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Salivary Gland Tumors in Jordan: A Retrospective Study of 221 Patients

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Aim. To evaluate the types and clinical outcome of salivary gland tumors in Jordan.

Methods. Hospital records of 221 patients (85 women and 136 men) with salivary gland tumors, diagnosed from January 1988 to December 1997 were reviewed. The patients were analyzed according to sex, age, histopathological type and site of the tumor. Survival curves for patients with malignant tumors were constructed using Kaplan-Meier's method.

Results. Of the total 221 salivary gland tumors, 155 (70.2%) were parotid tumors, 42 (19%) minor salivary gland tumors, 23 (10.4%) submandibular gland tumors, and a single (0.4%) sublingual gland tumor. Most of the tumors (151, or 68.4%) were classified as benign and 70 (31.6%) were malignant. Men to women ratio was 1.6:1, and the age of the patients ranged from 2 to 81 years. The overall 5 and 10 year-survival rates for the 70 malignant tumors were 67% and 53%, respectively, for all tumor stages. Mucoepidermoid carcinoma had the best, and squamous cell carcinoma the worst 10-year survival rate. Patients treated with surgery and subsequent radiation therapy had better survival rates than those treated with surgery or radiation therapy alone.

Conclusion. The principal site for salivary gland tumors in Jordan population was the parotid, and the pleo- morphic adenoma the most common pathological finding. Tumor characteristics and survival data for the Jordanian population are comparable to those from western countries.

Key words: *gland, parotid; gland, submandibular; Jordan; mixed salivary gland tumor; neoplasm metastasis; salivary glands, minor; tumor treatment*

Salivary gland tumors comprise less than 3-6% of all head and neck tumors (1,2). They may arise in the major salivary glands (parotid, submandibular, and sublingual) or in the minor salivary glands, which are located beneath the mucosal lining of the upper aero-digestive tract. Approximately 80% occur in the parotid. Salivary gland tumors have a marked variation of histopathology, which prompted the develoment of different histopathological classification of the tumors (3-5). Studies of the incidence of salivary gland tumors have rarely been reported from Middle East countries (6). The aim of this paper was to present an analysis of the clinical characteristics and treatment outcome of salivary gland tumors in Jordan.

Patients and Methods

We made a retrospective analysis of 221 patients with salivary gland tumors, who were treated in the military hospitals between January 1988 to December 1997. These hospitals are distributed all over Jordan and provide medical services for military people and their families, as well as for civilians.

We analyzed medical histories, x-ray examination records, surgical reports, pathological reports, and radiation therapy records. The patients were analyzed according to sex, age, histopathological type of the tumor, its site, symptoms, follow up information, localization, and size of the tumor. There were 136 men and 85 women, with an age mean of 46 years (range 2 to 81 years). The male to female ratio was 1.6:1.

Histological classification of the tumors was done according to Foots and Frazell (5). Benign tumors were found in 151 (68.4%) and malignant neoplasms in 70 (31.6%) patients.

Among 70 patients with malignant neoplasms, 50 patients had tumors located in major salivary glands (39 in the parotid, 10 in the submandibular, and 1 in the sublingual salivary gland) and 20 patients in minor salivary glands.

Most common histopathological findings (6) for the malignant tumors were mucoepidermoid carcinoma, adenocystic carcinoma, adenocarcinoma, mixed malignant tumor, acinic cell carcinoma, and epidermoid carcinoma (Table 1). Regarding tumor stage (7), there were 18 (25.7%) patients with stage I, 20 (28.6%) with stage II, 22 (31%) with stage III, and 10 (14%) with stage IV carcinoma.

