

Research Article

## A Clinico-Pathological and Immunohistochemical Study of Salivary Gland Tumors: A 5 Year Indian Experience

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### Abstract

**Objectives:** To report the clinico-pathological data of salivary gland tumors in Indian population and evaluate common salivary gland tumors using the immunohistochemical markers namely Smooth muscle actin. **Materials and Methods:** The files from 2004 to 2008 were searched for cases coded as salivary gland tumors. **Results:** A total of 1855 biopsy specimens were accessioned during the study period. 37 cases were of salivary gland neoplasms, from which 11 were benign and 26 were malignant in nature. Rare presentation of Polymorphous low grade adenocarcinoma in the lower lip and sub-mandibular region has also been reported here. **Conclusion:** The incidence of malignancies in our cases was higher than benign salivary gland neoplasms. In contrast to the previously existing literature, two unusual presentations have been noticed i.e. third case of Polymorphous low grade adenocarcinoma to be reported in the lower lip and fourth case in the submandibular region. Immunohistochemically, stromal myofibroblasts could be demonstrated only in the tumors with malignant potential. Aggressiveness & prognosis of the tumors can be predicted by measuring the density of myofibroblasts at the invasive front.

**Keywords:** Salivary Gland Neoplasms;Parotid Neoplasms;Sublingual Gland Neoplasms; Submandibular Gland Neoplasms;Clinico-Pathological Study;Immunohistochemistry.

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### Introduction

Salivary gland tumors are a morphologically diverse group of neoplasms, which may present considerable challenges for the pathologist and surgeon regarding diagnosis and management. Salivary gland tumors are rare with an overall incidence in the western world of about 2.5 to 3.0 per 100,000 per year. About 80% of all lesions are benign; hence salivary malignancies are particularly rare, comprising less than 0.5% of all malignancies and about 5% of cancers in the head and neck.<sup>1</sup>

Most of the studies on salivary gland tumors are in reference to western population and to the best of our knowledge this study is the first of its kind in Indian population. In this study, salivary gland neoplasms were retrospectively studied clinically and microscopically and the incidence of each category of tumors is demonstrated. The two cases of Polymorphous low grade adenocarcinoma (PLGA) in lower lip have been reported by Wenig et al.<sup>2</sup> and Wei-Yung Yih et al.<sup>3</sup> Three cases of PLGA in the sub-mandibular region have been reported by Nagao et al.<sup>4</sup>, Yamazaki et al.<sup>5</sup> and Haba et al.<sup>6</sup> In this case series, we report the 3<sup>rd</sup> case of PLGA in the lower lip and the 4<sup>th</sup>

case in the sub-mandibular region. Immunohistochemical analysis may also help to understand the contribution of stromal myofibroblasts to the degree of invasiveness of the neoplasm.<sup>10-14</sup> Their higher density contributes to the aggressiveness and hence invasiveness of the tumor.

### Materials and Methods

The files from Department of Oral and Maxillofacial Pathology from January 2002 to December 2006 were searched for cases coded as salivary gland tumors. These biopsies were collected from the patients reported to our institution. Data of demographic features, site of tumors and histopathology were obtained from patient's records. The pathology of all tumors were reviewed and classified according to the World Health Organization (WHO) Histological Typing of Salivary Gland Tumors, the Armed Forces Institute of Pathology (AFIP) and the WHO Classification of Head and Neck Tumors.<sup>7</sup> Immunohistochemical analysis for smooth muscle actin was done and the intensity of staining and staining location were considered.

## Results

A total of 1855 biopsy specimens were accessioned at our biopsy services during the study period (2002 – 2006). In this period, 37 cases were of salivary gland neoplasms accounting to 1.99% of all biopsy specimens accessioned. Of 37 cases, 11 were benign neoplasms (29.72%) and 26 were malignant (70.27%). Of 37 cases, nine cases occurred in major salivary glands, with eight occurrences in the parotid region [one Pleomorphic adenoma (PA), one Adenolymphoma & six Acinic cell adenocarcinomas (AcADCC)] and one in submandibular region [i.e. PLGA]. The common tumors overall was Pleomorphic adenoma and Mucoepidermoid carcinoma (MEC) (Table 1). Out of 37 cases, 28 cases occurred in minor salivary glands, with palate being the most commonly affected site by both benign (63.63%) and malignant tumors (58%).

