

Histomorphological spectrum of salivary gland tumors: a study at tertiary care teaching hospital of North Gujarat

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Abstract

Background: Salivary gland tumors (SGTs) are rare neoplasm of head and neck region. The salivary gland tumours vary widely in histopathological appearance. Also, epidemiological data of these tumors in various parts of the world are different. And so the study of SGTs for their biology and clinical characteristics can be helpful for a better understanding. **Objectives:** The objective of this study was to study types and new entities, common site of distribution and histomorphological spectrum of salivary gland tumors (SGTs). **Materials and Methods:** It was a retrospective followed by prospective study. Pertinent clinical history like age, duration of the lesion, site of the lesion, significant family and personal history, history of associated diseases was recorded. Specimens consisted of incisional biopsies were examined microscopically by the expert pathologist. Details of specimens noted in Performa include dimensions, appearance of external and cut surface and presence of lymph nodes, their size and number. **Observations:** Total 70 cases of SGTs could be included in the study. Among them 56 (80%) were benign and 14 (20%) were malignant. Parotid is commonest salivary gland involved with 75.71% of all tumors, followed by submandibular with 21.42% and minor salivary glands with 1(1.4%) of salivary gland tumors. among benign tumors Pleomorphic adenoma is most common with 70% of all benign SGTs followed by Warthin tumors (7%). Among malignant tumors commonest is Mucoepidermoid carcinoma with 14.28% of all SGTs. Female preponderance was clearly found in malignant SGTs. **Conclusion:** Parotid is most common site for the SGT. And pleomorphic adenoma and the Warthin tumors are the common benign tumors involve parotid gland the most. Among malignant tumors mucoepidermoid carcinoma are the commonest with female preponderance. While other carcinoma like adenoid cystic carcinoma and SCC are also common.

Keywords: Salivary Gland Tumors, Epidemiology, Histomorphology

Introduction

Salivary gland tumors (SGTs) are rare comprising approximately 3% to 10% of neoplasm of head and neck region [1]. The worldwide annual incidence of SGT ranges from 0.4 to 13.5 cases per 100000 population [2]. Benign tumors observed in third and fourth decade and malignant tumors fourth and fifth decades. In infants' mesenchymal tumors like hemangioma, lymphangioma, sialoblastoma, and salivary gland anlage tumor is most common [3].

Female are more commonly affected than men, except for warthin tumor and high grade carcinomas. Major salivary glands are involved more frequently and out of

them parotid being the most common site of involvement, followed by submandibular, sublingual and minor salivary glands [4]. FNAC is not a substitute of histomorphology but it could guide us whether lesion is salivary or non salivary, benign or malignant. Histochemical studies have only a limited role in diagnosis of SGT. e.g. diagnosis of high grade mucoepidermoid carcinoma by intracytoplasmic mucin, PAS-diastase in basal cell or mycoepithelial cell neoplasm, PTAH stain in clear cell variant of oncocytoma.

Immunohistochemical staining may aid in diagnosis to confirm tumor type such as mycoepithelial tumors, to confirm in situ nature of intraductal carcinoma, to distinguish adenoma from a carcinoma using Ki67

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proliferative index. Molecular study of SGT may aid in diagnosis of difficult cases of specific entities e.g. mammary analogue secretory carcinoma. Gene expression profiling studies can help us to differentiate benign salivary gland from neoplasm and different profiles for some difficult neoplasm [4].

SGT no uncommonly pose problems in diagnosis because of their rarity, broad morphologic spectrum and morphologic overlap among different tumor types. It is important to understand basic cyto-architectural features of each tumor types, in particular whether tumor shows dual luminal-abluminal cell differentiation. So, that diagnosis can be made logically through analysis of cellular components, cell arrangement and extracellular components.

The objective of this study was to study types and new entities, common site of distribution and histomorphological spectrum of salivary gland tumors (SGTs).

Methodology- It was a retrospective (from January 2011 to December 2013) followed by prospective (from January 2013 to July 2014) study conducted by Department of Pathology. Institutional Human Research Ethics Committee permission was taken before starting the study. Informed written consent was taken from all

Results

Total 70 cases of salivary gland tumor could be included in the study during study period of total one and half years. Frequency of various tumor types is seen in Table 1. According to that the commonest tumor was pleomorphic adenoma which accounted for 65.71% (46) of all cases followed by mucoepidermoid carcinoma, accounting for 14.28% (10) of all cases. And the least common tumors were cavernous haemangioma (1.46%), adeno cystic carcinoma (2.85%) and SCC (2.85%).

Table-1: Distribution of all salivary gland tumors according to their morphological types.

