PATHOLOGICAL STUDY OF BENIGN AND MALIGNANT SALIVARY GLAND TUMORS

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ABSTRACT

Objective: To carry out a retrospective analysis of all benign and malignant tumors of major and minor salivary glands which were diagnosed at King Hussein Medical Center during the years between 2000 and 2006.

Methods: A total of 127 patients diagnosed to have salivary gland tumors were retrieved from our histopathology data records between 2000 and 2006. Most patients were originally treated at King Hussein Medical Center, and some at one of the peripheral military hospitals. All cases were analyzed according to their sex and age distribution as well as the frequency of various histopathological types and their anatomical sites.

Results: Of the 127 cases 84.3% of tumors were benign and 15.7% were malignant. The mean age of the benign neoplasms was 43.3 years, and most of these tumors were seen between the fourth and sixth decade of life. The mean age for the malignant neoplasms was 51.1 years, and most cases were in the sixth decade of life. There was a male predominance in both benign and malignant salivary gland neoplasms. Among the benign salivary gland tumors, the most frequent histological type was pleomorphic adenoma (57.9%) followed by Warthin's tumor (35.5%). Adenoid cystic carcinoma and mucoepidermoid carcinoma were the most frequently encountered malignant tumors accounting for 90% of all malignant tumors. The most commonly involved salivary gland for benign and malignant tumors was the parotid gland. Of the minor salivary gland tumors, the most frequently affected site was the palate (65%), and the most frequent tumor encountered was pleomorphic adenoma (55%).

Conclusion: Salivary gland tumor is a subject of considerable interest because of its not uncommon occurrence and varied histological pattern. This study describes the pathological features of salivary gland tumors in Jordan. The findings are in agreement with results of most previously published research studies.

Key words: Salivary gland, Tumor, Parotid, Pleomorphic adenoma

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Introduction

Salivary gland tumors pose a morphologically and clinically diverse group of neoplasms which may present significant diagnostic and management challenges to the pathologist and surgeon. These tumors are rare, with an overall incidence in the Western world of approximately 2.5 to 3.0 cases per 100,000 per year.[1] Malignant salivary gland neoplasms account for less than 0.5% of all malignancies and approximately 3% to 5% of all

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Table I. Distribution of benign salivary gland tumors with respect to histological type and age

Histological Type	Age								Total
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	
Pleomorphic adenoma	1	6	12	16	9	13	2	3	62
Warthin's tumor	-	-	1	3	6	13	15	-	38
Monomorphic adenoma	-	-	-	-	-	4	-	1	5
Myoepithelioma	-	-	1	-	-	-	-	-	1
Oncocytoma	-	-	-	1	-	-	-	-	1
Total	1	6	14	20	15	30	17	4	107

Table II. Distribution of malignant salivary gland tumors with respect to histological type and age

Histological Type	Age								Total
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	
Adenoid cystic carcinoma	-	-	-	2	1	6	-	-	9
Mucoepidermoid carcinoma	-	-	-	1	-	5	1	2	9
Adenocarcinoma	-	-	-	-	2	-	-	-	2
Total	-	-	-	3	3	11	1	2	20

head and neck cancers.[1,2] Most patients with malignant salivary gland tumors are in the sixth or seventh decade of life.[3] Although exposure to ionizing radiation has been implicated as a cause of salivary gland cancer, the etiology of most salivary gland cancers is largely undetermined.[2,4]

Tumors of the salivary glands comprise those in the major salivary glands such as the parotid, submandibular, and sublingual glands, and those in the minor salivary glands such as the oral mucosa, palate, uvula, floor of mouth, posterior tongue, retromolar area, peritonsillar area, pharynx, larynx, and paranasal sinuses.[2,5]

Of all salivary gland neoplasms over 50% are benign and approximately 70% to 80% of them originate in the parotid gland.[1,2,6] The palate is the most common site for minor salivary gland tumors. The frequency of malignant lesions varies according to the site. Approximately 20% to 25% of parotid tumors, 35% to 40% of submandibular tumors, 50% of tumors of the palate, and more than 90% of sublingual gland tumors are malignant.[1]

Histologically, salivary gland tumors represent a most heterogenous group of tumors.[7] There are 40 histological types of epithelial tumors which are known to arise in the salivary glands. However some are exceedingly rare and may have been the subject of only a few case reports.[1] The most common benign major and minor salivary gland tumor is pleomorphic adenoma, which accounts for about 50% of all salivary gland tumors and 65% of parotid gland tumors.[1] The most common malignant major and minor salivary gland tumor is mucoepidermoid carcinoma, which accounts for about 10% of all salivary gland neoplasms and approximately 35% of all malignant salivary gland neoplasms.[1,8] Mucoepidermoid carcinoma occurs most often in the parotid gland.[2,8,9]

The aim of the present study is to retrospectively analyze benign and malignant tumors of major and minor salivary glands encountered in Jordanian military hospitals.

