an early diagnosis.*
Aims and Objectives: *To elucidate the cytomorphological features of various salivary gland lesions on FNAC and explore the diagnostic criteria by correlating with histomorphological findings.*
Materials and Methods: *The present study was done at the Department of Pathology, Sri Manakula Vinayagar Medical College, Pondicherry. FNAC was done using 24 gauge needle and 5 ml syringe and smears were stained with Haematoxylin & Eosin (H&E) and Giemsa stains. Histopathology was assessed on routine H&E stained paraffin sections. Cyto-histo correlation was done and overall diagnostic accuracy was calculated.*
Result: *The accuracy of FNAC in diagnosing salivary gland lesions was 72%.Age group between 51-60yrs was found to be the most common for salivary gland lesions and parotid was found to be the most common site for salivary gland lesions.*
Conclusion: *From this study it was concluded that fine needle aspiration cytology is an excellent first line of investigation for the diagnosis of various salivary gland lesions. However, there still remain few diagnostic dilemmas in which histopathology and immunohistochemistry confirmation is required.*
Keywords: *Diagnostic accuracy, FNAC, histopathology, salivary gland lesions, sensitivity, specificity.*

Introduction

Head and neck swellings accounts for two-thirds of all body region aspirations.The lesions range from reactive inflammatory to neoplastic, which may be benign or malignant[1,2]. Commonly presenting head and neck masses involves salivary glands[3]. Fine needle aspiration cytology (FNAC) is a reliable diagnostic method for the evaluation of these lesions because of the rather superficial location and easy accessibility of the salivary glands[4]. It is sensitive, specific, yet an economically effective technique for diagnosis of salivary gland lesions[5].

Biopsies or frozen sections of salivary tumors taken for treatment planning carries risk of bleeding, facial nerve injury or inflammation compared to FNAC where complications are very negligible[6]. It is virtually risk free and offers enough information to plan appropriate patient management[7].

Though histopathological diagnosis is gold standard for confirmation of Fine needle aspiration cytology (FNAC) findings, FNAC is an excellent first-line tool in providing an early diagnosis and there by avoids the need of unnecessary surgical intervention[8]. It has advantages over an operative incisional biopsy which has the potential risk of fistula formation along with seeding of tumor cells in malignant neoplasms[9].

Aims and Objectives

To elucidate the cytomorphological features of various salivary gland lesions on FNAC and explore the diagnostic criteria by correlating with histomorphological findings.

Methodology

Study setting - The present study was carried out in the Department of Pathology, SMVMCH, Puducherry**.**

Study participants – All patients coming for FNAC with salivary gland lesions.

Sample size – 50 cases**.**

Duration – 2yrs from January 2016 to January 2018

FNAC was done using 24 gauge needle and 5 ml syringe and smears were stained with papanicolau and May-Grunwald Giemsa stains. The specimen for histopathological analysis were received in 10% formalin and following tissue processing, hematoxylin and eosin staining were done. Histopathological confirmation was done on 23 cases. Cases which had histopathological correlation were only included in calculating diagnostic accuracy. The cytological findings in the smear were analysed based on characteristic background, cellularity and individual cell morphology and these parameters were correlated. Cyto-histo correlation was done and overall diagnostic accuracy was calculated.

Results

Table.1 Age wise distribution of salivary gland lesions

Age group	Percentage
1 - 10	4.0%
11 – 20	8.0%
21 – 30	8.0%
31 – 40	20.0%
41 – 50	18.0%
51 – 60*	32.0%
61 – 70	8.0%
71 – 80*	2.0%

- The most common age group in the present study was between 51-60 years (32%) and the least common age group was 71-80 years (2%).

Figure 1 Age wise distribution of salivary gland lesions

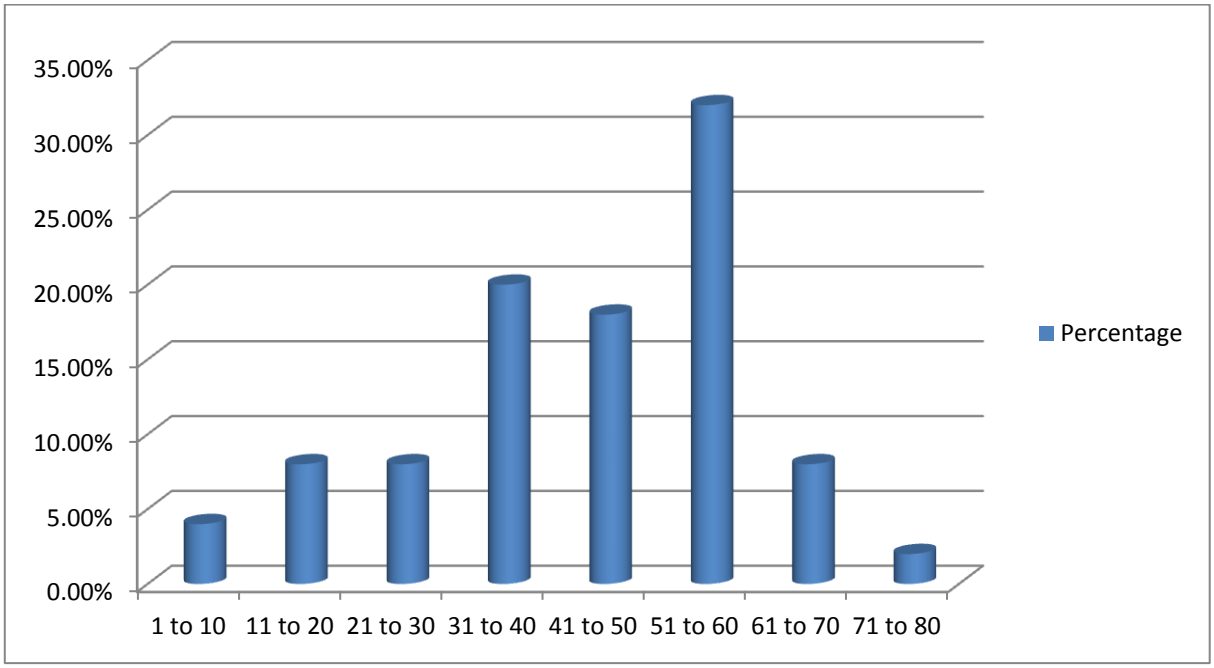


Table.2 Site of aspiration of various salivary gland lesions

Site	Percentage
Parotid*	70%
Submental	4%
Sub-mandibular	24%
Buccal	2%

- The most common site of aspiration of salivary gland lesions was the parotid (70%), followed by sub mandibular gland. The other sites constituted a very small proportion.

