INDEX COPERNICUS INTERNATIONAL

ORIGINAL ARTICLE

Evaluation of benign tumors of large salivary glands according to the new classification of the European Salivary Glands Society

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

Izabela Olejniczak[BCDEF], Agata Leduchowska[BCDEF], Zbigniew Kozłowski[A], Wioletta Pietruszewska[AD]

Department of Otolaryngology, Head and Neck Oncology, Medical University of Lodz, University Clinical Hospital Norbert Barlicki in Lodz, Poland; Head: prof. Wioletta Pietruszewska MD PhD

Article history: Received: 13.02.2021 Accepted: 28.02.2021 Published: 20.04.2021

SUMMARY:

Introduction: Tumors of large salivary glands constitute about 2–3% of all head and neck tumors. Their incidence is statistically greater in males than in females, with the first symptoms usually appearing between the 4th and 7th decade of life.

Aim: The aim of the study was to assess the usefulness of the new classification proposed by European Salivary Gland Society (ESGS) in comparison with the divisions of procedures previously valid in the literature, making a retrospective analysis of patients operated on due to benign tumors of large salivary glands in the Department of Otolaryngology, Head and Neck Oncology of the Medical University of Lodz in 2012–2020.

Material and methods: The retrospective examination was based on the material consisting of: surgical protocols, histopathological results, imaging results and clinical observations. The material includes 283 patients (141 women and 142 men): 249 patients with parotid gland tumor and 34 patients with submandibular gland tumor. The most common histopathological diagnosis was pleomorphic adenoma, which was found in 105 patients (42.17%) and adenolymphoma diagnosed in 94 patients (37.75%).

Results: The most common type of surgery was superficial parotidectomy including total superficial parotidectomy in 86 patients (34.54%) and partial superficial parotidectomy in 49 cases (19.68%). Then, according to the frequency of surgery, extracapsular tumor dissection (ECD) was performed (91 patients – 36.55%). According to the ESGS classification, in most cases parotidectomy I, II (37.34% of all parotidectomies) and parotidectomy II (28.49%) were performed. In case of ECD, all tumors were located at level II.

Conclusions: In summary, the new classification is aimed at unifying, but also simplifying the current nomenclature, reducing the existing nomenclature errors. Determination of the exact location and extent of the tumor within the parotid gland facilitates postoperative monitoring of patients by ENT doctors and those of other specialties.

KEYWORDS: ESGS classification, extracapsular tumor dissection, parotid gland, parotidectomy

ABBREVIATIONS

CT – computed tomography
ECD – extracapsular tumor dissection
ESGS – European Salivary Gland Society
FNAB – fine-needle aspiration biopsy
MRI – magnetic resonance imaging

INTRODUCTION

Tumors of large salivary glands (including malignant and benign lesions) constitute about 2–3% of all head and neck tumors [1]. Their incidence is statistically greater in males (0.7/100 000) than in females (0.5/100 000), with the first symptoms usually appearing between the 4th and 7th decade of life [2]. Although they constitute a small group of tumors, they are the most diverse tumors of the head and neck region in terms of histopathology [3]. Most of them (over 80% of all salivary gland tumors) are located in parotid salivary, then in submandibular gland. Over a dozen percent (10–15%) are malignant tumors, and their percentage usually increases with the age of patients. The location of the tumor in the smaller salivary gland also increases the likelihood of a malignant lesion.

The basic symptom is the presence of pathological mass on the neck or in the mandibular angle (Fig. 1A., B.), and the most frequent accompanying symptoms include pain in the area, paresthesias, features of paresis or paralysis of the facial nerve and, mainly in malignant lesions, the presence of a tumor on the neck corresponding to lymph node metastases [1, 2].

If a salivary gland tumor is diagnosed, the procedure of choice is surgical treatment, and the scope of the procedure depends on factors such as the location, size and histological type of the tumor. Surgical treatment determines the therapeutic success or the patient's chances of survival with no recurrence.

