

Epidemiology and Histomorphological Presentations of Salivary Gland Neoplasms

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Received: 25-09-2023 / Revised: 28-10-2023 / Accepted: 30-11-2023

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Conflict of interest: Nil

Abstract:

Background and Objective: Salivary gland tumors are relatively uncommon tumors and have diverse histopathological and clinical presentation. More than 70% of tumors occur in the parotid region. The second common site is submandibular salivary glands followed by sublingual and other minor salivary glands. About 70% salivary gland tumors are benign and arise from the major salivary glands. This study aims to evaluate relative frequency of various salivary gland tumors, its clinical presentation and histopathological morphology.

Method: It is a retrospective study. 150 cases of salivary gland tumors were taken up for study. Clinical and epidemiological details were collected from old case records. Histopathological reports were collected from the department of pathology and analysed. The incidence of various tumors, male to female ratio, mean age at presentation, site and histological appearance were analyzed.

Results: This is one among the few studies that concentrates predominantly on the epidemiology of salivary gland tumors. Among the 150 cases studied, 53.3% were females and 46.7% were males. 74% were benign tumors and 26% were malignant tumors. 108 tumors (72%) were from parotid, 16 (10.6%) from submandibular and 26 tumors (17.3) were from the other minor salivary glands. Pleomorphic adenoma was the commonest tumor. It constituted 91 cases (60.6%) out of the 150 cases studied. Mucoepidermoid carcinoma was the commonest malignant tumor of the study constituting 19.3% (29 cases) of the total tumors studied. Age at presentation of these cases ranges from 15 to 72 years. Our data shows that the various characteristics of salivary gland tumors evaluated in this study is similar to various available literature worldwide.

Conclusion: Salivary gland tumors have a wide range of presentation with regards to age, site and clinical features. Their histomorphological patterns too have different appearance. Even in the same type of tumor, individual components may vary in appearance and presentation. This study throws some light on the spectrum of salivary gland tumors and its different presentations.

Keywords: Incidence, Epidemiology, Histopathology, Benign Tumors, Malignant Tumors.

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Introduction

Salivary gland tumors have an incidence of about 2.5 to 3.0 per 100,000 people in western population [1]. Malignant salivary neoplasms constitute around 3% of all head and neck tumors [2]. Most of the tumors were from Parotid gland (75%) and remaining from minor salivary glands.[3]

The etiology and cause for salivary gland tumors remain unclear. It is also noted that the tumors are associated with certain occupation like rubber and wood industries. Therapeutic radiation is observed as another risk factor for salivary gland tumors. A study reports that the incidence of Epstein Barr virus in malignant salivary gland tumors to be 45.1%. [4] TP53, NOTCH1, PIK3CA, CDKN2A and ERBB2 are some of the genes commonly associated with salivary gland neoplasms. [5] In this study we will discuss the various important aspects of salivary gland tumors like incidence,

epidemiology and various histological appearances. The continuing increase in incidence of salivary gland neoplasms requires good diagnostic and treatment methods. Effective treatment of these tumors is possible by accurate diagnosis, by properly identifying and grading these tumours which will in turn improve survival and outcome.

Materials and Methods

It is a retrospective study. Data from 150 cases of salivary gland tumors were collected between the periods of June 2014 to June 2017. Informed consent was obtained from each patient. Histopathology reports of these patients were obtained. Detailed analysis of incidence, site and histomorphology was analysed. Photographs and tabulations were recorded.

Inclusion Criteria

1. All salivary gland neoplasms with histopathological confirmation between the
2. period of June 2014 to June 2017
3. Includes both benign and malignant neoplasms

Exclusion Criteria

1. Non neoplastic and inflammatory lesions of salivary gland
2. Cases without clear histopathological diagnosis were excluded
3. Cases without proper details of age, sex and site were excluded.

Results

150 cases of salivary gland tumors were totally studied. They constitute 3.4% of all neoplasms newly diagnosed during that period. The age at diagnosis of these cases was widely distributed from 15 years to maximum of 72 years. However the common age group affected was between the late thirties to 7th decade. The mean age of occurrence was 53.7 years.