Figure.2 Site of aspiration of various salivary gland lesions

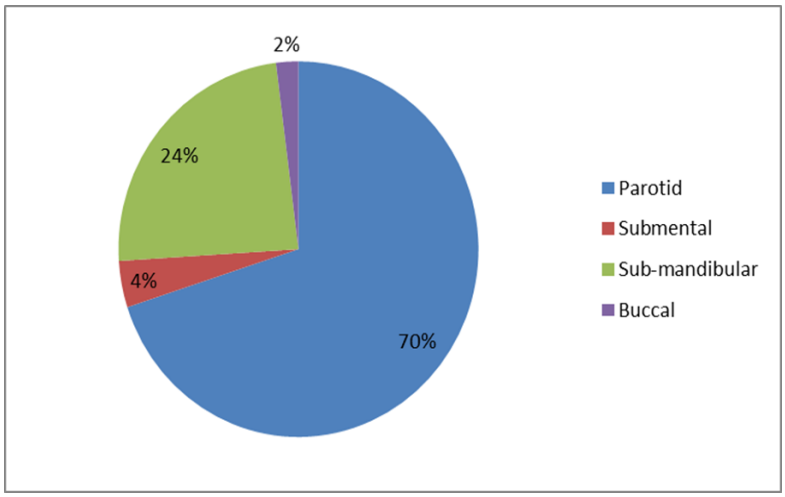


Table 3 Gender wise distribution of salivary gland lesions

Sex	Percentage
Male	48%
Female*	52%

- Most of the salivary gland lesions showed female predominance.

Figure 3 Gender wise distribution of salivary gland lesions

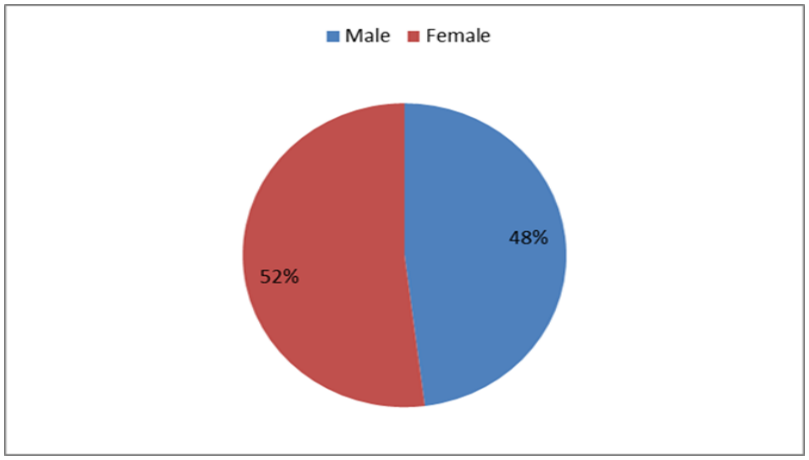


Table.4 Cytological diagnosis of salivary gland lesions

Inflammatory		Non-inflammatory		Neoplastic			
				Benign		Malignant	
SA	18*	SL	03*	PA	12*	MEC	01
RH	01	LPD	01	WT	03	SCC	02*
ASUL	05			MD	03	CEPA	01
Total	24	Total	04	Total	18	Total	04

SA-sialadenitis, SL-sialadenosis, LPD-lymphoproliferative disorder, ASUL-acute suppurative lesion, RH-reactive hyperplasia, PA-pleomorphic adenoma, WT-Warthim's tumor, MD-Mikuliz disease, MEC-mucoepidermoid carcinoma, SCC-squamous cell carcinoma, CEPA-carcinoma ex pleomorphic adenoma.

Table 5 Correlation of cytological findings of salivary gland lesions with histopathology

Diagnosis	No. of cases correlated with HP	Positive correlation	Negative correlation	Accuracy %
PA	12	11	1	92
WT	3	3	-	100
SA	1	-	1	0
MD	3	2	1	67
MEC	1	1	-	100
SCC	2	2	-	100
CEPA	1	1	-	100
TOTAL	23	20	3	87

PA-pleomorphic adenoma, WT-Warthim's tumor, MEC-mucoepidermoid carcinoma, SCC-squamous cell carcinoma, CEPA-carcinoma ex pleomorphic adenoma, SA-sialadenitis, MD-Mikuliz disease

- The cytological findings of 23 cases of salivary gland lesions were correlated with histopathology.
- 20 cases had positive correlation and in 3 cases the cytological findings did not correlate with histopathology.
- The overall accuracy of FNAC in diagnosing salivary gland lesions was 87%.

Statistical analysis analysis evaluating the role of FNAC in diagnosis of salivary gland lesions with histopathological correlation wherever possible

	Value
Sensitivity	100%
Specificity	85%

Out of 23 cases, in 20 cases the cytological findings correlated with histopathology. The sensitivity of FNAC was 100% and specificity was 85% in the diagnosis of salivary gland lesions.

Fig.4 Cytology of Acute sialadenitis showing ductal epithelial cell clusters and neutrophils (MGG40x)

