

Original Research Article**Role of FNAC in diagnosing salivary gland lesions**

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Abstract

Salivary gland lesions, either neoplastic or non-neoplastic lesions pose an interesting dilemma to the attending surgeon and the investigating pathologist to institute proper therapy. FNAC of salivary gland lesions is an increasingly important diagnostic procedure used to evaluate salivary gland lesions and to assist in their pre-operative management and overall therapy. The present study was undertaken to evaluate the prevalence of salivary gland lesions and to study the various cytological patterns and pitfalls in their diagnosis. Sixty nine out of a total eighty patients with salivary gland swelling in whom adequate cellularity was obtained, were included in the study. There was a female preponderance and the peak age of presentation was between 20-30 years. The swellings were seen commonly in the parotid and the sub-mandibular region. Majority of the diagnosis included non-neoplastic lesions, i.e 44(63.77%) and the rest 25 cases (36.33%) were neoplastic. The commonest non-neoplastic lesions include acute and chronic sialadenitis. The commonest benign tumor encountered was pleomorphic adenoma seen in 15 cases. The commonest neoplastic lesion was mucoepidermoid carcinoma seen in 6 cases. Rare findings in our study include sialadenosis, benign lymphoepithelial lesion, Warthins tumour, adenoid cystic carcinoma; acinic cell carcinoma and carcinoma ex-pleomorphic adenoma. Cyto-histological correlation was possible in 20 cases. Pitfalls in cytological diagnosis included acute sialadenitis, and pleomorphic adenoma which was subsequently diagnosed as non-neoplastic cyst and mucoepidermoid carcinoma respectively. It was thus concluded that FNAC of salivary gland lesions was an effective tool in the pre-operative workup of the patient with diagnostic accuracy of 92.30%, 88.88% and 100% for non-neoplastic lesions, benign tumour and malignant tumours respectively.

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1. Introduction

Fine needle aspiration cytology (FNAC) is an increasingly important diagnostic procedure used

to evaluate salivary gland lesions and to assist in their preoperative management and overall therapy. Medical and surgical approaches to inflammatory lesions, benign neoplasms and

primary and metastatic malignancies differ considerably. So the pre-operative diagnosis is important when planning the nature and extent of treatment.¹ There is a huge spectrum of non-neoplastic and neoplastic lesions of the salivary glands which requires detailed morphological evaluation so as to make a correct diagnosis. At the same time a cytopathologist has to be aware of non-salivary gland tissues present in and around the sites of these salivary glands which are sometimes misleading. FNAC of suspected salivary gland lesions can differentiate neoplastic and non-neoplastic lesions as well as malignant or benign. Incision biopsy in salivary gland has numerous disadvantages like sampling error, fistula formation, tumor implantation, and facial nerve damage. Excisional biopsies on the other hand might be unnecessary and has the added risk of surgery and anesthesia.² Clinically salivary gland diseases usually present with enlargement of the gland. The involved salivary gland may be diffusely enlarged and soft, cystic or solid and nodular, firm or hard. Rarely facial nerve palsy may be the presenting feature. It is also prudent for the cytopathologist to know that salivary gland lesions can also occur in ectopic locations.³ Keeping all these objectives in mind the present study was undertaken to evaluate the accuracy of FNAC in diagnosing salivary gland lesions and to study the different cytological patterns in various salivary gland lesions

2. Materials and methods

This prospective study was undertaken in the Department of Pathology, Vijayanagar Institute of Medical Sciences, Bellary, India during the period of October 2000 to September 2002. All the patients referred to the Department of Pathology for FNAC of salivary gland lesions during this period were included in the study. Prior to fine needle aspiration, all these patients were subjected to detailed clinical examination. After a brief explanation to the patient about the procedure, with prior consent, the salivary gland lesions were aspirated using 22 or 23 gauge

needle fitted to 5ml syringe. The lesion was grasped between the index finger and the thumb of left hand. The needle fitted syringe was pierced in to the lesion. Negative pressure was created in the syringe by withdrawing the plunger after entering the lesion. After gentle to and fro motion the negative pressure was released and the needle was removed from the mass. The needle containing the aspirated material was detached from the syringe and air was drawn in to the syringe. The needle was re-attached to the syringe and contents of the needle were ejected over the grease free glass slides. The aspirate was examined for the amount and nature of the aspirated material and several smears were prepared. In case of cystic lesions the fluid aspirated was centrifuged and smears were prepared from the sediment. Residual mass was re-aspirated.

