

Profile of Fine-Needle Aspiration Cytology (FNAC) of Salivary Gland Lesions with Histopathological Correlation in a Tertiary Care Hospital of Maharashtra

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ABSTRACT

BACKGROUND

Fine needle aspiration cytology (FNAC) is a method for the diagnosis of superficial lesions like swellings of the salivary glands since many years. The present study was undertaken to identify the patterns of salivary gland lesions (SGL) on FNAC and histopathology specimens and also describe the age and sex distribution of SGL.

METHODS

A total 319 cases of SGL were studied from June 2009 to July 2019 which included both retrospective and prospective cases. A detailed history was taken, clinical and necessary laboratory investigations were done; and then FNAC of salivary gland was done. Histopathology examination of specimens was done whenever available; FNAC and histopathology slides of retrospective cases were reviewed. Correlation between cytomorphology and histomorphology was done only where available.

RESULTS

The majority of cases was in the age group of 21 - 40 years (42.98 %) with female predominance (53 %) and commonest gland involved was parotid gland (52.97 %) in both the sexes. 138 (43 %) cases were non-neoplastic lesions and 181 (57 %) were diagnosed as neoplastic lesions. Of the 138 non neoplastic lesions, on cytology and histopathology, sialadenitis constituted 110 (79.71 %) cases; most being chronic sialadenitis (107). Out of 181 neoplastic lesions, 142 (77.78 %) were benign while 39 (22.22 %) cases were malignant. Pleomorphic adenoma was the commonest benign neoplasm (71.27 %) and mucoepidermoid carcinoma (66.69 %) was the commonest malignant neoplasm. Histopathological correlation was available in 37 cases.

CONCLUSIONS

FNAC is useful as an outdoor diagnostic procedure because of the availability of earlier diagnosis in comparison with the histopathological diagnosis. Histopathology correlation is helpful in cases where diagnosis at FNAC is difficult.

KEYWORDS

FNAC, Salivary Glands, Histopathology, Specimens, Cytomorphology, Sialadenitis, Pleomorphic Adenoma, Mucoepidermoid Carcinoma

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BACKGROUND

Fine needle aspiration cytology (FNAC) was first described in 1847 by Kun, and later in 1930's it was reintroduced and promoted by Martin and Ellis.¹ FNAC has now been accepted by head and neck surgeons as an excellent, though challenging primary method of evaluating space occupying lesions of salivary glands. It has advantage over an operative incisional biopsy which has the potential risk of fistula formation and in case of malignant neoplasms theoretical possibility of seeding tumour cells.²

The usefulness of salivary gland FNAC relates to the fact that it is easy to perform, is minimally invasive, smear evaluation is immediate, and procedure can be repeated several times if necessary, to obtain more tissue for diagnosis or special studies.^{3,4}

There are three major salivary glands: Parotid, submandibular and sublingual as well as innumerable minor salivary glands distributed throughout the mucosa of the oral cavity.

Salivary glands consists of: 1) Acinar cells (serous or mucinous), 2) Ductal epithelial cells, 3) Scant fibro-vascular stroma. The salivary gland mass lesion varies from inflammatory, non-neoplastic to neoplastic tumours. A listing of the salivary gland tumours includes the more common pleomorphic adenoma, Warthin tumour, adenoid cystic carcinoma, mucoepidermoid carcinoma, acinic cell carcinoma, various cystic entities and many rare tumours that are infrequently encountered in FNAC. Salivary gland tumours can arise from either the major salivary glands or minor salivary glands.⁵

However, the malignant tumours comprise 15 - 20 % of all parotid tumours, 37 - 43 % of submandibular gland tumours and over 80 % of minor salivary gland tumours.⁶ Between 64 - 80 % of all primary benign epithelial tumours occur in parotid glands, 7 - 11 % occurs in the submandibular glands, less than 1 % occurs in the sublingual glands and 9 - 23 % occur in minor glands.⁷⁻⁹ The ratio of malignant to benign tumour is greatest (> 2.3:1) in the sublingual gland, tongue, floor of the mouth and retro-molar area.¹⁰

Although all the salivary gland tumours account for 2 - 6.5 % of all head and neck tumours, their superficial location, easy accessibility and high diagnostic accuracy make FNAC a popular method for evaluating salivary gland tumours.¹¹ When performed properly, FNAC can provide useful preoperative information about a mass lesion, permitting the clinician to appropriately manage the patient.¹⁰ In view of above, the present study was undertaken to decide feasibility and utility of FNAC in diagnosis of patient with salivary gland swellings and their histopathology correlation wherever possible.