Methods

We reviewed the pathology reports of 127 patients with salivary gland tumors treated at King Hussein Medical Center (KHMC) as well as peripheral military hospitals of the Royal Medical Services between 2000 and 2006. Hospitals involved were distributed all over Jordan and provided medical services for military personnel as well as civilians.

Diagnosis of individual tumours was based on the World Health Organisation classification of salivary gland tumors (1991). All tumors from major and minor salivary glands accessioned between 2000 and 2006 at the laboratory of Pathology and Cytology Division of Princess Iman Research Laboratory Sciences at KHMC were reviewed by at least two pathologists. Data analyzed included sex and age of patients, anatomical site and histopathological type.

Results

Age distribution of the various salivary gland neoplasms is shown in Tables I and II.

Mean age for benign and malignant neoplasms was 43.3 and 51.1 years, with peaks during the fourth and sixth decades and sixth decade of life, respectively.

Mean age of the most prevalent neoplasm, namely, pleomorphic adenoma was 40.4 years with an age

Table III. Distribution of benign salivary gland tumors in respect to histological type and gender

Histological Type	Gender		Total
	Female	Male	
Pleomorphic adenoma	30	32	62 (57.9%)
Warthin's tumor	6	32	38 (35.5%)
Monomorphic adenoma	3	2	5 (4.7%)
Myoepithelioma	1	-	1 (0.9%)
Oncocytoma	1	-	1 (0.9%)
Total	41	66	107 (100%)

Table IV. Distribution of malignant salivary gland tumors with respect to histological type and gender

Histological Type	Gender		Total
	Female	Male	
Adenoid cystic carcinoma	2	7	9 (45%)
Mucoepidermoid carcinoma	3	6	9 (45%)
Adenocarcinoma	2	-	2 (10%)
Total	7	13	20 (100%)

Table V. Frequency of benign and malignant salivary gland tumors with respect to histological type

Histological type	Total	Percentage
Pleomorphic adenoma	62	48.8
Warthin's tumor	38	29.9
Monomorphic adenoma	5	3.9
Myoepithelioma	1	0.8
Oncocytoma	1	0.8
Adenoid cystic carcinoma	9	7
Mucoepidermoid carcinoma	9	7
Adenocarcinoma	2	1.6
Total	127	100

an age range of 8 to 80 years and a peak incidence in the fourth decade of life. Mean age of patients with Warthin's tumor was 56.2 years. Among malignant salivary gland neoplasms, adenoid cystic carcinoma showed a mean age of 49.2 years, while mucoepidermoid carcinoma showed a mean age of 61.9 years.

Sex distribution of salivary gland neoplasms is shown in Table III and IV. Of the 127 cases, 79 (62.2%) were males, 48 (37.8%) were females. The male to female ratio was 1.6:1. There was a male predominance of benign and malignant salivary gland neoplasms with male to female ratio of 1.6:1 and 1.9:1 respectively.

Frequency of benign and malignant salivary gland tumors in respect to histological type is shown in Table V. Out of 127 cases, 84.3% (n=107) were benign and 15.7% (n=20) were malignant. Pleomorphic adenoma accounted for 57.9% of benign salivary gland tumors and 48.8% (n=62) of all cases, followed by Warthin's tumor (35.5% and 29.9 respectively). Other reported benign tumors were monomorphic adenoma (4.7%), myoepithelioma (0.9%) and oncocytoma (0.9%).

Among malignant salivary gland tumors, adenoid cystic carcinoma and mucoepidermoid carcinoma were the most frequent, accounting for 90% of all malignant tumors. Adenocarcinoma was seen in two cases (10%).

Distribution of benign and malignant salivary gland tumors in respect to anatomical site is shown in Tables VI and VII. The most affected site for benign tumors was the parotid (75.7%), followed by minor glands (13%), submandibular gland (10.2%) and sublingual gland (0.93%). The parotid gland was also the most frequent site for malignant tumors (55%), followed by minor (30%) and submandibular glands (15%).

Distribution of minor salivary gland tumors in respect to histological type and anatomical site is shown in Table VIII. The most affected site was the palate (65%) and the most frequent tumor was pleomorphic adenoma (55%).

Discussion

In this present study of 127 major and minor salivary gland tumors, we saw predominance of benign (84.3%) over malignant tumors (15.7%).