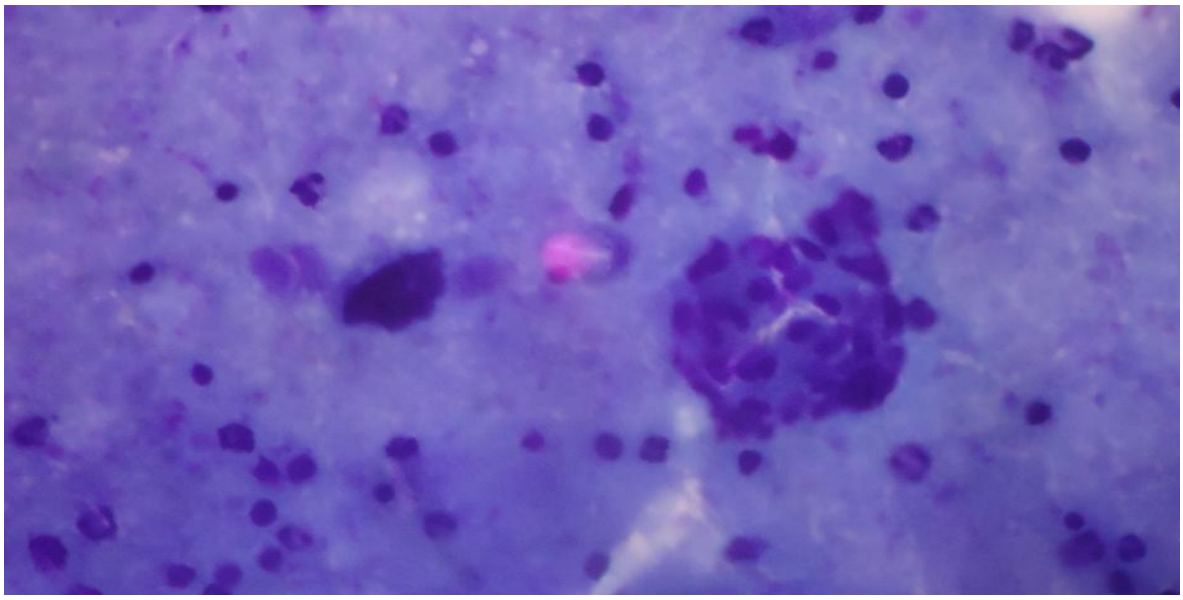


Fig.5 Cytology of Sialadenosis showing hyperplastic salivary gland acini (PAP40x) Inset: Benign acini (40x)

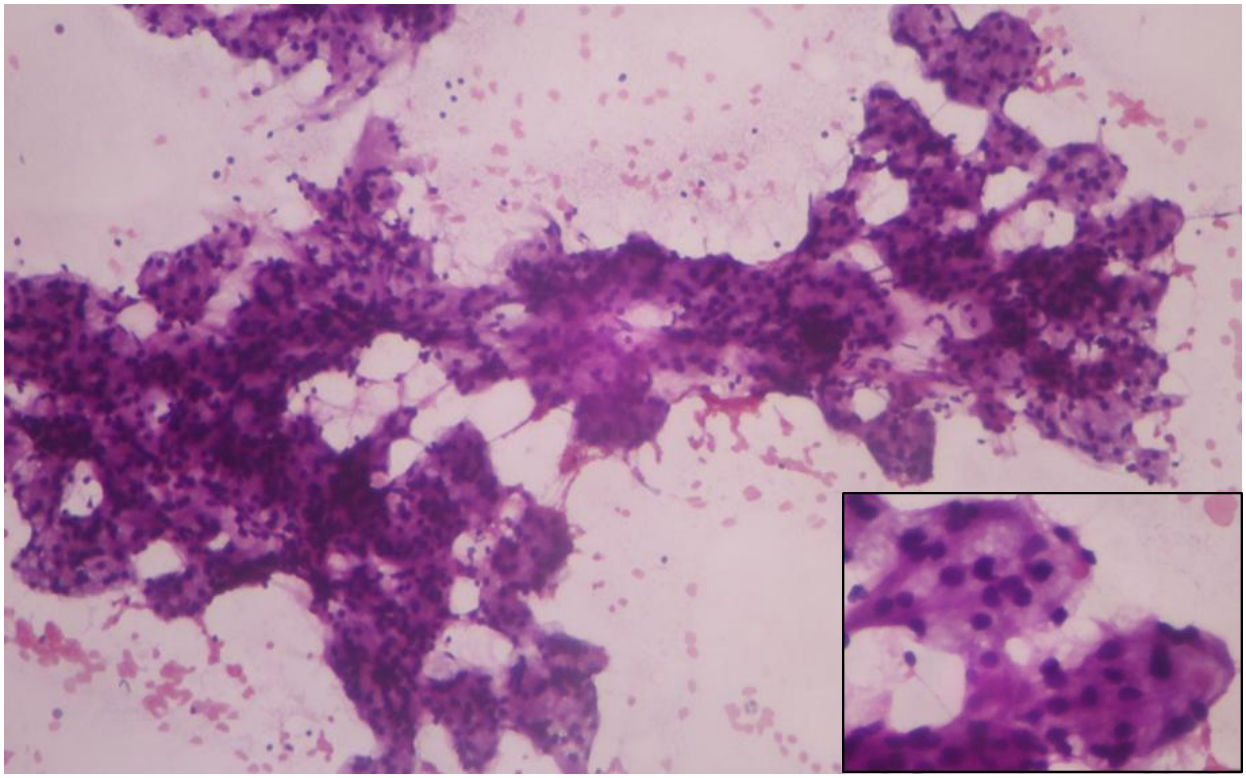


Fig.6 Cytology of Warthin's tumour composed of oncocytic epithelial cells. Inset: lymphoid cells with background of granular debris and cyst macrophages (MGG40x)

