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Do we need a new classification of parotid gland surgery?

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:

Background: In February 2016 the European Salivary Gland Society (ESGS) presented and recommended classification of parotidectomies based on the anatomical I-V level division of the parotid gland. The main goal of this paper is to present the new classification, and to find out whether it is more precise compared to the classic one.

Material and method: 607 patients (315 men, 292 women) operated on for parotid tumours in a tertiary referral centre, Department of Otolaryngology, Head and Neck Surgery, Medical University of Poznań (502 benign and 105 malignant tumours). Parotid surgery descriptions provided by a retrospective analysis of all operating protocols covering the years 2006-2015 were "translated" into the new classification proposed by the ESGS.

Results: Analysis of operating protocols and fitting them into the new classification proposed by the ESGS show some discrepancies, in both benign and malignant tumours. Based on the re-evaluation of 607 cases, in 94 procedures for benign tumors the only information available was that "surgery was performed within the superficial lobe". Thus, the new classification forces the surgeon to be much more precise than previously. In 3 cases the whole superficial lobe was removed, together with the upper part of the deep lobe. Because the classification lacked parotidectomy I–II–IV, it indicated that the new classification was insufficient in the aforementioned three cases. In 6 cases of ECD more than one parotid gland tumour was removed. Among malignant tumours, total parotidectomy was the predominant procedure. In 3/13 cases of expanded parotidectomy the temporomandibular joint (TMJ) was additionally removed and it seems that the acronym TMJ should be included among the additional resected structures. It is also necessary to supplement the description of the treatment with casuistically resected anatomical structures for oncological purposes (RT planning) and follow-up imaging.

Since 2015 in Poland there has been the National Cancer Registry of benign salivary gland tumours (https://guzyslinianek.pcss.pl). New surgical anatomy and classification based on it will be very helpful in unequivocal, albeit brief and not laborious, reporting of procedures.

To summarize, the classification is: easy to use, precise, and forced the surgeon to make a detailed description saving time at the same time. Although it is broad and accurate, it does not cover all clinically rare cases, multiple foci and it does not contain key information about the rupture of the tumour's capsule, so it is necessary to complement the type of surgery with these annotations. The simple, clear and comprehensive classification is especially valuable for centres that keep registration. Thus, we are personally grateful for this new classification, which facilitates multicentre communication.

KEYWORDS: oncology, ENT, salivary gland, register salivary glands, classification, salivary gland, parotidectomy

In 2003 the National Cancer Registry (https://guzyslinianek.pcss.pl) in Poland registered a total of 316 new cases of malignant tumours of large salivary glands (C07 + C08); 102 men and 52 women died of these cancers in the analyzed period. The crude incidence rate among men was 0.5/100 thousand, and in women 0.3/100 thousand. The proportion of incidence M:W = 1.5:1. In 2013, 400 new cases (220 men and 180 women) were registered; 133 men and 79 women died. However, tumours of the salivary glands are mostly benign, and constitute 85-90% of the total, which means that the disease and the treatment were not previously recorded. Therefore, we can assume that in our country about 3000 operations on parotid gland tumours are probably performed annually. Traditionally, these treatments can be divided into extracapsu-

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lar tumour dissection (ECD) and/or resection of the tumour along with fragments of a different part of the gland (parotidectomy). One of the latest surgical classifications in Polish literature was contained in the manual edited by Szyfter [1]. However, hospital discharge cards from different centres have descriptions of varying degrees of detail about the topography of the tumour and the extent of resection.

The European Salivary Gland Society (ESGS) recently presented a new classification of salivary gland surgery [2]. The amended surgical anatomy of the gland is an introduction to a new classification of parotid surgical procedures. The Barcelona group [3] proposed using levels to define parotid areas in a similar way to those used in neck dissections, where levels helped to unify the nomenclature [4]. The ESGS recommends following this level classification system with a modification (change level III for IV and vice versa). The level classification system is easy and helps to explain the resection performed (Fig.1). The separation between superior and inferior levels was established with an imaginary line connecting the bifurcation of the facial nerve trunk into its two major branches (temporofacial and cervicofacial) with the help of the Stensen's duct. Basically, the superior level is the area corresponding to the branch of the temporofacial nerve, and the inferior level - the area of the cervicofacial branch.

The new classification distinguished two types of surgery: extracapsular dissection (ECD) and parotidectomy. The definitions are as follows. The term ECD should be used if at least one condition is fulfilled: when no facial nerve dissection is performed and/or less than one level is removed. 1. The symbol "ECD" should be used to represent the term extracapsular dissection and applied as the first component of the description. A prefix should be included to denote the side using the abbreviation L for left, and R for right. If bilateral, both sides must be classified independently. 2. The second component of the description should be the level where the tumour was located (level I or level II; it does not mean that both levels have been completely removed; it just means the tumour was located at this level).

