Salivary Gland Tumors: A Single Institutional Experience

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Abstract

Tumors of the salivary glands are uncommon. They may be broadly categorized into benign, neoplasms, tumor like conditions and malignant neoplasms. Most salivary gland tumors arise in the parotid gland. The remaining tumors arise in the submandibular, sublingual and minor salivary glands dispersed throughout the aerodigestive submucosa.

Aim: To study the pattern of salivary gland tumors distribution in Jordan University Hospital (JUH).

Method: This is a retrospective study of cases of salivary gland tumors in JUH, where we collected cases from 2000 – 2011 and classified them into epithelial and non-epithelial tumors, and the epithelial tumors were classified according to the revised WHO 2005 classification of salivary gland tumors. We also studied the age and sex distribution of these cases.

Results: Of the 80 salivary gland tumors, 68 were epithelial tumors, 12 were hematolymphoid and benign mesenchymal tumors. Of the epithelial tumors, 57 were benign and 11 were malignant, with a male to female ratio of 3:1.

Conclusion: Most tumors originated from the parotid gland, and most of them are benign tumors. Compared to other studies, there were more benign tumors than malignant ones, and more parotid tumors than other salivary gland tumors. There was a striking male predominance in most tumors.

Keywords: Salivary gland tumors, epithelial tumors, benign mesenchymal tumors, parotid tumors.

(J Med J 2012; Vol. 46 (3):267- 277)

Received	***Accepted***
January 3, 2012	*February 1, 2012*

Introduction

Tumors of the salivary glands represent 3 – 6 % of head and neck neoplasms. The global incidence of these tumors is 0.4 – 13.5 per 100,000 persons annually.[1, 2] The site, patient's age, and sex distribution of different types of salivary glands neoplasms vary with race and geographic location. The incidence of these tumors is different between geographic areas and ethnic groups.[2, 3]

Most salivary gland tumors originate in the parotid gland (70%). The remaining tumors originate in the submandibular gland (8%) and in the minor salivary gland (22%). Although 75% of the parotid gland tumors are benign, slightly more than 50% of the tumors of the submandibular glands and 60 – 80% of the tumors of minor salivary glands are found to be malignant.

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Pleomorphic adenomas (benign mixed tumors) are the most common benign salivary gland tumors, comprising 85% of all salivary gland neoplasms.

Tumors of the parotid gland are the most common salivary gland tumors and are 5 times more common than tumors of the minor salivary gland. The latter are twice as common as neoplasms that develop in the submandibular glands. The incidence of salivary gland neoplasms peaks in the 5th decade of life.

Most of all minor salivary gland tumors (60-80%) are malignant. Overall adenoid cystic carcinoma is the most common malignant tumor of all minor salivary glands. The submandibular gland has a high incidence of malignant tumors (65% malignant vs.35% benign).[4]

Reports on salivary gland tumors in the Jordanian population are rare in the English literature. Therefore, the aim of this study is to analyze the relative frequency, location, patient's sex and age of salivary gland tumors in our hospital as a referral center in the past 11 years.

Methods

This study included patients with primary salivary gland tumors who underwent excisional surgery at JUH in the period from 2000 – 2011. Information regarding the patient's age, gender and anatomical location of the tumor were collected from the files of the pathology department.

Hematoxylin eosin stained slides for these tumors were reviewed by the pathologist and sample cases were photographed. This research was approved by the ethics committee of the JUH Institutional Review Board (IRB). The data were analyzed for their distribution of patient's sex, age and anatomical location of the tumor.

Results

Eighty patients underwent surgery for salivary gland tumors during this period for the first time, and of those, 68 patients had epithelial tumors while 12 had non-epithelial mesenchymal and hematolymphoid tumors. Of the epithelial tumors 57 were benign (83.8%), 11 were malignant (16.17%) tumors, with a ratio of (5.18:1). The majority of benign epithelial tumors were pleomorphic adenomas [Figure 3] (30 cases, 52.6%), Warthin's tumor [Figure 4] (25 cases, 43.85%) and only 2 cases (3.5%) of basal cell adenoma [Figure 5] [Table 1].

Of the malignant tumors, mucoepidermoid carcinoma [Figure 6] was the most common tumor followed by adenoid cystic carcinoma [Figure 7]. We had one case of oncocytic carcinoma [Figure 8] of the parotid and a salivary duct carcinoma [Figure 9] of the minor salivary gland, in addition to two cases of adenocarcinoma NOS [Table 1].