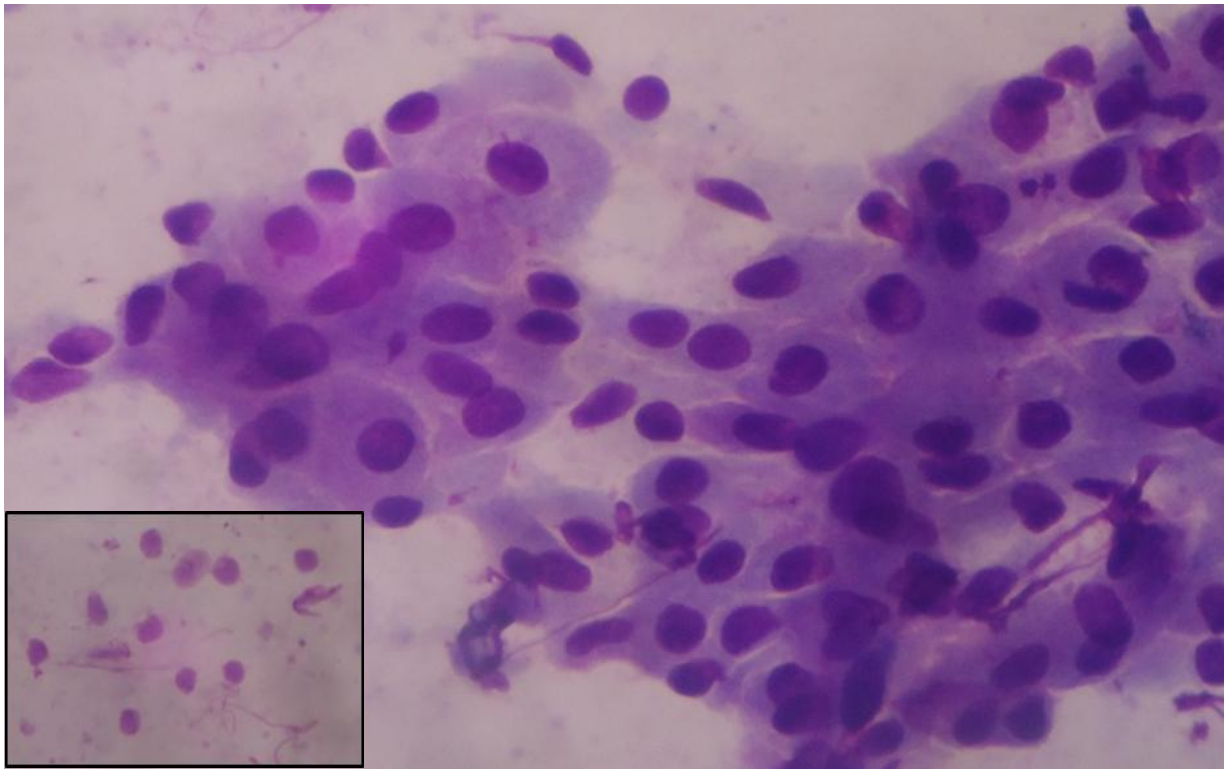


Fig.7 Histopathology of Warthin's tumour showing papillary projections composed of oncocytic epithelial cells surrounding lymphoid germinal centres (H&E10x)

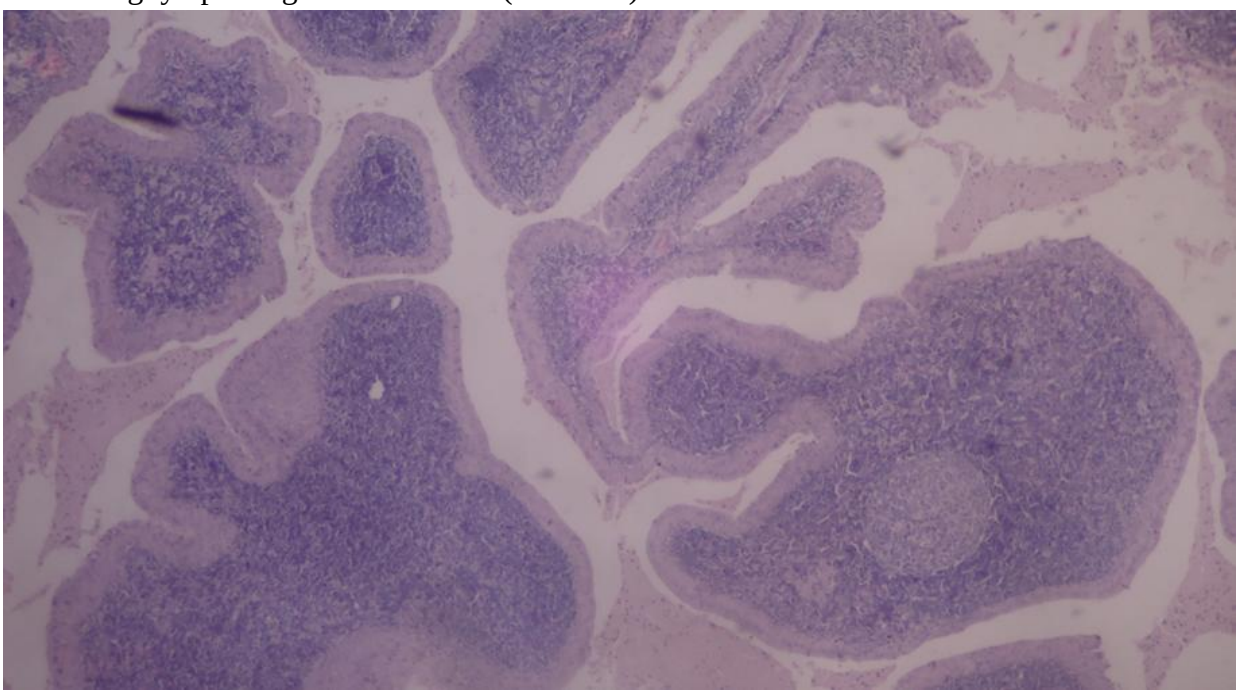


Fig.8 Cytology of Pleomorphic adenoma showing poorly cohesive clusters of epithelial cells with fibromyxoid background (MGG10x). Inset: Plasmacytoid cells (40x)

