The importance of the patient's perspective in function-sparing parotid surgery for benign neoplasms: clinical reappraisal

L'importanza della prospettiva del paziente nella chirurgia funzionale parotidea per neoplasie benigne: rivalutazione clinica

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SUMMARY

Objective. Function-sparing surgery is the cornerstone for the treatment of benign parotid neoplasms. We assessed the incidences and determinants of the main postoperative complications, reappraising their influence on the patient's quality of life (QoL).
Methods. Patients who underwent parotid surgery for benign neoplasms were reviewed (2016-2019). Parotidectomy Outcome Inventory-8 (POI-8) and condition-specific questionnaires were used to investigate the patient's perspective.
Results. We enrolled 211 patients. Preservation of the posterior branch of the great auricular nerve (GAN) seemed to reduce early dysfunction (87% vs 96%, $p = 0.053$), but not the late one. Deep lobe dissection and resection of more than one parotid segment favoured first bite syndrome (FBS) and Frey's syndrome (FS), respectively (16% vs 3%, $p = 0.003$; 37% vs 15%, $p = 0.003$). Neither GAN impairment, FBS, nor FS influenced patient QoL. Facial weakness affected 19 patients (9%), being more likely after total parotidectomy (23% vs 7%, $p = 0.034$). According to POI-8, QoL was mainly jeopardised by fear of revision surgery, especially in females ($p = 0.005$) and those experiencing early complications ($p = 0.004$).
Conclusions. Reappraisal of the patient's perspective after functional parotid surgery is fundamental to tailor preoperative counselling.

KEY WORDS: parotid, salivary glands, benign neoplasms, complications, quality of life

RIASSUNTO

Obiettivo. La chirurgia funzionale è il caposaldo del trattamento delle neoplasie benigne parotidee. Abbiamo valutato incidenze e determinanti delle principali complicanze, studiandone l'influenza sulla qualità di vita (QoL) dei pazienti.
Metodi. Abbiamo raccolto le parotidectomie eseguite per neoplasie benigne dal 2016 al 2019, valutando la QoL dei pazienti attraverso il Parotidectomy Outcome Inventory-8 (POI-8) e questionari specifici per ogni complicanza.
Risultati. Sono stati selezionati 211 pazienti. La preservazione della branca posteriore del nervo grande auricolare (GAN) ne ha ridotto la disfunzione precoce, non quella a distanza. La dissezione del lobo profondo e la resezione di più di un segmento ghiandolare hanno incrementato, rispettivamente, le chance di first bite (FBS) e Frey's syndrome (FS) (16% vs 3% e 37% vs 15%). Né la disfunzione del GAN, né FBS o FS hanno influenzato la QoL dei pazienti. Una paralisi faciale è stata riportata da 19 pazienti (9%), più frequentemente dopo parotidectomia totale (23% vs 7%). La paura di una chirurgia di revisione è stata l'elemento più impattante sulla QoL, soprattutto nelle donne e nei pazienti con complicanze precoci.
Conclusioni. la rivalutazione della prospettiva dei pazienti dopo chirurgia funzionale parotidea è essenziale per ricalibrarne il counselling preoperatorio.

PAROLE CHIAVE: *parotide, ghiandole salivari, neoplasia benigne, complicanze, qualità della vita*

Introduction

Parotid neoplasms are relatively rare entities, accounting for about 2% of all head and neck tumours [1]. Surgery is the mainstay of treatment for most parotid lesions, but since the majority are benign it becomes a compromise between adequate tumour excision and functional outcomes. Although many studies have been published on which surgical technique should be preferred in the settings of benign parotid tumors, a clear consensus is still lacking [2,3]. Complexity may rise as far as malignancies are concerned, as it is often difficult to preoperatively detect the malignant nature of a parotid lesion: 50-70% of cancers may present as asymptomatic, demarcated, small tumuors of the superficial lobe, without clear suspicious signs [4].

Moreover, even when surgery is performed in high-volume centres, postoperative complications do occur and are potentially expected events of which patients should be made aware [5-7]. The face is the centre of human expression and slight defects or motion dysfunctions can be readily observed and noted. Thus, it is imperative to understand how complications develop and prevent their occurrence, and it is likewise of paramount importance to appreciate how these conditions may affect the patient's perception and quality of life (QoL), allowing proper preoperative counseling. This was the aim of the present study; we examined our recent series of patients who underwent parotid surgery at a single, high-volume centre for proven benign neoplasms. We started with the assessment of frequencies and promoting factors of main postoperative complications and ended with a clinical reappraisal of their influence on the patient's everyday life, which is the ultimate goal of any function-sparing surgery.

Materials and methods

Selection criteria and data collection

We retrospectively reviewed our series of 240 consecutive patients who underwent parotid surgery between January 2016 and December 2019 at the ENT department of San Raffaele Scientific Institute in Milan (Italy). Patients who underwent surgery for malignancies, recurrent neoplasms, or pure parapharyngeal lesions were excluded. We ruled out minors, patients with a previous history of head and neck radiotherapy or surgery, and any kind of preoperative facial nerve dysfunction or peripheral neuropathy to avoid potential functional bias. A minimum 12-month follow-up was required.

All patients were evaluated preoperatively with clinical examination, neck ultrasonography (US) with fine-needle aspiration cytology (FNAC) and, when appropriate, computed tomography (CT) or multiparametric magnetic reso-

nance imaging (MRI). Clinical, surgical and pathological data were collected from medical charts (Tab. I).

