

Review and characteristics of 585 salivary gland neoplasms from a tertiary hospital registered in the Polish National Major Salivary Gland Benign Tumors Registry over a period of 5 years: a prospective study

Authors' Contribution:

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

Krzysztof Piwowarczyk^{ABDEF}, Ewelina Bartkowiak^{ABDEF}, Hanna Klimza^{ADEF}, Grażyna Greczka^{ABCD},
Małgorzata Wierzbicka^{ABDEF}

Department of Otolaryngology and Laryngological Oncology, Poznan University of Medical Sciences, Poland;
Head: prof. Małgorzata Wierzbicka MD PhD

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ABSTRACT:

Introduction: A Polish National Major Salivary Gland Benign Tumors Registry (SGR) is a report of benign salivary gland neoplasms (SGNs) from 26 different centres in Poland, introduced in 2014. The aim of this study is to analyze demographic characteristics and clinico-pathological factors of benign SGNs treated in large tertiary institutions and to determine possible correlations between selected variables.

Material and method: Analysis of 585 patients recorded in SGR and operated on for SGNs in the Department of Otolaryngology and Laryngological Surgery, University of Medical Sciences, Poznań, Poland, over a 5-year period. Patient age, sex, occupation, place of residence, tumor location, size, histology, recurrence, facial nerve function after surgery, wound healing, surgery procedure, availability of pre-operative imaging examinations, fine-needle aspiration cytology (FNAC) results were analyzed.

Results: 338 females and 247 males with a mean age of 53 years were operated on. In total, 96.2% of tumors originated from the parotid and 3.8% from the submandibular gland. The most frequent primary tumor diameter was 2–4 cm (59.5%) followed by <2 cm (29.2%) and >4 cm (8.4%). Tumors of over 4 cm were frequently removed by partial superficial parotidectomy, while those under 2 cm – by extracapsular dissection (ECD). Pleomorphic adenomas (PA) were predominant (58.8%), followed by Warthin's tumor (WT) – 37.1%. Patients with WT were on average 13.3 years older than patients with PA.

Discussion: This research can be helpful to better understand the clinico-pathological features of SGNs. Long-term hospital-based analysis is important for subsequent metaanalyses and comparisons with other centers. The reasons why not all patients' data are reported to the national SGR should be further precisely analyzed.

KEYWORDS:

benign neoplasms, characteristics, pleomorphic adenoma, registry, salivary gland, surgery

ABBREVIATIONS

CT – computed tomography
ECD – Extracapsular dissection
FNAC – fine-needle aspiration cytology
MRI – magnetic resonance imaging
PA – Pleomorphic adenoma
SGN – salivary gland neoplasm
SGR – The Polish National Major Salivary Gland Benign Tumors Registry
US – ultrasonography
WHO – World Health Organization
WT – Warthin's tumor

INTRODUCTION

Salivary gland neoplasms (SGNs) represent in 2–6.5% of all head and neck region tumors [1–3]. The majority (75–85%) of them occurs in the parotid glands [4, 5] and 65–75% are benign [6, 7]. Pleomorphic adenoma (PA) is the most often histological finding [8, 9]. The global incidence rate of SGNs accounts for 0.4–13.5 cases per 100.000 individuals [10, 11] and 1.35 per 100.000 in Poland annually [12]. The standard treatment is the surgical resection with a margin of intact tissue, with facial nerve preservation [13]. Surgical techniques include: extracapsular dissection, partial superficial parotidectomy, superficial parotidectomy and total parotidectomy. There have been many studies performed to describe the epidemiology of

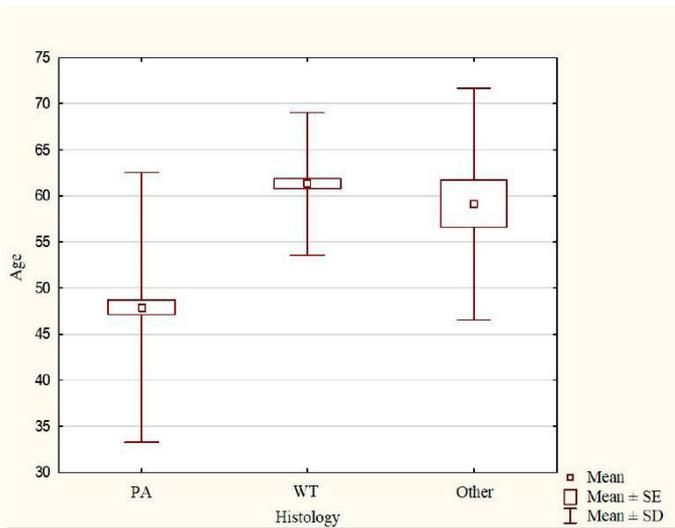


Fig. 1. Distribution of mean age according to histological types of benign salivary gland tumors.

benign SGNs [14–19]. Nevertheless, epidemiological data on the incidence and characteristics of benign tumors are uncertain because of lack of national registries for this entity. Nowadays there are some databases which collect information on all head and neck neoplasms. All clinical registries presented above collect single-institution data.