Objectives

1. To identify the patterns of salivary gland lesions in our institute on FNAC and histopathology specimens.

2. To describe the age and sex distribution of patients suffering from salivary gland lesions.

METHODS

The present cross-sectional study comprised of 335 cases of salivary gland lesions encountered in a tertiary care hospital during a 10-year period from June 2009 – July 2019. It included both retrospective and prospective cases. For the period 2009 to 2016, retrospective analysis was done using archived slides and blocks. Prospective study was undertaken for the remaining period (2017 - 2019). A detailed history was taken. Aspiration was done at the Department of Pathology after a thorough clinical examination and necessary laboratory investigations of the patient, in each instance. The procedure was repeated in cases where the aspiration was acellular or inconclusive. Biopsies and surgically resected specimens which were sent for histopathological examination were studied.

Written informed consent was obtained from all the patients. Aspiration was done with the help of 24 - 22 gauge disposable needle fitted to 10 - 20 ml disposable syringes. Aspirates were smeared over clean glass slides and half of them were immediately fixed in alcohol and later on stained with haematoxylin and eosin (H & E) stain or Papanicolaou (Pap) stain. Rest half of the slides were air dried and stained by May-Grunwald-Giemsa (MGG) method. Then the slides were examined under a light microscope. Histopathological examination of specimens was done whenever available, FNAC and histopathology slides of retrospective cases were reviewed. Histopathological correlation was done with the FNAC findings whenever possible.

Statistical Analysis

The quantitative variables like age in years were expressed in terms of range. All the categorical variables were expressed in percentages. Analysis was done by using Microsoft Excel.

Histopathology

A total of 103 specimens of salivary gland lesions were received in the study period which included both non-neoplastic and neoplastic lesions of the salivary glands. The specimens consisted of open biopsies and surgical excisions of salivary glands. For archived material history and clinical details were obtained from available medical records. Fresh slides were prepared from the blocks where ever required. In the prospective study, patient's history and clinical details were noted from the original request forms. Specimens were grossed as per standard grossing techniques and adequate sampling of the tissue was done. This was followed by routine processing for paraffin embedded tissue. These sections were stained with hematoxylin and eosin and in selected cases special stains like periodic acid-Schiff (PAS) and Alcian blue were ordered.

RESULTS

A total of 335 cases of salivary gland lesions were studied from year June 2009 to July 2019 in the Department of Pathology. Out of 335 cases, 16 cases were reported as inconclusive in spite of repeated aspiration. Hence were not included in the final analysis. Thus, total cases analysed were 319, among them 169 cases (53 %) were females and 150 cases (47 %) were males. The male to female ratio was calculated to be 1:1.13. Age of the patients ranged from 20 - 80 years, most lesions were found in age group of 21 - 40 (138; 43.27 %) followed by 41 - 60 (100; 31.64 %), 0 - 20 (51; 15.98 %) and 61 - 80 years (30; 9.40 %). The commonest gland involved was the parotid gland (169; 52.97 %) in both the sexes. Submandibular (134; 42 %) being the second followed by minor salivary glands (14; 4.39 %) and sublingual gland (02; 0.64 %). Out of 335 cases of salivary gland swelling, 138 (43 %) were non-neoplastic lesions and 181 (57 %) were diagnosed as neoplastic lesions. In 14 cases cytological study confirmed normal salivary gland. Two cases were inconclusive on FNAC. Of the 138 non neoplastic lesions on cytology and histopathology, sialadenitis constituted to 110 (79.71 %) cases; most being chronic sialadenitis (107), (Figure 1). Sialadenitis was seen most often in 2nd to 4th decade. Chronic sialadenitis was more common in adult age group of 40 - 60 years. Sialadenitis was seen in 2nd to 6th decades of life while benign lymphoepithelial cyst in 2nd to 4th decades, (Table 1).

