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Neoplasms of the salivary glands: analysis of 727 histopathological reports in a single institution

Nowotwory ślinianek: analiza 727 raportów histopatologicznych z jednej instytucji

Authors' Contribution:
A – Study Design
B – Data Collection
C – Statistical Analysis
D – Data Interpretation
E – Manuscript Preparation
F – Literature Search
G – Funds Collection

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ABSTRACT:

Introduction: Salivary gland tumors comprise three to ten percent of all head and neck tumors. The parotid gland is affected most often (64-80%). Malignant tumors constitute a minority, occurring in 15-32% of cases. Pleomorphic adenoma is the most common benign tumor, while mucoepidermoid carcinoma is a malignant neoplasm characterized by the highest incidence.

Objectives: The objective of this study was to conduct a cross-sectional study of all salivary gland tumors diagnosed in a tertiary hospital in the period between 1995 and 2013.

Methods: We reviewed all salivary gland histopathological reports completed at a single institution. Patient demographics and clinical data were analyzed. We used Pearson's chi-square test (χ^2) to determine statistical significance for the variables.

Results: Neoplastic lesions amounted to 271 cases (37,27%). Pleomorphic adenoma was the most frequent benign tumor, while mucoepidermoid carcinoma was the most commonly found malignant tumor. Parotid gland showed a clear, statistically significant (p=0.045) preponderance of benign tumors. Age was the only predictor of malignancy (OR 1.03).

Conclusion: The present study is in agreement with the current literature regarding the most frequent types of tumors, incidence according to a type of gland and gender.

KEYWORDS: salivary glands, salivary gland neoplasms, biopsy

STRESZCZENIE:

Wprowadzenie: Guzy ślinianek stanowią 3-10% nowotworów głowy i szyi. Najczęściej zajęta zostaje ślinianka przyuszna (64-80%). Guzy złośliwe rozpoznaje się u 15-32% pacjentów. Najczęstszym nowotworem łagodnym jest gruczolak wielopostaciowy. Częściej występującym nowotworem złośliwym jest rak śluzowo-naskórkowy.

Cel: Celem badania było przeprowadzenie badania przekrojowego wszystkich guzów ślinianek rozpoznanych w szpitalu o niskiej referencyjności w latach 1995-2013.

Metody: Przeanalizowaliśmy wszystkie raporty z badań histopatologicznych ślinianek uzyskane w jednej instytucji, z uwzględnieniem danych demograficznych i klinicznych. Do określenia istotności statystycznej różnic zastosowaliśmy test chi kwadrat Pearsona (χ^2).

Wyniki: Zmiany nowotworowe stwierdzono u 271 pacjentów (37,27%). Najczęstszym guzem łagodnym był gruczolak wielopostaciowy, a najczęstszym guzem złośliwym - rak śluzowo-naskórkowy. Nowotwory łagodne istotnie częściej występowały w śliniance przyusznej (p = 0.045), a różnica ta była istotna statystycznie. Jedynym czynnikiem predykcyjnym złośliwości był wiek pacjenta – OR 1,03.

Wnioski: Wyniki badania potwierdziły aktualne dane literaturowe co do najczęstszych typów nowotworów, częstości zajęcia poszczególnych ślinianek oraz płci pacjentów.

SŁOWA KLUCZOWE: ślinianki, nowotwory ślinianek, biopsja

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INTRODUCTION

Salivary glands tumors constitute an important area of oral and maxillofacial pathology. Although uncommon, are not so rare, representing 3 to 10% of all tumors of the head and neck [1-3]. The majority of these lesions are of epithelial origin, although soft tissue tumors, such as hemangiomas, lymphomas and metastases may occur within salivary glands[2].

Tumors are found predominantly in major salivary glands[4,5]. Parotid gland is affected most often, ranging from 36.6 to 83% of salivary gland tumors[6,7]. Malignant tumors are a minority, occurring in 15-32% of cases.

The most common malignant and benign tumors are the mucoepidermoid carcinoma and the pleomorphic adenoma, respectively[1,2].

The submandibular gland is affected in 9.5 to 24.3% of cases. However, occurrence of malignant lesions is higher compared to the parotid, ranging from 37 to 45%. As in the parotid, pleomorphic adenoma is the most common benign tumor of submandibular gland (44-68% of cases). However, adenoid cystic carcinoma is the most frequent malignant tumor (12-27%)[6,9].