Of the non-epithelial tumors, we had five cases of non-Hodgkin's lymphoma, two of the large cell type and one of the T-cell rich B-cell, one follicular and a MALT lymphoma [Figure 10]. Four of the cases of non-Hodgkin's lymphoma involved the parotid gland and only one case, the follicular lymphoma, involved the submandibular gland [Table 2].

The other non-epithelial tumors included two lymphoepithelial cysts [Figure 11], three lipomas [Figure 12] of the parotid, a cavernous hemangioma [Figure 13] and a lymphangioma [Figure 14]; of all the benign lesions, all of them originated from the parotid in male patients.

The overall male to female ratio was 3.2: 1, while the epithelial tumors' male to female was ratio 3:1.

The peak incidence for pleomorphic adenoma was in the 4th decade with a mean age of 41.46 years, [Figure 1] (male to female ratio 1.73:1), 23 cases involved the parotid gland, 3 cases involved the submandibular gland, and 4 cases involved the minor salivary gland. The peak incidence for Warthin's tumor was in the 6th decade with a mean age of 49.0 years [Figure 2]. Warthin's tumor cases were almost restricted to males (male to female 24:1) and they exclusively involved the parotid gland.

Salivary Gland tumors (2000 – 2011)

Table (1): Histologic type and site distribution of epithelial salivary gland tumor at JUH 2000 – 2011.

		Epithelial Tumors				
			Location		Sex	
	Tumor Type	**Parotid**	**Submandibular**	**Minor**	**Male**	**Female**
	Pleomorphic adenoma	*23*	*3*	*4*	*19*	*11*
	Warthin's tumor	*25*	*0*	*0*	*24*	*1*
	Basal cell adenoma	*2*	*0*	*0*	*0*	*2*
Benign	***Total:***	*50*	*3*	*4*	*43*	*14*
			Total number of benign cases is 57			
	Mucoepidermoid Ca	*3*	*1*	*0*	*3*	*1*
	Adenoid cystic Ca	*0*	*2*	*1*	*1*	*2*
	Salivary duct Ca	*0*	*0*	*1*	*1*	*0*
	Oncocytic Carcinoma	*1*	*0*	*0*	*1*	*0*
Malignant	*Adenocarcinoma NOS*	*1*	*1*	*0*	*2*	*0*
	Total:	*5*	*4*	*2*	*8*	*3*
			Total number of malignant cases is 11			
Total of malignant and benign= 68 cases		*55*	*7*	*6*	*51*	*17*

Table 2: Histologic type and site distribution of non-epithelial salivary gland tumor at JUH 2000 – 2011.

	Non-Epithelial Tumors				
		Location		Sex	
Tumor Type	**Parotid**	**Submandibular**	**Minor**	**Male**	**Female**
Lymphoma	*4*	*1*	*0*	*3*	*2*
Lymphoepithelial cyst	*2*	*0*	*0*	*2*	*0*
Lipoma	*3*	*0*	*0*	*3*	*0*
Cavernous hemangioma	*1*	*0*	*0*	*1*	*0*
Lymphangioma	*1*	*0*	*0*	*1*	*0*
Total = 12	*10*	*1*	*0*	*10*	*2*

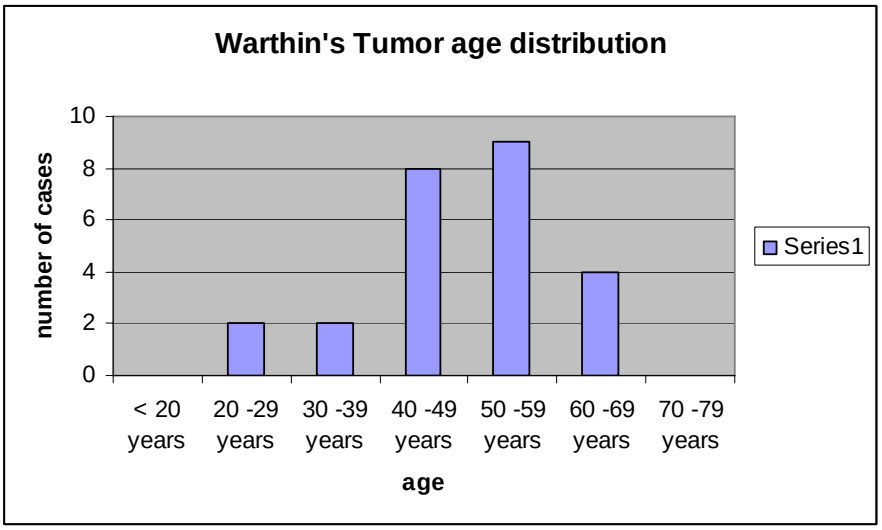

Figure (1): Age distribution for pleomorphic adenoma.