Procedures and removed parotid levels were defined according to Quer et al. [8]. Type of surgical procedure was graded as follows: extracapsular dissection (ECD), segmental parotidectomy (SP, removal of segments I or II), lateral parotidectomy (LP, removal of both segments I and II) and total parotidectomy (TP, removal of segments I, II, III and/or IV). SP or LP partially extending to one of the deep segments of the gland (III or IV), depending on the specific location of a lesion, were considered as limited procedures. The term "ECD" was used whenever ≤ 1 segment was removed and/or no formal dissection of the main trunk of the facial nerve (FN) was performed. Suspected pathology of the tumour (pleomorphic adenoma *vs* Warthin's tumour *vs* others), size (≤ or > 3 cm) and location within the gland (superficial *vs* deep, single or multiple involved levels) were the three main factors influencing the extent of surgery, according to Quer et al. [3].

All surgical procedures were performed under general anaesthesia by senior surgeons of comparable expertise, with binocular loupe and visual FN monitoring. Cold dissection along with bipolar forceps and haemoclips were used during all procedures; no further vessel-sealing devices were employed during dissection. From June 2016, an electromyographic intraoperative nerve monitoring system (IONM; NIM-Response® 3.0, Xomed Medtronic, Inc, Jacksonville, FL, USA) was also regularly introduced into our surgical routine, even for primary procedures. The superficial muscular aponeurotic system (SMAS) was always integrated in the skin flap. We did not usually perform reconstructive techniques (sternocleidomastoid muscle flap, SMAS flap) or free abdominal fat graft (FFG); we excluded those who were occasionally submitted to these procedures from the analysis.

Records of regular follow-up visits were used to collect data about the incidence and severity of postoperative complications. As far as FN palsy was concerned, barely perceptible asymmetry and/or muscle weakness on maximal volition were classified as "normal FN function", since these were often not even perceived by the patients themselves and spontaneously resolved within a few days or weeks. Subsequently, patients were contacted by phone and interviewed about the long-term outcome of postoperative complications and, finally, general and complication-related QoL after parotid surgery was assessed through specific questionnaires. All the reports of the questionnaires were formally endorsed by patients themselves.

We excluded patients who did not answer our calls, unable or refused to respond to our questions, or who reported a recurrence of disease from the analysis. All procedures performed and data management were in accordance with the ethical standards of our institutional and national research

Table I. Demographics and patient and disease characteristics.

Demographics	Gender	Male: 100/211 (47.4%) Female: 111/211 (52.6%)
	Age at surgery	51.0 ± 15.6 years ≥ 60 years: 137/211 (64.9%) < 60 years: 74/211 (35.1%)
Disease	Side of disease	Right: 105/211 (49.8%) Left: 106/211 (50.2%)
	Lesion maximum diameter	Median: 20 mm [3-60] ≤ 20 mm: 95/211 (45.0%) > 20 mm: 116/211 (55.0%)
	Site of disease (segments)	I: 13/211 (6.2%) I-II: 42/211 (19.9%) II: 131/211 (62.1%) III-IV: 20/211 (9.5%) Multifocal: 5/211 (2.4%)
Preoperative workup	US + FNAC	211/211 (100.0%)
	CT	21/211 (10.0%)
	MRI	126/211 (59.7%)
Type of surgery	ECD	20/211 (9.5%)
	Segmental parotidectomy	40/211 (19.0%)
	Lateral parotidectomy	129/211 (61.1%)
	Total parotidectomy	22/211 (10.4%)
Incision	Redon-Blair	62/211 (29.5%)
	Modified facelift	146/211 (69.2%)
	Extended submandibular	3/211 (1.4%)
VII CN IONM	Yes	96/211 (45.5%)

US: ultrasound; FNAC: fine-needle aspiration cytology; CT: computed tomography; MRI: magnetic resonance imaging; ECD: extracapsular dissection; IONM: intraoperative nerve monitoring.

ethical committee and with the principles stated in the 1964 Declaration of Helsinki and its later amendments. Informed consent for retrospective data management was obtained for all patients.

General QoL assessment

General QoL assessment was performed through the Parotidectomy Outcome Inventory 8 (POI-8), a questionnaire validated by Baumann et al. to measure health-related QoL after parotid surgery in patients affected by benign tumours [9]. It consists of 8 Likert-type questions scaled from 0 to 5 evaluating pain at the surgical site, sensory impairment, scar, facial appearance related to tissue loss and facial palsy, gustatory sweating, dryness of mouth and fear of eventual revision surgery (Fig. 1). The reliable application and comparability of POI-8 to other validated QoL surveys were demonstrated previously [5].

