

# Cytomorphological study of major salivary gland lesions: a 5-year experience at a tertiary care center

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## Abstract

**Background:** Fine needle aspiration cytology (FNAC) has been widely accepted as a safe method for diagnosis of salivary gland lesions. This study was conducted to see the cytological spectrum of different salivary gland lesions and to study the prevalence of non-neoplastic and neoplastic lesions in our institute.

**Methods:** A retrospective study was carried out over a period of 5 years to review the cases with major salivary gland lesions who underwent FNAC in our department.

**Results:** A total of 65 cases were studied of which 35 cases (53.84%) were reported as non-neoplastic lesions and 30 cases (46.15%) as neoplastic lesions on cytology (80%-benign, 20%-malignant). Sialadenitis was the most common non-neoplastic lesion. Pleomorphic adenoma was the most common benign tumor and adenoid cystic carcinoma was the most common malignant tumor. Parotid was the most frequently involved gland. Histopathological correlation was seen in 6 cases which underwent surgery.

**Conclusion:** In the present study, non-neoplastic lesions were more common than the neoplastic lesions. We conclude that FNAC can play a significant role in triaging patients with onsite cytological interpretation and can reduce unnecessary surgery for non-neoplastic lesions.

**Key words:** Cytology, FNAC, Major salivary glands, Parotid, Salivary gland lesions.

## Introduction

Salivary gland lesions form about 2-6.5% of all head and neck lesions<sup>[1]</sup>. FNAC is a safe, reliable, cost-effective and minimally-invasive method for evaluating salivary gland lesions<sup>[2]</sup>. FNAC is a useful technique for the evaluation of major salivary gland lesions, because of their rather superficial location and easy accessibility<sup>[3]</sup>. The characteristic cytologic features of the common salivary gland lesions are well-delineated in literature. Along with the more common salivary neoplasms, the cytomorphological features of the non-neoplastic lesions are also well recognized, and accurate cytological diagnosis is therefore possible in most cases, thereby preventing unnecessary surgery in many of these lesions<sup>[4,5]</sup>.

The present study was undertaken to analyze the cytomorphological features of major salivary gland lesions and to study the prevalence of non-neoplastic and neoplastic lesions in our institute.

## Material and methods

After obtaining the institutional ethical clearance, a 5-year retrospective study was carried out from March 2011 to February 2015, which included 65 cases with major salivary gland lesions irrespective of their age and sex, at the department of Pathology, Belagavi Institute of Medical Sciences, Belagavi. The FNAC smears stained with giemsa and papanicolaou (PAP) stain which were prepared using 22-25 gauge needle, were reviewed and categorized into non-neoplastic and neoplastic lesions. Histopathological correlation was done for subsequently excised specimens.

## Results

A total of 65 cases with major salivary gland lesions were studied. The age of the patients ranged from 6 to 75 years with a mean age of 37 years for all lesions considered together (Figure 1). The mean age for non-neoplastic lesions was 37.28 years while for

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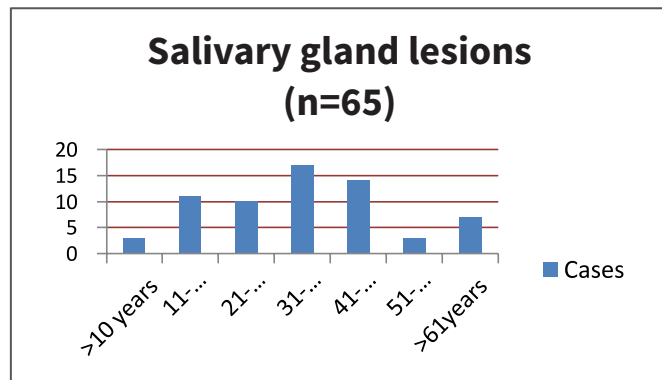
**Table 1. Anatomical distribution of salivary gland lesions**