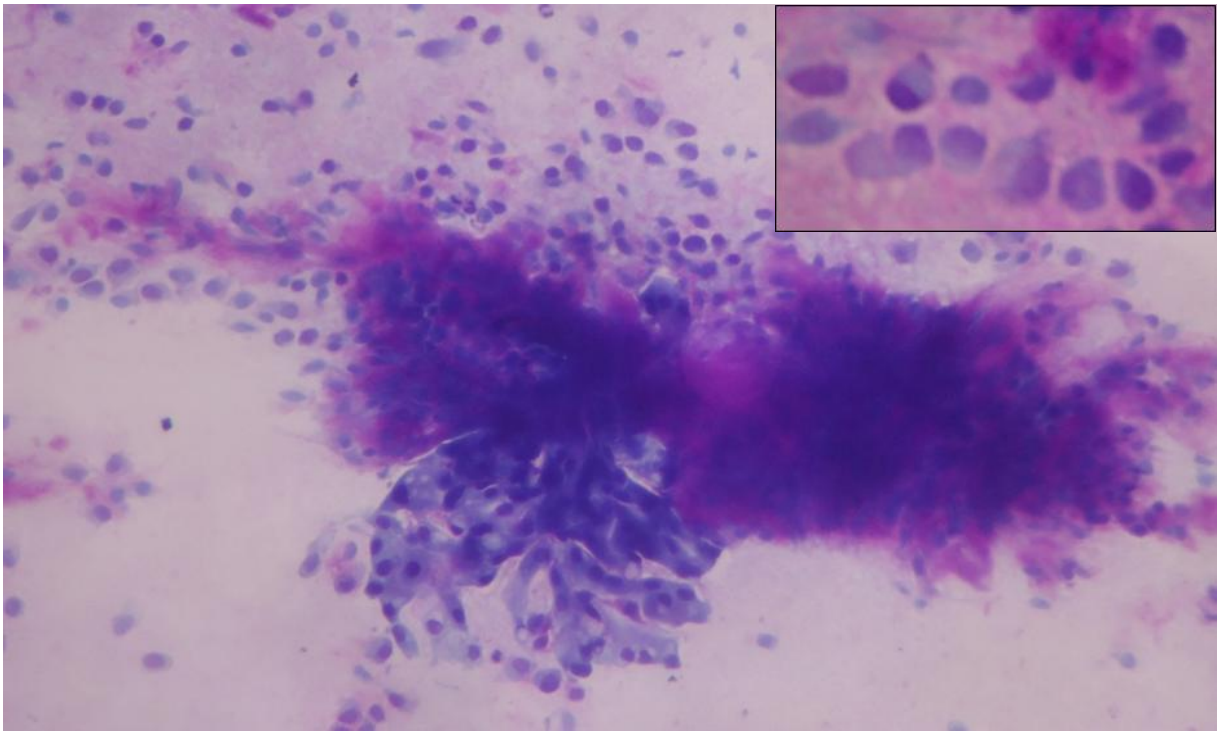


Fig.9 Histopathology of Pleomorphic adenoma showing epithelial and mesenchymal elements (H&E10x). Inset: Cystic changes (40x)

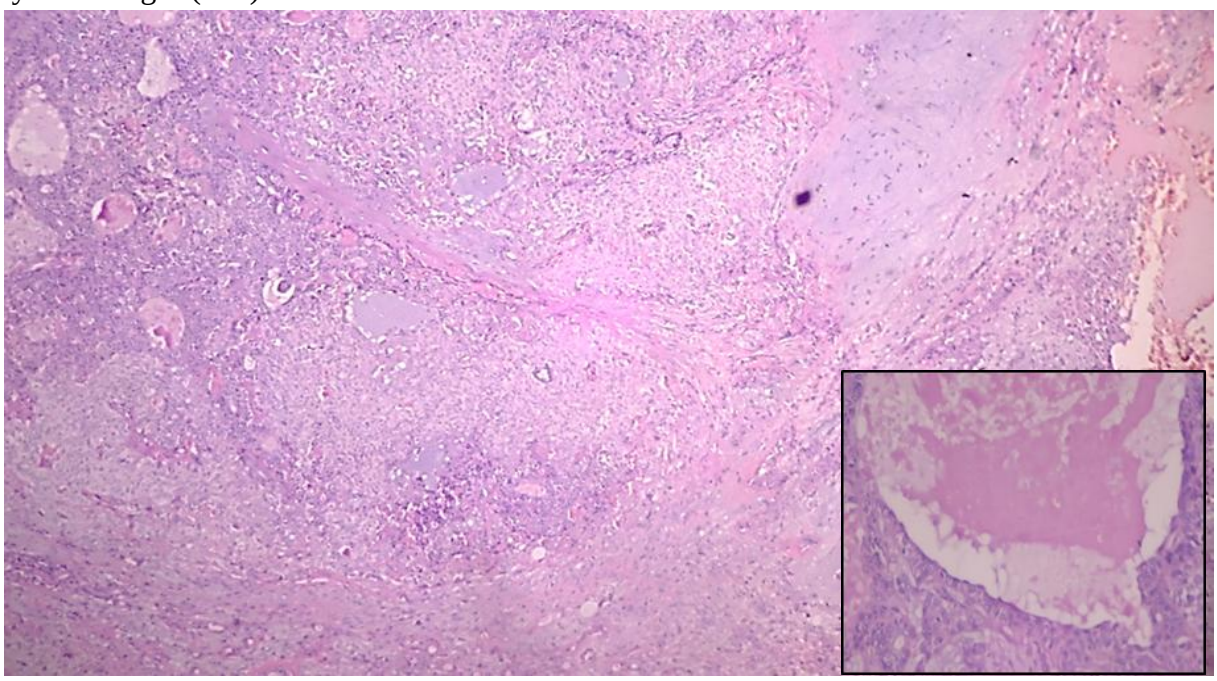


Fig.10 Cytology of Mucoepidermoid carcinoma showing intermediate cells and mucin secreting cells with dirty background(MGG10x). Inset: Dirty background (40x)