Sublingual gland tumors are rare, accounting for 0 to 10.1% of all cases. However, this gland holds an increased risk of malignancies, ranging from 70 to 90%[2,3,6,9,10,11,12].

Minor salivary glands are reported as the second most common tumor location, with incidence ranging from 3 to 31.8%[7,10]. As in the case of major glands, pleomorphic adenoma is the most common tumor and it is found in 40% of cases. The palate is the most frequently affected region with 42-54% of tumors found in this location[4,7,10].

The proportion of benign versus malignant masses in the minor salivary glands amounts to about 50%. Pleomorphic adenoma is the most frequent benign tumor, while malignant neoplasms include the mucoepidermoid carcinoma and adenoid cystic carcinoma[3,5,12,13].

OBJECTIVES

The objective of this research project was to conduct a cross-sectional study of all salivary gland tumors diagnosed at a tertiary hospital in the period between 1995 and 2013.

METHODS

We reviewed histopathological reports of all salivary gland tumors completed at a single institution. Patient demographics and clinical data were analyzed. Their names were not retrieved.

This study was in accordance with all Principles of the Helsinki Declaration.

The study analyzed the occurrence of tumors of all histological types in each salivary gland, their distribution according to gender and age.

We used Pearson's chi-square test (χ^2) to determine statistically significant differences between the variables.

RESULTS

During the study period (1995-2013) there were 271 diagnoses of salivary gland tumors. Pleomorphic adenoma was the most frequent type - 157 cases (57.93%), followed by Warthin's tumor - 44 cases (16.24%), and mucoepidermoid carcinoma - 20 (7.38%) (Table 1).

Table 1. Most frequent salivary gland tumors

Salivary gland tumors	N	%
Pleomorphic adenoma	157	57.93
Warthin Tumor	44	16.24
Mucoepidermoid carcinoma	20	7.38
Squamous cell carcinoma	8	2.95
Adenoid cystic carcinoma	7	2.58
Adenocarcinoma	7	2.58
Others	28	10.34
Total	271	100

Females were affected in 175 cases (64.6%) vs. 96 males (35.4%).

Benign tumors comprised the vast majority - 215 cases (79.3%). Malignant tumors accounted for 56 cases (20.7%) (Figure 1).

Parotid gland was the most common tumor location (219 cases - 80.8%), followed by the submandibular gland (29 cases - 10.7%). Minor salivary glands constituted the third most common location (19 cases - 7%) and the sublingual gland was affected least frequently (4 cases - 1.5%) (Figure 2).

