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Facial reanimation in radical parotidectomy: The Milan proposal

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ABSTRACT

Surgery for advanced stage or recurrent parotid tumors often involves VII nerve sacrifice. Facial reanimation techniques aim to restore corneal protection and both static and dynamic facial symmetry, without compromising resection.

Surgical strategies were based on tumor histology and intraoperative frozen section analysis. Masseteric to facial nerve branch (for the ZMM) neurorrhaphy was done in patients without perineural invasion, while temporalis muscle tendon lengthening was used when that nerve was resected. Facial symmetry and function were objectively assessed using the eFACE system preoperatively and in follow-up.

Postoperative eFACE analysis demonstrated good results in both static and dynamic facial symmetry. Masseteric to facial neurorrhaphy achieved satisfactory smile excursion (81 ± 14), while static symmetry parameters, including nasolabial fold orientation (90 ± 4), were high across both surgical groups. Gentle and full eye closure scored lower (79 ± 3 and 85 ± 4), reflecting the limited impact of reanimation techniques on voluntary eyelid closure.

The multimodal facial reanimation protocol adopted effectively addressed recovery of facial symmetry and function. Masseteric to ZMM branch neurorrhaphy combined with cross face nerve graft offers excellent dynamic results with minimal morbidity, while additional static techniques ensure immediate ocular protection and aesthetic outcomes.

1. Introduction

Surgical management of parotid gland tumors, both benign and malignant, may require a complete sacrifice of the facial nerve, when it is extensively infiltrated or anatomically compromised. Facial nerve sacrifice associated with parotidectomy poses functional and aesthetic challenges due to the resulting facial paralysis. Facial nerve preservation is mandatory whenever it's not infiltrated by the tumor (Haddad et al., 2025).

Radical parotidectomy with complete facial nerve sacrifice represents a relatively uncommon but highly challenging reconstructive scenario. In these patients, facial reanimation strategies are often dictated by oncologic considerations, including the presence of perineural invasion, tumor proximity to critical nerve branches, and the need to achieve safe surgical margins. Consequently, reconstructive techniques cannot always be standardized or directly compared. For this reason, the aim of the present study is not to compare different reanimation procedures but rather to describe the multimodal reconstructive workflow adopted at our institution, integrating dynamic and static techniques to optimize facial symmetry, ocular protection, and smile restoration following radical parotidectomy. The primary objectives of facial reanimation options are corneal protection and oral competence, followed by restoration of static and dynamic symmetry (David et al., 2021). This paper reports the efficacy of our facial reanimation protocol in patients undergoing oncologic facial nerve sacrifice.

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2. Materials and methods

2.1. Study design and patients selection

This study was carried out from June 2022 to July 2024 at Facial Palsy Center of Maxillofacial Surgery Unit of San Paolo University Hospital in Milan. Patients undergoing parotidectomy with VII nerve sacrifice for oncological indications were included. All were assessed preoperatively for tumor infiltration, and intraoperative frozen section analysis was done on the branch of the VII nerve innervating the ipsilateral zygomaticus major muscle (ZMM).

The standardized protocol implemented by our Center differs according to the neoplasms' malignant or benign nature.

In cases of *malignant neoplasms*, following radical resection, intraoperative frozen section analysis is performed on the ipsilateral residual branch directed to the zygomaticus major muscle. If it is negative for neoplastic infiltration, facial reanimation is done via masseteric to facial nerve (branch for the ZMM) neurorrhaphy (end-to-end), in order to recover the ability to smile and therefore to restore the dynamic function of the midface; upper eyelid lipofilling and lateral tarsorrhaphy are performed to improve corneal protection as well as a midface suspension with fascia lata graft to enhance symmetry at rest. In case of small low grade malignant tumors near the stylomastoid foramen far from the recipient nerve, a supercharged cross-face sural nerve graft can be included.

On the other hand, if the frozen section is positive for perineural invasion, a temporalis muscle tendon transposition according to Boahene's technique (Boahene et al., 2011; Biglioli, 2015b) is used (after resection of residual VII branches), along with upper eyelid lipofilling and lateral tarsorrhaphy.

In case of benign neoplasms, such as multiple recurrences of pleomorphic adenoma (PA), facial reanimation is carried out by an end-to-end masseteric to facial nerve branch (for the ZMM) neurorrhaphy, upper eyelid lipofilling, lateral tarsorrhaphy, midface suspension with fascia lata graft and a supercharged cross-face sural nerve graft (Dunn et al., 2021). Figs. 1 and 2 summarize surgical workflow.

In both groups selective neurectomies of the branches of the healthy facial nerve for the depressor labii inferioris muscle (DLI) are performed to improve the symmetry of the inferior lip.

The temporalis muscle transposition according to Boahene's technique can also be performed in a delayed setting, not necessarily concomitant with oncologic resection surgery. This technique, indeed, does not require reopening the oncologic surgical field, as it is carried out through a surgical approach via the nasolabial fold.