In Poland, there exists a Polish National Major Salivary Gland Benign Tumors Registry (SGR) (<https://guzyslinianek.pcss.pl>) which reports in detail on patients operated on for benign SGNs and is based on constantly updated data from 26 centres from different regions of Poland. This database was set up in 2014 but this epidemiological approach has not been used for research analysis before.

The purpose of the present study is to analyze demographic characteristics and clinico-pathological factors of benign SGNs from the SGR, treated in a large tertiary institution. The main outcome measure is to find and determine possible correlations between selected variables from the registry.

MATERIAL AND METHODS

This paper is a prospective study, presenting the Polish National Major Salivary Gland Benign Tumors Registry (<https://guzyslinianek.pcss.pl>) activity. The analysis covers 5 years of the SGR material, i.e. from September 9, 2014 to December 31, 2019. All cases taken into consideration were recorded at the Department of Otolaryngology and Laryngological Surgery, University of Medical Sciences, Poznań, Poland, which is also a leader of SGR.

All patients with parotid tumor underwent one of classic parotid gland operations. All tumors were classified according to the histological typing of World Health Organization (WHO) International Histological Classification [20].

The SGR was searched through for codes of the operation center “Medical University Poznan”. Following variables were reviewed:

patient data such as age, sex, occupation, place of residence, operation date, tumor location, size, histology, as well as surgery procedure, tumor recurrence, facial nerve function after surgery, wound healing, availability of pre-operative imaging examinations, fine-needle aspiration cytology (FNAC) result. The statistical analysis of the collected data was performed and the results were compared with literature research.

The research was conducted in accordance with a protocol approved by the Bioethics Committee of the Karol Marcinkowski University of Medical Sciences in Poznań (Resolution No. 1256/18).

STATISTICAL ANALYSIS

We analyzed our data with STATISTICA 12.0 software (StatSoft, Inc.). Probability values (P) of <0.05 were considered statistically significant. Statistical analysis was performed with Kruskal-Wallis H test as well the chi-squared (χ^2) test with the Fisher correction.

RESULTS

During the 5-year period 338 females (57.8%) and 247 males (42.2%) underwent surgery because of benign salivary gland neoplasm and were recorded in SGR. The male-to-female (M:F) ratio was 0.73:1. Of those patients, 14.7% (86/585) were white collar workers, 11.6% (68/585) retired pensioners, 7.9% (46/585) manual workers and 2.1% (12/585) students.

“No occupation” data constituted 63.8% (373/585) of all records. The minimum age of the patients was 17, the maximum 86 and the mean age was 53 years (52 years for females and 54 years for males). The place of residence of the operated patients was analyzed. As much as 24.1% (141/585) originated from a city with a population over 100,000, while 47.7% (279/585) came from a city under 100,000 population. As much as 28.2% (165/585) of operated people lived in the country. As concerns the major salivary gland tumors, 96.2% (563/585) originated from the parotid and 3.8% (22/585) from the submandibular gland. No sublingual gland tumor was found. The most frequent primary tumor size was 2–4 cm (59.5% – 348/585) followed by <2 cm (29.2% – 171/585) and >4 cm (8.4% – 49/585). In 2.9% (17/585) the tumor size was not mentioned. Likewise, 3.2% (19/585) of secondary, recurrent tumors were found in our material, with 84.2% (16/19) of them under 2 cm and 15.8% (3/19) over 2 cm in size. The tumor histology was as follows: PAs were predominant – 58.8% (344/585) followed by WT – 37.1% (217/585). The distribution of tumor histology and demographics are shown in Tab. I.

Of all cases, 96.2% (563/585) underwent ultrasonography (US) before surgery. CT or MRI was done by 2 patients (0.3%) and 1 patient (0.2%) performed CT, MRI and US. As many as 2.7% (16/585) of patients did not have any preoperative imaging performed. There were 5.5% (35/585) FNAC results available in the analyzed material. A total of 32 records confirmed histological typing after surgery, while 3 biopsy results were negative. The surgical technique was reported as: partial superficial

Tab. I. Histology distribution and demographics in 585 salivary gland tumors.

HISTOLOGY	NO.	%	AGE			
			Mean	Minimum	Maximum	SD
PA	344	58,8	47,92	17	86	14,64
WT	217	37,09	61,32	28	80	7,77
Basal cell adenoma	8	1,37				
Lipoma	6	1,03				
Mucinous cystadenoma	3	0,51				
Myoepithelioma	3	0,51	59,13	34	80	12,54
Oncocytoma	2	0,34				
Tubular adenoma	1	0,17				
Sebaceous adenoma	1	0,17				

parotidectomy in 35.6% (208/585), extracapsular dissection (ECD) – 29.4% (172/585), superficial parotidectomy – 25.3% (148/585), total parotidectomy with facial nerve preservation – 6% (35/585). Submandibular gland resection was reported in 3.8% (22/585). Patients with facial nerve dysfunction after surgery accounted for 0.68% (4/585). In most of the cases, correct wound healing was present – 59.3% (347/585); no data were available in 40.5% (237/585). One (0.2%) case of disturbed wound healing was reported on. The possible correlations between different variables from registry were examined. A detailed analysis is shown in Tab. II.