Radiotherapy of benign tumors is not justified because they are not sensitive to radiation. This method of treatment is considered mainly in cases of recurrent mixed tumors of clinically

severe course. In proliferative changes of submandibular salivary gland, the preferred method of treatment is to remove the entire gland along with the tumor [1, 2].

In the case of tumors of the parotid gland, over the years, many authors have presented different proposals for the classification of surgical operations. The most common division binding so far was: extracapsular removal of the tumor, partial parotidectomy of the superficial lobe, lateral or total parotidectomy. Snow et al. (2001) additionally distinguished partial deep lobe parotidectomy, whereas Tweedie and Jacobs (2009) proposed a classification including total parotidectomy with preservation or resection of the facial nerve, and they divided partial superficial parotidectomy and deep lobe parotidectomy into surgery with tumor removal in the upper, middle or lower segment [4, 5]. The previous classification was based on the division of the salivary gland into superficial (lateral) and deep lobe and the conventional borderline was the course of the facial nerve through the gland [1].

The classifications used so far have raised doubts as to the scope of the performed operation and there was a lack of consensus that would unify the type of procedure used. In view of the above-mentioned need to clarify the scope of the operation, in 2016, the European Salivary Gland Society (ESGS) published a new classification of operations of parotid glands, including the division of the gland into 5 levels: I – lateral upper, II – lateral lower, III – deep lower, IV – deep upper, V – additional. The upper levels correspond to the temporal branch of the facial nerve, while the lower levels correspond to its cervical branch. The upper and lower levels were separated from each other by a conventional line connecting the facial nerve trunk division into its main branches with the duct leading out the parotid gland (Stensen's duct) [6] (Fig. 2.).

The new classification distinguishes two main types of procedures: extracapsular tumor dissection (ECD) and parotidectomy [6, 7]. The procedure description scheme according to the new ESGS classification is as follows:

1. The first element of the procedure description is a prefix defining the operated side (L – left, R – right) – in the case of a procedure performed on both sides, each side is classified separately;

2. The scope of the operation is then determined: extracapsular tumor removal (ECD or parotidectomy). The first term is used when during the procedure the facial nerve is not exposed and/or less than one level of the gland is removed. A parotidectomy, on the other hand, concerns cases meeting both conditions: dissection of the facial nerve and removal of at least one whole level of the gland;

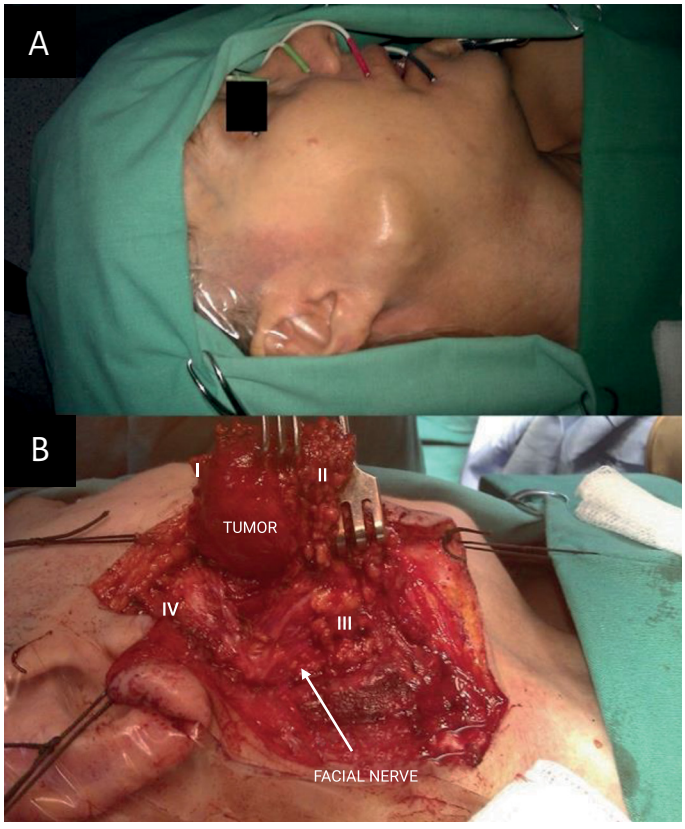

Fig. 1. (A) Tumor of the right parotid gland; (B) with the new ESGS classification levels marked.