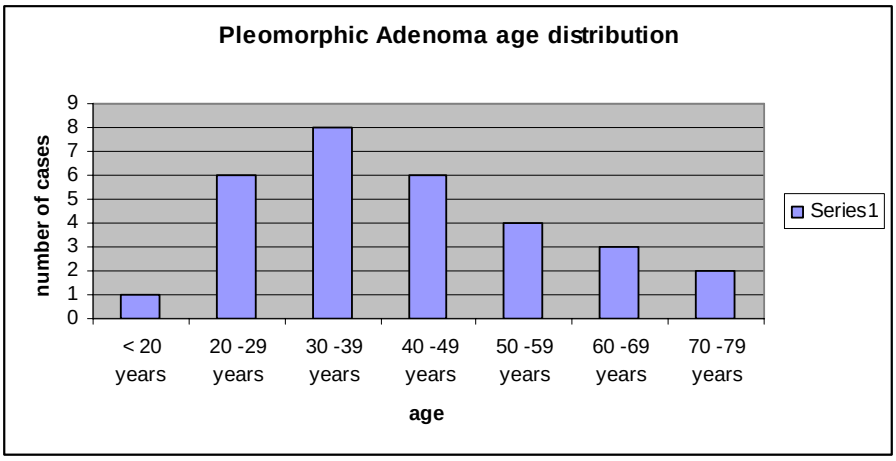

Figure (2): Age distribution for Warthin's tumor.

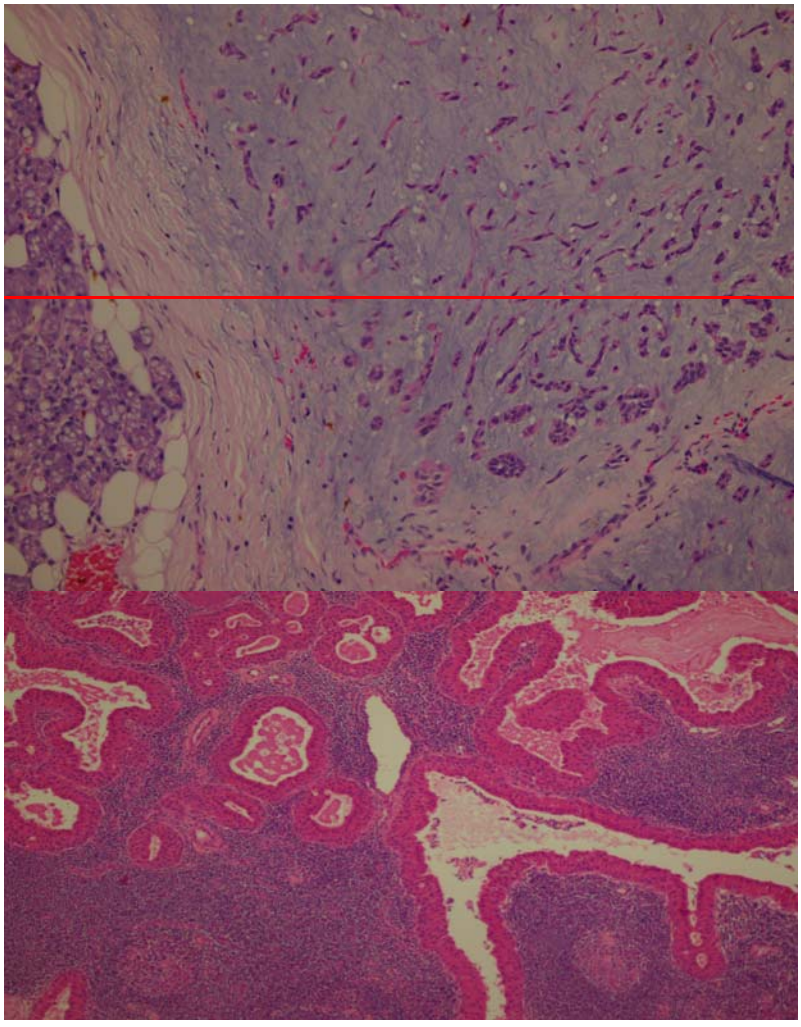

Figure 3: Pleomorphic adenoma (100X); islands of epithelial cells in loose myxoid stroma surrounded by a fibrous capsule