Some smears were immediately fixed in a fixative containing 95% alcohol and were stained with hematoxylin and eosin stain. Air-dried smears were stained with May-Grunwald-Giemsa (MCG) stain. Whenever necessary Pap smear and Periodic acid-Schiff (PAS) stains were used. Histopathological study of these lesions were possible in 20 cases. The results of cytological and histopathological study were correlated to evaluate the accuracy of the procedure.

3. Results

In the present study 80 patients were subjected to FNAC. Age group ranged from 4 years to 94 years with a peak age incidence of 20-30yrs. There was a female preponderance in this study. Fourty three females were affected compared to thirty seven males. The most common symptoms included pain and swelling at the site of the lesion followed by local rise of temperature. The commonest systemic symptom was fever. Out of 80 salivary gland lesions, 38 (47.5%) involved the parotid gland, 37 (46.25%) in submandibular gland, 2 (2.5%) in sublingual gland and 3(3.75%)

cases occurred in minor salivary glands. Out of 80 aspirates, adequate cell samples were obtained in 69 aspirates (86.25%). In 11 cases (13.75%) aspirates were inadequate, thus rendering them unsatisfactory for cytological evaluation. The cytological diagnosis of non-neoplastic lesions was made in 44 (63.76%) patients and cytological diagnosis of neoplastic lesions was made in 25 patients (36.24%). The commonest non-neoplastic lesions were acute sialadenitis, chronic sialadenitis, non-neoplastic cysts, benign lymphoepithelial lesion and sialadenosis (Table 1). Out of 25 neoplasms, 16(64%) cases were benign and 9 (36%) were malignant. The commonest benign neoplasm was pleomorphic adenoma which was diagnosed in 15 cases. The remaining one case was diagnosed cytologically as Warthin's. In the present study the cytological diagnosis of malignant salivary gland tumor was made in 9 patients, of which the commonest

malignancy encountered was mucoepidermoid carcinoma (6 cases). One case of acinic cell carcinoma, one case of adenoid cystic carcinoma and one case of carcinoma ex-pleomorphic adenoma were the other malignancies encountered in our study.

Cyto-histopathological correlation was possible in 20 cases of the 69 FNAC cases. Seventeen histopathological examination diagnoses correlated with FNAC findings. Three cases did not correlate with histopathology. There was one case of acute sialadenitis which was histologically diagnosed as non-neoplastic cyst. One case of cytologically diagnosed pleomorphic adenoma was confirmed histologically as mucoepidermoid carcinoma and in another case histologically diagnosed chronic sialadenitis was cytologically inadequate for evaluation (Table 2).

Table 1: Distribution of non-neoplastic lesions

Lesions	Total no.	Percentage
Acute sialadenitis	16	36.37%
Chronic sialadenitis	22	50.00%
Non-neoplastic cyst	4	9.09%
Benign lymphoepithelial lesion	1	2.27%
Sialadenosis	1	2.27%
Total	44	100%

Table 2: Cyto-histopathological correlation in the present study

Cytological diagnosis	Histopathological diagnosis					
	NN cyst	CSA	PA	MEC	ADCC	ACC
Acute sialadenitis	1	-	-	-	-	-
Chronic sialadenitis	-	4	-	-	-	-
Nonneoplastic cyst	1	-	-	-	-	-
Pleomorphic adenoma	-	-	8	1	-	-
Mucoepidermoid	-	-	-	2	-	-
Acinic cell carcinoma	-	-	-	-	-	1
Adenoid cystic carcinoma	-	-	-	-	1	-
Unsatisfactory	-	1	-	-	-	-

(NNcyst-Nonneoplastic cyst; CSA-Chronic sialadenitis; PA-Pleomorphic adenoma; MEC-Mucoepidermoid carcinoma; ADCC-Adenoid cystic carcinoma; ACC-Acinic cell carcinoma)

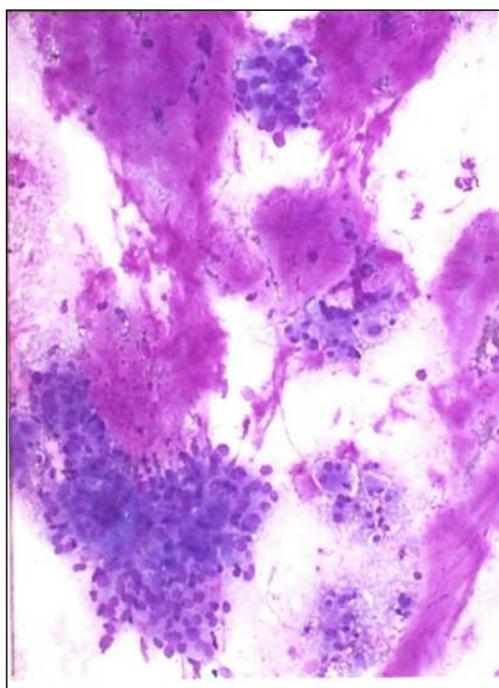


Fig. 1: Pleomorphic adenoma showing epithelial cells with chondromyxoid ground substance