There is a correlation between the histology and age in Kruskal-Wallis H test (2, N = 585) = (119.5928, P = 0.0000). Patients operated on, with WT (mean age 61.3) were on average 13.3 years older than patients with PA (mean age 47.9).

The impact of the tumor size on the surgery procedure was analyzed. As many as 34.7% (17/49) of large tumors (over 4 cm in diameter) were frequently removed by partial superficial parotidectomy, while 35.7% (61/171) of small tumors (under 2 cm in diameter) were predominantly removed by extracapsular dissection. As many as 36.2% (126/348) of tumors 2–4 cm in diameter were mainly removed by partial superficial parotidectomy. There is a statistically significant relationship between the size of the primary tumor and surgery procedure [Chi2(8) = 18.69748; P = 0.01656].

DISCUSSION

Most of the studies report that benign SGNs, especially PA, predominate in females [21, 22] and similar findings were observed in our research. In our material, as in the study by Correia et al. [23], the percentage of pleomorphic adenomas in female patients (68.6%) was higher than in males (47%) while Warthin tumor was more common in male patients (49%) than in females (29%).

Literature search has shown that SGNs occur very rarely in the sublingual gland (0.3%) [24, 25] and are uncommon in minor salivary glands of the oral cavity, lips and pharynx (15–25%) [26]. In SGR none of them was reported, which does not mean that such tumors are not identified in our country. Some oral cavity lesions are not suspected for SGNs before histological result and their surgery procedures do not cover SGNs removal, therefore patients

Tab. II. The correlation between tumor size and selected registry variables and their P values.

	TUMOR SIZE			P VALUE
	<2 CM	2–4 CM	>4 CM	
Location				
Parotid gland	163	337	47	0,68257
Submandibular gland	8	11	2	
Procedure				
Partial superficial parotidectomy	57	126	17	0,01656
ECD	61	102	8	
Superficial parotidectomy	38	93	14	
Total parotidectomy with facial nerve preservation	7	16	8	
Submandibular gland resection	8	11	2	
Histology				
PA	102	205	30	0,3160
WT	58	133	16	
Other types	11	10	3	

are not recorded in the SGR. Although the SGR is not dedicated to minor SGNs they are a rare but important part of SGNs and it should be considered to supplement the registry with this data.

In our study an interesting result was that the patients who developed WT were on average 13.3 years older than patients with PA. In the study by de Ru et al. [27] and Tartaglione et al. [28] similar results were found. The mean age of patients with PA was respectively 10 and 16 years less than in WT. Therefore, a close correlation with smoking habits has been suggested.

When deciding upon the surgery procedure for benign SGNs, one of the factors taken into consideration is the size of the tumor. ECD is recommended for inexperienced surgeons [29] and for small tumors [30, 31] while parotidectomy techniques are dedicated for larger neoplasms. What is important, the surgeon must be able to switch to another procedure at any time during surgery – for example from ECD to classic parotidectomy. Our results are consistent with other reports and confirm the correlation between surgery procedure and tumor size. However, it should be noted that

there are other variables besides the tumor size, such as location, which determine the surgery procedure [32].

The literature to date shows that pre-operative imaging examinations are significant in differential diagnostics of SGNs. An important role in the diagnosis of SGNs is played by US [33]. This method is mainly used for the assessment of major SGNs. The examination is worldwide available, cost-effective and performed by ENT practitioners. Among the analyzed patients, 96.2% underwent US before surgery. It was a fundamental examination and it does not preclude other additional pre-operative imaging examinations such as CT or MRI. The finding that 2.7% of patients did not have any imaging before surgery can be baffling and worrying. The medical documentation and letters of these patients were checked. There were discrepancies between SGR results and medical documentation. It turned out that those patients performed ultrasonography before surgery. Nevertheless, this information was not in the register. This confirms that the SGR has some substantial limitations and disadvantages and their causes must be further investigated.

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CONCLUSION

In conclusion, we found in our study that the mean age of PA patients was statistically significantly lower than in WT. Females with PA were mostly affected. ECD predominated for small tumors while classic parotidectomy was the most frequent procedure for tumors of over 2 cm in diameter. Our results confirm data from others studies on SGNs. This study can be helpful in understanding the clinico-pathological features of SGNs. However, local long-term, hospital-based analysis is very important for further metaanalyses and comparison with other centers. Data from the SGR should be taken into consideration when planning the re-operation in case of tumor relapse. It should facilitate the decision on the surgery procedure, based on clear data contained therein. The present study suggests that the results of SGR can constitute the basis to improve the quality of follow-up care of patients after salivary gland tumor resection. The value of SGR depends on the completeness of the reported data. We can assume that about 3–4 thousand surgeries of SGNs are performed in Poland annually. The reasons why not all of them are reported to the national SGR should be further precisely analyzed.

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Corresponding author: Krzysztof Piwowarczyk; Department of Otolaryngology and Laryngological Oncology, Poznan University of Medical Sciences, Poznan; Przybyszewskiego Street 49, Poznan, Poland; Phone: +48 618691387; E-mail: krzysztofpiwowarczyk2@gmail.com

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