SR. No	Types of Lesions	Total No of Cases	Percentage
1.	Pleomorphic Adenoma	46	65.71%
2.	Warthin Tumor	07	10.00%
3.	Basal Cell Adenoma	02	02.85%
4.	Mucoepidermoid Carcinoma	10	14.28%
5.	Adenoid Cystic Carcinoma	02	02.85%
6.	SCC	02	02.85%
7.	Cavernous Haemangioma	01	01.46%
Total		70	100%

In present study the distribution of all cases according to age shows that 40 – 49 years of age is the commonest age group with 28.57% (20) of total cases were from this group followed by 30 – 39 years of age [27.14% (19)]. The Warthin tumors were commonly seen in 60 – 69 years of age. Also the frequency of malignant tumors was high after 40 years of age [Table 2].

participants before enrolment in the study. Total numbers of 70 cases with Salivary gland tumor were included in the study during study period.

Pertinent clinical history like age, duration of the lesion, site of the lesion, significant family and personal history, history of associated diseases was taken and entered in the Performa. After detailed general and local examination, the site of the biopsy was selected. The selected patients consent was taken after explaining the details of the biopsy procedure. Biopsies received from ENT and Surgery department with consent.

Specimens consisted of incisional biopsies (few), partially resected and excisional biopsies (majority) with or without draining lymph node of that region in case of prospective study. All specimens were fixed in 10% formalin, then processed into paraffin-embedded sections of 5 microns thickness and stained with hematoxylin and eosin.

Also whenever necessary special stains (e.g., for mucin) like PAS with or without diastase were employed. All the slides were reviewed by the expert pathologist.

Details of specimens noted in Performa include dimensions, appearance of external and cut surface and presence of lymph nodes, their size and number.

Table-2: Age wise distribution of all salivary gland tumors.

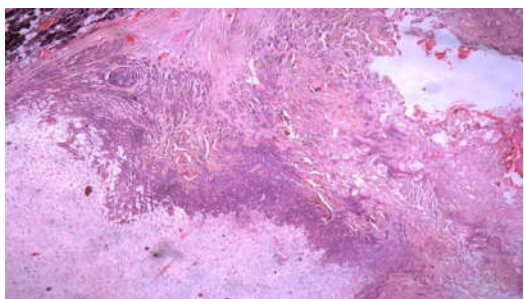
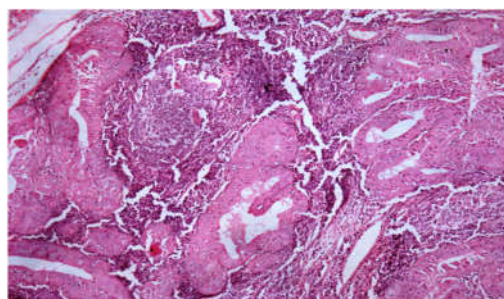
Sr. No	Tumours	Age in year								Total
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	
1	Pleomorphic Adenoma	0	06	08	15	13	02	02	0	46
2	Warthin Tumor	0	0	0	0	02	0	04	01	7
3	Basal Cell Adenoma	0	0	0	0	0	0	02	0	2
4	Mucoepidermoid Carcinoma	0	0	01	04	04	01	0	0	10
5	Adenoid Cystic Carcinoma	0	0	0	0	0	01	01	0	2
6	SCC	0	0	0	0	1	0	01	0	2
7	Cavernous Haemangioma	0	0	1	0	0	0	0	0	1
	Total	0	6	10	19	20	4	10	1	70

Gender wise incidence of salivary gland tumors in males was 47.14% and in female was 52.86% with a male to female ratio of 1:1.2. For benign salivary gland tumors slight preponderance seen in male with male to female ratio is 1.07:1. For malignant tumor male to female ratio is 1:2.5. Among benign tumours, female preponderance was seen in pleomorphic adenoma. Among malignant tumours mucoepidermoid carcinoma showed a female preponderance [Table 3].

Table-3: Gender wise distribution of all salivary gland tumours.