Figure 4: Warthin's tumor (100X); two layered epithelial lining of oncocytic cells surrounded by lymphoid stroma forming lymphoid follicles

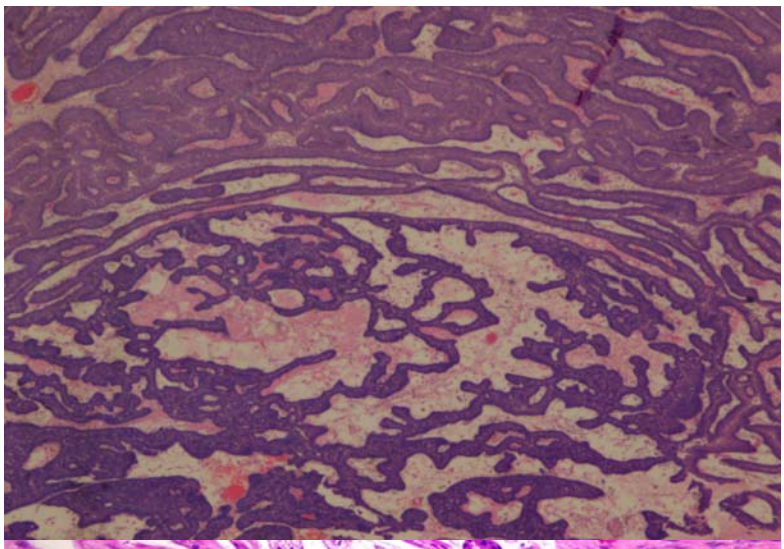

Figure 5: Basal cell adenoma (100X); anastomosing strands of basaloid cells with peripheral palisading in a loose fibrous stroma

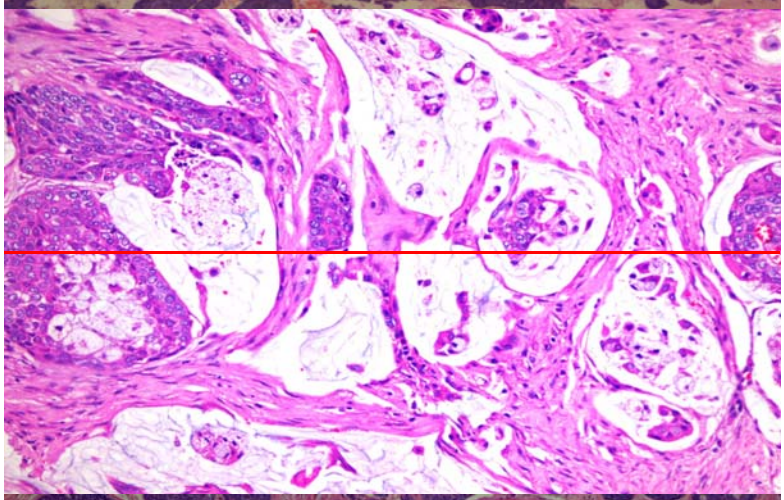

Figure 6: Mucoepidermoid carcinoma (100X); islands of squamoid cells mixed with mucinous cells floating in pools of mucin

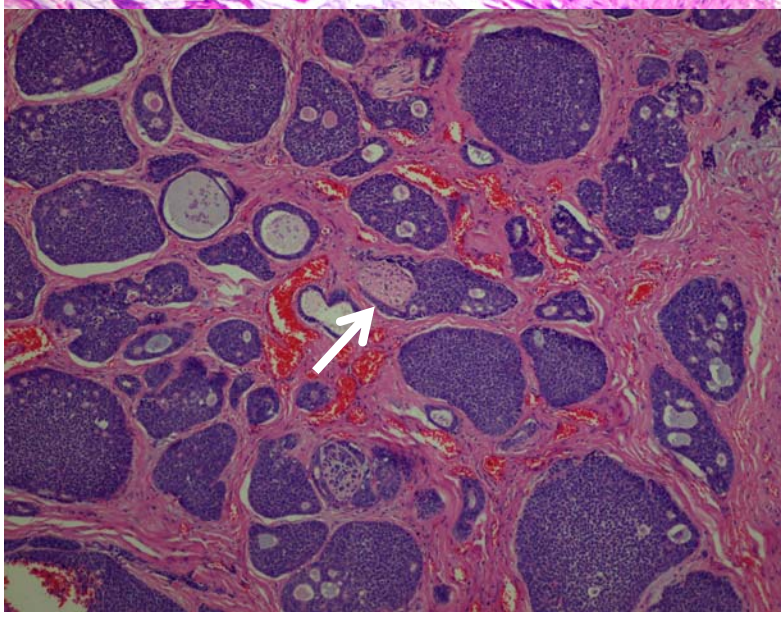

Figure 7: Adenoid cystic carcinoma (100X); multiple glands with basaloid cells and central lumina filled with pinkish material, occasional glands showing perineural invasion (see arrow)