There was a mild female preponderance accounting for 53.3% of cases and 46.7% of males. The distribution of various salivary gland tumors was seen to predominantly involve the parotid gland with 108 cases out of the 150 studied, which is 72% of all salivary gland tumors. Superficial lobe of parotid was commonly affected (86%) and the deep lobe was involved in 14% of cases. Submandibular salivary gland gave rise to 16 cases out of the 150 (10.6%). The minor salivary glands give rise to 26 cases out of the 150 cases (17.3%). Palate was the commonest site of minor salivary gland tumors (63%). Of the 150 cases studied 107 (71.3%) cases were benign and 43 (28.6%) were malignant. There was significant age difference between benign and malignant tumors. Benign tumors were commonly affected around the 4th to 6th decade, whereas malignant tumors were common beyond the 5th decade. Similarly benign tumors were more common in female compared to males with a ratio of 1.24:1

The most common benign tumour in the present study was pleomorphic adenoma - 91 cases (60.6%). It had a mean age of occurrence of 51.4 years with male: female ratio of 1:1.8. The most common site of occurrence was parotid (59.14%), followed by submandibular (35.83%) and other minor salivary glands (5.03%).

The most frequent malignant neoplasm seen in the study was mucoepidermoid carcinoma - 29 cases (19.3%). The mean age of occurrence was 55.8 years. It has male: female ratio of 1:1.9. The other tumors are given in table 1.

Salivary gland tumors of the same type had various histomorphological presentations. In our study we had 111 cases of pleomorphic adenoma.

Predominant tumors showed a mixed pattern of epithelium composed of glandular structure and typical chondromyxoid stroma. Around 17% of pleomorphic adenoma cases exhibited squamous metaplasia. The basal epithelial cells less frequently had varied appearance composed of cuboidal cells (23.07%), oncocytic cells (4.3%), clear cells (5.4%), spindle cells (3.2%) and at times plasmacytoid appearance (4.3%).

Stroma frequently had myxoid and chondroid appearance. Definite cartilaginous areas were seen in 4.3% of tumors. Osseous metaplasia was seen in one case.

All the cases of Warthin's tumor exhibited the classic morphology of bilayered oncocytic cells with prominent lymphoid tissue. However, 1 case demonstrated mucin-secreting cells. Cases of canalicular adenoma had ribbons of bilayered columnar epithelial cells separated by well vascularized, paucicellular stroma. Basal cell adenoma had basal cells arranged in ductal pattern often filled with eosinophilic secretions. They lack the chondromyxoid stroma there by differentiating it from pleomorphic adenoma. Two cases of oncocytoma of parotid were reported. Tumor was composed entirely of benign oncocytic cells.

Mucoepidermoid carcinoma was the most frequent malignant neoplasm reported. Majority of cases were from parotid and submandibular glands (59%). Microscopically well differentiated mucinous cells, squamous cells and intermediate cells are seen in various proportions. These tumors are graded depending on the proportion of these cells. Our study had 66% low grade tumors, 29% intermediate grade and 5% high grade mucoepidermoid tumors. 4 cases of Acinic cell carcinoma were reported. One case was found to have bilateral involvement. The predominant microscopic pattern was solid growth of cells with granular basophilic cytoplasm. Occasional tumors with focal clear cell change were reported. Our cases of adenoid cystic carcinoma had cribriform pattern showing pseudocystic structures filled with eosinophilic material. Perineural invasion was reported in one case of adenoid cystic carcinoma.

Cases of epithelial-Myoepithelial carcinomas were identified by their infiltrative growth, increased cellularity, increased mitosis and frequent necrosis. We had 2 cases of polymorphous low grade adenocarcinoma. Both the cases were reported from the minor salivary glands. One case of secretory carcinoma from the parotid gland was reported. This tumor was microscopically composed of glandular spaces filled with abundant eosinophilic material. The monotonous cells with vacuolated cytoplasm found in these tumors helps to differentiate it from similar looking adenoid cystic carcinoma. We had one case of carcinoma ex

pleomorphic adenoma. Tumor was composed of duct with focal capsular invasion. malignant cells resembling the cells of salivary

Table 1: Distribution of Tumors in the Present Study

Name of Tumor	Distribution %
Benign	
Pleomorphic Adenoma	60.6%
Warthins Tumor	6%
Ductal Adenomas	3.3%
Oncocytoma	1.3%
Malignant	
Mucoepidermoid Carcinoma	19.3%
Acinic Cell Carcinoma	2.7%
Adenoid Cystic Carcinoma	2.7%
Epithelial Myoepithelial Carcinoma	1.3%
Polymorphous Adenocarcinoma	1.3%
Secretory Carcinoma	0.7%
Carcinoma Ex Pleomorphic Adenoma	0.7%

Table 2: Mean Age at Occurrence of Salivary Neoplasms

Mean Age At Occurrence	Our Study	Wen – Chieh Liao Et Al
Salivary Tumors In Common	53.7	53.5
Benign Salivary Tumors	50.8	52.6
Malignant Salivary Tumors	56.7	55.8

Discussion

Salivary gland neoplasms are complex and heterogenous group of disorders with varied presentation and prognosis. Our study has 150 cases of salivary gland neoplasms. We have attempted to study the epidemiological and histomorphological pattern of these cases. Distribution with regard to age, sex and site was studied. The salivary gland tumors in our study have an incidence rate of 4.6 for benign tumors and 1.1 for malignant tumors which fairly correlates with previous studies [6].