Condition-specific QoL assessment

Condition-specific questionnaires assessing complication-related QoL were submitted to patients referring symptoms compatible with alteration of sensitivity in
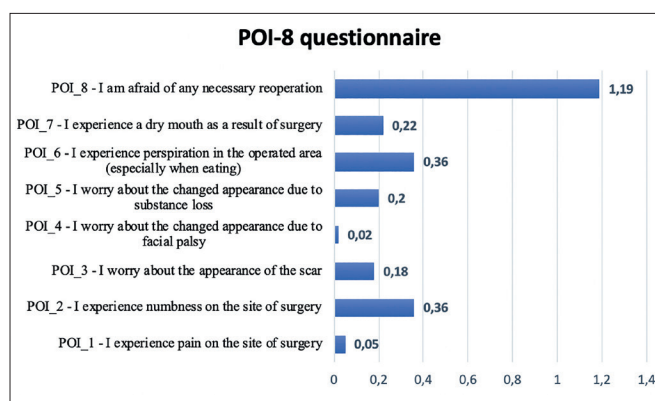
Figure 1. Results of the Parotidectomy Outcome Inventory 8 (POI-8) questionnaire, a validated tool for measuring health-related quality of life after parotid surgery in patients affected by benign tumours.

the area innervated by the great auricular nerve (GAN), first-bite syndrome (FBS), Frey's syndrome (FS) or FN deficit, as depicted in Tables II, III, IV and V, respectively [10-12]. Those who were no longer suffering from a specific condition (GAN deficit, facial weakness) were asked to answer these questionnaires with regard to the

Table II. Questionnaire about sensorial impairment in the territory of the great auricular nerve (GAN) and its influence on patient quality of life.

Have you <u>ever</u> noticed **any change in tactile perception** in the operating area?
☐ Yes ☐ No

<u>In the early postoperative phase</u> did you experience **hypoaesthesia/hyperaesthesia** in the operating area?
☐ Yes ☐ No

The **hypoaesthesia** has: ☐ Improved ☐ Worsened ☐ Remained the same

How long did it take to improve? _____ months

The **hyperaesthesia** has: ☐ Improved ☐ Worsened ☐ Remained the same

How long did it take to improve? _____ months

<u>At follow-up</u> did you experience **hypoaesthesia/hyperaesthesia** in the operating area?
☐ Yes ☐ No

How did the change in tactile perception affect your **quality of life**?
☐ No influence
☐ Limited influence
☐ Heavy influence

Table III. Results of the first part of the questionnaire about quality of life in subjects affected by first bite syndrome (FBS), according to Lee et al. [10].

	Our cohort	Fiacchini, 2018 [13]	Lee, 2009 [10]
Pain <u>without</u> **sour or bitter food**	4.00	4.38	5.40
Pain <u>with</u> sour or bitter food	4.73	5.86	8.20
Interference with **daily activities**	1.00	2.88	4.80
Interference with **enjoying meal**	1.64	4.13	7.20

Table IV. Results of the questionnaire about quality of life in subjects affected by Frey's syndrome (FS), according to Hartl et al. [11].

	Our cohort	Fiacchini, 2018 [13]	Hartl, 2008 [11]
Functional domain	3.12	2.76	6.60
Social domain	0.21	1.14	2.60
Emotional domain	0.77	0.90	3.80

Table V. Results of the Facial Disability Index (FDI) questionnaire [22].

	Our cohort	Prats-Golczer, 2017 [22]
Physical function subscore	81.05	79.13
Social functioning and well-being subscore	93.47	79.00

postoperative period in which that complication was actually present.

In particular, if patients reported any postoperative change in GAN sensitivity, they were questioned about the exact nature of the condition (anaesthesia/hypoaesthesia *vs* hyperaesthesia), its behaviour over time (improved, worsened, unchanged; with recovery time) and how the change in tactile perception affected their QoL (Tab. II).

When patients reported symptoms compatible with FBS, they were asked to complete a specific questionnaire, originally proposed by Lee et al. [10]. It consists of four questions, with 0-10 scaled answers, evaluating the intensity of the pain experienced, with or without sialogogues, and its interference in enjoying meals or everyday activities (Tab. III).

In those complaining of symptoms related to FS, we submitted a specific questionnaire proposed by Hartl et al. [11]

consisting of 14 questions about functional, social and emotional consequences of gustatory sweating on their QoL, rating their replies on a 0-3 scale. An individual score was provided for each section (Tab. IV).

Finally, for patients reporting signs or symptoms related to facial weakness, we asked them to complete the Facial Disability index (FDI), a questionnaire originally elaborated by VanSwearingen et al. [12] to assess the influence of FN deficit on patient QoL. It consists of 10 questions divided into two subscales: five questions associated with physical well-being and five with psycho-social well-being. Each item is scored up to 5 (for the physical part) or 6 (for the social one) points on a scale that ranges from "no disability" to "severe disability". Both subscales were transformed into a 100-point scale. The higher the score, the better the facial function (Tab. V).

Statistics and data management

Statistical analysis was performed with IBM-SPSS statistical package, version 25 (IBM Corp., Armonk, NY, USA). Categorical variables were represented as absolute values and percentages and analysed by chi-square test or Fisher's exact test, when appropriate. Continuous variables were represented as mean values and standard deviation and analysed by Mann-Whitney U-test or Kruskal-Wallis H test. A $p < 0.05$ was considered to be statistically significant.

## Results

Patient and surgical characteristics

In total, 211 patients completed the study. Mean follow-up time was 46.0 ± 12.6 months (range: 16-60 months). Demographics, patient and disease characteristics are shown in Table I. Permanent sections revealed pleomorphic adenoma (PA) in 136 cases (64.5%), Warthin's tumour (WT) in 59 (28.0%), basal cell adenoma in 5 (2.4%), oncocytoma in 4 (1.9%), salivary duct cyst in 2 (0.9%) and lipoma, chronic sialadenitis, atypical lymphoid proliferation, cystadenoma, and angiomatous hamartoma each in 1 patient (0.5% each). IONM was employed in almost half of the procedures (96/211, 45.5%), whereas anatomical FN preservation was achieved in all cases. Concurrent preservation of the posterior branch of the GAN (pbGAN) was feasible in 140 cases (66.4%; Fig. 2), according to the location of the mass.