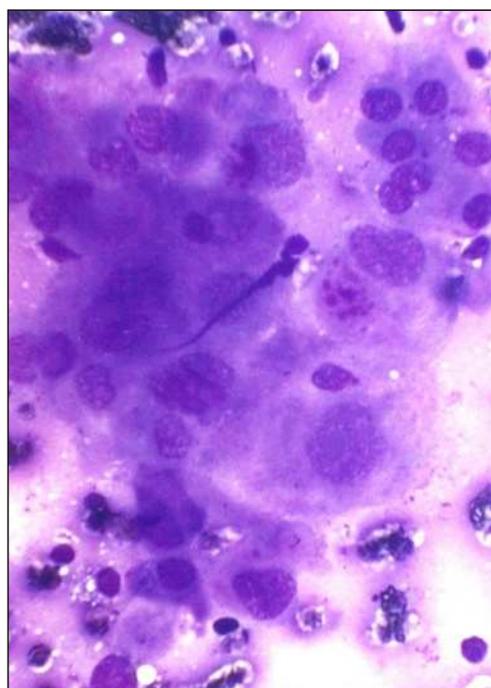


Fig. 2: Mucoepidermoid carcinoma showing intracytoplasmic mucin and squamoid cells

4. Discussion

Salivary gland FNAC'S formed 0.5% of all FNAC's performed during the study period of October 2000 to September 2002. There was slight female preponderance in our study which correlated with Senguptal et al.⁵ Parotid glands are the most commonly affected salivary glands (47.5%) and it correlates with and Cajulis et al. and Frable et al.⁴ Out of 80 smears 69 were adequate. Inadequate smears can be due to abundant haemorrhage, inability to fix the swelling in submandibular region, predominantly inflammatory smears with fibrosis or rarely due to needle aspirating the lipid filled areas. In the present study, non-neoplastic lesions included chronic sialadenitis, acute sialadenitis, benign lymphoepithelial lesion, sialadenosis, chronic sialadenitis and non-neoplastic cysts. Chronic sialadenitis was the most common non-neoplastic lesion forming 50% of the total lesions followed by acute sialadenitis which constituted 16 cases which formed 36.36%. In a study by Senguptal et al. the inflammatory lesions were 464 out of 852 forming 54.46% of the total lesions.⁵ Cytological diagnosis of sialadenosis is significant as plump acinar cells which are seen in the background can simulate malignancy. Cytological diagnosis of benign lymphoepithelial lesion was done in one case. Cytology showed epithelial cells, lymphocytes and transformed lymphocytes.

Non-neoplastic cystic lesion was diagnosed in 4 (5.80%) aspirations. Cytohistological correlation was possible in one case and found to be retention cyst which was the similar observation by Nettle and Orell.¹ Pleomorphic Adenoma was the most common benign lesion diagnosed cytologically forming 60% of the cytological diagnosed neoplastic lesions. In a study by Frable et al. pleomorphic adenoma was the commonest lesion forming 73.28% of total number of benign lesions.⁴ Chan et al. in their study observed involvement of parotid gland in 22 cases, submandibular gland in 8 cases and minor salivary gland in one case, which closely

correlates in the present study where parotid gland was involved in 11 cases, submandibular gland in 3 cases and minor salivary gland in one case.⁶ Aspirate in all these cases showed both stromal and epithelial elements along with fibrillary chondromyxoid ground substance (Fig. 1). Plasmacytoid epithelial cells were observed in one case.⁶

Cytohistopathological correlation was possible in 9 cases out of 15 cytologically diagnosed pleomorphic adenomas; in 8 cases histology confirmed the cytological diagnosis of pleomorphic adenoma. In the remaining one case diagnosis of high grade mucoepidermoid carcinoma was made on histopathology. Mucin along with intermediate cells was interpreted for fibromyxoid and epithelial elements. Frable et al. in their study cytologically misinterpreted a FNAC as pleomorphic adenoma, which on histopathological examination was diagnosed as mucoepidermoid carcinoma-low grade.⁴ In the present study, pleomorphic adenoma formed 93.75% of all benign neoplastic lesions. The accuracy of diagnosing pleomorphic adenoma in the study was 88.8%. The cytological diagnosis of Warthin's tumour was done in one case. Cytology showed oncocytic cells in cohesive, monolayered sheets and many lymphocytes. With MGG staining the cytoplasm appeared dense gray blue and was more homogenous. Frable et al. found Warthin's tumour to be the second most common tumour in their study forming 20% of the benign lesions.⁴ In a study by Senguptal et al. Warthin's tumour formed 15.60% of the total benign neoplastic lesions.⁵