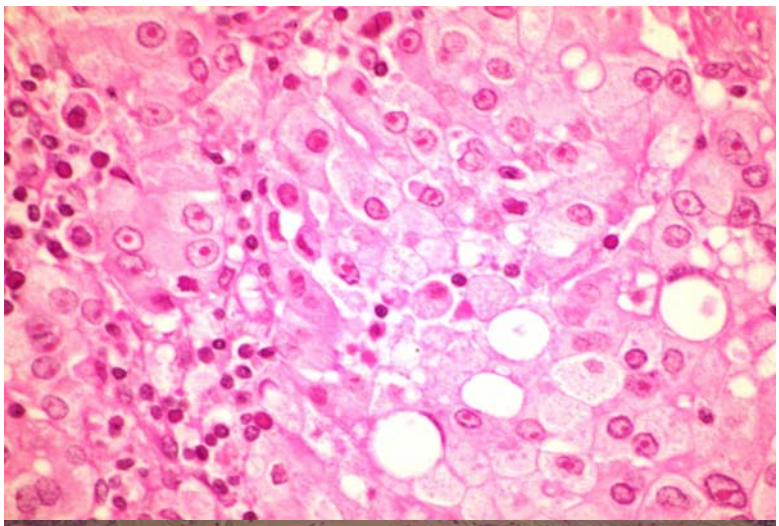

Figure 8: Oncocytic carcinoma (400X); tumor cells with eosinophilic cytoplasm and pleomorphic nuclei with prominent neucleoli

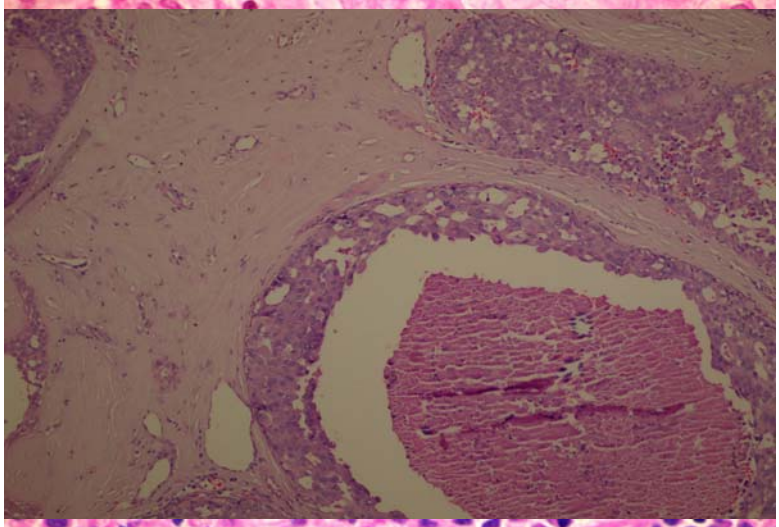

Figure 9: Salivary duct carcinoma (400X); duct like structures filled with atypical cells with dark pleomorphic nuclei and with central necrosis

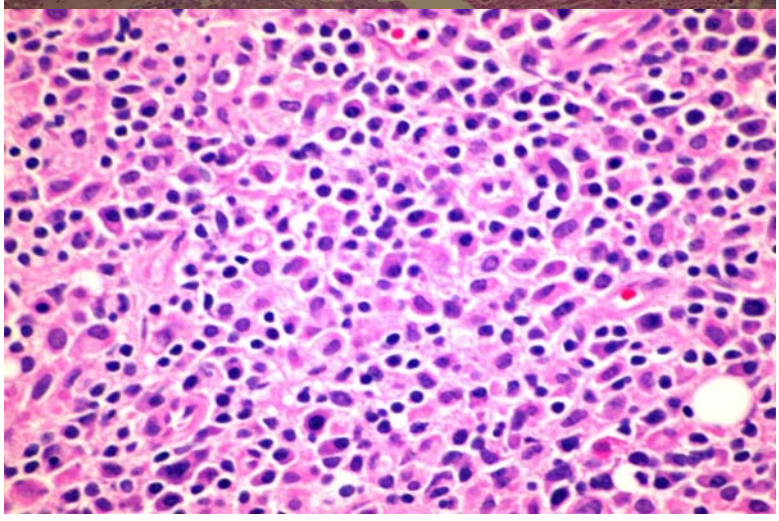

Figure 10: MALT lymphoma (400X); centrocyte like lymphoid cells some are plasma cytoid