The treatment of malignant tumors consisted of surgery alone in 39 patients, surgery followed by radiotherapy in 26 patients, and radiotherapy alone in 5 patients with inoperable advanced local disease. In 199 cases, local excision of the tumor was limited to a single anatomic

Table 1. Histological types of salivary gland tumors in 221 Jordanian patients; N (%)

Type of tumor	Parotid	Minor salivary gland	Submandibular	Sublingual
Benign:				
Pleomorphic adenoma	106 (68.4)	21 (50)	12 (52.2)	0
Warthin's tumor	9 (5.8)	1 (2.4)	1 (4.3)	0
Oncocytoma	1 (0.6)	0	0	0
Total	116 (74.8)	22 (52.4)	13 (56.5)	0
Malignant:				
Mucoepidermoid carcinoma	32 (20.1)	3 (7.3)	3 (13.1)	0
Malignant mixed tumor	2 (1.4)	2 (4.7)	2 (8.7)	0
Acinic cell tumor	2 (1.4)	1 (2.3)	0	0
Adenocarcinoma	1 (0.6)	6 (14.4)	1 (4.3)	0
Adenoid cystic carcinoma	1 (0.6)	7 (16.6)	3 (13.1)	1 (1.5)
Epidermoid carcinoma	1 (0.6)	1 (2.3)	1 (4.3)	0
Total	39 (25.2)	20 (47.6)	10 (43.5)	1 (1.5)

area. Radical neck dissection was performed in 17 patients with malignant tumors; 12 of those had metastasis of the cervical lymph nodes. Survival curves were calculated using Kaplan-Meier method (8), and the differences were tested at the $p<0.05$ level of significance.

Results

At most sites, pleomorphic adenoma was the predominant tumor, and parotid pleomorphic adenomas accounted for 47% of all tumors in the series (Table 1). Mucoepidermoid carcinomas formed the second largest group and were almost all localized in the parotid, with only 3 in the submandibular gland and 3 in the minor salivary glands (Table 1). Adenoid cystic carcinomas comprised 4.9% of all the tumors, and were almost all found in the minor salivary glands. The majority of the patients (180; 81.4%) presented with asymptomatic salivary gland masses and 41 (19.6%) patients had symptomatic swelling, tenderness, and pain. Facial *paralysis* was observed in 3 (1.3%) cases. In 2 patients (0.9%) with the tumors of the deep parotid lobe, intra-oral masses were noted.

Among 30 patients who had local recurrence, 13 had benign and 17 malignant tumors. In the group of benign tumors, 12 were diagnosed as pleo- morphic adenoma and one patient had Warthin's tumor. After surgery, 17 cases of malignant tumors recurred (8 mucoepidermoid carcinomas, 3 carcinomas in pleo- morphic adenoma, 5 adenocystic carcinomas, and 1 acinic cell carcinoma). Regional lymph nodes metastases were found in 12 patients.

Cervical metastases were found in 4 out of 12 patients with tumors of stages I and II, and in 8 out of 13 patients with the tumors of the stages III and IV. These 25 patients were treated with neck dissection (8 with supraomohyoid neck dissection and 17 with radical neck dissection), and, as stated before, 48% (12/25) of them had positive cervical lymph nodes metastases. Cervical lymph nodes metastases were found in patients with muco- epidermoid carcinoma (N=5), adenoid cystic carcinoma (N=4), carcinoma in pleomorphic ade- noma (N=2), and acinic cell carcinoma (N=1).

Survival

No significant differences in the survival rates were observed between patients with malignant neoplasms of the major salivary glands and those with malignant neoplasms of the minor salivary glands. The 5- and 10-year survivals were 70% and 52% for patients of the former group, and 76% and 67% for the latter group, respectively (p=0.082).

Survival was directly related to the stage of disease on presentation (Fig. 1). The overall 5- and 10- year survivals were 67% and 53% for all stages of malignant salivary gland tumors (Fig. 1; p=0.0034).

When survival was analyzed with respect to histology, patients with mucoepidermoid carcinomas and acinic cell carcinomas had the best, whereas the patients with squamous cell carcinoma had the worst survival (Fig. 2; p=0.0039). No significant difference was seen between the 5- and 10-year survival rates for patients with muco- epidermoid and acinic cell carcinomas (p= 0.073). For patients with adenoid cystic carcinoma, the survival rate continued to decrease after 5 years, reflecting the natural history of late recurrence.