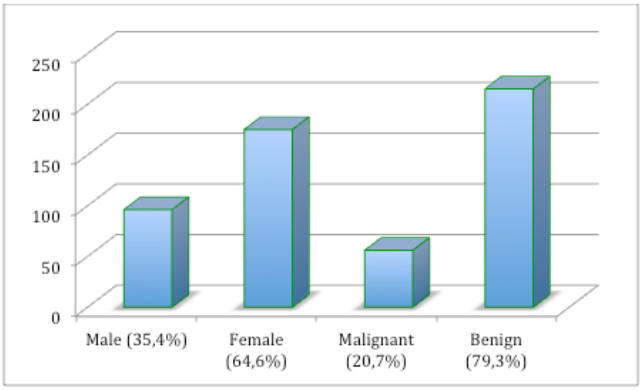

Figure 1. Frequency according to gender and clinical presentation

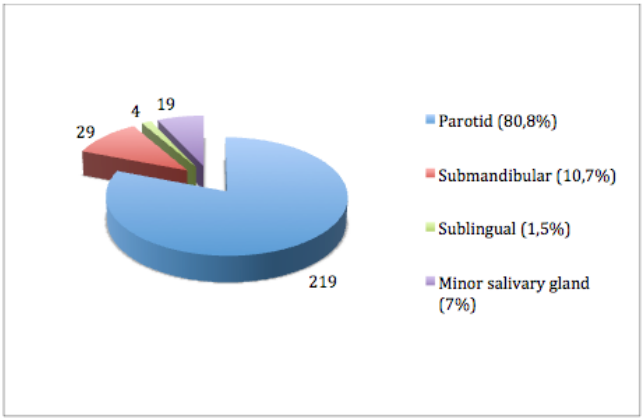

Figure 2. Incidence of tumors according to the type of salivary gland

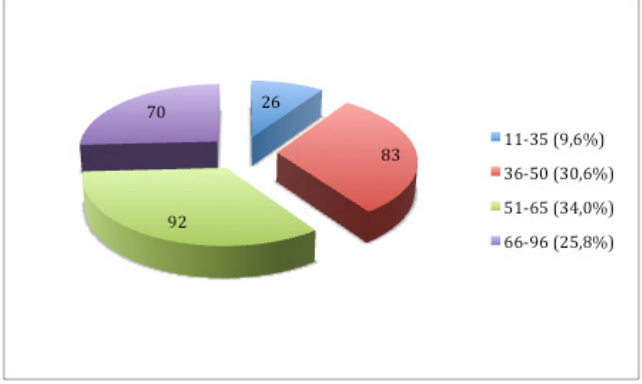

Figure 3. Distribution according to age

A low incidence was noted in the age group of 11-35 years, corresponding to 9.6% of cases. The 51-65 age group was characterized by the highest incidence, with 34.0% of cases (Figure 3).

Logistic regression model (multivariate analysis) showed that age was the only variable related to malignancy (Table 2).

Benign tumors were more common in females, and of these pleomorphic adenoma was the most frequent (105 cases in females and 52 in males).

Warthin's tumor followed with 27 cases in females and 17 in males.

Myoepithelioma was the third most common tumor, identified in three females and two males.

Malignant tumors also affected females at a higher frequency. The most common type was the mucoepidermoid carcinoma, 13 in females and seven in males.

Adenocarcinoma was diagnosed in six females and only in one male.

On the other hand, six males presented with squamous cell carcinoma versus two females.

Table 2. Possible predictive factors for malignancy

Gender	Non-adjusted Odds Ratio OR (95%)	Adjusted Odds Ratio OR (95%)
Male	1.00 (ref)	1.00 (ref)
Female	0.74 (0.40-1.35)	0.72 (0.39-1.36)
Age	1.03 (1.01-1.05)	1.03 (1.01-1.06)
Site		
Parotid	1.00 (ref)	1.00 (ref)
Submandibular	2.01 (0.85-4.75)	2.22 (0.89-5.50)
Sublingual	4.47 (0.01-32.7)	7.80 (0.90-5.50)
Minor salivar gland	1.60 (0.54-4.70)	1.12 (0.34-3.61)

The parotid gland was most often affected, as evidenced by 219 identified cases. Mean age of patients was 55.06 years. Males constituted 79 cases and females 140 cases ($p > 0.05$). Benign tumors corresponded to 179 diagnoses vs. 40 cases of malignancy ($p < 0.05$) (Table 3).

The submandibular gland was the origin of 20 benign and nine malignant tumors ($p > 0.05$); average patient age was 53.31 years. Males accounted for 11 cases, while females constituted 18 cases ($p > 0.05$).

The sublingual gland was affected in four patients - one male and three females ($p > 0.05$). Two cases of benign tumors and two cases of malignancy (one diagnosed as primary metastasis from another site) were identified, ($p > 0.05$). Average age was 40 years.

Finally, minor salivary glands constituted tumor location in 19 cases - 15 benign and four malignant tumors ($p > 0.05$);

Table 3. Clinical presentation and tumor characteristics depending on location

	Age (mean)	Male N=96	Female N=175	p-value	Benign N=215	Maligmant N=56	p-value	Total N=271
Parotid	55.1	79	140	p=0.647	179	40	p=0.045	219
Submandibular	53.3	11	18	p=0.765	20	9	p=0.144	29
Sublingual	40.0	1	3	p=0.660	2	2	p=0.144	4
Minor salivary gland	58.1	5	14	p=0.528	15	4	p=0.965	19

Table 4. Distribution of most common types of tumors according to clinical features

	Age (Average)	Male	Female	p-value	Site	Total
Pleomorphic adenoma	51,9	52	105	0.352	Parotid:126 Submand:17 Sublingual:2 Minor: 12	157
Warthin's Tumor	57.9	17	27	0.626	Parotid:41 Submand:3 Sublingual:0 Minor: 0	44
Mioepitheioma	67.2	2	3	0.829	Parotid:4 Submand:1 Sublingual:0 Minor: 0	5
Mucoepidermoid Carcinoma	53.6	7	13	0.967	Parotid:15 Submand:4 Sublingual:1 Minor: 0	20
Adenocarcinoma	56.6	1	7	0.236	Parotid:5 Submand:0 Sublingual:0 Minor:2	7
Squamous cell Carcinoma	67.2	6	2	0.017	Parotid:8 Submand:0 Sublingual:0 Minor: 0	8

average age was 58.1 years old. In five instances tumors were identified in males and in 14 cases in females (p> 0.05).