Males represented 54% of the affected patients, and certain tumors showed a strong male predilection, like Mucoepidermoid carcinoma (6 out of 10), polymorphous low grade adenocarcinoma (2 out of 2), Adenoid cystic carcinoma (ACC) (5 out of 8), Adenolymphoma (1 out of 1); in contrast, some tumors such as Pleomorphic adenoma (7 out of 10), Acinic cell carcinoma (4 out of 6) showed a female predilection. The mean age for malignant tumors in females (40.6 years) was lower than that in males (45 years). Most patients presented with a firm, painless swelling. But three patients with Mucoepidermoid carcinoma, one patient with Adenoid cystic carcinoma and one patient with Acinic cell carcinoma had pain at the time of presentation. Smoking habit was present in 6 of 37 patients and they smoked 5 - 12 cigarettes a day. The mean duration prior to excision was 45.57 weeks, and the range was between 2 – 192 weeks (Table 1).

Pleomorphic adenoma was the most common benign tumor (10 out of 37) (27.02%) (Table 3). PAs occurred between ages of 32 to 46 years. PAs in females (6 cases) were more common than in males (4 cases) with a ratio of 1.5:1. (Table 3 & 4) To the best of our knowledge, we report the first presentation of Pleomorphic adenoma in the infratemporal fossa (Accepted for publication in *Head and Neck Pathology*, 2007). Warthin's tumor represented only 1 out of 10 benign neoplasms (9.9%) and it occurred in a 58 year old male (Table 1 & 2).

Mucoepidermoid carcinoma was the most common malignant neoplasm representing 10 out of 26 malignancies (38.46%) (Table 2). The age range was between 45 to 68 years. MEC in males (7 cases) were more common than in females (3 cases) with a ratio of 2.3:1 (Table 2 & 3).

Adenoid cystic carcinoma was the second most common malignant neoplasm comprising 8 out of 26 malignancies (30.76%) (Table 2). The age range was between 18 to 55 years. ACC in males (5 cases) were more common than in females (3 cases) with a ratio of 1.6:1 (Table 2 & 3). Acinic cell carcinoma represented 6 of 26 malignancies (23.07%) (Table 2). The age range was 35 to 45 years. It was more common in females (4 cases) than in males (2 cases) with a ratio of 2:1 (Table 3 & 4).

Most of Pleomorphic adenomas showed ductal proliferation containing eosinophilic coagulum. The peripheral connective tissue capsule was incomplete in most of the cases. There was also evidence of chondroid differentiation and myxoid component in few cases. Warthin's tumor showed tall, columnar, finely granular, eosinophilic epithelial cells surrounding lymphoid tissue which forms germinal centers. The epithelium typically forms papillary projections into cystic spaces. Most Mucoepidermoid carcinomas were low or intermediate grade lesions with one case being the clear cell variant. Low grade variants showed prominent cystic spaces lined with mucous cells. The intermediate grade tumors showed solid islands of epidermoid cells, scattered mucous cells and predominance of intermediate cells.

In Adenoid cystic carcinoma, the tumor cells were isomorphic with deeply basophilic nuclei and scanty cytoplasm. In most of the cases, the tumor cells were arranged in nests of various size and shape depicting the classical "swiss-cheese pattern" of the cribriform type. Out of 8 cases, 5 cases fall into histopathological grade 1 and other 3 cases fall into grade 3 as per AFIP. Few cases showed solid islands and invasion of tumor cells into the deeper tissues. In Acinic cell adenocarcinoma, the tumor cells were round to polygonal, large cells with basophilic to amphiphilic cytoplasm and dark-staining cytoplasmic granules. Acinar cell was the predominant cell type. In most of the cases, the tumor cells were arranged in solid and micro-cystic patterns.

Polymorphous low grade adenocarcinoma represented 2 out of 26 malignancies (5.05%) (Table 2) and both occurred in males. Considering previously existing literature, Here we report the third case of Polymorphous low grade adenocarcinoma occurring in lower lip<sup>2,3</sup> and 4<sup>th</sup> case occurring in the submandibular region. A 68 year old Indian male came with a complaint of swelling on the inner aspect of lower lip, for the past six months. On examination, the swelling was 1.5 x 2 cm in size, involving the labial mucosa, and was well circumscribed. The mucosa overlying the swelling was stretched without any sinus formation (Fig 1). On palpation, the swelling was firm in consistency, non-tender and was not fixed to deeper tissues. There was no evidence of lymph node involvement.