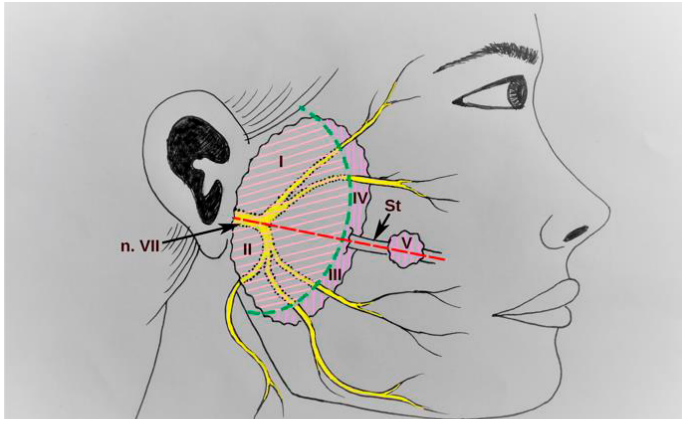

Fig. 2. Division of parotid gland into 5 levels: I – lateral upper, II – lateral lower, III – deep lower, IV – deep upper, V – additional. Trunk of the facial nerve (n. VII). The duct leading out the salivary gland – Stensen's duct (St).

3. The third element of the description is the inclusion of the level or levels (I–V) removed, depending on the location of the tumor in the gland. For the ECD, this is only a determination of the location and does not imply that this level was completely removed during surgery;

L/R → ECD/parotidectomy → level I–V → extraglandular structures (CN VII/ECA/S)

Fig. 3. Diagram of the description of the surgical procedure for the removal of the parotid gland tumor according to ESGS.

Tab. I. Number and type of surgeries performed (Snow et al. in Tweedie and Jacobs modification).

PAROTID GLAND SURGERY	249	100%
Lateral parotidectomy	86	34.54%
Partial superficial parotidectomy	49	19.68%
Extracapsular tumor dissection (ECD)	91	36.55%
Total parotidectomy with preservation of n. VII	23	9.23%
Total parotidectomy with resection of n. VII	0	0%

Tab. II. Number and type of surgeries performed according to ESGS classification.

PAROTID GLAND SURGERY	249	%
Extracapsular tumor dissection (ECD)	**91**	**100%**
II	91	100%
Parotidectomy	**158**	**100%**
I	6	3.80%
II	45	28.49%
III	6	
I, II	59	37.34%
II, III	25	15.82%
I, II, III	1	0.63%
I, II, III, IV	15	9.49%
I, IV	1	0.63%

Tab. III. Histopathological diagnoses.

Pleomorphic adenoma (mixed tumor)	105	42.17%
Adenolymphoma (Warthin's tumor)	94	37.75%
Myoepitelioma	16	6.43%
Mucinous cystadenoma	11	4.42%
Lipoma	9	3.61%
Basal cell adenoma	7	2.81%
Oncocytic adenoma (oncocytoma)	3	1.20%
Papillary cystadenoma	2	0.80%
Sebaceous adenoma	2	0.80%

4. The last element of the description is the determination of the removed extraglandular anatomical structures. Common abbreviations or symbols are used for this purpose. For example, for the trunk of the facial nerve – CN VII, the great auricular nerve – GAN, the external carotid artery – ECA, the skin – S.

Fig. 3. shows a diagram of the description of the surgical procedure for the removal of the parotid gland tumor according to ESGS taking into account the individual elements mentioned.