Diagnosis	Total Cases	Age Wise Distribution of Cases			
		0 - 20	21 - 40	41 - 60	61 - 80
Acute on chronic sialadenitis	07	02	04	00	01
Chronic sialadenitis	103	21	35	36	11
Sialadenosis	22	03	09	08	02
Lymphoepithelial cyst	05	00	04	01	00
Changes secondary to obstruction	01	01	00	00	00
Normal	14	02	06	06	00

Table 1. Age Wise Distribution of Non-Neoplastic Lesions

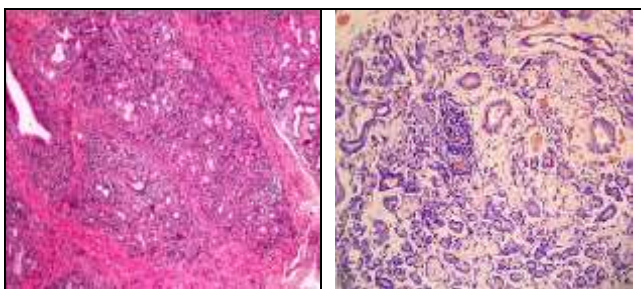


Figure 1. Microscopic Features of Chronic Sialadenitis

Age	Total Cases	Sex	
		Male	Female
0 - 20	26 (14.36 %)	10	16
21 - 40	86 (47.51 %)	36	50
41 - 60	53 (29.29 %)	26	27
> 60	16 (8.84 %)	09	07
Total	181 (100 %)	81	100

Gland	Total Cases	Neoplasms	
		Malignant	Benign
Parotid	113 (62.43 %)	26	87
Submandibular	52 (28.73 %)	06	46
Sublingual	01 (0.55 %)	01	00
Minor salivary gland	15 (8.26 %)	06	09
Total	181 (100 %)	39	142

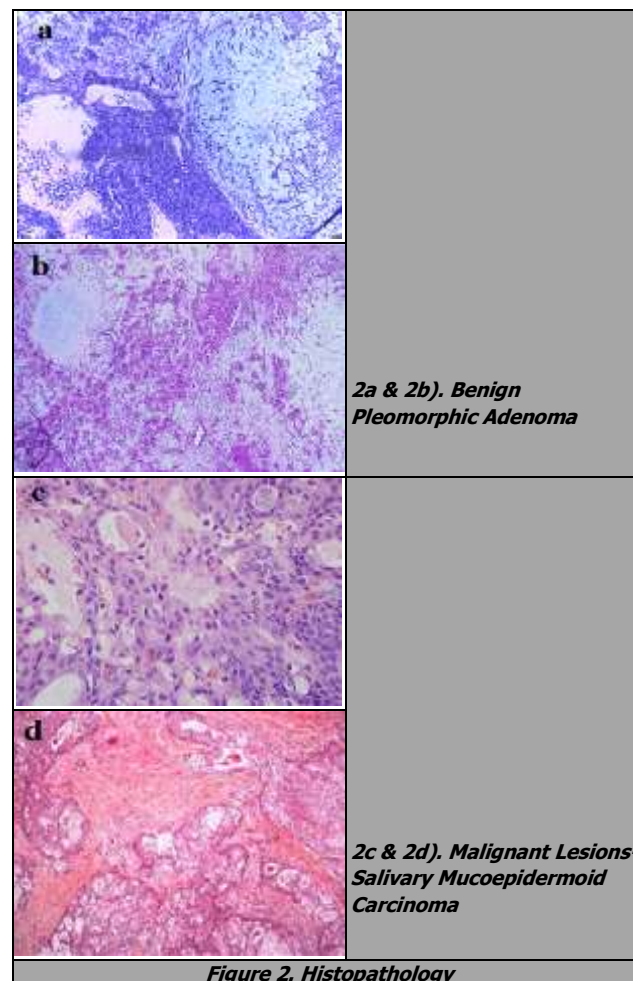
Table 2. Age-Sex Wise Distribution of Neoplasms and Frequency of Gland Involved