Table VI. Distribution of benign salivary gland tumors in respect to histological type and anatomical site

Histological type	Site				Total
	Parotid	Submandibular	Sublingual	Minor	
Pleomorphic adenoma	40	10	1	11	62
Warthin's tumor	37	1	-	-	38
Monomorphic adenoma	3	-	-	2	5
Myoepithelioma	-	-	-	1	1
Oncocytoma	1	-	-	-	1
Total	81	11	1	14	107

Table VII. Distribution of malignant salivary gland tumors in respect to histological type and anatomical site

Histological type	Site				Total
	Parotid	Submandibular	Sublingual	Minor	
Adenoid cystic carcinoma	5	1	-	3	9
Mucoepidermoid carcinoma	6	2	-	1	9
Adenocarcinoma	-	-	-	2	2
Total	11	3	-	6	20

Table VIII. Distribution of minor salivary gland tumors in respect to histological type and anatomical site

Histological type	Site				Total
	Palate	Lip	Floor of mouth	Nose	
Pleomorphic adenoma	8	2	-	1	11
Monomorphic adenoma	1	-	1	-	2
Myoepithelioma	1	-	-	-	1
Adenoid cystic carcinoma	-	-	2	1	3
Mucoepidermoid carcinoma	1	-	-	-	1
Adenocarcinoma	2	-	-	-	2
Total	13	2	3	2	20

Similarly, Ma'aita *et al.*[10] analyzing 221 salivary gland tumors in a Jordanian population, found 151 benign and 70 malignant tumors. Satko *et al.*[11] analyzing a group of 1021 Slovakian patients with salivary gland tumors, observed higher frequency of benign tumors (74%) versus malignant tumors (26%). Osuch-Wojcikiewicz *et al.*[12] studying 332 Polish patients with salivary gland tumors, reported 275 benign and 57 malignant tumors. In contrast, Poomsawat *et al.*[13] who retrospectively studied 60 cases of salivary gland tumors in a Thai population found a predominance of malignant tumors with 68.3% being malignant and 31.7% being benign.

The vast majority of our salivary gland tumors occurred in the parotid gland (72.4%). A similar finding was reported by Luukkaa *et al.*[14] who evaluated 237 cases of salivary gland tumors in Finland and where the parotid gland was involved in 64% of the cases.

In our study, one case of salivary gland tumor was noted in the sublingual gland. This demonstrates a low prevalence of sublingual tumors, as has been reported by Eveson *et al.*[15] who also observed one single sublingual tumor against 100 parotid tumors. Similarly, Ma'aita *et al.*[10] reported one sublingual tumor (0.4%) among 221 cases. In contrast, Satko *et al.*[11] reported sublingual tumors in 33 out of 1021 salivary gland tumors, which presented a higher incidence (3.2%) than that of minor salivary gland tumors (3%).

We found higher prevalence of salivary gland tumors in males (62.2%) than in females (37.8%). Peak incidence was in the sixth decade. Similar findings were reported by Gonzalez *et al.*[16] who observed a predominance of salivary gland tumors in the male group (58.75%) and in the seventh decade of age. In contrast, Ito *et al.*[17] who analyzed 496 cases of salivary gland tumors in a Brazilian population found slight female predominance with male to female ratio of 1:1.2.

Regarding histological types diagnosed in this study, pleomorphic adenoma was the most frequent (48.8%), as well as among benign neoplasms (57.9%), which is in accordance with most published series around the world.[11,12,16] Out of 62 cases of pleomorphic adenoma, 32 (51.6%) occurred in men, with a peak incidence in the sixth decade of life. A similar observation was reported by Ma'aita *et al.*[10] Conversely, other studies reported those lesions to be predominant in women.[18]

Pleomorphic adenoma in this study was most frequently seen in the parotid gland; and it was the most frequent histological type in other salivary glands, which was in agreement with other published reports.[19]

Warthin's tumor comprised 35.5% of all benign tumors and 29.9% of all salivary gland tumors and 97.4% of cases found in the parotid gland. In European and American series this tumor accounts between 5-20% of all salivary gland tumors.[15,20] Although it is known to occur exclusively in the parotid gland, we have reported one case in the submandibular gland. Similar finding was reported by another study on salivary gland tumors in Jordan.[10]

Malignant neoplasms of salivary glands totaled 20 cases out of all cases in this study (15.7%), among which adenoid cystic carcinoma and muco-epidermoid carcinoma were the most frequent neoplasms accounting for 90% of all malignant tumors. Adenocarcinoma was seen in two cases (10%). These findings are supported by some publications,[21] but are in disagreement with other studies reporting mucoepidermoid carcinoma as the most frequent malignancy.[22]

Regarding minor salivary gland tumors the most affected site was the palate (65%) and the most frequent tumor seen was pleomorphic adenoma (55%) while adenoid cystic carcinoma was the most frequent malignant tumor. Similar findings were reported by Li *et al*.[23]

Conclusion

Salivary gland tumor is a subject of considerable interest because of its not uncommon occurrence and varied histological pattern. This study for the first time reports the pathological features of salivary gland tumors in Jordan. Our findings were in agreement with results of most previously published research studies.

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