Type of lesions	Parotid	Sub Mandibular	Sub Mental	Number of cases
Sialadenosis	07	01	-	08
Sialadenitis	11	05	01	17
Non neoplastic cysts	03	02	-	05
HIV related Parotid cyst	01	-	-	01
Lymphoepithelial cyst	01	-	-	01
Pleomorphic adenoma	18	02	01	21
Monomorphic adenoma	-	01	-	01
Oncocytoma	02	-	-	02
Normal salivary gland	-	02	-	02
No opinion possible	01	-	-	01
Primary salivary gland tumor/ Metastatic epithelial malignancy	01	-	-	01
Low grade ca of Salivary gland	01	-	-	01
Adenoid cystic carcinoma	-	02	-	02
Acinic cell carcinoma	01	-	-	01
Mucoepidermoid carcinoma	01	-	-	01
Total	48	15	02	65

benign neoplasms, it was 36.54 years. The malignant neoplasms were seen in older age group (43.16 years). 29 (44.6%) patients were males and 36 (55.4%) were females with male to female ratio=1:1.24 (Figure 2).

The parotid gland was the most commonly involved salivary gland seen in 48cases (73.84%) followed by the submandibular gland, seen in 15 cases (23.07%) and submental gland in 2 cases (3.09%) as shown in table 1.

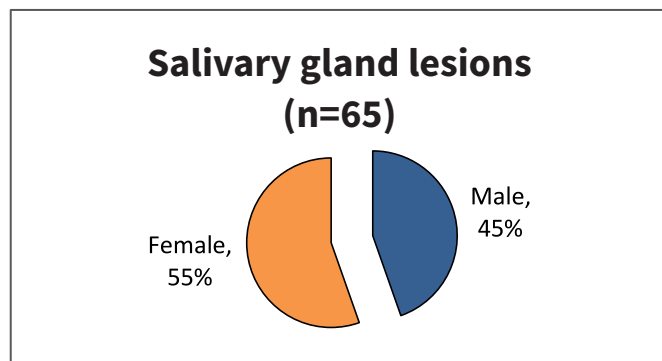
Out of 65 cases, 35 cases were reported as non-neoplastic lesions (53.84%) and neoplastic in 30 cases (46.15%) on FNAC (Table 2).



**Figure 1. Distribution of salivary gland lesions by age**

**Non-neoplastic lesions**

Inflammatory lesions were the most common non neoplastic lesions, of which sialadenitis was reported in 17 cases (48.57%). Chronic sialadenitis was more frequent than acute sialadenitis. This was followed by sialadenosis in 8 cases (22.85%) and non- neoplastic cysts in 5 cases (14.28%) (Figure 3). HIV-related parotid cyst and lymphoepithelial cyst were reported in one case each (Table 3, Figure 4).



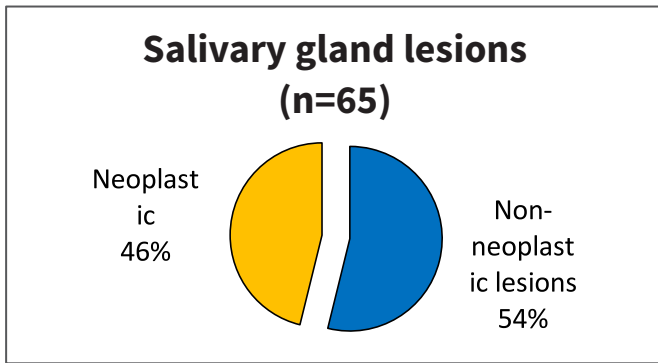
**Figure 2. Distribution of salivary gland lesions by gender**

**Neoplastic lesions**

Of the 30 neoplastic lesions, 24 cases (80%) were reported as benign and 06 (20%) as malignant on FNAC (Table 4).