ECD was performed in 20/211 patients (9.5%), and formal parotidectomy in 191 (90.5%), according to the indications postulated by Quer et al.[3]. Mean duration of surgery was 138.2 ± 40.7 min (range 40-253 min). Duration of ECD (78.9 ± 23.9 min) was significantly shorter compared to SP (137.7 ± 30.3 min; $p < 0.001$), and LP (141.6 ± 36.3 min) was significantly shorter compared to TP (173.0 ± 40.6 min; $p = 0.001$); no statistically significant differences were detected between SP and LP with regards to operative time ($p = 0.997$).

Mean hospital stay was 3.8 ± 1.3 days (range 2-9 days); unless early specific complications occurred, patients were discharged after removal of the drain.

Postoperative complications and condition-specific QoL assessment

Sensorial impairment in the area innervated by the GAN was the most commonly referred complication (190/211, 90.0%). Sixty-five patients (34.2%) recovered fully (median recovery time: 6 months, range 5-48 months), while residual hypoaesthesia or hyperaesthesia/dysaesthesia was reported at follow-up by 94 (49.5%) and 31 patients (16.3%), respectively. Nineteen patients experienced a tran-
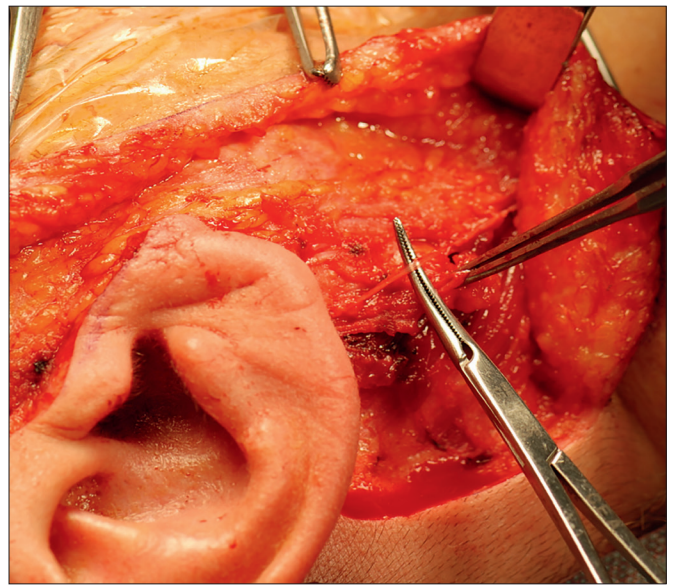
Figure 2. Effective preservation of the posterior branch of the great auricular nerve.

sition from hypoaesthesia to hyperaesthesia/dysaesthesia. Among those suffering from initial GAN alteration, 164 (86.3%) referred no significant effect of that condition on their QoL, 22 (11.6%) a limited impact and only 4 (2.1%) a substantial influence (Tab. II). No significant association was found between early postoperative GAN deficit or GAN deficit at follow-up and extent of surgery or size of the lesion. Preservation of the pbGAN (Fig. 2) seemed to reduce early sensorial impairment, although this evidence failed to reach statistical significance (122/140, 87.1% early deficit with preservation of the pbGAN vs 68/71, 95.8% with nerve sacrifice; OR 0.30, 95% CI 0.85-1.05; $p = 0.053$). Conversely, sensorial impairment at follow-up did not seem to be influenced by the nerve preservation strategy (79/140, 56.4% deficit at follow-up with preservation of the pbGAN vs 46/71, 64.8% with nerve sacrifice; OR 0.70, 95% CI 0.39-1.27; $p = 0.243$).

Fifty patients experienced sialocele/salivary fistula (23.7%). Among these, 45 patients were managed conservatively with compressive dressings and bland diet, while 5 patients underwent wound revision with infiltration of human fibrin glue (median recovery time: 4 weeks, range 1-9 weeks). No significant correlation was found between this complication and size of lesion (25/95, 26.3% for lesions < 20 mm vs 25/116, 21.6% for lesions ≥ 20 mm; OR 0.77, 95% CI 0.41-1.45; $p = 0.418$) or extent of surgery (12/52, 23.1% in the case of resection of one parotid segment at most vs 38/159, 23.9% with more extended resections; OR 1.05, 95% CI 0.50-2.20; $p = 0.904$).

Postoperative bleeding/haematoma was reported in 5 pa-

tients (2.4%): the haematoma was drained at bedside in three cases, while in two patients revision surgery was needed. Eleven patients experienced a postoperative wound infection (5.2%); they were all treated with bedside wound cleaning and irrigation and concurrent systemic antibiotic course (e.g. amoxicillin/clavulanic acid 1 g TID for 7 days). The limited number of these outcome events prevented us from performing statistical analysis.