In the present study cytological diagnosis of malignant lesions were done in 9 cases. This formed 36% of the total neoplastic lesions. Out of 9 malignant lesions, Parotid gland was the most commonly involved forming 44.44% of the total malignant neoplasms. Out of 9 malignant lesions of salivary glands, mucoepidermoid carcinoma was the most common malignant lesions (6 cases) forming 66.6% of the total malignant

lesions. In a study by Frable et al. and Accetta et al. mucoepidermoid carcinoma was the most common malignant salivary gland lesion.^{4,7} Parotid gland was the most common site for mucoepidermoid carcinoma in the present study. Three cases (50%) of the mucoepidermoid tumour occurred in the parotid gland as noted by Kumar et al.⁸ Of the 6 cytologically diagnosed mucoepidermoid carcinomas, 5 were low-grade tumours and the remaining one was a high-grade tumour. Frable et al. reported 5 cases of mucoepidermoid carcinoma in their study, 4 of which were low-grade tumours and one was diagnosed as high-grade tumour which showed pleomorphic squamoid cells with intracytoplasmic mucin (Fig. 2) which closely correlates with the present study.⁴ Cyto-histological correlation was possible in two cases and histology confirmed the cytological diagnosis. Cytological diagnosis of adenoid cystic carcinoma was done in one case in a minor salivary gland swelling of a 56 year old female patient. Even though it is thought to be the disease of elderly, it is now considered that there is bimodal distribution with a mean age of 50 years. Spiro et al in their study mentioned that minor salivary gland was the most common site for occurrence of adenoid cystic carcinoma.⁹ Nettle and Orel also reported a case of adenoid cystic carcinoma occurring in the minor salivary gland.¹ Cytological diagnosis was mainly based on homogenous hyaline globules and cells with hyperchromatic nuclei. Dutta et al. also observed similar features in their study.¹⁰ Chan et al. in their study misdiagnosed two cases of adenoid cystic carcinoma as pleomorphic adenoma.⁶ On review, however, they found hyaline globules characteristic of adenoid cystic carcinoma in one case.

Cytological diagnosis of one case of acinic cell carcinoma was done in an aspirate from a submandibular gland of a 40 year old female which was also similarly reported by Palm et al.¹¹ It formed 11.11% of the total malignant lesions in the present study. In a study by Cajulis et al. and

Frable et al. acinic cell carcinoma formed 4.76% and 7.6% of the total malignant lesions respectively.^{2,4} Cytology showed large acinar cells arranged in sheets and groups and few dissociated and naked tumour cell nuclei. Cytological correlation was possible in this case and histology confirmed the cytological diagnosis. Cajulis et al. reported a case of acinic cell carcinoma in which cytology showed benign looking acinar cells with small nuclei and indistinct nucleoli. The overall appearance was that of benign or reactive acinar cells. Subsequent histology showed well differentiated acinic cell carcinoma.² Cytological diagnosis of carcinoma ex-pleomorphic adenoma was done in aspirate from the submandibular gland of a 60-year-old female patient. The swelling was present since 16 years and since 3 months it showed sudden increase in size. It has been suggested that the risk of malignancy progressively increase with the duration of benign mixed tumour.¹² Thakray and Lucas estimated that approximately 25% of the untreated mixed tumours would eventually develop carcinoma.¹³ In the present study carcinoma ex-pleomorphic adenoma formed 11.11% of salivary gland malignancies. In a large series of study carcinoma ex-pleomorphic adenoma accounted for 5%-15% of salivary gland malignancies.¹³ In the present study, the size of the tumour measured 8x7cms. In a study by Lewis et al. the overall tumour size ranged from 1-17 cms.¹³ Cytology showed fibromyxoid ground substance and epithelial components. The carcinomatous part included mainly groups of cells with squamoid features.¹⁴ Among the 20 cases available for histopathology; cytological diagnosis was possible in 19 cases. In one case, fine needle aspirate was inadequate. Out of 19 cases, histology confirmed cytological diagnosis in 17 cases. The overall diagnostic accuracy of salivary gland lesions by FNAC was 89.47%. The present study showed a very good sensitivity of diagnosing benign tumors (88.88%), and malignant tumors (100%).

5. Conclusion

FNAC of salivary gland lesions is indeed a very good tool in diagnosis. However, a cytopathologist has to interpret in conjunction with clinical findings and always be aware of differential diagnosis. This will help the surgeon in planning treatment and follow up.

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