**Table 2. Cytological categorization of salivary gland lesions by FNAC**

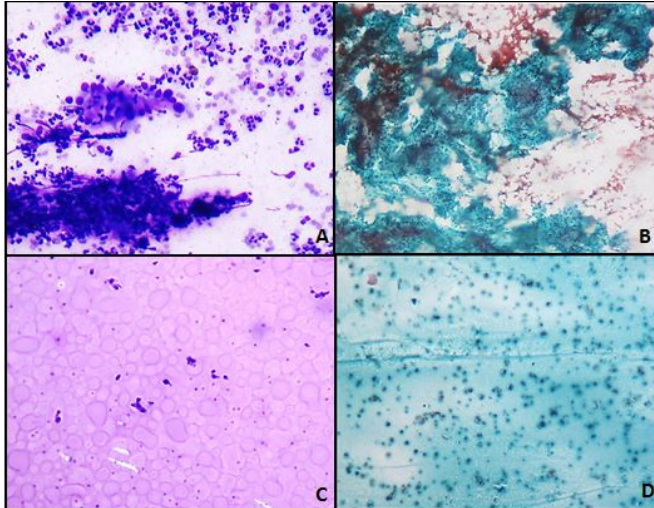
Cytologic diagnostic category	Frequency (n)	Percentage
Non -Neoplastic	35	53.84%
Neoplastic	30	46.15%
Total	65	100%



**Figure 3. Cytological categorization of salivary gland lesions**

**Table 3. Cytologic diagnosis of non-neoplastic salivary gland lesions**

Cytological diagnosis	Frequency (n)	Percentage
Sialadenitis	17	48.57%
Sialadenosis	08	22.85%
Non-neoplastic cysts	05	14.28%
HIV related parotid cyst	01	2.85%
Lymphoepithelial cyst	01	2.85%
Others	03	8.60%
<b>Total</b>	<b>35</b>	<b>100%</b>



**Figure 4.** Microphotograph of A) Acute sialadenitis (Giemsa,x200). B) Sialadenosis showing hyperplastic salivary gland acini (PAP, x200). C) & D) Non neoplastic salivary gland cyst showing cyst fluid with degenerate squamous epithelial cells and few inflammatory cells (C. Giemsa, x200; D. PAP, x200).

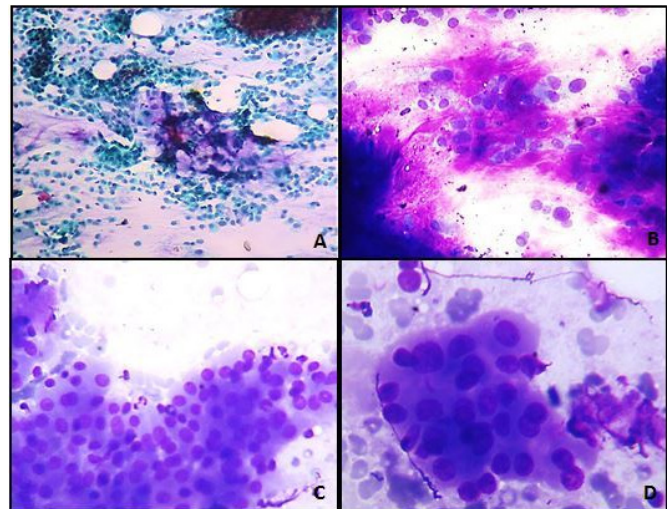
**Table 4. Cytological categorization of neoplastic lesions of salivary gland on FNAC Benign neoplasms**

Cytological diagnosis	Frequency	Percentage
Benign neoplastic lesions	24	80%
Malignant neoplastic lesions	06	20%
<b>Total</b>	<b>30</b>	<b>100%</b>

Among the 24 benign neoplasms, pleomorphic adenoma was the most common lesion seen in 21 cases (87.5%) of which 18 cases were seen in parotid (85.71%). 2 cases were seen in submandibular gland (9.52%) and one case in sublingual gland (4.76%). Other benign neoplasms that were reported was 2 cases of oncocytoma of parotid and one case of monomorphic adenoma of submandibular gland (Table 5, Figure 5).

**Table 5. Cytologic diagnosis of Benign neoplastic lesions of salivary gland**

Cytological diagnosis	Frequency (n)	Percentage
Pleomorphic adenoma	21	87.5%
Monomorphic adenoma	01	4.18%
Oncocytoma	02	8.33%
<b>Total</b>	<b>24</b>	<b>100%</b>



**Figure 5.** Microphotograph of A & B) Pleomorphic adenoma showing cellular smear with epithelial cell predominance, myoepithelial cells & fibrillar fibromyxoid stroma (A. PAP, x200; B. Giemsa, x400). C & D) Oncocytoma showing cohesive oxyphil cells having bland nuclear chromatin & abundant granular eosinophilic cytoplasm (C. Giemsa, x200; D. PAP, x400).