Tumour	Male	Female	Total
Benign			
1.Pleomorphic Adenoma	21	25	46
2.Warthin Tumor	7	0	7
3. Basal Cell Adenoma	0	2	2
4.Cavernous Haemangioma	1	0	1
Total	29	27	56
Malignant			
1. Mucoepidermoid Carcinoma	3	7	10
2. Adenoid Cystic Carcinoma	0	2	2
3.SCC	1	1	2
Total	4	10	14
Grand total	33 (47.14%)	37 (52.86%)	70

Parotid is most common salivary gland involved accounting for 53(75.71%) of all tumors, followed by submandibular with 15(21.42%) and minor salivary glands with 1(1.4%) of salivary gland tumors. Pleomorphic adenoma is most common salivary gland tumor constituting 46(65.71%) of total salivary tumors and 70.0% of benign tumors. Histopathology of pleomorphic adenomas showed classical pleomorphic features [Figure 1]. There are 7(10.00%) cases of Warthin tumor. Warthin tumor occurred between age group of 40-70 years. 6 are located in parotid and 1 in submandibular gland with typical histological features. [Figure 2] Basal cell adenoma is rare benign tumor of salivary gland. These tumors constituted 2(2.85%) of all tumors, which occurred in parotid gland of 60 years old female. Major architectural pattern of basal cell adenoma are tubular, solid, trabecular, and membranous.

**Figure-1: Pleomorphic adenoma****Figure-2: Warthin tumor**

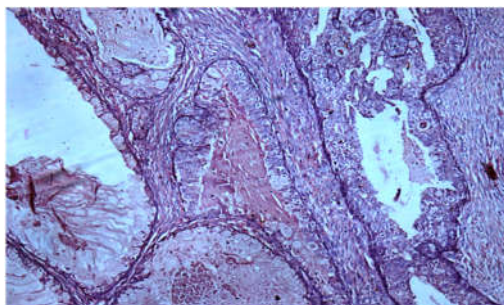


Figure-3: Mucoepidermoid Carcinoma

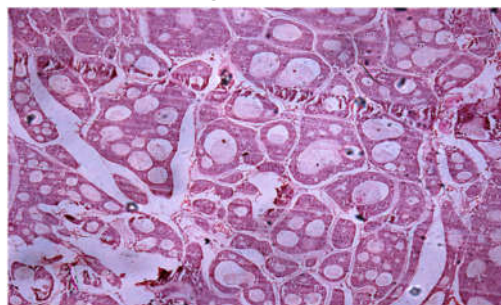


Figure-4: Adenoid Cystic Carcinoma

Table-4: Site wise distribution of all salivary gland tumors

S.No	Tumors	Numbers	Parotid	Submandibular	Minor salivary
1	Pleomorphic Adenoma	46	33	12	0
2	Warthin Tumor	7	6	1	0
3	Basal Cell Adenoma	2	2	0	0
4	Mucoepidermoid Carcinoma	10	9	1	0
5	Adenoid Cystic Carcinoma	2	2	0	0
6	SCC	2	0	1	1
7	Cavernous Haemangioma	1	1	0	0
	Total	70	53	15	1

Mucoepidermoid is most common malignant tumor of present series. It constitutes 10(14.28%) of salivary gland tumors and parotid gland was the most common site. Mucoepidermoid carcinoma divided into three grade -Low, intermediate and High according to their histological parameters includes cyst, mucinous cells, biological potential, recurrence and metastasis. According to Brandwein Grading System (2001) [5] for mucoepidermoid carcinoma scoring histomorphological criteria like invasion, cyst, atypia, invasion, mitosis and necrosis are scored 1+ to 3+. [Figure 3] Adenoid cystic is second most common malignant salivary gland tumor with incidence of 2(2.85%) of all salivary gland tumors. Occurs in parotid gland between 50-70 age and in female. Three criteria for Adenoid Cystic Carcinoma Grading by MD Anderson Cancer Center and Batsakis include histomorphological features like architectural pattern, solid area and atypia [Figure 4]. Two cases of SCC occurred constituting 2.84% of SGT. Occurs in submandibular and minor salivary gland between 40-70 year of age and equal distribution in both sex. One case of Hemangioma occurred constituting 1.42% of SGT. Occurs at age of 20 in parotid gland in male [Table 4].

Discussion

Salivary gland tumors (SGTs) are least common tumors with their annual incidence is <1/100,000 inhabitants, without noticeable geographical gap, and they represent <5% of head and neck tumors [7]. In India, overall incidence of SGTs can be ascertained from the cancer registry established by Indian Council of Medical Research [8]. However, the geographic area and population covered by these registries are small and perhaps unrepresentative of the Indian population.

In addition, there is a limited published literature on SGTs in Indian population [9]. In present study total 70 cases of salivary gland tumor were evaluated for its nature, age, gender and site wise distribution and histomorphological aspects. The benign tumors [56 (80%)] predominate over malignant tumors [14 (20%)]

in present study. This findings are in accordance with observations found with other studies like Rajdeo RN et al, Rajesh et al, and Elagoz S et al [10,11,12]. Salivary gland tumors has maximum incidence in 3rd and 6th decade. With peak in 4th decade. Benign tumors has maximum incidence in 4th decade while malignant has maximum incidence in 5th decade.