The best therapeutic outcome for primary salivary gland carcinomas was seen in the patients treated with surgery followed by postoperative radiotherapy for gross or microscopic residual disease. Two of the five patients treated with radiotherapy alone for locally advanced inoperable disease also achieved local control of the tumor (Table 2).

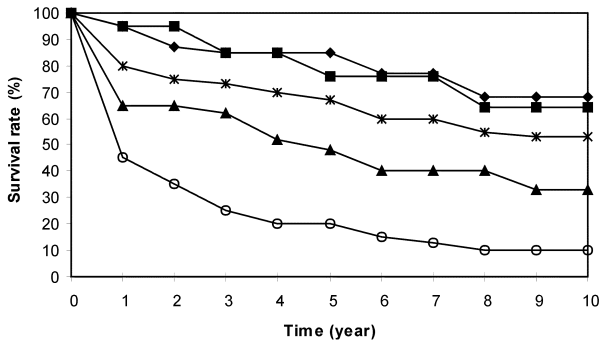

Figure 1. Survival rates according to the stage of carcinoma of salivary gland. Rhomb – stage I (N=18), open circle – stage IV (N=10), square – stage II (N=20), triangle – stage II (N=22), asterisk – total (N=70); p=0.0034 for 5- year and p= 0.0048 for 10-year survival.

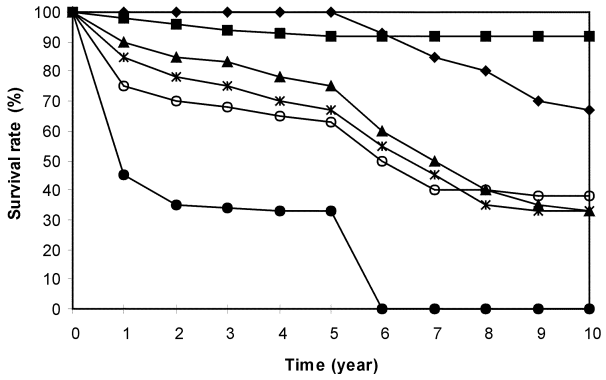

Figure 2. Survival rates in malignant salivary gland tumors. Rhomb – acinic cell carcinoma (N=3); triangle – adenocystic carcinoma (N=12); asterisk – malignant mixed tumor (N=6); rhomb – mucoepidermoid carcinoma (N=38); open circle – adenocarcinoma (N=8); closed circle – squamous cell carcinoma (N=3).

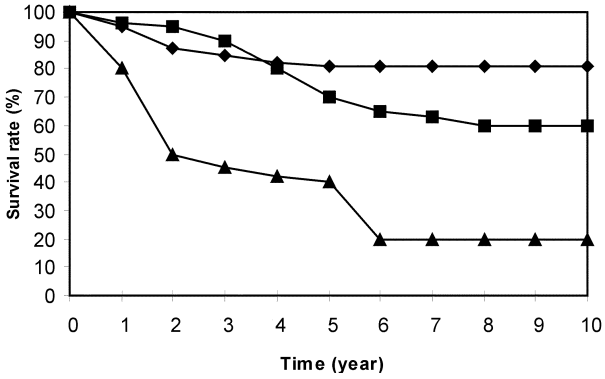

Figure 3. Survival according to the initial treatment modality. Rhomb – surgery plus radiation; square – surgery; and triangle – radiation; p=0.021.

The final outcome of the primary lesion after salvage was 36/50 (72%) for patients with carcinoma of the major salivary glands. Also, the initial outcome for the carcinoma of the minor salivary glands was best in the group of patients who received surgery plus postoperative radiotherapy. The final outcome after salvage surgery for patients with the carcinoma of the minor salivary glands was 15/20 (75%). According to the histology and treatment modality, the best therapeutic outcome was achieved in patients with acinic cell carcinomas and muco- epidermoid carcinomas (Table 2). Most of the patients with mucoepidermoid carcinomas had low grade tumors (grade I in 24 cases, grade II in 8 cases, and grade III in 6 cases). Because of the small number of patients with different histological types of the tumor, who received radiotherapy either alone or postoperatively, we could not detect any significant difference in the local control rate between the different histological types (p=0.93).