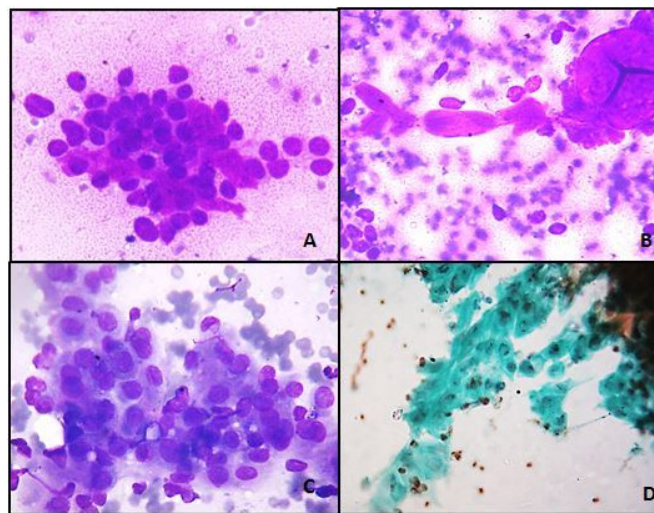


## Malignant neoplasms

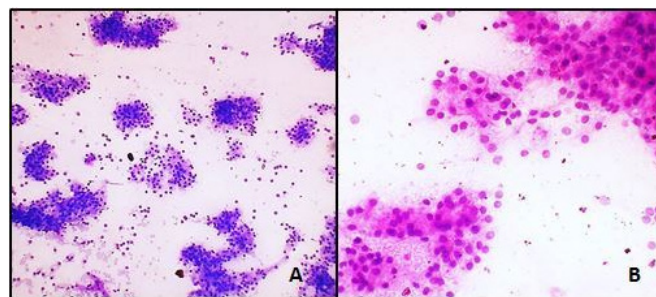
All the malignant tumors were carcinomas. Adenoidcystic carcinoma was reported in 2 cases (33.33%) involving the submandibular gland. One case each of primary salivary gland tumor/ Metastatic epithelial malignancy, mucoepidermoid carcinoma, acinic cell carcinoma and low grade carcinoma of salivary gland were reported (Table 6). Parotid was the most common site to be involved (66.66%) (Figures 6 and 7) .

**Table 6. Cytologic diagnosis of malignant neoplastic lesions of salivary gland**

Cytological diagnosis	Frequency (n)	Percentage
Adenoid cystic carcinoma	02	33.33%
Acinic cell carcinoma	01	16.66%
Mucoepidermoid carcinoma	01	16.66%
Primary salivary gland tumor/ Metastatic epithelial malignancy	01	16.66%
Low grade carcinoma of Salivary gland	01	16.66%
<b>Total</b>	<b>06</b>	<b>100%</b>



**Figure 6.** Microphotograph of A & B) Adenoid cystic carcinoma showing small, uniform tumor cells with hyaline stromal globules (A. Giemsa, x200; B. Giemsa, x400). C) & D) Mucoepidermoid carcinoma showing cohesive clusters of malignant intermediate cells with few tumor cells showing intracytoplasmic mucin vacuole (C. Giemsa, x 200; D. PAP, x 200).



**Figure 7.** Microphotograph of A) Acinic cell carcinoma showing tumor cells arranged in acinar pattern (A. Giemsa, x100). B) Malignant serous acinar cells showing PAS positive diastase resistant cytoplasmic granules (PAS, x200).

## Others

Of the total 65 cases, 2 cases showed features of normal salivary gland and one case was reported as no opinion possible.