We studied 181 neoplastic lesions which included FNAC and histopathology specimens, majority of them were benign 142 (77.78 %) while 39 (22.22 %) cases were malignant. Maximum numbers of cases were seen in 2nd to 4th decade followed by age group of 40 - 60 years. Females were more commonly affected than males. Most common gland involved was the parotid gland (62.43 %), (Table 2). Benign tumours were common in the younger age groups (21 - 30 years) and malignant tumours were common in the older age groups (41 - 60 years).

Among the benign salivary gland tumours, pleomorphic adenoma (PA), (Figure 2a and b) was the commonest tumour accounting for 71.27 % of all tumours and 90.84 % of benign tumours. Among the malignant tumours, mucoepidermoid carcinoma (MEC), (Figure 2c and d) was the commonest, accounting for 66.69 % of all malignant tumours as shown in Table 3.

Benign Lesions	Cases	%
Pleomorphic adenoma	129	90.84
Monomorphic adenoma	01	0.70
Myoepithelioma	02	1.40
Warthin tumour	08	5.63
Others (neurilemmoma, Osteoclast type giant cell tumour)	02	1.40
Total	142	100
Malignant Lesions	Cases	%
Mucoepidermoid carcinoma	26	66.66
Acinic cell tumour	05	12.82
Adenoid cystic tumour	04	10.20
Salivary duct carcinoma	03	7.74
Carcinoma ex pleomorphic adenoma	01	2.56
Total	39	100

Table 3. Distribution of Benign and Malignant Lesions



2a & 2b). Benign Pleomorphic Adenoma

2c & 2d). Malignant Lesions-Salivary Mucoepidermoid Carcinoma

Figure 2. Histopathology

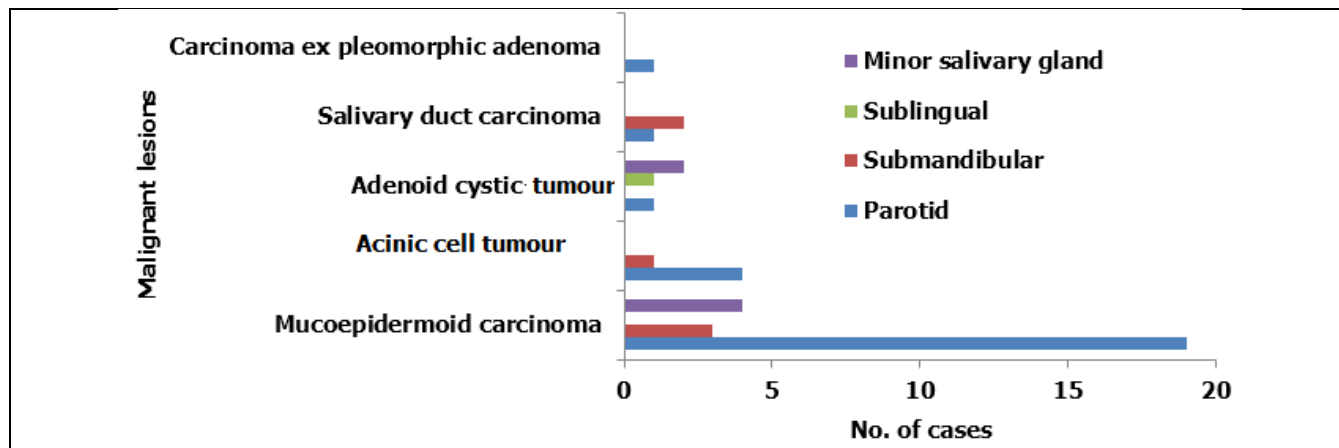


Figure 3. Site Wise Occurrence of Malignant Neoplasm

The malignant neoplasms were more common in females (21) than males (18) and in 2nd (12) and 4th (16) decade, 7 patients were in 6th decade and 4 patients in 0 - 20 years of age group. Parotid was the commonest gland involved 66.66 % followed by submandibular and other minor salivary glands 15.4 % each as shown in Figure 3.