Age wise distribution shows that benign tumors occurs at lower age group like pleomorphic adenoma seen commonly below 40 years of age while the incidence of all malignant tumors like Mucoepidermoid Carcinoma, Adenoid Cystic Carcinoma, and SCC are high after 40 years of age. Average age of patients with benign tumors and malignant tumors are 40.5 years and 46.5 years in present study. Which is comparable to other

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studies like Vargas et al and Shresha et al, in which average age for benign/malignant tumors were 47.7/48.8 years and 44.7/56.0 years respectively [13, 14]. Salivary gland tumors exhibits slight female preponderance with M:F ratio of 1.1:2. However for benign salivary gland tumors slight preponderance seen in male with male to female ratio is 1.07:1. While incidence of malignant tumor was very much high in female with male to female ratio is 1:2.5. Thus the slight female predominance in the present study was in accordance with the study of Rajdeo et al (2015), Stewart et al (2000) [10,15]. However, some authors like Shrestha et al and Rajesh et al found male preponderance in their studies [14,16]. Parotid is most common salivary gland involved accounting for 53(75.71%) of all tumors, followed by submandibular with 15(21.42%) and minor salivary glands with only 1(1.4%) of salivary gland tumors. The findings are similar to other studies like Shrestha et al and Vargas et al [13,14]. However study by Zohreh et al had more incidence of tumor in minor salivary glands as compare to submandibular glands [11].

Pleomorphic adenoma is most common salivary gland tumor constituting 46(65.71%) of total salivary tumors and 70.0% of benign tumors. Parotid is most favored site with 33 out of 46 cases. Peak age for pleomorphic adenoma is 30-39 years. In most studies, pleomorphic adenoma is the most common salivary gland tumor. [17,18,19] with an incidence ranging from 33% [20] to 76.79% as seen by Rajesh Singh Laishram (2013) [16] of all tumors and from 70.6% [19] to 100% [18] of benign tumors. In present study there are 7(10.00%) cases of Warthin tumor. Warthin tumor occurred between age group of 40-70 years. 6 were located in parotid and 1 in submandibular gland with typical histological features. All cases of Warthin tumor were male. Similar findings were seen in other study like Shreedevi et al (2017) [21]. However the site of Warthin tumor in study by Shreedevi was parotid.

While in present study one case of Warthin tumor also found that involve submandibular gland. Basal cell adenoma is rare benign tumor of salivary gland. These tumors constituted 2 (2.85%) of all tumors, which occurred in parotid gland of 60 years old female. Major architectural pattern of basal cell adenoma are tubular, solid, trabecular, and membranous. The 10 year study done by Subhashraj K (2008) also found the incidence of basal cell adenoma was 3% [22].

Out of 10 malignant tumors mucoepidermoid is the commonest tumor of present series. It constitutes 10 (14.28%) of salivary gland tumors. Parotid is most common site and age is 30-50 years in females.

Pinkston et al. in their series and also Rajesh Singh Laishram (2013) noted mucoepidermoid carcinomas to be more common in parotids, similar to present study [16,23]. Microscopically Mucoepidermoid carcinoma shows varying proportions of mucous, epidermoid and intermediate-type cells with cystic or papillary mucin-filled cystic lumens, often have pools of extravasated mucin in surrounding tissue which are strongly positive for mucicarmine stain. It may also contain clear cells with clear cytoplasm mainly glycogen and less mucin. Adenoid cystic carcinoma is second most common malignant salivary gland tumor with incidence of 2(2.85%) of all salivary gland tumors. Occurs in parotid gland between 50-70 age and in female.

Primary squamous cell carcinoma of salivary gland is rare. In present study two cases of Squamous Cell Carcinoma occurred constituting 2.84% of SGT. Occurs in submandibular and Oral minor salivary gland between 40-70 year of age and equal distribution in both sex.

One case of Hemangioma occurred constituting 1.42% of SGT. Occurs at age of 20 in parotid gland in male. However by reviewing the other studies it is found that hemangioma is not commonly found in minor salivary glands.

Conclusion

This study observed that parotid is most common site for the SGT. And pleomorphic adenoma and the Warthin tumors are the common benign tumors involve parotid gland the most. Among malignant tumors mucoepidermoid carcinoma are the commonest with female preponderance. While other carcinoma like adenoid cystic carcinoma and SCC are also common.

Findings: Nil; **Conflict of Interest:** None initiated

Permission from IRB: Yes

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