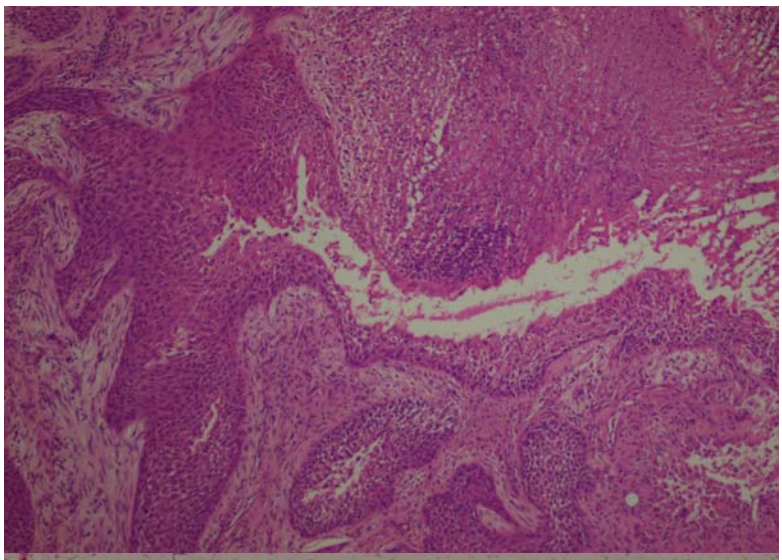

Figure 11: Lymphoepithelial cyst (100X); cystic space lined by epithelium with surrounding inflamed fibrous tissue

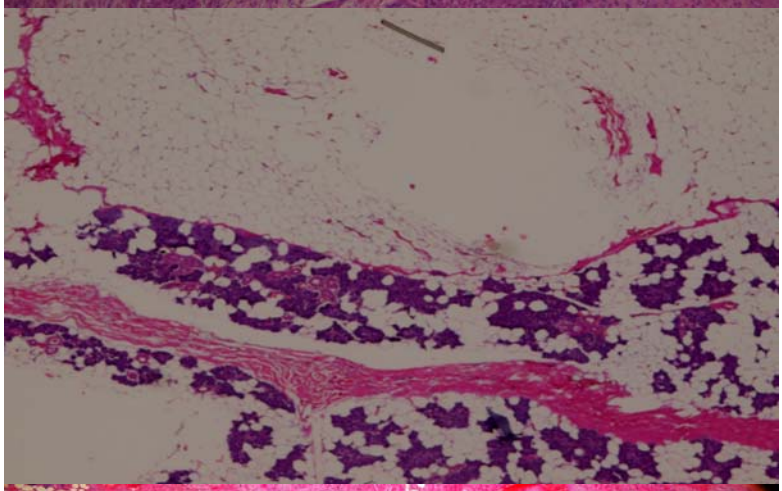

Figure 12: Lipoma (100X); encapsulated mature fatty tissue within the parotid gland

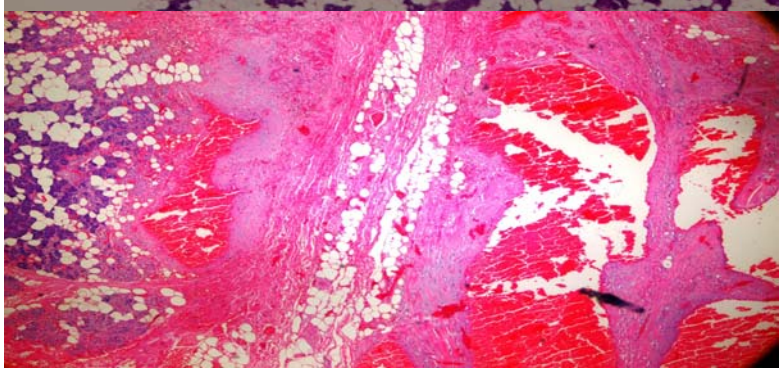

Figure 13: Hemangioma (100X); dilated thick walled vascular spaces lined by endothelial lining