The initial cytological diagnosis was compared with the gold standard, histopathological diagnosis in 37 cases as shown in Table 4.

Cytology	Concordant	Discordant	Total No. of Cases on Cytology
Chronic sialadenitis	01	02	03
Lymphoepithelial cyst	00	01	01
Pleomorphic adenoma	22	02	24
Warthin tumour (WT)	03	01	04
Acinic cell tumour	00	01	01
Mucoepidermoid carcinoma	03	00	01
Adenoid cystic tumour	01	00	01
Total	30	07	37

Table 4. Comparison of Cytological Diagnosis and Histopathology

DISCUSSION

Salivary gland lesions are commonly encountered as superficial swellings. SGL are more common in adult females, but about 5 % occur in children younger than 16 years.¹² Similarly, in the present study, incidence of salivary gland lesions were common in young adults with female predominance and parotid gland was most commonly involved which was comparable to previous studies.^{13,14} The neoplastic lesions (57 %) were more common than non-neoplastic lesions (43 %) comparable to other studies.^{15,16} Of the 138 non neoplastic cases on the cytology and histopathology, inflammatory lesions were common; most being chronic sialadenitis, however comparatively high incidence of cystic lesions in a study conducted by Sengupta et al.¹⁷ was explained as a result of poor hygiene of patients. There were 7 cases of acute exacerbation of chronic sialadenitis while two cases were of granulomatous sialadenitis. Both these lesions were more commonly seen in submandibular gland. Chronic sialadenitis was also more commonly seen in submandibular gland constituting 68 out of 102 cases. While mixed cells of lymphocytes, plasma cells and histiocytes, fibrous tissue fragments, scarcity of acinar

cells, ductal cell hyperplasia with or without squamous metaplasia were the cytological features of chronic sialadenitis and smears from acute exacerbation of chronic sialadenitis showed predominantly polymorphonuclear leukocytes, eosinophils and necrotic material. Histopathological correlation was available in 3 cases of chronic sialadenitis. Out of 3 cases, 1 was diagnosed as chronic sialadenitis and remaining 2 cases turned out to be benign spindle cell neurogenic tumour and a monomorphic adenoma on histopathology. There were 5 cases of non-neoplastic cysts, all of which were benign lymphoepithelial cyst, one in the parotid gland and one in submandibular gland. The FNAC of these cases showed lymphocytes and degenerated epithelial cells against a myxoid background. Of the 5 cases of benign lymphoepithelial cyst, 4 cases had HIV seropositivity. Histopathological diagnosis was available only in 1 case which showed features of chronic sialadenitis. 22 cases of tumour-like lesions were encountered on cytology. All of them were sialadenitis. Histopathology correlation was not available. Surgical excision of the painful enlarged parotid gland in 18 years old male showed changes secondary to obstruction.

The present study comprised of 181 salivary gland tumours of which benign tumours were more common than malignant tumours which was similar to earlier studies.^{18,19} Salivary gland neoplasms were seen from 1st to 8th decade and maximum numbers of cases were seen in 2nd decade, thus involving younger age group as reported in other studies.^{16,20} The occurrence of salivary gland tumours were common in female patients and parotid was the commonest gland involved which was similar to the observation of other authors.^{17,21} One case of monomorphic adenoma was diagnosed on histopathology. There was one case each of neurilemmoma and osteoclast type giant cell tumour. PA was the most common tumour accounting for 71.27 % of all tumours and 92.15 % of benign tumours. We observed a peak age incidence in the 2nd decade with a female predominance. The epithelial and mesenchymal like elements were found in wide variety of patterns. Common mesenchymal elements that were seen include fibrous, mucinous, myxochondroid and chondroid tissue. On histopathology, PA with cellular component, one 52-year-old male patient came with mass over the hard palate. On FNAC smear revealed tumour cells admixed with abundant mature squamous epithelial cells. Diagnosis of PA with squamous