The term parotidectomy should be used if two conditions are fulfilled: dissection of the facial nerve (at least the main trunk and one of the two major divisions - temporofacialis, cervicofacialis) or at least one level is removed. 1. The term parotidectomy is the first component of the description. A prefix should be included to denote the side using the abbreviation L for left, and R for right. If bilateral, both sides must be classified independently. 2. The second component of the description should be the level or levels removed, each designated by the Roman numerals I to V, in ascending order. 3. The third component of the description should be the non-glandular structures removed, each identified through the use of specified acronyms (symbols), all of which have been universally accepted. Herein, there are listed non-parotid structures: CN VII - Facial nerve trunk and/or all the main branches (when the whole nerve was sacrificed), CN VII t-z-b-m-c - Facial nerve branches (when the surgeon sacrificed just some branches, i.e. CN VII means that the surgeon removed only the zygomatic branches), ECA - External carotid artery, GAN - Greater auricular nerve, LTB - Lateral temporal resection, MB - Mastoid bone, MM -Masseter muscle, S- Skin, Others to be defined.

The aim of the study is to present a new classification of parotid surgeries developed by the ESGS, and to answer the question of whether it is more accurate and useful than the classic one. The aim is to compare the previous and current classification of parotid surgeries in terms of efficiency to characterize the entire surgical material, covering the period 2006-2015, by comparison of the precision of operational protocols and indication/selection of patients who do not "fit" in terms of the previous or new classifications.

MATERIAL AND METHOD

A retrospective study based on the analysis of the operating protocols. The material included 607 patients (315 men, 292 women) operated on for parotid tumours in a tertiary referral centre, Department of Otolaryngology, Head and Neck Surgery, Medical University of Poznań between 2006 and 2015. There were 502 benign and 105 malignant tumours, including 49 and 25 reoperations, respectively. The comparison of the procedures described by the previous "classic" terms and the classification proposed by the European Salivary Gland Society (ESGS) is shown in Table 1.

RESULTS

The comparison of the parotid surgery descriptions provided by a retrospective analysis of operating protocols and "translated" into the new classification proposed by the ESGS shows some discrepancies, in both benign and malignant tumours.

Among benign tumours, partial superficial parotidectomy was predominant and covered three types: Parotidectomy I, II and V. The comment marked "A" pointed out that in 59 females and 36 males operational protocols of partial superficial parotidectomy did not contain the exact location