Eleven patients referred symptoms compatible with FBS (5.2%). Deep lobe dissection around the external carotid artery (ECA) (Fig. 3) significantly increased the chances of developing FBS (6/180, 3.3% for more superficial procedures *vs* 5/31, 16.1% for resections of segments III/IV; OR 5.58, 95% CI 1.59-19.59; *p* = 0.003). No correlation was found between FBS and size of the lesions (4/95, 4.2% for lesions < 20 mm *vs* 7/116, 6.0% for lesions ≥ 20 mm; OR 1.46, 95% CI 0.41-5.15; *p* = 0.553). Interestingly, the presence of pain at diagnosis was associated with a higher chance of experiencing postoperative FBS (7/184, 3.8% in asymptomatic patients *vs* 4/16, 25.0% in those reporting pain preoperatively; OR 6.57, 95% CI 1.73-24.86; *p* = 0.013). Table III summarises the results of the questionnaire about QoL in patients affected by FBS.

Sixty-seven patients (31.8%) reported clinical FS. Resection of more than one parotid segment significantly increased occurrence of FS (8/52, 15.4% for ECD and SP *vs* 59/159, 37.1% for more extended surgical procedures; OR 3.24, 95% CI 1.3-7.36; *p* = 0.003). Table IV shows the results of the questionnaire about QoL in patients affected by
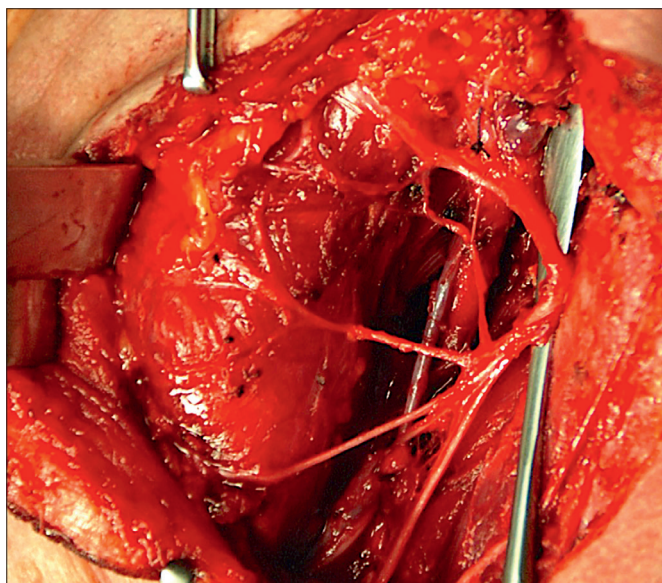
Figure 3. Total parotidectomy with complete facial nerve dissection and external carotid artery exposure, a procedure involved in occurrence of first bite syndrome.

FS, according to functional, social and emotional domains. None of our patients recveived botulinum toxin A (BTX-A) or anticholinergic drug application.

Postoperative facial weakness was documented in 19 patients (9.0%): the affected branch was the temporofacial in 1 case (5.3%), cervicofacial in 14 (73.7%) and both in 4 (21.1%). Mean early House-Brackmann (HB) score was 2.4 ± 0.9. Only one patient reported FN deficit at follow-up (40 months after surgery, HB 3 in the cervicofacial area), which was considered permanent, while in the other 18 patients FN function fully recovered within 12 months (median recovery time: 6.0 months, range 14 days-24 months). All patients with postoperative facial weakness underwent a course of tapered steroid therapy in the first weeks after surgery. Physiokinetic therapy (PKT) and neuro-taping were also applied. As far as extent of resection was concerned, no statistically significant differences were noted between resections of one parotid segment, or less, and more extended procedures with regard to FN deficit (5/52, 9.6% *vs* 14/159, 8.8%, respectively; OR 0.91, 95% CI 0.31-2.65; *p* = 0.859). Regular use of IONM did not affect the risk of postoperative facial weakness (8/115, 7.0% for unmonitored procedures *vs* 11/96, 11.5% for IONM-equipped surgical procedures; OR 1.73, 95% CI 0.67-4.49; *p* = 0.255). However, facial palsy was significantly higher in patients submitted to TP in comparison to less extensive procedures (5/22, 22.7% *vs* 14/189, 7.41%, respectively; OR 3.68, 95% CI 1.18-11.54; *p* = 0.034). Results for the Facial Disability Index are shown in Table V.

Parotidectomy Outcome Inventory-8 (POI-8)
Results for POI-8 are highlighted in Figure 1. Patients submitted to TP were significantly more annoyed by "changed appearance due to facial palsy" (*p* = 0.003). Larger lesions (≥ 20 mm) were associated with a lesser degree of trouble as a result of hypoaesthesia (*p* = 0.007). Type of incision did not seem to affect QoL related to the "appearance of the scar" (*p* = 0.506), even when considering only younger patients (*p* = 0.647). Even the size of the lesion did not influence POI-8 outcome with regard to "changed appearance due to substance loss" (*p* = 0.715). Fear of a potential revision surgery was higher in females (*p* = 0.005) and those who experienced early postoperative complications (*p* = 0.004). Finally, QoL of older patients (age ≥ 60 years) was significantly less impaired by hypoaesthesia (*p* = 0.004), scar appearance (*p* = 0.045), substance loss in the parotid region (*p* = 0.022), gustatory sweating (*p* = 0.001) and fear of revision surgery (*p* < 0.001). No significant association was detected between length of follow-up and POI-8 parameters.

Discussion

Surgical treatment of benign parotid tumours has always been considered to have little impact on the patient's QoL, especially when performed in high-volume centres. Nevertheless, the reported rates of postoperative complications are not negligible and vary widely among different series [5-7,13]. In this retrospectively designed study on a large, single-centre series of parotidectomies performed for benign neoplasms, we analysed the incidence and possible promoting factors of early and late complications, trying to appreciate how these conditions may actually affect patient perception and QoL.