AIM

The aim of the study was to assess the usefulness of the new classification proposed by ESGS in comparison with the divisions of procedures previously valid in the literature, making a retrospective analysis of patients operated on due to benign tumors of large salivary glands in the Department of Otolaryngology, Head and Neck Oncology of the Medical University of Lodz in 2012–2020.

MATERIAL AND METHODS

The retrospective examination was based on the material consisting of: surgical protocols, histopathological results, imaging results and clinical observations. Based on the collected data, an attempt was made to apply the new classification according to ESGS and to compare its usefulness with the most common classification used in literature so far, including the division of parotid gland procedures into extracapsular resection, partial superficial parotidectomy, lateral parotidectomy and total parotidectomy with preservation or resection of the facial nerve. The material includes 283 patients (141 women and 142 men) who underwent surgery during the above-mentioned period in the Department of Otolaryngology and Head and Neck Oncology of Medical University of Lodz. The youngest patient was 19 years old, the oldest 85 years (mean age: 54.78). The tumors of parotid gland constituted 249 cases (87.99%); the remaining 34 concerned submandibular gland tumors (12.01%). Tumors of submandibular salivary gland, which were not included in ESGS classification, were excluded from further analysis.

RESULTS

According to the current classification (Snow et al. in Tweedie and Jacobs modification), in the analysed material, the most common type of surgery was superficial parotidectomy (135 cases in total – 54.22%), including lateral parotidectomy, i.e. excision of the entire superficial lobe of the parotid gland together with the tumor, performed in 86 patients (34.54%), and partial superficial parotidectomy in 49 cases (19.68%). Then, according to the frequency of surgery, ECD was performed, without removal of salivary gland parenchyma and identification of the facial nerve (91 patients – 36.55%). The least frequently performed was total parotidectomy with preservation of the facial nerve (23 patients – 9.23%) (Tab. I.).

According to the ESGS classification, 91 procedures of ECD and a total of 158 parotidectomies were performed. In case of ECD, all tumors were located at level II (Tab. II.).

The most common histopathological diagnosis among benign tumors of parotid gland was pleomorphic adenoma (mixed tumor), which was found in 105 patients (42.17%). The second most frequent was adenolymphoma (Warthin's tumor), which was diagnosed in 94 patients (37.75%) (Tab. III.).

The main additional examinations performed in the preoperative period were salivary gland ultrasound and fine-needle aspiration biopsy (FNAB). Salivary gland ultrasound was an imaging

examination performed to qualify patients for surgical treatment in 236 cases (94.78%). In 14 patients, when salivary gland tumor clinically aroused suspicion of malignant process development and caused diagnostic difficulties, preoperative examinations were extended by CT scans (13 cases – 5.22%) or MRI (1 case – 0.40%). FNAB preceding the procedure was performed in 150 patients (60.24%). Postoperative histopathological result confirmed the preoperative biopsy diagnosis in 91 patients (60.67%).

DISCUSSION

The most common benign tumors in the analysed material were pleomorphic adenoma and adenolymphoma, which together accounted for almost 80% of all removed tumors of parotid gland. Similar results were obtained by Croonenborghs et al. (2019), analyzing 250 cases of parotid gland tumors: the most common were mixed tumors (48.8%) and Whartin's tumors (30.8%) [8]. In preoperative imaging diagnostics, ultrasonographic examination was performed mainly, in own analysis in slightly more than 90% of cases, which did not differ from the literature data (80% of patients), and it is considered a diagnostic standard. Ultrasound examination, although it does not allow archiving, is a non-invasive, cheap, repeatable and easy to perform examination [1, 8, 9]. In doubtful cases, usually suspected of malignant growth, CT and/or MRI was performed, as a complementary examination, i.e. in about 6% of the patients (N = 15). In the literature, these studies were carried out much more frequently: CT in about 20% and MRI in up to 70% of patients [8].