Another case reported by us is of a 62 year old Indian male with a swelling in the left side of the neck, for the past 3 months. On examination, the swelling was 4 x 2 cm in size, involving the left sub-mandibular region and was well circumscribed. The skin overlying the swelling did not reveal any abnormalities. On palpation, the swelling was firm in consistency and non-tender. There was no regional lymphadenopathy. Gross pathology revealed submandibular gland (Fig 2), whitish brown in color, firm in consistency, with lobulated surface and connective tissue septae.

Histologically, Polymorphous low grade adenocarcinoma of the lower lip and the submandibular region (mentioned above), showed a well-circumscribed but unencapsulated tumor. It comprised of cytologically uniform, bland cells with oval and vesicular nuclei and inconspicuous or small nucleoli. The cytoplasm was ample and appeared eosinophilic or clear. The cells were arranged in various configurations/growth patterns like solid, lobular, tubular, cribriform (Fig 3) and papillary cystic areas. The strands of tumor cells were arranged in Indian file pattern (Fig 4) at the periphery. The connective tissue stroma showed hyaline areas. Necrosis was not evident and mitotic figures were infrequent. In the Polymorphous low grade adenocarcinoma involving the sub-mandibular region, solid islands were predominant.

Expression of smooth muscle actin was studied and found positive for all the cases of Adenoid cystic carcinoma with respect to

stromal myofibroblasts in tumour invasion front and at the periphery of cribriform areas. In all cases of Mucoepidermoid carcinoma and Polymorphous low grade carcinoma, smooth muscle actin was positive for stromal myofibroblasts in tumour invasion front but in all cases of Pleomorphic adenoma, it was occasionally positive for abluminal cells.

### Discussion

There have been several relatively recent reports of significantly large series of salivary gland tumors<sup>1-3,7,8</sup> which are in reference to the Western population. To the best of our knowledge, our case series is the first of its kind in reference to the Indian population. Intra-oral minor salivary gland tumors occur more frequently in females than in males. They affect mainly adult patients from 3<sup>rd</sup> to 7<sup>th</sup> decades of life, with peak prevalence from the 5<sup>th</sup> to 6<sup>th</sup> decades of life.<sup>7</sup> Our data are in agreement with these findings. Most patients presented with a firm, painless swelling. But three patients with Mucoepidermoid carcinoma, one patient with Adenoid cystic carcinoma and one patient with Acinic cell carcinoma had pain at the time of presentation. The palate has been cited as the most common site for minor salivary gland tumors, of which 42 - 75% occurs in the palatal mucosa.<sup>7</sup> In our study also, the palate was the most common location (59%) (Table 5).

According to literature, benign salivary tumors are more common than malignant ones accessioned at most oral pathology laboratories.<sup>7,8</sup> Of 37 cases, 14 cases had occurred on the left side and 23 cases on the right side. 11 were benign neoplasms (29.72%) and 26 were malignant (69.85%) (Table 2). This is in contrast to other series of studies in the literature, which showed that 46 - 72% were benign tumors. The differences in the type of tumors and the tumor location when compared to other published studies could be due to differences in access to treatment. Patients with stable growths may be less likely to seek treatment, particularly if access to health care is limited. Conversely, patients with tumors associated with pain, rapid growth, or a tumor which interferes with speech or eating may be more likely to seek treatment. This could probably be the reason for higher incidence of malignant salivary gland tumors in our case series.

Pleomorphic adenoma, Mucoepidermoid carcinoma and Adenoid cystic carcinoma

are the common types of intra-oral minor salivary gland tumors in most large series of studies reported in the literature. Most papers confirm that Mucoepidermoid carcinoma is the most common malignant minor salivary gland tumor,<sup>7,8</sup> followed by Adenoid cystic carcinoma and Polymorphous low grade adenocarcinoma. Our series is also in agreement with this finding. Pleomorphic adenoma is by far the most common intra-oral minor salivary gland tumor reported in the literature, representing 21 - 70% of all benign and malignant tumors combined and accounting for 71 - 100% of benign tumors<sup>7,8</sup>. In our study, Pleomorphic adenoma comprised 90.09% (10 of 11) of benign tumors in our series. But, we had 26 malignancies in our series of 37 cases.