An impairment in tactile perception in the area innervated by the GAN was reported by almost all of the patients (90.0%) in the early postoperative period. Although only 34.2% fully recovered, the residual sensorial alteration did not seem to significantly affect QoL, with 97.9% reporting no or limited impact. The mean value of POI-8 item with regard to "numbness on the site of surgery" was very low (0.35). This finding is consistent with those of Patel et al.: in their patients referring a sensorial impairment in the GAN area (30/53, 57%), 77% reported only a little or no inconvenience caused by the symptoms, and 90% no interference or almost none with their daily activities [14]. We also noticed that patients affected by larger lesions were associated with a lesser degree of trouble as a result of hypoaesthesia, according to the POI-8 questionnaire, probably as a consequence of the aesthetic improvement linked to the removal of a disfiguring facial lump, which underplayed subsequent sensorial troubles. Moreover, we found that preservation of the pbGAN (Fig. 2) seemed to reduce early postoperative sensorial impairment in the area, while not at all tactile function at long-term assessment. This is in agreement with the findings of Bulut et al., who demonstrated that a preservation technique improved short-term tactile sensation (2 weeks after surgery; 2.8 *vs* 2.1, $p = 0.017$ according to POI_2), but not long-term tactile sensation (at 5-year follow-up; 1.7 *vs* .13, $p = 0.145$), advocating some kind of collateral reinnervation [15].

Sialocele and salivary fistula are common sequelae after parotid surgery, with typical occurrence after discharge from hospital. There is a large reported variability with regards to their incidence (5% to 39% for sialocele, 2% to 17% for salivary fistula), since most of these complications are self-limiting over a few weeks, even without active treatment [16,17]. Witt et al. found SP to be associated with increased risk of sialocele compared to TP [18]. The same finding was reported by Tuckett et al. [6]; this would seem coherent with a persistent secretion of saliva by remaining parotid tissue; however, there are some conflicting reports [7,17]. Grosheva et al., who described this complication only in patients with visible residual parotid tissue by ultrasound, did not demonstrate any influence of a limited FN dissection or a greater volume of excised tissue on FS occurrence [19]. Our results agree with the latter findings, with no significant correlation found between sialocele/salivary fistula and size of parotid lesion or extent of surgery.

FBS is usually considered as a minor complication; indeed, it occurred in only 5.2% of our patients. We found that deep lobe dissection (Fig. 3) significantly increased the chances of developing it, as previously reported [13]. Linkov et al. showed that the incidence of FBS was particularly high in patients undergoing parapharyngeal space dissection (22.4%), resection of the deep lobe of the gland (38.4%) and sacrifice of the sympathetic chain (48.6%), with a possible role of ECA ligation [20]. In a study by Lee et al., 5 patients with FBS were treated with BTX-A and were asked to complete a specific questionnaire to assess the severity of their symptoms [10]. Our results for that questionnaire (Tab. III) are consistent with the findings of Fiacchini et al. (who also employed it) and lower than those of Lee et al. reported before BTX-A application; this is justified by the fact that, in this latter study, they only selected patients who were candidates for treatment, with significant interference of FBS in everyday activities [10,13]. Interestingly, in our cohort, the presence of pain at diagnosis was associated with a higher chance of experiencing postoperative FBS; this may advocate a lower pain threshold and/or a pre-existing disruption of the regional sympathetic innervation due to an expanding mass towards the parapharyngeal space, enhanced by the surgical procedure.

The occurrence of FS varies between 0% and 66% in the literature, strongly depending on the methods employed to detect it [5,16]. In our cohort, FS was diagnosed upon patient complaint, since our aim was to highlight clinically relevant complications. Nevertheless, it has been reported quite frequently (31.8%). Resection of more than one parotid level doubled the risk of FS, as previously demonstrated [17,19]. We did not routinely perform sternocleidomastoid or SMAS flap to cover the parotid bed, and we excluded those who were occasionally submitted to these procedures from the analysis to avoid potential bias. Severity and influence of FS on QoL, assessed through a specific questionnaire (Tab. IV), were consistent with the findings of Fiacchini et al. (who also employed it) and lower than those of Hartl et al. reported before a course of BTX-A; this is, again, justified by selection bias [11,13]. None of our patients were submitted to BTX-A or anticholinergic drug application and the results of this questionnaire are coherent with our management.