Fine-needle aspiration biopsy in our material was performed in more than 60% of patients (N = 150) and postoperative histopathological result confirmed the biopsy diagnosis in 60.67% of cases. In the literature review, the compliance of the FNAB result with the postoperative outcome varies on average from 38 to 80% [10–13]. In other studies, much more favourable data are observed: in the study by Venkatesh et al. (2019), histopathological diagnosis confirmed the FNAB result in 93.48% of benign tumors and 91.67% of parotid gland malignancies [14]. In the analysis of usefulness of FNAB in preoperative diagnosis, the size of the tumor is also important. The compatibility of pre- and postoperative histopathological results increases with tumor size, and for tumors < 2 cm is about 40% and for lesions 2–4 cm the average is estimated at 60% [15]. The pre-operative diagnosis is of great importance when planning the extent of the procedure. In the case of benign tumors, this fact concerns mainly the diagnosis of pleomorphic adenoma. Due to the possibility of satellite outbreaks and the resulting risk of recurrent tumors, the planning of the procedure avoids extracapsular tumor dissection in favour of a wider resection [16, 17].

Over the years, the authors have presented different proposals for the classification of parotid gland surgery. According to different authors, the terms "lateral parotidectomy", "total superficial parotidectomy" or "superficial parotidectomy" referred to the resection of the same gland area. There have been subsequent modifications in the surgery nomenclature, additionally including partial deep lobe parotidectomy (Snow et al. 2001) [4] or complete parotidectomy with preservation or resection of the facial nerve (Tweedie and Jacobs 2009) [5]. The types of the procedures were described on the basis of division of the gland into a superficial and a deep lobe (depending on its position in relation to the facial nerve) or into three segments in the superficial and deep lobe (upper, middle, lower) [5, 18]. Very often individual authors used the available classifications according to their own modification and the lack of cohesion hindered agreement and the possibility of conducting multi-centre surveys. Another problem was the lack of precise location of the tumor within the salivary gland parenchyma in the procedure description and the lack of unification of surgical protocols. Therefore, in order to clarify the nomenclature of the procedure description and the location of the neoplastic lesion, an attempt was made to create an additional classification of parotid gland surgery [6].

In our own material, in accordance with the previous classification (based on the classification of Snow et al. and Tweedie and Jacobs), the most frequently performed procedures were ECD (36.55%) and lateral parotidectomy (34.54%). According to the new ESGS classification, the most common procedure was ECD II (100% of all ECDs), parotidectomy I, II (37.34% of all parotidectomies) and parotidectomy II (28.49%). Similar results were obtained by Wierzbicka et al. (2016) – ECD II and parotidectomy II were also the most frequently performed procedures [7]. In the analysed material, the most common benign tumors were pleomorphic adenoma (42.17%) and Warthin's tumor (37.75%), which did not differ from literature data [1].

When assessing the usefulness of the ESGS classification for the description of procedures, the most important new element introduced is the precise determination of the location of the pathological lesion. The location of the tumor within the salivary gland is important already at the level of qualifying the patient for surgery. Specifying the exact location of the neoplasm in the description of the procedure is also useful in order to better monitor possible local recurrence postoperatively, especially in the case of pleomorphic adenoma. It allows for precise determination of where to look for the recurrence, also when assessing the same patient by different specialists in the course of further observation. This may be of particular importance for a radiologist who, by performing an ultrasound examination, is able to determine the exact location of the remaining salivary gland parenchyma and assess the appearance of a local recurrence. The literature presents very different data on the occurrence of local recurrences (mainly in case of pleomorphic adenoma) after ECD and lateral parotidectomies. On average, the relapse rate does not exceed 2%, and in less radical surgeries the risk of damage to the facial nerve is lower [19]. Witt (2002), on the basis of the conducted meta-analysis, observed 1.8% recurrences of pleomorphic adenoma after total parotidectomies, 2.6% – after partial superficial parotidectomies, 3% – after lateral parotidectomies and 2.6% after extracapsular tumor dissections [20]. The risk of recurrence also increases with the patient's age, the location of the tumor in the deep salivary gland, the size of the tumor (> 2 cm) and its direct relationship with the branches of the facial nerve [21].