Among the malignant tumors in our case series, Mucoepidermoid carcinoma (27.02%), Adenoid cystic carcinoma (21.62%), PLGA (5.05%) and only 2.7% of cases were found on lips (Table 1). Only one case had occurred in the lower lip and it was a Polymorphous low grade adenocarcinoma (Table 1 & 5). Most intra-oral Mucoepidermoid carcinoma varying from 48 - 85% are low grade lesions, in accordance with our results. Regarding Adenoid cystic carcinoma, our results as well as other reports, showed that the cribriform variant is the most common type, representing 56 - 80% of the cases.

To the best of our knowledge, only two cases of Polymorphous low grade adenocarcinoma involving the lower lip had been reported by Wenig et al.<sup>2</sup> and Wei-Yung Yih et al.<sup>3</sup> This is the third case report of Polymorphous low grade adenocarcinoma involving the lower lip (rare location). Both were male patients and the median age was 60 years by Wenig et al.<sup>2</sup> and 64 years by Wei-Yung Yih et al.<sup>3</sup> The duration of the tumors ranged from 6 months to 20 years. In our case, Polymorphous low grade adenocarcinoma had presented in a 68 year old male with 6 months duration (Table 1).

Similarly, only three cases of Polymorphous low grade adenocarcinoma involving the sub-mandibular region had been reported in a 79 years female by Nagao et al.<sup>4</sup> 67 years female by Yamazaki et al.<sup>5</sup> and 72 years female by Haba et al.<sup>6</sup> The duration of the tumors ranged from 3 - 5 years. We report the fourth case of Polymorphous low grade adenocarcinoma in the sub-mandibular region (rare location) which presented in a

62 year old male patient with 7 months duration.

The diagnosis of Polymorphous low grade adenocarcinoma was based on cytologic uniformity and histologic diversity. Only few immunohistochemical studies on Polymorphous low grade adenocarcinoma have been carried out using panels of antibodies including the Cytokeratins. Other studies have showed positivity to carcinoembryogenic antigen, S-100 protein, bcl-2 and anti-Glial fibrillar acidic protein.<sup>9</sup>

All the patients in our case series underwent surgical management. The benign lesions were treated with local surgical excision. The benign tumors and low grade malignancies of parotid gland were managed with superficial parotidectomy. The malignant tumors involving the palate were treated with hemi-maxillectomy.

Polymorphous low grade Adenocarcinomas are usually slow growing tumors and carry a relatively good prognosis. Complete surgical excision was chosen as the treatment, since studies sustain that it provides an excellent long term prognosis.<sup>1,7</sup> Local surgical excision was performed for our patients and they are remaining disease free on follow-up. Intra-oral minor salivary gland tumors are relatively uncommon lesions in the daily practice. Large series of study of these tumors help to understand their site, gender and age prevalence, and histological typing in relation to the prognosis. Therefore, these data are helpful in the proper diagnosis and appropriate management of various types of minor salivary gland tumors.

In various types of tumors, epithelial-mesenchymal interaction<sup>10</sup> has been found between malignant epithelial cells and stromal fibroblasts leading to formation of activated fibroblasts called as myofibroblasts which contributes in aggression. In our study, their role is discussed in salivary gland tumors. Numerous stromal myofibroblasts present in Adenoid cystic carcinoma and Mucoepidermoid carcinoma may be a factor that contributes to the malignant potential of the tumor. Presence of moderate number of stromal myofibroblasts in Polymorphous low grade adenocarcinoma may show that it is a low grade malignancy. Absence of stromal myofibroblasts in Pleomorphic adenoma correlates with its slow growing and benign nature. The neoplastic transformation results

in a *lack of differentiation*, thus the neoplastic myoepithelial cells lack SMA

which is a characteristic feature of the normal myoepithelial cell.<sup>11-14</sup>