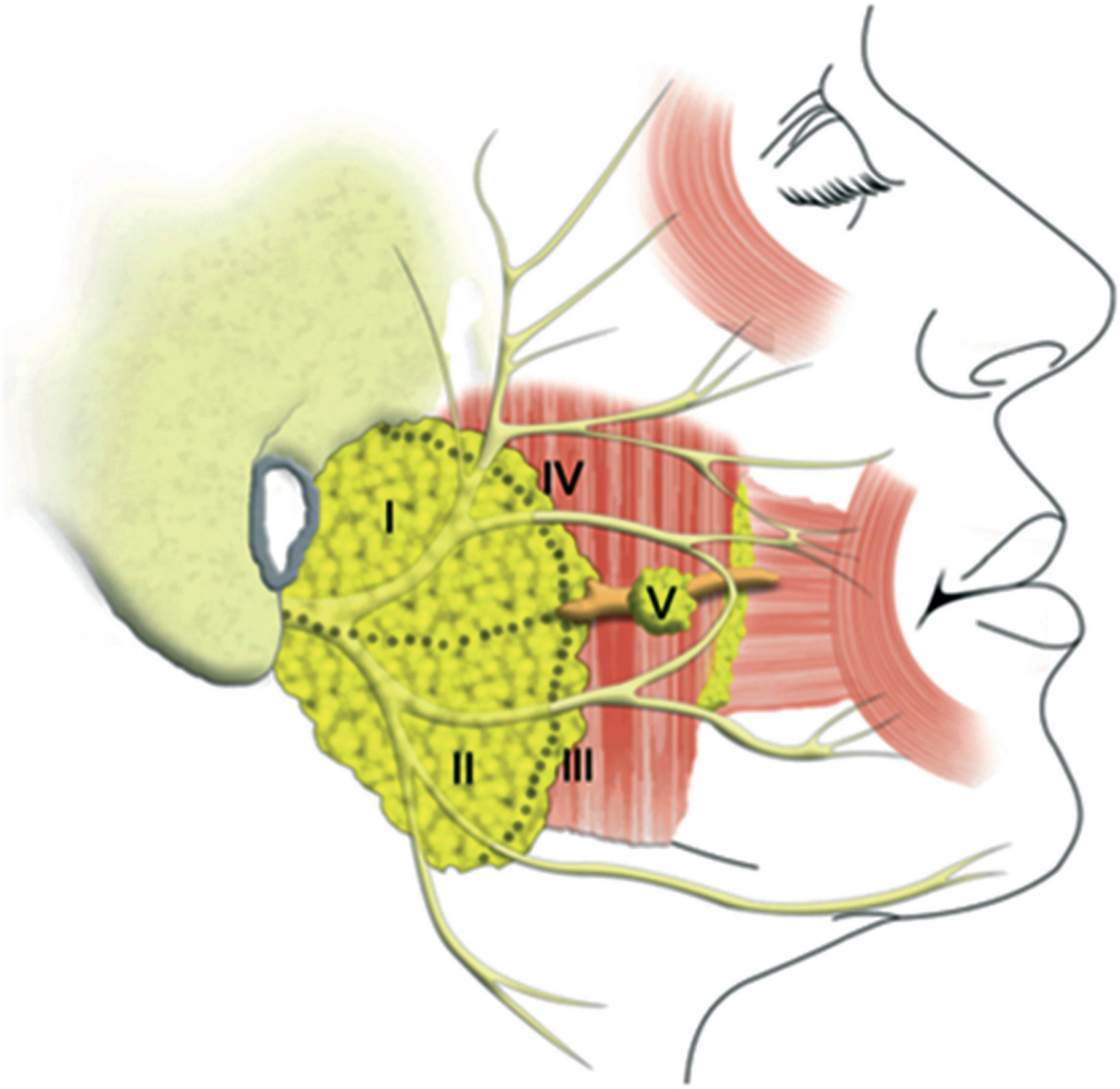

Fig. 1. ESGS division into five levels (modified from Quer et al. [2]). The division into five levels: I (lateral superior), II (lateral inferior), III (deep inferior), IV (deep superior), V (accessory). The superior level is the area corresponding to the branch of the temporofacial nerve, and the inferior level of the cervicofacial branch.

of the tumour and the part of the gland removed, making it impossible to classify these treatments as type I, II or V parotidectomy in the new nomenclature. In the surgical descriptions the only information available was that "surgery was performed within the superficial lobe." Thus, the new classification forces the surgeon to be much more precise than previously.

In the comment marked "B" the authors showed rare clinical situations. In 2 women and 1 man the whole superficial lobe was removed, together with the upper part of the deep lobe. Because the classification lacked parotidectomy I–II–IV, it indicated that the new classification was insufficient in the aforementioned three cases. However, this is clinically rare. In 6 cases of ECD and 13 partial parotidectomies the surgeon removed more than one parotid gland tumour. This information was contained in a narrative form in the procedure protocol. In the case of multiple tumours, the new classification leaves no place to put this information in the header of the procedure, so it is only possible to make annotations in the description of the procedure and in the discharge summary of the medical information letter. The operating protocols of the analyzed material did not contain the removal of only an extra lobe of the parotid gland with the tumour.

Among malignant tumours, total parotidectomy was the predominant procedure. In the comment marked "C", total parotidectomy extended to: masseter muscle resection – 3 cases, temporomandibular joint (TMJ) – 3, skin - 2, sternocleidomastoid muscle (SCM) – 1, and single cases where operators additionally removed: SCM muscle, styloid muscle - 1- masseter muscle, temporal and zygomatic branch of nerve VII -1 - pterygoid muscles, styloid process, internal jugular vein, external carotid artery- 1- SCM muscle, the cartilaginous part of the external auditory meatus - 1. In 3 cases of expanded parotidectomy the temporomandibular joint was additionally removed. It appears to be important to create an acronym for this structure (TMJ) and to use it in the name of the procedure, as in the case of the great and auricular nerve - GAN, mastoid bone – MB, etc.

DISCUSSION

The first noteworthy contribution unifies the surgical anatomy of the parotid region. Although during embryogenesis the parenchyma evolves as one indivisible anatomic whole, a surgical division of the parotid gland into two or three parts has been the practical norm. The relation between the parotid gland, facial nerve and the cover plans suggests bilobular architecture or three "lobes" in relation to facial nerve main branches. The ESGS proposes accepting and using the Barcelona classification with one modification. Finally, the division of the parotid gland into five levels was adopted by the ESGS to report the surgery performed. The level classification system is easy and helps to explain the resection performed. Since deep lobe resections are more frequent in the inferior parotid, the ESGS proposed that modification of the deep lobe levels might facilitate the use of this classification. We confirmed these observations. Out of 607 patients, parotidectomy type II was performed in 136 and extracapsular dissection at level II in 58 cases. Parotidectomy type I, II and Parotidectomy I, II, III were not so common - in 49 and 41 patients, respectively.