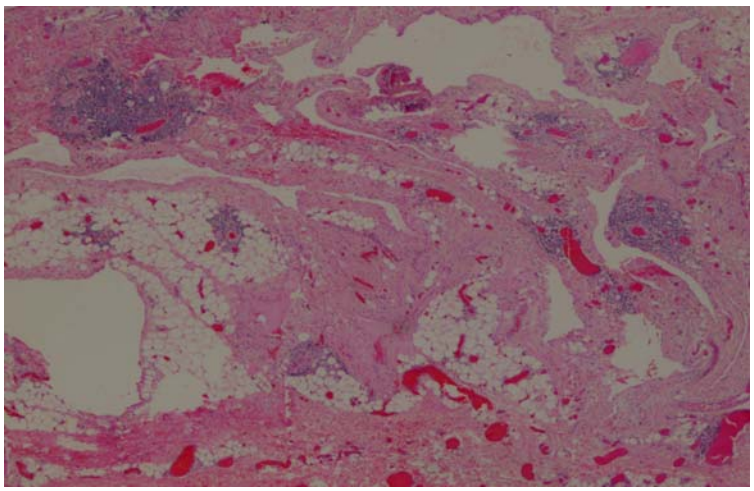

Figure 14: Lymphangioma (100X); dilated thin walled lymphatic spaces

Discussion

In this study, benign epithelial salivary gland tumors comprise 83.82% of all epithelial salivary gland tumors and predominated in the parotid gland. This percentage is higher than the rates reported in the literature in Iran, China, UK, USA, India, Brazil, Congo, Uganda, and Sri Lanka[5 – 12] although in all these reports benign epithelial tumors accounted for more than 50% of all epithelial salivary gland tumors.

Pleomorphic adenoma was the most common type (44.1%) of all the epithelial salivary gland tumors and this was consistent with the reports from different parts of the world, which consider the prevalence rate for pleomorphic adenoma between 40-65%. The majority of pleomorphic adenomas were in the major salivary glands, mainly the parotid (76.66%). This finding was similar to a WHO report,[13] in which approximately 80% of all pleomorphic adenomas occurred in the parotid and 10% occurred in various minor glands [Table 1].

The second most benign epithelial tumor in this study, Warthin's tumor comprised 36.76% of all epithelial salivary gland tumors. This was similar to the reports from other regions of the world like in Denmark and parts of Pennsylvania (about 30% of parotid tumors).[14, 15] This tumor was rare in African populations. [9] Most of these tumors occurred in males (87%) with 3.6:1 male to female ratio, and 96% in our study with a male to female ratio of 24:1. It is reported that during the past 50 years there has been an increasing incidence of Warthin's tumors in females, and the male to female ratio has changed from 10:1 to 1.2:1 which might be related to the increased number of female smokers. [13, 14] Obviously, this is not the case in our sample where the ratio is still much higher than 10:1.

Although malignant lymphoma of the salivary

The reported frequencies for malignant salivary gland epithelial tumors were between 10 – 46%, and the mucoepidermoid carcinoma was the most common malignant tumor with a prevalence ranging from 4 - 12%.[13] Our data showed that malignancies comprised 16.17% with a mucoepidermoid carcinoma comprising 5.88% while adenoid cystic carcinoma comprised 4.41% of all tumors. These data are consistent with those published from Iran, China, UK, USA, India, Brazil, Nigeria and Uganda where the frequency of mucoepidermoid carcinoma was higher than that of adenoid cystic carcinoma. However, reports from other regions showed a high frequency of adenoid cystic carcinoma like South Iran and Congo.[7]

Most studies [3, 6, 8] revealed that the occurrence of salivary gland epithelial tumors were slightly higher in females. In this study there is a marked male predominance (male to female 3:1) mainly due to the significant male predominance for Warthin's tumors.

The other benign non-epithelial tumors are three

gland is uncommon, historically, they comprise 1.7 – 3.1% of all salivary neoplasms. The parotid glands are the most common site of occurrence, but the submandibular, sublingual and minor salivary gland involvement are well documented.[10]

In our study, we had five cases of non-Hodgkin's lymphoma, four of which involving the parotid and one involving the submandibular gland. Two of the parotid tumors are of large B-cell lymphoma, one T-cell rich B-cell lymphoma and a MALT lymphoma, while the one involving the submandibular gland was a follicular lymphoma [Table 2].