Age / Sex	Habit	Location	Duration (weeks)	Clinical details	Salivary gland neoplasms	Management
68/M		Inner aspect of lower lip	24	Firm growth	PLGA	Surgical excision
62/M		Left submandibular region	12	Firm , nodular growth	PLGA	Surgical excision
55/F		Rt. Side hard palate	6	Firm swelling, tender	Mucoepidermoid carcinoma	Hemimaxillectomy
68/M	Smoking	Rt. Side hard palate	12	Firm swelling, pain	Mucoepidermoid carcinoma	Hemimaxillectomy
59/M		Rt.side hard palate	8	Firm swelling, pain	Mucoepidermoid carcinoma	Hemimaxillectomy
23/F		Rt. Side hard palate	12	Firm swelling, pain	Mucoepidermoid carcinoma	Hemimaxillectomy
4/M		Lt. lateral aspect of soft palate	24	Well circumscribed, non-fluctuant swelling, painful	Mucoepidermoid carcinoma	Hemimaxillectomy
52/M	Smoking	Lt. Side of hard palate	2	Well circumscribed, non-fluctuant swelling, tender	Mucoepidermoid carcinoma	Hemimaxillectomy
60/M		Rt. Side hard palate	4	Well circumscribed, non-fluctuant swelling, tender	Mucoepidermoid carcinoma	Hemimaxillectomy
49/M		Lt side hard palate	7	Well circumscribed, non-fluctuant swelling	Mucoepidermoid carcinoma	Hemimaxillectomy
50/F		Rt. Side hard palate	8	Hard painful swelling	Mucoepidermoid carcinoma	Hemimaxillectomy
45/M		Rt. Side hard palate	12	Firm swelling	Muco epidermoid carcinoma	Hemimaxillectomy
18/M		Rt. Side hard palate	2	Hard, painless swelling	Adenoid Cystic Carcinoma	Hemimaxillectomy
34/F		Rt. Side hard palate	48	Hard, painless swelling	Adenoid Cystic Carcinoma	Hemimaxillectomy
42/M		Lt. Side hard palate	24	Single, localized swelling, tender , firm	Adenoid Cystic Carcinoma	Hemimaxillectomy
45/M		Lt. buccal mucosa	12	Tender, firm swelling	Adenoid Cystic Carcinoma	Surgical excision
33/M	Smoking	Floor of the mouth	8	Tender, firm swelling	Adenoid Cystic Carcinoma	Surgical excision
40/F		Left buccal mucosa	8	Tender, firm swelling	Adenoid Cystic Carcinoma	Surgical excision
55/M	Alcohol	Left palate	12	Tender, firm swelling	Adenoid Cystic Carcinoma	Hemimaxillectomy
40/F		Left palate	192	Tender, firm swelling	Adenoid Cystic Carcinoma	Hemimaxillectomy
36/M		Lt. Posterior hard palate	144	Slow growing, firm swelling	Pleomorphic adenoma	Hemimaxillectomy
32/F		Rt. Posterior hard palate	96	Slow growing, painless swelling	Pleomorphic adenoma	Hemimaxillectomy
37/M		Palatine midline	192	Slow growing, tender swelling	Pleomorphic adenoma	Hemimaxillectomy
42/F		Rt. Posterior hard palate	144	Slow growing, painless swelling	Pleomorphic adenoma	Hemimaxillectomy
45/F		Rt. Posterior hard palate	144	Slow growing, tender swelling	Pleomorphic adenoma	Hemimaxillectomy
34/F		Rt. Buccal mucosa	96	Slow growing, painless swelling	Pleomorphic adenoma	Surgical excision
43/F		Rt. Posterior hard palate	144	Slow growing, painless swelling	Pleomorphic adenoma	Hemimaxillectomy
52/M	Smoking	Lt. Parotid region	48	Slow growing, painless swelling	Pleomorphic adenoma	Superficial parotidectomy
45/F		Rt. Side infratemporal fossa	96	Slow growing, painless swelling	Pleomorphic adenoma	Surgical excision
45/F		Rt. Side hard palate	96	Slow growing, painless swelling	Pleomorphic adenoma	Hemimaxillectomy
58/M	Smoking	Parotid, angle of mandible	8	Firm swelling	Warthin's tumor	Superficial parotidectomy
43/F		Lt. parotid region	4	Swelling with pain	Acinic cell adenocarcinoma	Superficial parotidectomy
35/F		Rt. parotid region	16	Swelling without pain	Acinic cell adenocarcinoma	Superficial parotidectomy
41/M	Alcohol	Lt parotid region	12	Swelling without pain	Acinic cell adenocarcinoma	Superficial parotidectomy
39/F		Rt. parotid region	24	Swelling without pain	Acinic cell adenocarcinoma	Superficial parotidectomy
45/M	Smoking	Rt. parotid region	16	Swelling without pain	Acinic cell adenocarcinoma	Superficial parotidectomy
42/F		Lt. parotid region	8	Swelling without pain	Acinic cell adenocarcinoma	Superficial parotidectomy

Table 1: Salivary gland neoplasms: University Experience.