The survival rates at 5 and 10 year were best for the patients treated with surgery and radiation, and poorest for those treated with radiation therapy alone (Fig. 3; p=0.021).

Discussion

The majority of salivary gland tumors are benign. Pleomorphic salivary adenomas are most common, with a prevalence ranging from 53 to 70.9% (4-6,9-12). High recurrence rate was reported for these tumors, ranging from 5% to 50%, mostly because of inadequate surgical removal (2). In our study, pleomorphic salivary adenomas also occurred most frequently (62.9%). The tumor recurrence rate was 8.6%, corresponding to the lower limit of the reported range.

Mucoepidermoid carcinoma is the most common primary malignant tumor of the salivary glands, with a prevalence ranging from 4.2% to 12% (3,4,9,10,13-15). We found 17% of this tumor type, which is slightly higher than in the literature.

Other malignant tumors of the salivary gland are found less often. Their prevalence is reported to range from 0.1% to 5% (3,4,9,10). The range for these tumors is 1.4 to 4.9% in our study. The tumors included adenoid cystic carcinoma, acinic cell carcinoma, adenocarcinoma, malignant mixed tumor, and epidermoid carcinoma. The majority displayed aggressive behavior with extensive local tissue invasion.

Regarding race, age, and sex, salivary gland tumors occur predominantly in the white population (3). Benign tumors are more frequent in the younger age group. The peak incidence for pleomorphic adenoma is in the fifth decade of life and in the sixth decade for Warthin's tumor (3). Pleomorphic adenomas are more common in females, whereas Warthin's tumors are more frequent in males (3). In our study, the mean age of the patients with pleomorphic adenoma was 43 years and 54.3 years for those with Warthin's tumor. Both tumors were predominant in males.

Histological features of the tumors, location of lesions, and sex distribution of patients in this series are similar to other reports in the literature (16,17).

Table 2. Initial outcome of the primary malignant tumor of salivary glands (N=70) according to histology and treatment modality

Histology	Surgery	Surgery+radiation	Radiation only	Total
Mucoepidermoid carcinoma	23/26	8/10	1 /2	32/38 (84%)
Adenocarcinoma	1/2	3/3	1/3	5/8 (63%)
Adenoid Cystic carcinoma	2/6	5/6	0	7/12 (58%)
Malignant mixed tumor	1/3	2/3	0	3/6 (50%)
Acinic cell carcinoma	1/1	2/2	0	3/3 (100%)
Epidermoid carcinoma	0/1	1 /2	0	1/3 (33%)
Total	28/39 (70%)	21/26 (81%)	2/5 (40%)	51/70 (73%)

The overall therapeutic outcome was numerically slightly superior for the patients who received a combined therapy (81% vs. 70%); even though the difference was not significant. The outcome of adenoid cystic carcinoma was poor, as has been reported by others (18).

Similar to the experience of Spiro et al (16), no evidence was seen to suggest that more radical surgery would have produced better results. Local control of the tumor appeared better for patients receiving combined surgical and radiation therapy management than for patients treated with surgery alone. Our study confirmed the reports of others (19,20) that radiotherapy in the control of microscopic disease was effective for tumors of certain histological type such as adenoid cystic carcinoma, high grade mucoepidermoid carcinoma, and adenocarcinoma. There seems to be no significant difference in the response to radiation therapy between different histological types of malignant salivary gland tumors. Our findings agree with the recommendation that the best therapeutical approach to these tumors is a complete excision of the tumor at the first surgery (2). In conclusion, the salivary gland tumours in Jordan show clinical characteristics similar to the studies elsewhere in the world.

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