A retrospective analysis of the descriptions of surgical procedures prepared so far showed limitations in relation to the data necessary for the surgical protocols according to ESGS. ESGS

classification requires the operator to be more precise in locating the tumor in the gland tissue during the preparation of the operating protocol. In a large number of cases, the descriptions of procedures prepared according to the previous classifications (based on the classification of Snow et al. and Tweedie and Jacobs) were not precise enough to determine the exact location of the pathological lesion in the gland – it was only possible thanks to imaging studies included in the medical history – mainly ultrasound of the salivary glands.

As already mentioned, the exact location of the tumor is important both at the stage of qualifying the patient for surgery and monitoring him/her in the postoperative period. Additionally, the classification according to ESGS enables easier communication between doctors from different centers treating tumors of the parotid gland. It should be remembered, however, that despite the fact that the surgical protocols according to the new ESGS classification are accurate and quick to apply, they do not take into account the occurrence of such cases as the presence of multiple tumors in the gland or the discontinuity of the tumor capsule, and thus determining the probability of an additional area of the parenchyma parotid gland being occupied.

Already in 2017, Wong and Shetty proposed to modify the system according to ESGS, dividing levels I and II into two parts: A and B, thus creating the possibility of further divisions. The authors of the modification pointed out that the system according to the ESGS does not take into account the situation in which only a part of level I and / or II is removed. The dividing line for level I was the temporal branch of the facial nerve (level IA – above, IB – below the nerve branch). Similarly, the division of level II into A (above) and B (below) was constituted by the cervical branch [22]. It is worth noting, however, that the subsequent divisions, although they allow for a more precise location of the tumor, may also excessively complicate and thus hinder the transparency of the type of surgery performed. It should be emphasized that the authors of the new classification wanted to facilitate and unify the description in order to uniformly assess the extent and location of benign tumors of the salivary glands.

CONCLUSIONS

The new classification is aimed at unifying, but also simplifying the current nomenclature, reducing the existing nomenclature errors. The determination of the exact location and extent of the tumor within the parotid gland facilitates postoperative monitoring of patients by ENT doctors and those of other specialties. Thanks to its application, it is possible to improve scientific communication, exchange of experience between different centers and standardization of performed operations or control of procedures. Often, however, a description of postoperative histopathological examination should be taken into account in order to reclassify the type of surgery in selected cases.