No. of tumors	Males	Females
<b>Benign tumors (n=11)</b>	<b>4</b>	<b>7</b>
Palate (n=7)	2	5
Buccal mucosa (n=1)	-	1
Infra temporal fossa (n=1)	-	1
Parotid region (n=2)	2	-
<b>Malignant tumors (n=26)</b>	<b>16</b>	<b>10</b>
Palate (n=15)	10	5
Buccal mucosa (n=2)	1	1
Floor of the mouth (n=1)	1	-
Submandibular region (n=1)	1	-
Lower lip (n=1)	1	-
Parotid region(n=6)	2	4

Table 2: Sex distribution

Type of tumor	No. of cases	Incidence Overall (%) (n=37)	Incidence Tumor wise (%)
<b>Total cases</b>	37	100	
<b>Benign salivary gland tumors</b>			
Total	11	29.7	
Pleomorphic Adenoma	10	27.02 (out of 37)	90.09 (out of 11)
Adenolymphoma	1	2.7 (out of 37)	9.09 (out of 11)
<b>Malignant salivary gland tumors</b>			
Total	26	70.27	
Mucoepidermoid carcinoma	10	27.02	38.46
Adenoid cystic carcinoma	8	21.62	30.76
Acinic cell carcinoma	6	16.21	23.07
Polymorphous low grade adenocarcinoma	2	5.40	7.69

Table 3: Benign and malignant salivary gland tumors

<b>Benign tumors</b>	<b>11</b>	<b>29.7%</b>
Palate	7	63.63%
Buccal mucosa	1	9.09%
Infra temporal fossa	1	9.09%
Parotid region	2	18.18%
<b>Malignant tumors</b>	<b>26</b>	<b>70.27%</b>
Palate	15	57.6%
Buccal mucosa	2	8%
Floor of the mouth	1	3.84%
Submandibular region	1	3.84%
Lower lip	1	3.84%
Parotid region	6	23.07%

Table 4: Site distribution

Site	Total Number	Percent age
<b>Palate</b>	<b>22</b>	<b>59</b>
MEC	10	
PA	7	
ACC	5	
<b>Buccal mucosa</b>	<b>3</b>	<b>8</b>
ACC	2	
PA	1	
<b>Parotid region</b>	<b>8</b>	<b>21.6</b>
PA	1	
Adenolymphoma	1	
Acinic cell carcinoma	6	
<b>Floor of the mouth</b>	<b>1</b>	<b>2.70</b>
ACC	1	
<b>Infratemporal fossa</b>	<b>1</b>	<b>2.70</b>
PA	1	
<b>Lower lip</b>	<b>1</b>	<b>2.70</b>
PLGA	1	
<b>Submandibular region</b>	<b>1</b>	<b>2.70</b>
PLGA	1	

Table 5: Anatomic distribution of 37 salivary gland neoplasms.

Tumors	SMA	Density
Adenoid cystic carcinoma	yes	High
Mucoepidermoid carcinoma	yes	High
Polymorphous low grade adenocarcinoma	yes	Moderate
Pleomorphic adenoma	occasional	Absence

Table 6: Smooth muscle actin positivity and density of stromal myofibroblasts.