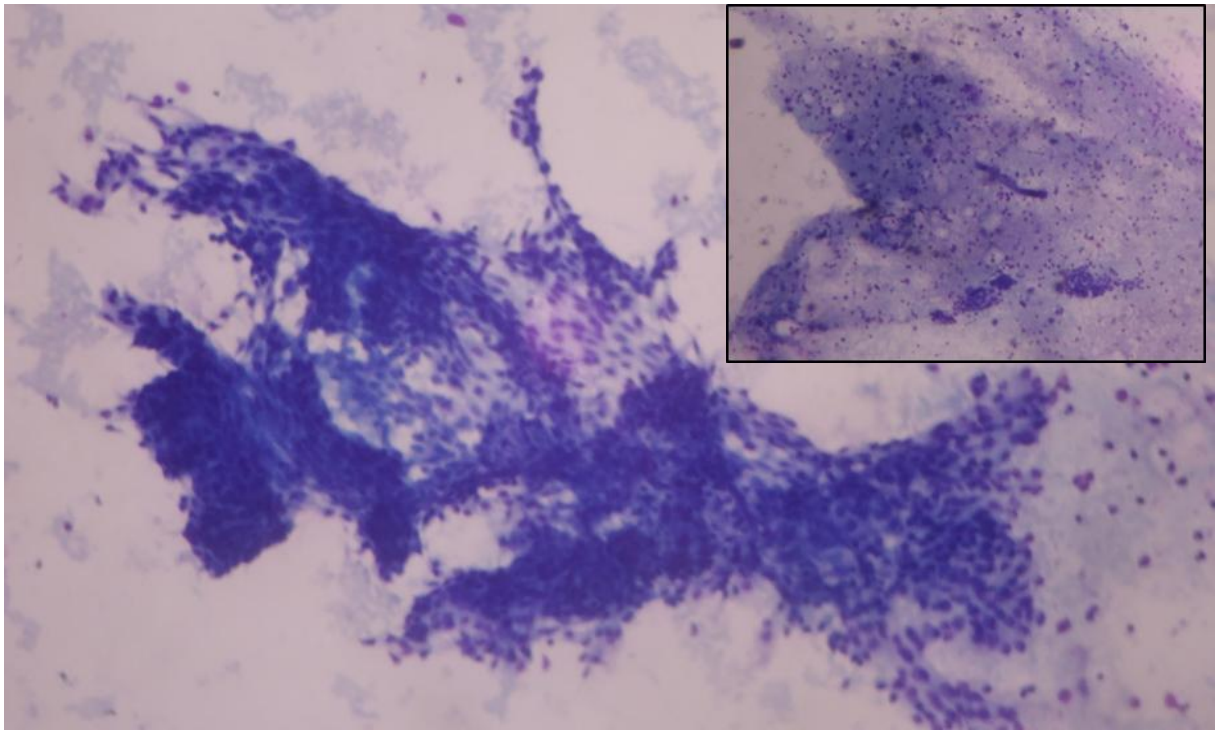


Fig.11 Histopathology of Mucoepidermoid carcinoma showing intermediate cells, mucous cells and clear cells (H&E 10x)

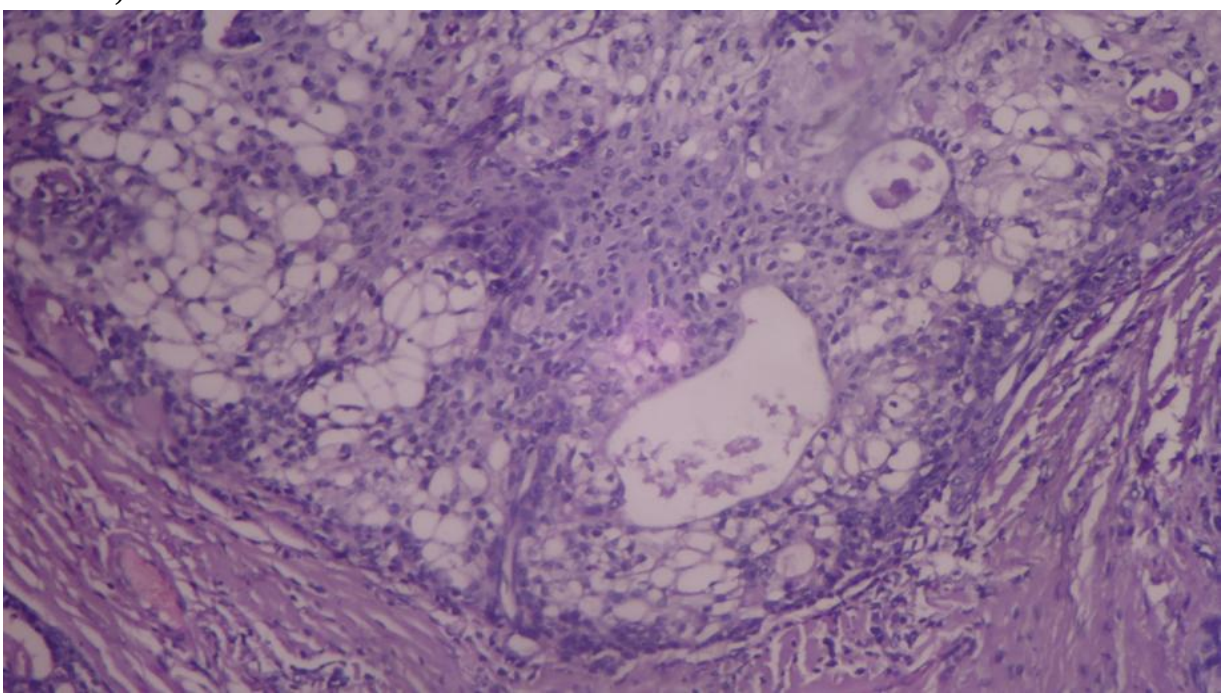


Fig 12 Cytology of Squamous cell carcinoma showing keratinised malignant squamous cells with hyperchromatic nuclei (PAP10x). Inset: Malignant cells(40x)