The age group commonly affected by salivary neoplasms in our study was between the 3rd to 7th decade. Mean age of occurrence was 53.5 years. The mean age of occurrence for benign and malignant tumors was 50.8 years and 56.7 years respectively which closely correlated with the observations of the study conducted by Wen – Chieh Liao et al [7]. (Table 2)

In the present study male to female ratio of 0.8:1 this is closely similar to the results from the study conducted by A V Jones et al [8] in the UK. The incidence of benign tumors in females was higher when compared to males with a male - female ratio of 1:1.24, which is closely similar to the ratio 1:1.6, obtained in the study conducted by Allen Young et al [9]. Pleomorphic adenoma was the most common tumor in this study, with a male – female ratio of 1:1.8. Mucoepidermoid carcinoma was the commonest malignant tumor which had a significantly higher incidence in females with a male – female ratio of 1:1.9 which fairly correlates

with the study conducted by Janet – Ofelia et al [10].

By the observations of our study, Parotid gland is the most common site of salivary gland tumors giving rise to around 72% of tumors. Submandibular gland gives rise to 10.6% of salivary neoplasms and minor salivary glands give rise to 17.3% of salivary tumors. The most common minor salivary gland giving rise to tumor was palate.

These observations fairly correlate with the observations of a study conducted by Krishnaraj [11]. However, parotid involvement is slightly lower when compared to our study (61%). One study conducted by Erison et al states that tumor site has a major impact on overall survival [12]. It was observed in this study that tumors arising from major salivary glands had better recurrence free survival whereas minor salivary gland tumors had relatively worse survival.

Our study had 91 cases of pleomorphic adenoma. Around 17% of these cases exhibited focal squamous metaplasia. Squamous metaplasia occurs as a result of ischemia. Similar studies state that around 25% of pleomorphic adenoma can exhibit squamous metaplasia and the major pitfall is that, when these metaplastic changes are extensive they can be mistaken for malignant tumors like mucoepidermoid carcinoma or squamous cell carcinoma [13]. The epithelial cells in pleomorphic adenoma in our study had various appearances like cuboidal, oncocytic, clear cell, spindle cell and plasmacytoid. Certain variations like mucinous change and cribriform appearance may mimic

malignancies like mucoepidermoid carcinoma and adenoid cystic carcinoma. Absence of invasion and genetic mutation studies help to distinguish from these tumors [14]. Second common benign tumor was Warthin (6%). One case was identified to have mucinous metaplasia. A study by Xiomingzheng et al shows that 83% of warthins tumor exhibited mucinous metaplasia demonstrated by mucicarmine stain and that the size of the tumor was related to mucinous metaplasia [15].

Mucoepidermoid carcinoma was the most frequently observed malignant salivary gland neoplasm in our study accounting for 17.3% of cases.

They are graded based on the presence of mucinous, intermediate and squamous cells. Many studies on mucoepidermoid carcinoma state that warthin like, spindle cell, clear cell and mucinous variants are commonly observed. These tumors commonly exhibit CRTC1/3-MAML2 fusions. Some unusual histopathological findings like marked atypia, mitosis >10 per 10 high power field, and extensive necrosis may be observed [16].

Acinic cell carcinoma and adenoid cystic carcinoma each constituted 2.7 % of cases in our study. One case of acinic cell carcinoma had bilateral presentation. A study states that 4.8% of acinic cell carcinoma cases are bilateral. This necessitates the need for thorough examination of salivary glands [17].

We had 4 cases of adenoid cystic carcinoma. One case with perineural invasion was identified. Various studies state that perineural invasion can be found in 25 to 55% of cases.

However it is essential to identify cases with perineural invasion as it has major prognostic significance. A study states that those with perineural invasion had 80% chance of distant and local invasion and ultimately poor 5 year survival, whereas in those without perineural invasion, 27% of cases had recurrence [18].

Conclusion

Salivary gland neoplasms, though infrequent show an increasing trend of occurrence. They form a diverse group of tumors with various outcomes. It is essential to understand the basic epidemiology and stay updated on the evolving concepts for effective diagnosis. Proper diagnosis, including genetics plays a major role in assessing outcomes and treating these patients.

Benign tumors were more common than malignant tumors in all the studies conducted. Malignant and benign tumors had overlapping features and may need genetic testing to diagnose certain cases. It is evident from our study that it is essential to identify

the various salivary gland tumors and their variants for clinically effective results.

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