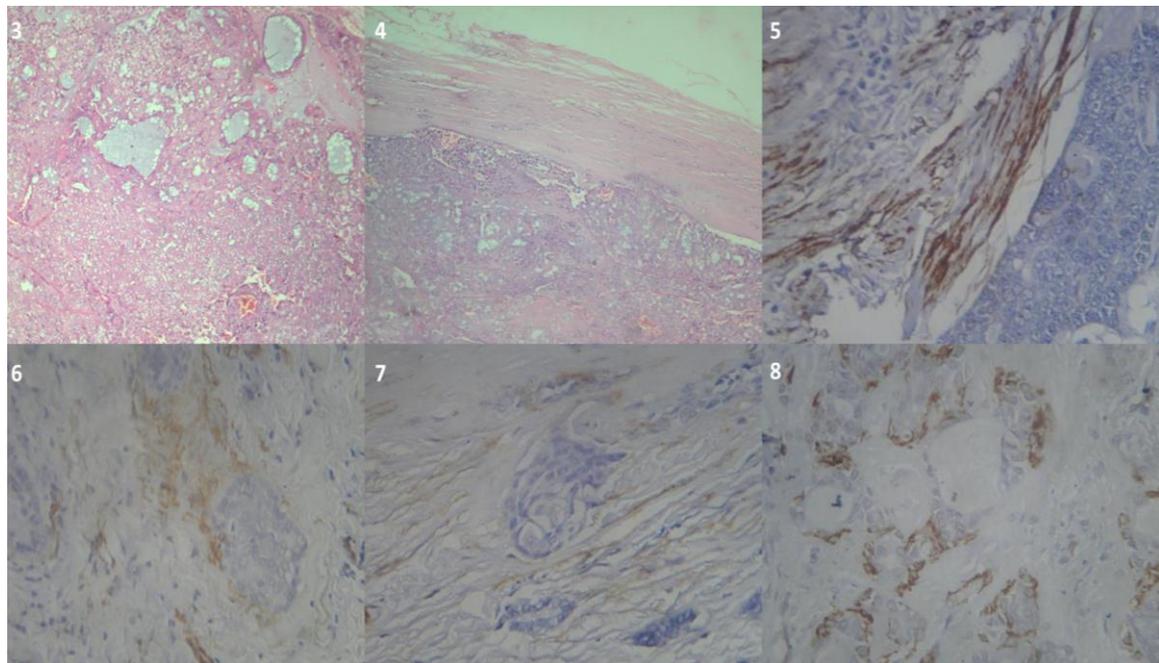
In our study, all cases of Adenoid cystic carcinoma and Mucoepidermoid carcinoma showed higher density of stromal myofibroblasts (as stained by smooth muscle actin) which may be a factor that contributes to the malignant potential of the tumour. In Polymorphous low grade adenocarcinoma cases, moderate density of stromal myofibroblasts shows that it is a low grade malignancy. In Pleomorphic Adenoma cases, no stromal myofibroblasts correlates with its slow growing and benign nature (Table 6). In our study, higher density of these cells in Adenoid cystic carcinoma and Mucoepidermoid carcinoma in comparison to Polymorphous low grade adenocarcinoma contributes to the fact that although Adenoid cystic carcinoma and Mucoepidermoid carcinoma are low grade lesions, they are

more aggressive (more malignant transformation rate) than Polymorphous low grade adenocarcinoma.

As far as habits like smoking and alcohol are concerned, few studies suggest possible relation between cigarette smoking and increasing incidence of Warthin's tumour.<sup>15</sup>



The clinical presentation of PLGA as a swelling in the right side of lower lip (Figure 1) and Gross specimen of the PLGA in the submandibular region, whitish brown in color, with lobulated surface (Figure 2).



The hematoxylin and eosin stained photomicrograph showing the tumor cells in PLGA arranged in solid & cribriform patterns under low power view (Figure 3) and Indian file pattern in the periphery under high power (Figure 4). The photomicrograph of ACC showing SMA positive for stromal myofibroblasts in the tumor invasion front and at the periphery of cribriform areas (Figure 5) The photomicrograph of MEC showing SMA positive for stromal myofibroblasts in tumor invasion front (Figure 6). The photomicrograph of PLGA showing SMA positive for stromal myofibroblasts in tumor invasion front (Figure 7). The photomicrograph of PA showing SMA occasionally positive for abluminal cells (Figure 8).

### Conclusion

To the best of our knowledge, this case series on salivary gland tumors is the first of its kind in reference to Indian population. In our series, In contrast to previously existing literature, the incidence of malignancies in our cases was higher than benign salivary gland neoplasms which may be attributed to less awareness and invariable report by

general pathologist laboratories. Along with our case series, we report the 3<sup>rd</sup> case of Polymorphous low grade adenocarcinoma involving the lower lip and 4<sup>th</sup> case in the submandibular region. Stromal myofibroblasts could be demonstrated only in the tumors with malignant potential. The density of these cells at the invasive front may act as a prognostic marker and predict

the aggressiveness of the lesion.

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