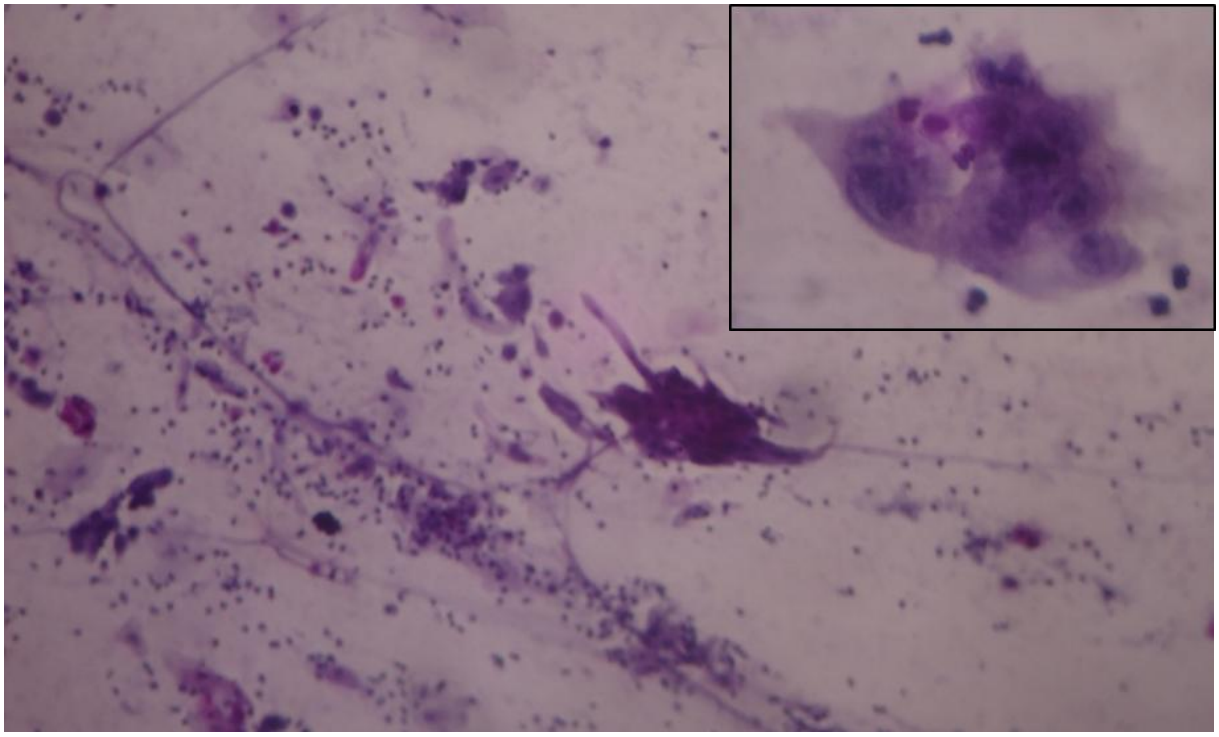


Fig.13 Histopathology of Squamous cell carcinoma showing malignant squamous and keratin pearls (H&E40x)

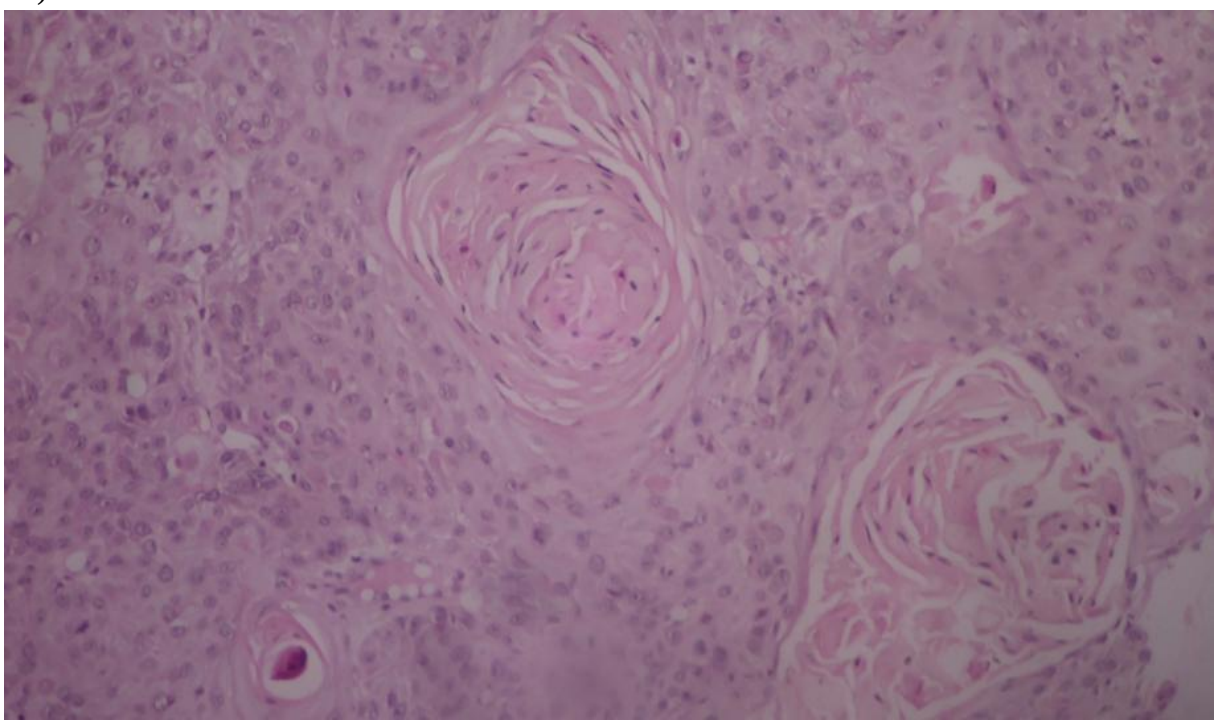


Fig.14 Cytological smear ofCarcinoma ex-pleomorphic adenoma shows epithelial clusters to the right showing prominent nuclear atypia, fragments in the left of benign spindle cells with a fragment of myxoid stroma (H&E 40x).