Postoperative facial weakness was noted in 19 patients

(9.0%), with only one permanent deficit at follow-up (0.5%). Reviewing the literature, the reported incidence of temporary FN dysfunction after parotidectomy ranges between 23% and 66% [6,17,21]. This large variability is likely related to different indications for surgery, size of lesions and surgical techniques, but mainly definition and diligence in assessment of postoperative FN function. For instance, our rate is even below the lower end of the range mentioned; in fact, we did not apply stringent criteria for characterisation of postoperative facial motion, in order to highlight only clinically relevant complications and their influence on everyday life. Although the extent of surgery has been widely recognised as a risk factor for facial weakness [17,19], we did not find significant differences between resections of one parotid segment or less, and more extended procedures with regard to facial palsy. However, the FN dysfunction rate was significantly higher in patients submitted to TP in comparison to less extended surgical procedures (22.7% vs 7.44%). This clear discrepancy was also evident in the work of Grosheva et al., with 75% of FN dysfunction after TP, 39% after LP and 48% after PSP [19]. In our cohort, patients submitted to TP were significantly more annoyed by "changed appearance due to facial palsy" according to the POI-8 questionnaire. The necessary tractions and circumferential dissection (with possible devascularisation) of the FN, performed to mobilise the deep portion of the parenchyma and/or lesions located beyond the plane of the nerve, are the potential harmful manoeuvers in TP, rather than the simple detection and superficial dissection of the nerve, regardless of its craniocaudal extension. In fact, regular use of IONM did not influence the rate of facial weakness. Moreover, since just one permanent paralysis was present, we could assume that the extent of surgery, regardless of its definition, did not affect the final FN function, as long as its anatomical integrity was preserved, as previously stated [19]. Results for the Facial Disability Index are shown in Table V; they are generally good and substantially consistent with the results of Prats-Golczer et al. evaluated at 1 week after surgery with regards to the physical function subscore, but higher than the social subscore, possibly because of our deferred administration of the questionnaire [22].

Cosmetic outcome was deemed satisfactory by the vast majority of our sample according to the POI-8 questionnaire, as demonstrated by the low values of "appearance of the scar" and "changed appearance due to substance loss" (0.18 and 0.20, respectively) (Fig. 1). Bianchi et al. showed that using a modified facelift incision alone led to a significant improvement in aesthetic outcome [23]. However, in our cohort, no differences in POI_3 results were noted with regards to skin incision (modified facelift vs Redon-Blair; $p = 0.506$), not even only younger patients ($p = 0.647$). This is consistent with the study by Ciuman et al. in which over 87% of all patients rated the cosmetic result as "very good" or "good", even if a standard modified Blair S-shaped incision was systematically applied [5]. Our assessment and that of Ciuman et al. were exclusively patient-based, while in the study by Bianchi et al. a concurrent objective evaluation by a blinded panel was provided; this may suggest that the patient's perspective may often underplay cosmetic outcome.

The same evidence involved "changed appearance due to substance loss". While the size of the lesion did not seem to influence cosmetic satisfaction from the patients' standpoint ($p = 0.715$), in a recent report by Grosheva et al. the independent assessment of facial contour revealed a significant correlation of poor results with higher volume and mass of excised specimens [19].

Particular mention should be made about the elderly (age ≥ 60 years). In our assessment, their QoL seemed significantly less impaired by hypoaesthesia, scar appearance, substance loss, gustatory sweating and fear of eventual revision surgery compared to their younger counterparts, and these findings could be taken into account in surgical planning.

Lastly, a remark should be made about fear of revision surgery. Although irrational for many reasons, it was the aspect that most impacted patient QoL, with the highest mean value in the POI-8 questionnaire (1.19), especially in females ($p = 0.005$) and in those who experienced early postoperative complications ($p = 0.004$). These findings were previously reported by Wolber et al., who also showed that the POI_8 score did not decrease significantly from 6 to 24 months after surgery [24]. Thus, we can assume that proper preoperative counselling and an effort in trying to limit early postoperative complications are key in achieving a satisfying long-term functional outcome.

Our study has some limitations. First of all, its retrospective design prevented us from performing an ongoing re-assessment of complication severity and POI-8 values. Nevertheless, the design allowed the recruitment of a large, single-centre series of parotidectomies performed for benign neoplasms by senior surgeons of comparable expertise and surgical technique, which is the main strength of our work. Second, a clear classification of the extent of surgery based upon dissection of facial branches was lacking; this would have allowed a more precise analysis of complication determinants, especially with regards to the recent work by Grosheva et al. [19].

Conclusions

Even when parotid surgery for benign neoplasms is per-

formed in high-volume centres, postoperative complications do occur and may influence the everyday life of patients. Preservation of the pbGAN seemed to minimise early sensory disturbance, while not influencing long-term function. Deep lobe dissection around the ECA enhanced the risk of experiencing FBS. Resection of more than one parotid level doubled the risk of FS, whereas TP seemed to be the most important single determinant for postoperative facial weakness.

The assessment of the patient's perspective in function-sparing parotid surgery is as important as the traditional analysis of incidence and possible promoting factors of postoperative complications, since this evaluation may help physicians to properly counsel patients before surgery, underemphasising (e.g. GAN sensorial impairment, cosmetic outcome) or, conversely, overplaying (e.g. fear of eventual revision surgery) the weight of some of the expected conditions.

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References

[1] Zhan KY, Khaja SF, Flack AB, et al. Benign parotid tumors. Otolaryngol Clin North Am 2016;49:327-342. https://doi.org/10.1016/j.otc.2015.10.005

[2] Foresta E, Torroni A, Di Nardo F, et al. Pleomorphic adenoma and benign parotid tumors: extracapsular dissection vs superficial parotidectomy - review of literature and meta-analysis. Oral Surg Oral Med Oral Pathol Oral Radiol 2014;117:663-676. https://doi.org/10.1016/j.oooo.2014.02.026

[3] Quer M, Vander Poorten V, Takes RP, et al. Surgical options in benign parotid tumors: a proposal for classification. Eur Arch Otorhinolaryngol 2017;274:3825-3836. https://doi.org/10.1007/s00405-017-4650-4