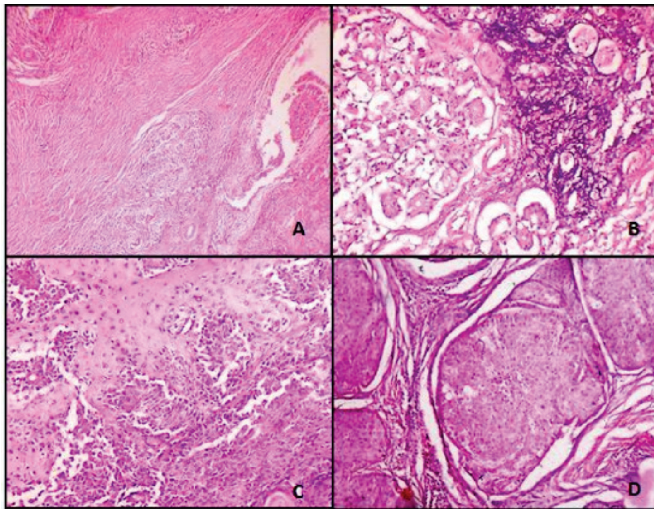
## Histopathological examination

Histological samples were available for 10 cases, of which 1 was reported as Kuttner's tumor (chronic sialadenitis with sialolithiasis) (Table 7). In the remaining 9 cases, majority were pleomorphic adenoma (6), 1 was recurrent

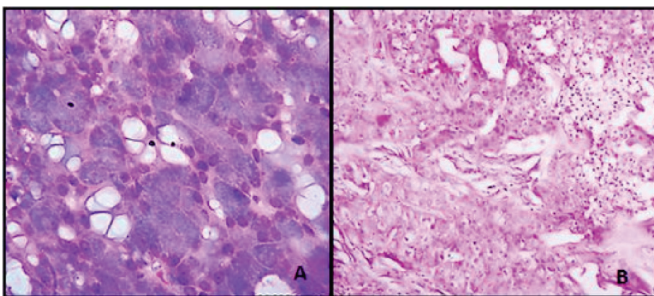
**Table 7. Cyto-histological correlation of the major salivary gland lesions**

Cytological diagnosis	Kuttner's tumor	Pleomorphic adenoma	Oncocytoma	Mucoepidermoid carcinoma	Acinic cell carcinoma
Chronic sialadenitis(1)	1	-	-	-	-
Pleomorphic adenoma(6)	-	6	-	-	-
Oncocytoma(1)	-	-	1	-	-
Acinic cell carcinoma(1)	-	-	-	-	1
Mucoepidermoid carcinoma(1)	-	-	-	1	-

oncocytoma and 1 each of mucoepidermoid carcinoma and acinic cell carcinoma (Figure 8 and 9).



**Figure 8.** Microphotograph of A & B) Kuttner's tumor showing fibrous stroma with acinar cell atrophy & chronic inflammatory cells (A. H&E, x100; B. H&E, x200). C) Pleomorphic adenoma with epithelial component with foci showing squamous metaplasia and chondromyxoid stromal component (H&E, x200). D) Oncocytoma showing aggregates of oncocytic cells with bland nuclear chromatin (H&E, x200).



**Figure 9.** Microphotograph of A) Acinic cell carcinoma showing neoplastic serous acinar cells arranged in solid and microcystic pattern (A. H&E, x200); B. Mucoepidermoid carcinoma showing predominantly intermediate cells with squamous metaplasia with mucin-secreting cells (H&E, x200).

## Discussion

Salivary gland swellings, specifically parotid and submandibular gland presents as a common problem and being readily visible creates havoc among patients. But because of the superficial location and accessibility of these lesions, FNAC provides a convenient way to obtain a tissue based diagnosis and therefore has now become a diagnostic test of choice. In salivary gland lesions, FNAC serves to determine the nature of the lesion (inflammatory/neoplastic – benign or malignant) and in some cases, the specific diagnosis. It is a minimally invasive technique that has a pivotal role in the diagnosis and management of patients with salivary gland lesions. When performed properly, FNA cytology can provide useful preoperative information about a mass lesion arising in the salivary gland, permitting the clinician to appropriately manage the patient.