MALT lymphoma is the most common primary salivary gland lymphoma, followed by the diffuse large B-cell lymphoma and follicular lymphoma. [17,18] There is an increased risk of high grade B-cell lymphoma in patients with AIDS and some of these lymphomas are associated with EBV.[19]

The best predisposing factors for MALT lymphoma of the salivary glands are lymphoepithelial sialadenitis (LESA) or Sjögren's syndrome and hepatitis C infection.[18,20] The transformation to diffuse large B-cell lymphoma occurs in 12% of the cases.

In our study, we have two lymphoepithelial cysts of the parotid gland, both in males [Table 2]. The lymphoepithelial cyst of the salivary gland is characterized by an epithelial lined cyst with dense lymphoid stroma in the wall. Its incidence has increased over the past two decades because of the association with HIV infection. The development of these cysts is now thought to be from a Sjögren's-like cystic lymphoepithelial lesion of the parotid gland. The enormous cystic dilation of the duct lesion presumably is a consequence of ductal obstruction through basal cell hyperplasia of striated ducts and intraglandular lymphofollicular hyperplasia. [21]

lipomas, a cavernous hemangioma and the lymphangioma, all occurring in the parotid and all in male patients. [Table 3]

Lipomas are relatively uncommon in major salivary glands with peak incidence in the 5^{th} – 6^{th} decade in life and a male to female ratio of 10:1. This is consistent with our cases that are all in the parotid, all males and all in the 5^{th} decade of life. Cavernous hemangiomas are relatively rare in the salivary gland and mostly affect adults. There is no tendency to undergo spontaneous regression. Dystrophic calcification and organized thrombi are frequent.

Lymphangioma may involve the parotid gland and submandibular gland or both, and more than 50% are manifest at birth while 80% manifest at age 2.

Conclusion

In summary, this study reflects the experience of a single referral center in Jordan. Most of the findings about the distribution of histologic type and age were comparable to those reported in the literature; however, there were a few racial and sex variations in the frequency and distribution between this study and the other populations. There was a striking male predominance for Warthin's tumor which comprised a significant portion of the sample. Although the malignant tumor percentage was within the reported data, it was comparatively low in the sample size, and although we reported some rare malignant tumors like oncocytic carcinoma of the parotid and salivary duct carcinoma of the palate, other more common benign and malignant salivary gland tumors were not detected in our sample.

The reason for these differences remains unclear, so more research in this field with a larger sample size on a national level is greatly encouraged.

Competing interest statement by all authors

There are no competing interests to declare by the authors.

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أورام الغدد اللعابية: تجربة مؤسسة منفردة

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الملخص

الخلاصة: إن أورام الغدد اللعابية غير شائعة الحدوث، وهي تصنف إلى أورام حميدة واورام خبيثة. معظم اورام الغدد اللعابية تنشئ في الغدة النكفية، وباقي الأورام تنشئ في الغدة تحت الفكية والغدة تحت اللسانية والغدد اللعابية الصغرى.

الهدف: دراسة نسبة طراز توزيع أورام الغدد اللعابية في مستشفى الجامعة الأردنية.

المنهج: هذه دراسة استعادية فقد تم تجميع حالات أورام الغدد اللعابية ما بين عام ٢٠٠٠-٢٠١١ وتم تصنيفها إلى أورام ظهارية وأورام غير ظهارية، ومن ثم تم تصنيف الأورام الظهارية حسب تصنيف منظمة الصحة العالمية لعام ٢٠٠٥ للأورام اللعابية. وقد قمنا بدراسة توزيع هذه الحالات بالنسبة للعمر والجنس.

النتائج: من الـ٨٠ ورم التي تم تجميعها، كان هناك ٦٨ ورم ظهاري و١٢ ورم لمفاوي ولحمي متوسطي. من الأورام الظهارية كان هنالك ٥٧ ورم حميد و١١ ورم خبيث ونسبة حدوث الذكور إلى الإناث ١:٣.

الاستنتاج: تنشأ معظم الأورام من الغدة النكفية، ومعظمها كانت حميدة. ومقارنةً بالدراسات الأخرى كان يوجد أورام حميدة أكثر من الأورام الخبيثة، وأورام بالغدة النكفية أكثر من باقي الغدد اللعابية، وكان هنالك أيضا سيادة ذكورية واضحة في معظم الأورام.

الكلمات الدالة: أورام الغدة اللعابية، الأورام الظهارية، الأورام الحميدة الوسيطة، أورام الغدة النكفية.