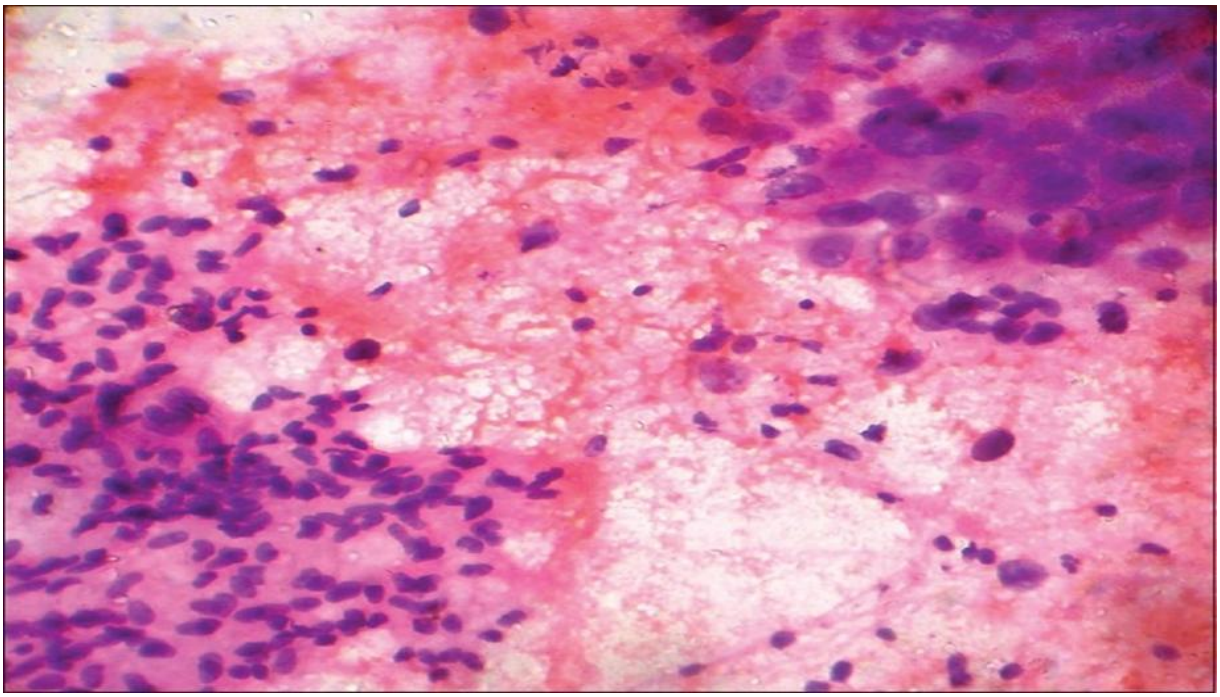
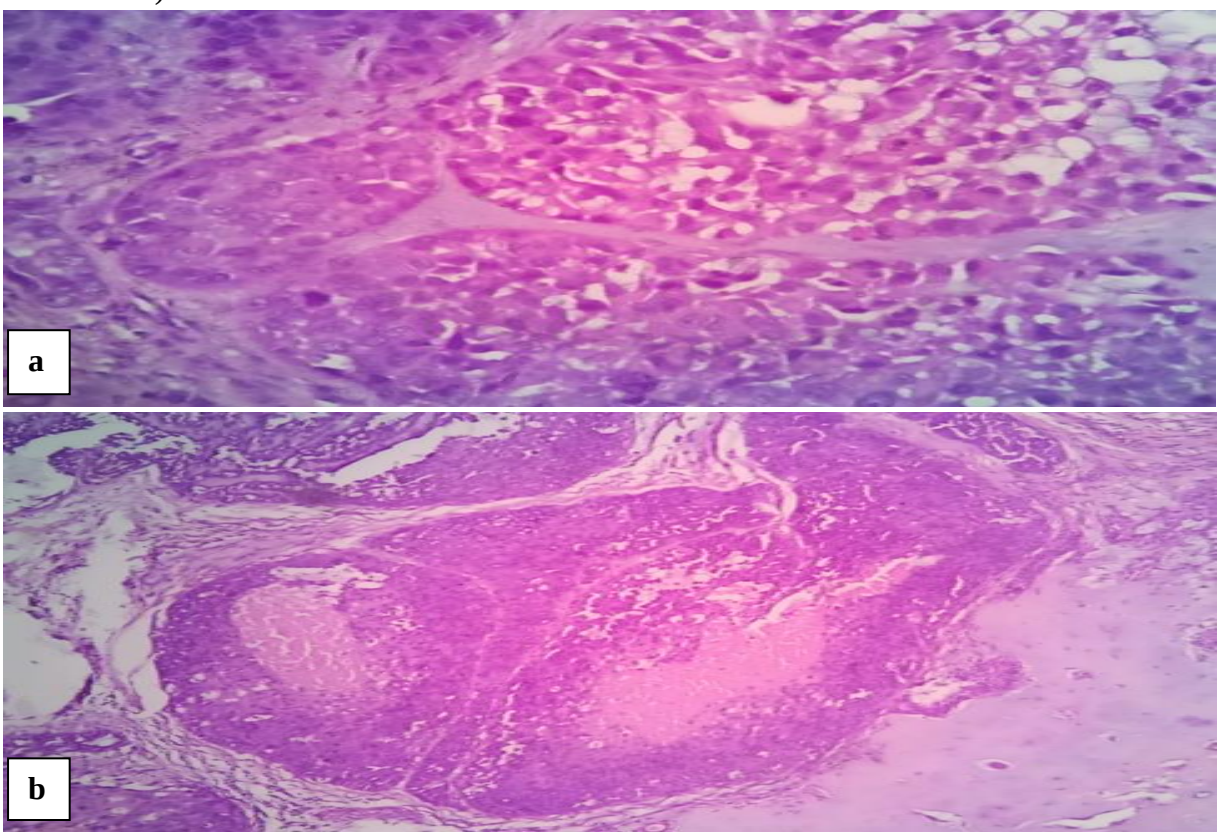


Fig.15 Histopathology of Carcinoma ex-pleomorphic adenoma a) Smear shows pleomorphic atypical cells with few mitoses.b) Smear shows comedo necrosis.



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[5].

Table 6 Accuracy of FNAC in salivary gland lesions in various studies

Accuracy %	Present study (2016-18)	Qizilbash et al. (1985)[10]	O'Dwyer et al. (1986)[11]	Jayaram et al. (1989)[12]	Shintani et al. (1997)[13]
	87	98	90	87.7	93

- The accuracy of FNAC in diagnosing salivary gland lesions in the present study was 87%. This was similar to the findings observed in previous studies.

Table 7 Statistical analysis evaluating the role of FNAC in various studies in the diagnosis of salivary gland lesions

Type of lesion		Present study (2012-14)	Tandon et al (2008)[14]	Chauhan et al (2012)[15]	Rajabhandar et al (2013)[16]
Salivary gland lesions	Sensitivity	100	85	89	80
	Specificity	85	98	100	100

- In the present study, the overall accuracy of FNAC in the diagnosis of salivary gland lesions was 87%.
- The sensitivity of FNAC was 100% and the specificity was 85% in the diagnosis of salivary gland lesions.
- This was on par with previous studies.

The simple nature of the procedure (FNAC) with high diagnostic yield establishes its role in primary diagnosis of salivary gland lesions. The danger of neoplastic seedling by FNAC has been refuted by many studies with long follow up. Complications are rare and high diagnostic accuracy has made this technique preferable to traditional surgical biopsy[11].

Limitation of the Study

- In the present study sample size was restricted to 50 and among these histopathological correlation could be done in only 23 cases. The smaller sample size reduced the level of significance of the present study.
- Imaging findings were not included.
- Immunohistochemistry was not done.

Conclusion

From this study it was concluded that fine needle aspiration cytology is an excellent first line of investigation for the diagnosis of various salivary gland lesions. Its a safe, reliable, convenient, economically effective and accurate method of diagnosis.It has a high degree of diagnostic yield and sensitivity and thereby obviating the need for open biopsy.

However, there still remain few diagnostic dilemmas in which histopathology and immunohistochemistry confirmation is required. FNAC and histopathology are complementary to each other, in yielding an accurate diagnosis of various salivary gland lesions.

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