Males were more often affected than females by squamous cell carcinoma and this association was statistically significant (p <0.017) (Table 4).

DISCUSSION

Salivary gland tumors corresponded to 271 cases (37.27%). Benign tumors constituted the majority, accounting for 79.34% of cases. This finding is in agreement with the international literature [1-13].

There was also concordance with previous investigations with regard to higher incidence of these tumors in females. However, in our study we found no statistically significant correlations corroborating this finding.

The reason women are affected more often than men is still unclear. It is speculated that there is an association with estrogen/progesterone ratio and its changes with age. Further studies are needed to elucidate this theory.

The parotid gland was affected in the majority of cases (80.8%) – our finding was in agreement with all the reviewed studies [1-13] .

All of the analyzed studies showed the pleomorphic adenoma

Table 5. Overall view of studies

	Long-jiang	Satko	Oliveira	Ito	Williams	Present study	Kayembr	Lima	Anari	Vargas	Al-khateeb
Behaviour											
Benign	59.8	73.9	78.3	67.5	70.6	79.34	65.6	76.3	68.4	80	70
Maligmant	40.2	26.1	21.7	32.5	29.4	20.66	34.4	23.7	31.6	20	30
Gender											
Male	47.3	47.4	39	41.5	?	35.4	35	37.4	41	40	44
Famale	52.7	52.6	61	58.5	?	64.6	64	62.6	59	60	56
Site											
Parotid	61.4	83	68.5	67.7	66	80.8	36.6	62	63	71	49.5
Submandibular	10.8	10.8	15.5	9.5	18	10.7	24.3	19	23	24	18.7
Sublingual	1.4	3.2	0.5	0	0	1.5	10.1	0	0	0	0
Minor salivary gland	26.4	3	14.5	22.8	16	7	29	19	14	5	31.8
Tumor											
Pleomorphicadenoma	51.3	53.9	67.8	54.2	64.5	57.93	55.1	68.5	65.4	67.7	54
Adenoid cystic carcinoma	7.3	6.4	6.5	7.9	5	2.58	15.9	5.3	2.3	4	13
Warthin's Tumor	4.4	9.7	6.3	8.5	5	16.4	--	6.9	0	10.5	2
Adenocarcinoma	6.6	3.5	5.8	1.4	3.3	2.58	5.4	3.6	4.6	4	1
Mucoepidermoid carcinoma	7.6	5.2	4.8	13.5	9.5	7.38	8	4.4	11.5	10.4	8
Total	3461	1021	599	496	344	271	266	245	130	124	102

as the most frequent histological type, ranging from 51.3 to 68.5% of all tumors. The incidence of adenoid cystic carcinoma ranged from 2.3 to 15.9%. Frequency of occurrence of Warthin's tumor ranged from 0 to 16.4%, (with the highest percentage observed in the present study). The second highest incidence of this tumor was reported in another Brazilian study[3] that had found incidence of 10.5%. Table 5.

Mucoepidermoid carcinoma and adenocarcinoma represented 1- 6.6% and 4.4 - 13.5% of cases, respectively. The low incidence of tumors in the minor salivary glands in this study does not allow a more reliable analysis, however one can consider the results in discordance with the literature, which shows high rate of occurrence of malignancy in these glands.

Squamous cell carcinoma affected more males than females (6:2 ratio) and this finding showed statistical significance. It remains unclear whether it is due to higher exposure of men to carcinogenic factors.

CONCLUSION

Present study demonstrated that the parotid is the predominant location of salivary gland tumors, both benign and malignant.

The pleomorphic adenoma was the most common benign tumor, while mucoepidermoid carcinoma was the most common malignant tumor.

In general, analyzed variables are in agreement with several global studies. It is important to emphasize higher incidence of Warthin's tumor noted in this study compared to other reports [3,10,11].

Higher incidence of benign tumors in minor salivary glands was in discordance with the literature. However, that could be justified by a small number of cases involving these glands in this sample.

Parotid gland showed a clear, statistically significant (p=0.045) preponderance of benign tumors.

Taking the two major groups (benign and malignant) together, age was the only predictor of malignancy, with an odds ratio (OR) of 1.03.

Regarding squamous cell carcinoma it appears that males were more frequently affected than females, and this association was statistically significant (p = 0.017).

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