metaplasia was further confirmed on histopathology. Out of 24 cases of cytologically diagnosed PA, 22 cases were confirmed on histopathology and one case was diagnosed as acinic cell carcinoma while the other was diagnosed as spindle cell (neurogenic) tumour. WT was the second most common benign salivary gland tumours and nearly all occurred in the parotid gland and in males. Youngest patient was 40 years old while oldest being 80 years old. In 4 cases of WT, correlation of cytology findings with histopathology was available. Three of them showed positive correlation while one case turned out to be a mucoepidermoid carcinoma. Obtaining diagnostic material may be difficult in a predominantly cystic tumour. Both oncocytic and lymphoid tissue may be sparse, absent or obscured by mucoid debris. Two cases of myoepithelioma, one from parotid and other from hard palate, were diagnosed on histopathology. Both were males in the 5th decade. On histopathology, both cases showed predominantly spindle cells with vesicular nucleus and eosinophilic cytoplasm. Cells were arranged in fascicles and associated with scant stroma. One case of monomorphic adenoma was encountered in present study and was present in left submandibular gland. It was misdiagnosed as chronic sialadenitis with squamous metaplasia on cytology. Histology showed well circumscribed tumour with branching and anastomosing cords consisting of a single or double layer of epithelial cells. The cords formed narrow channels. Varying number of basaloid cells, cystic components and scant loose stroma that was lightly fibrillar with few fibroblasts was seen. The cellular component was devoid of pleomorphism, mitosis and devoid of myoepithelial cells. Osteoclast like giant cell tumour (OGCT) of the salivary gland is a rare entity, first described in 1984. In our department, histopathology examination of parotidectomy specimen of a 40-year-old female was done and diagnosed as OGCT. We encountered one case of neurilemmoma in parotid gland.

The incidence of malignant tumour increased by age in current study and also showed in the study conducted by Akhter et al.¹⁴ Female preponderance in malignant tumours and parotid was the commonest gland involved and was similar to study conducted by Sengupta et al.¹⁷ Mucoepidermoid carcinoma (MEC) was the commonest malignant tumour which was comparable to the findings of Khandekar et al.¹⁶ and Agravat et al.²⁰ 4 cases of acinic cell tumour were observed, of which in only 1 case cytohistology correlation was available which was confirmed on histopathology. Of 4 cases of adenoid cystic carcinoma, only one underwent preoperative FNAC and was confirmed on histology. We had one elderly female patient who presented with slowly growing paranasal swelling. On FNAC, diagnosis was given as papillary neoplasm. Subsequently, she underwent surgical resection of the mass and histopathology examination of mass revealed sinonasal adenoid cystic carcinoma. There were 3 cases of salivary duct carcinoma, on histopathology; histological features showed resemblance to that of ductal carcinoma. It was well circumscribed tumour and epithelial cells had a papillary, cribriform and solid architecture coupled with central necrosis. One case was diagnosed as carcinoma ex-pleomorphic adenoma on histopathology while on microscopy, this was diagnosed as high-grade epithelial

carcinoma composed of malignant squamous cells. The stroma was desmoplastic and hyalinised.

CONCLUSIONS

FNAC of salivary gland lesion is advantageous to both the patient and clinician because of its immediate results, relative accuracy, economy and lack of complications. FNAC helps in appropriate therapeutic management, whether it is local excision for a benign neoplasm, radical surgery for a malignant neoplasm or alternate treatment. However, the main advantage of FNAC procedure is that it can be repeated at different sites in a particular lesion. FNAC is useful as an outdoor diagnostic procedure because of the availability of earlier diagnosis in comparison with the histopathological diagnosis. Histopathologic correlation is helpful in cases where diagnosis at FNAC is difficult.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.

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