REFERENCES

1. Szyfter W. (red.): Nowotwory w otorynolaryngologii. Wyd. 2., Termedia, Poznań 2015.
2. Kopacz A. (red.): Zarys chirurgii onkologicznej. Wyd. 1., AM Gdańsk, Gdańsk 2000.
3. El-Naggar A.K., Chan J.K.C., Takata T. et al.:,Grandis JRSlootweg PJ The fourth edition of the head and neck World Health Organization blue book: editors' perspectives. Hum Pathol., 2017; 66: 10–12.
4. Snow G.B.: The surgical approaches to the treatment of parotid pleomorphic adenomas. W: Controversies in the management of salivary gland disease. Oxford University Press, Red.: M. McGurk, A.G. Renehan, Oxford 2001: 58.
5. Tweedie D.J., Jacob A.: Surgery of the parotid gland: evolution of techniques, nomenclature and a revised classification system. Clin Otolaryngol., 2009; 34: 303–308.
6. Quer M., Guntinas-Lichius O., Marchal F. et al.: Classification of parotidectomies: a proposal of the European Salivary Gland Society. Eur Arch Otorhinolaryngol., 2016; 273(10): 3307–3312.
7. Wierzbicka M., Piwowarczyk K., Nogala H. et al.: Do we need a new classification of parotid gland surgery? Otolaryngol Pol., 2016; 70(3): 9–14.
8. Croonenborghs T.M., Van Hevele J., Scheerlinck J. et al.: A multicentre retrospective clinicohistopathological review of 250 patients after parotidectomy. Int J Oral Maxillofac Surg., 2019, https://doi.org/10.1016/j.ijom.2019.03.963
9. Bień S.: Standardy postępowania diagnostycznego i terapeutycznego w leczeniu nowotworów gruczołów ślinowych. Otorynolaryngol., 2003; 2(1): 1–7.
10. Gierek T., Majzel K., Jura-Szołtys E., Witkowska M.: Analiza histokliniczna 95 nowotworów złośliwych ślinianek przyusznych. Otolaryngol Pol., 2006; 60(3): 313–316.
11. Alphs H.H., Eisele D.W., Westra W.H.: The role of fine needle aspiration in the evaluation of parotid masses. Curr Opin Otolaryngol Head Neck Surg., 2006; 14(2): 62–66.
12. Nouraei S.A., Hope K.L., Kelly C.G., McLean N.R., Soames J.V.: Carcinoma ex benign pleomorphic adenoma of the parotid gland. Plast Reconstr Surg., 2005; 116(5): 1206–1213.
13. Olejniczak I., Kozłowski Z., Dąbrowska K., Łukomski M.: Tumors of the parotid gland – management and results of surgical treatment. Otolaryngol Pol., 2008; 62(4): 446–450.
14. Venkatesh S., Srinivas T., Hariprasad S.: Parotid gland tumors: 2-year prospective clinicopathological study. Ann Maxillofac Surg., 2019; 9(1): 103–109.
15. Altin F., Alimoglu Y., Acikalin R.M., Yasar H.: Is fine needle aspiration biopsy reliable in the diagnosis of parotid tumors? Comparison of preoperative and postoperative results and the factors affecting accuracy. Braz J Otorhinolaryngol., 2019; 85(3): 275–281.
16. Stennert E., Guntinas-Lichius O., Klussmann J.P., Arnold G.: Histopathology of pleomorphic adenoma in the parotid gland: a prospective unselected series of 100 cases. Laryngoscope., 2001; 111(12): 2195–2200.
17. Zbären P., Stauffer E.: Pleomorphic adenoma of the parotid gland: histopathologic analysis of the capsular characteristics of 218 tumors. Head Neck., 2007; 29(8): 751–757.
18. Iizuka K., Ishikawa K.: Surgical techniques for benign parotid tumors: segmental resection vs extracapsular lumpectomy. Acta Otolaryngol Suppl., 1998; 537: 75–81.
19. Glas A.S., Vermey A., Hollema H. et al.: Surgical treatment of recurrent pleomorphic adenoma of the parotid gland: a clinical analysis of 52 patients. Head Neck., 2001; 23(4): 311–316.
20. Witt R.L.: The significance of the margin in parotid surgery for pleomorphic adenoma. Laryngoscope., 2002; 112(12): 2141–2154.
21. Colella G., Cannavale R., Chiodini P.: Meta-analysis of surgical approaches to the treatment of parotid pleomorphic adenomas and recurrence rates. J Craniomaxillofac Surg., 2015; 43(6): 738–745.
22. Wong W.K., Shetty S.: Classification of parotidectomy: a proposed modification to the European Salivary Gland Society classification system. Eur Arch Otorhinolaryngol., 2017; 274(8): 3175–3181.

Word count: 3370 Tables: 3 Figures: 3 References: 22

DOI: 10.5604/01.3001.0014.7889 Table of content: https://otolaryngologypl.com/issue/13862

Competing interests: The authors declare that they have no competing interests.

Corresponding author: Izabela Olejniczak MD PhD; Department of Otolaryngology, Head and Neck Oncology, Medical University of Lodz, University Clinical Hospital Norbert Barlicki in Lodz; Kopcińskiego street 22, 90-153 Lodz, Poland;
E-mail: izabela.olejniczak@umed.lodz.pl

Cite this article as: Olejniczak I., Leduchowska A., Kozlowski Z., Pietruszewska W.: Evaluation of benign tumors of large salivary glands according to the new classification of the European Salivary Glands Society; Otolaryngol Pol, 2021: 75 (4): 7-13