[4] Galli A, Tulli M, Giordano L, et al. Fine needle aspiration cytology for parotid neoplasms: risk of malignancy through inconclusive results and lower grade tumors. Eur Arch Otorhinolaryngol 2020;277:841-851. https://doi.org/10.1007/s00405-019-05733-w

[5] Ciuman RR, Oels W, Jaussi R, et al. Outcome, general, and symptom-specific quality of life after various types of parotid resection. Laryngoscope 2012;122:1254-1261. https://doi.org/10.1002/lary.23318

[6] Tuckett J, Glynn R, Sheahan P. Impact of extent of parotid resection on postoperative wound complications: a prospective study. Head Neck 2015;37:64-68. https://doi.org/10.1002/hed.23558

[7] Wong WK, Shetty S. The extent of surgery for benign parotid pathology and its influence on complications: a prospective cohort analysis. Am J Otolaryngol 2018;39:162-166. https://doi.org/10.1016/j.amjoto.2017.11.015

[8] Quer M, Guntinas-Lichius O, Marchal F, et al. Classification of parotidectomies: a proposal of the European Salivary Gland Society. Eur Arch Otorhinolaryngol 2016;273:3307-3312. https://doi.org/10.1007/s00405-016-3916-6

[9] Baumann I, Cerman Z, Sertel S, et al. Entwicklung und Validierung des Parotidectomy Outcome Inventory 8 (POI-8): Messung der Lebensqualität nach Parotidektomie bei benignen Erkrankungen [Development and validation of the Parotidectomy Outcome Inventory 8 (POI-8). Measurement of quality of life after parotidectomy in benign diseases]. HNO 2009;57:884-888. https://doi.org/10.1007/s00106-009-1991-3

[10] Lee BJ, Lee JC, Lee YO, et al. Novel treatment of first bite syndrome using botulinum toxin type A. Head Neck 2009;31:989-993. https://doi.org/10.1002/hed.21054

[11] Hartl DM, Julieron M, LeRidant AM, et al. Botulinum toxin A for quality of life improvement in post-parotidectomy gustatory sweating (Frey's syndrome). J Laryngol Otol 2008;122:1100-1104. https://doi.org/10.1017/S0022215108001771

[12] VanSwearingen JM, Brach JS. The Facial Disability Index: reliability and validity of a disability assessment instrument for disorders of the facial neuromuscular system. Phys Ther 1996;76:1288-1300. https://doi.org/10.1093/ptj/76.12.1288

[13] Fiacchini G, Cerchiai N, Tricò D, et al. Frey Syndrome, First Bite Syndrome, great auricular nerve morbidity, and quality of life following parotidectomy. Eur Arch Otorhinolaryngol 2018;275:1893-1902. https://doi.org/10.1007/s00405-018-5014-4

[14] Patel N, Har-El G, Rosenfeld R. Quality of life after great auricular nerve sacrifice during parotidectomy. Arch Otolaryngol Head Neck Surg 2001;127:884-888.

[15] Bulut OC, Hohenberger R, Oladokun D, et al. Long-term quality of life and sensory impact of great auricular nerve preservation in parotid surgery as measured with the Parotidectomy Outcome Inventory-8. Clin Otolaryngol 2019;44:743-748. https://doi.org/10.1111/coa.13366

[16] Klintworth N, Zenk J, Koch M, et al. Postoperative complications after extracapsular dissection of benign parotid lesions with particular reference to facial nerve function. Laryngoscope 2010;120:484-490. https://doi.org/10.1002/lary.20801

[17] Koch M, Zenk J, Iro H. Long-term results of morbidity after parotid gland surgery in benign disease. Laryngoscope 2010;120:724-730. https://doi.org/10.1002/lary.20822

[18] Witt RL. The incidence and management of siaolocele after parotidectomy. Otolaryngol Head Neck Surg 2009;140:871-874. https://doi.org/10.1016/j.otohns.2009.01.021

[19] Grosheva M, Pick C, Granitzka T, et al. Impact of extent of parotidectomy on early and long-term complications: a prospective multicenter cohort trial. Head Neck 2019;41:1943-1951. https://doi.org/10.1002/hed.25651

[20] Linkov G, Morris LG, Shah JP, et al. First bite syndrome: incidence, risk factors, treatment, and outcomes. Laryngoscope 2012;122:1773-1778. https://doi.org/10.1002/lary.23372

[21] Mantsopoulos K, Koch M, Klintworth N, et al. Evolution and changing trends in surgery for benign parotid tumors. Laryngoscope 2015;125:122-127. https://doi.org/10.1002/lary.24837

[22] Prats-Golczer VE, Gonzalez-Cardero E, Exposito-Tirado JA, et al. Impact of dysfunction of the facial nerve after superficial parotidectomy: a prospective study. Br J Oral Maxillofac Surg 2017;55:798-802. https://doi.org/10.1016/j.bjoms.2017.07.006

[23] Bianchi B, Ferri A, Ferrari S, et al. Improving esthetic results in benign parotid surgery: statistical evaluation of facelift approach, sternocleidomastoid flap, and superficial musculoaponeurotic system flap application. J Oral Maxillofac Surg 2011;69:1235-1241. https://doi.org/10.1016/j.joms.2010.03.005

[24] Wolber P, Volk GF, Horstmann L, et al. Patient's perspective on long-term complications after superficial parotidectomy for benign lesions: prospective analysis of a 2-year follow-up. Clin Otolaryngol 2018;43:1073-1079. https://doi.org/10.1111/coa.13104