In the present study, 65 cases of major salivary gland lesions were included irrespective of their age and sex. Of the 65 cases studied, the present study observed the age range of 6 to 75 years with mean age of 37 years and had a female preponderance. The non-neoplastic and benign lesions were seen more common in younger age group whereas malignant lesions were seen in older population. This is in concordance with the study done by Ameli et al<sup>[6]</sup>.

In the present study, parotid gland was the most common site for all the salivary gland lesions (73.84%), followed by submandibular gland (23.07%) and submental gland (3.09%). Similar findings were observed in the studies of Verma et al and Sengupta et al<sup>[7,8]</sup>. There was a higher incidence of non-neoplastic lesions in parotid than the benign or malignant neoplasms. This finding is consistent with the results of previous studies<sup>[7,8]</sup>.

In the present study, non-neoplastic lesions constituted around 53.84% of all salivary gland aspirates and included sialadenitis, sialadenosis and non-neoplastic cysts. This proportion is in

accordance with the existing literature (11-66%<sup>[9,10]</sup>. It was also observed that chronic sialadenitis was more common than acute sialadenitis. In the present study, neoplastic lesions were reported in 46.15% of the cases. 80% of these neoplasms were benign and 20% were malignant. This is similar to study done by Mihashi et al and Ashraf et al<sup>[10,11]</sup>.

Among benign neoplasms, pleomorphic adenoma (PA) was the most frequently encountered lesion in our study with higher incidence of occurrence in the parotid gland, which is well documented by Nanda et al and Cohen et al<sup>[12,13]</sup>. A cytologic smear representative of PA includes three components: extracellular matrix, myoepithelial, and ductal epithelial cells in varying proportions and metachromatic chondromyxoid stroma<sup>[14]</sup>.

However, considerable variation of the cellular composition of PA raises diagnostic difficulty especially in FNAC. In addition, secondary changes like fibrosis, hyalinization, cystic degeneration may lead to sampling error.

In our study, two cases of PA showed cystic change on cytology smears. 2 cases of oncocytoma was reported, characterized by sheets of oncocytes with small regular nuclei and absence of fluid, debris or lymphoid cells.

Among the malignant salivary gland neoplasms, adenoid cystic carcinoma (ACC) was seen in 2 cases. Various studies have reported the characteristic cytologic features of ACC as tight clusters of hyperchromatic epithelial cells with hyaline globules having a smooth sharp border. A case of mucoepidermoid carcinoma was reported. Cytology shows mucus producing and intermediate cells in a dirty mucoid background with varying degree of atypia depending on the grade of the tumor.

The differential diagnoses include squamous cell carcinoma, primary as well as metastatic or contiguous involvement from cutaneous or intra-oral location. One case of acinic cell carcinoma was reported in an adolescent in parotid. On cytology, acinic cell carcinoma shows acinic cells with vacuolated cytoplasm and anisonucleosis and bare nuclei in the background<sup>[10,14]</sup>.

In the present study, out of these 65 cases, 10 cases subsequently underwent surgical excision/histologic evaluation, out of which 8 were benign and 2 were malignant. Majority of the benign neoplasms were pleomorphic adenoma. One case reported as chronic sialadenitis was reported as Kuttner's

tumor, also known as chronic sclerosing sialadenitis on histopathology. A case of mucoepidermoid carcinoma on cytology was reported as metastatic mucoepidermoid carcinoma on histopathology.

The remaining cases were of oncocytoma of parotid and acinic cell carcinoma. In the present study, majority of the non-neoplastic lesions were treated conservatively. FNA provides beneficial preoperative information to the clinician in deciding whether a particular patient should be managed surgically or conservatively. Better planning of the type and extent of the surgical procedure can be done. It also essentially eliminates unnecessary surgery in about 1/3rd of cases<sup>[4,5]</sup>.

## Conclusion

FNAC is a highly reliable technique for pre-operative diagnosis of salivary gland tumors in hands of experienced pathologists. In the present study, non-neoplastic lesions were more common than the neoplastic lesions with parotid being the most common site. We conclude that FNAC can play a significant role in triaging patients with onsite cytologic interpretation and can reduce unnecessary surgery for non-neoplastic lesions.

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