The key issue that was approved was the classification system for parotid surgery, which uses two basic terms to define the procedures: extracapsular dissection and parotidectomy. The ESGS clearly defines the term extracapsular dissection. In the majority of cases, ECD is performed for small tumours, so in these cases the two conditions are evident (no facial nerve dissection and only 1 level removed). Such small tumours were in the minority in the presented material, and thus only 91/607 ECD were performed. In all the remaining cases the surgeon dissected the facial trunk (the upper or the lower division) or removed more than one level. The ESGS and the authors of the new classification underline that ECS should not be seen as an endorsement type of approach for parotid tumours and especially for pleomorphic adenoma, where it could lead to an increased incidence of difficult to treat recurrences because of pseudopodia and an absent capsule [5] [6]. We fully endorse this view, and over time we observe the steadily decreasing number of ECDs (unpublished data).

In contrast, when the facial nerve is dissected and at least one level is removed, the operation should be defined as parotidectomy. Once the distinction between parotidectomy and ECD is clear, the extension of the resection can be specified (as in neck dissections) with the use of two components: the levels removed and non-parotid structures removed. With these two components any surgeon can understand what has been done.

In our material, the most common category, partial superficial parotidectomy (319 patients), was divided into type I and type II. Interestingly, the material analyzed by the authors did not contain insolated parotidectomy type III. We encountered 3 cases where levels I, II and IV were resected, and they did not fit into the new classification due to the fact that the authors did not anticipate such a clinical situation. However, thanks to the fact that clearly described levels were introduced into

Tab. I. Comparison of the procedures described by the previous "classic" terms and the classification proposed by the ESGS

Classic classifications	№ of pts		ESGS proposal	№ of pts		comments
	F	M		F	M	
Extracapsular dissection with tumour at level I	13	5	ECD I	13	5	
Extracapsular dissection with tumour at level II	31	58	ECD II	31	58	
Extracapsular dissection with tumour at level V	1	1	ECD V	1	1	
Partial superficial parotidectomy			Parotidectomy I	8	6	
Partial superficial parotidectomy	141	178	Parotidectomy II	74	136	"A"
Accessory lobe removal			Parotidectomy V	0	0	
Superficial parotidectomy	28	21	Parotidectomy I–II	28	21	
Superficial parotidectomy extended to the inferior deep lobe	24	20	Parotidectomy I–II–III	22	19	"B"
Deep lobe parotidectomy	13	8	Parotidectomy III–IV	13	7	
Total parotidectomy with facial nerve preservation	21	9	Parotidectomy I–IV	21	9	
Total parotidectomy with facial nerve resection	15	7	Parotidectomy I–IV (VII)	15	7	VII m–1 VII z–1 VII t-z-b-m–1 VII t-z-b-c -1
Extended total parotidectomy with facial nerve resection + skin and masseter muscle resection	5	8	Parotidectomy I–IV (VII, S, MM)	5	8	"C"

the surgical parotid anatomy, it was not a serious shortcoming of the new classification.

In 22 patients total parotidectomy with facial nerve resection was indispensable, and the descriptions in the "old" and "new" classifications are univocal. However, there was a lack of the important anatomical structure in extended total parotidectomy with facial nerve resection, in 3/13 cases the temporo-mandibular joint was resected, and it seems that the acronym TMJ should be included among the additional resected structures.

Currently, since 2015 in Poland there has been the National Cancer Registry of benign salivary gland tumours (https://guzyslinianek.pcss.pl). Based on data from 19 centres, in 2015 in Poland 497 patients with benign tumours of the parotid glands were treated. The register contains strict categorization of the types of procedures according to the old classification, but in many cases the data turn out to be difficult to clarify. It seems that the new surgical anatomy and new classification based on it will be very helpful in unequivocal, albeit brief and not laborious, reporting of procedures.

To summarize, based on the re-evaluation of 607 new cases, the classification was: easy to use, precise, and forced the surgeon to make a detailed description saving time at the same time. Although it is broad and accurate, it does not include clinically rare cases, such as the removal of levels I, II, IV. It does not include multiple parotid tumours either, and it seems to be important to include the information about the number of resected independent tumours of the salivary gland in the name of the procedure. As for benign tumours, it does not contain key information about the rupture of the tumour's capsule, so it is necessary to complement the type of surgery by this annotation. As for malignant tumours and extended parotidectomy, it would be very useful to add the acronym TMJ. It is also necessary to supplement the description of the treatment with casuistically resected anatomical structures for oncological purposes (RT planning) and follow-up imaging. The new classification is of great value for the standardization of procedures, follow-up, and the planning and performance of reoperation.

CONCLUSION

The simple, clear and comprehensive classification is especially valuable for centres that lead registration. In our institution the Polish National Registry of Benign Parotid Tumours has been implemented and a variety of techniques, along with certain dispersion in the criteria that define them, has led to some confusion about the surgery performed. Thus, we are personally grateful for this new classification, which facilitates multicentre communication.

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