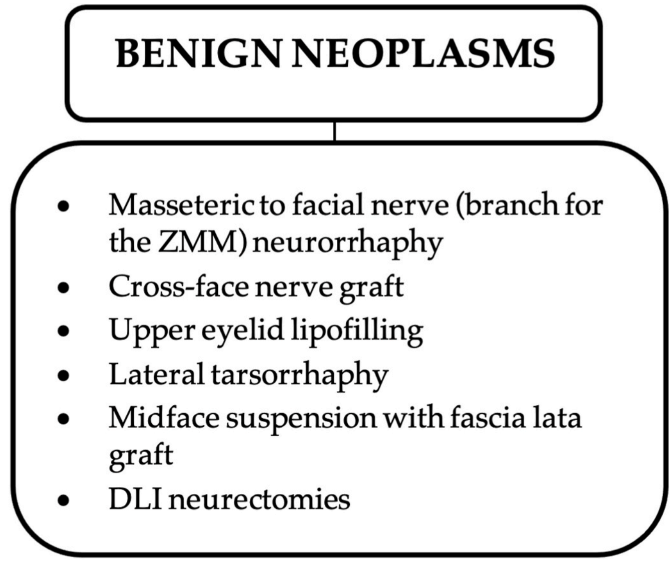

Fig. 2. SURGICAL ALGORITHM FOR BENIGN NEOPLASM: summary workflow of facial reanimation techniques in cases of radical parotidectomy for benign tumors as multiple recurrences of pleomorphic adenoma.

Preoperative, intraoperative, and postoperative photographic documentation was collected for all patients.

Facial symmetry at rest and during movement was evaluated from 8 to 12 months postoperatively using eFACE system, a validated tool for the objective assessment of facial function (Banks et al., 2015). This is a visual analog scale evaluated by multiple observers who, using photographs and video recordings, assign scores to 16 defined parameters with the aim of quantifying facial symmetry and function.

Data were collected preoperatively and in follow-up to assess improvements and outcomes. All patients gave their informed consent to participate in the study, including permission to use clinical images for scientific and educational purposes. The study was conducted in accordance with the Declaration of Helsinki and approved by the

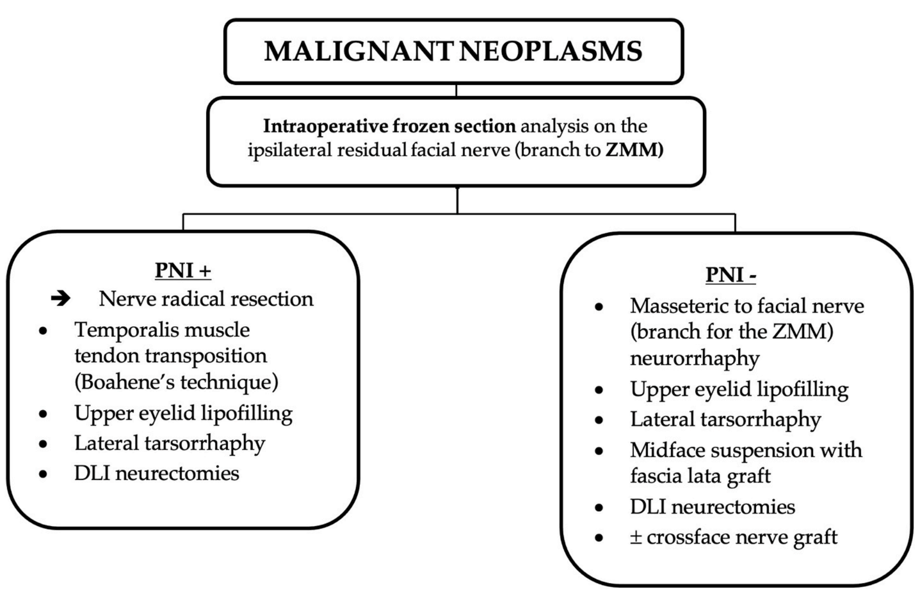

Fig. 1. SURGICAL ALGORITHM FOR MALIGNANT NEOPLASMS: summary workflow of facial reanimation techniques in cases of radical parotidectomy for malignant tumors with or without perineural invasion, detected during intraoperative frozen section examination.

institutional ethics committee.

2.2. Surgical technique

Radical parotidectomy was done via a facelift incision. A frozen section of VII nerve residual stump was done for malignancies. If the nerve biopsies were negative for neoplastic infiltration, the procedures outlined in the study were carried out.

The trunk of the masseteric nerve, 1,5-2 cm below the masseter muscle fascia, was exposed by gently dissection of the muscle fibers along their axes (Abdelkarim et al., 2023). A 2,5-3 cm long nerve trunk segment was released after severing small collateral branches, if necessary. The nerve was cut and turned superficially, with the ipsilateral VII nerve branch directed to ZMM identified, isolated, and prepared using a specific nerve probe. An end-to-end neurorrhaphy was done between the masseteric nerve and the VII nerve branch (directed to ZMM). Simultaneously, the sural nerve was harvested, reversed and the distal stump was divided into two branches for an end-to-end coaptation to the contralateral masseteric nerve and a contralateral small branch of facial nerve for ZMM (healthy side). An epineural window was then created in the side of the affected VII nerve branch directed to ZMM for end-to-side coaptation of the supercharged sural nerve graft (Fig. 3A–B). All the neurorrhaphies were done with an operating microscope with 10-0 nylon sutures and fibrin glue.

Fascia lata graft was harvested from the lateral thigh. Subcutaneous injection of vasoconstrictor was administered at the incision and dissection sites on the paralyzed side of the face. Pretarsal incision was made along a skin crease and a preseptal dissection was performed till the inferior orbital rim was reached. A subcutaneous pocket was created to anchor the fascia lata graft between the nasolabial sulcus and the inferior orbital rim. Three 2/0 nylon stitches passing through holes drilled into the bone were used to fix the fascia cranially and fixed caudally to the nasolabial sulcus (Atta et al., 2023).

The lateral surface of the thigh, the abdominal or gluteal area were used to collect autologous fatty tissue. The fat tissue was harvested and centrifuged for 10 min at 2700 round/minute to separate and remove the oil and aqueous layers. The injection of 1 or 2 ml of fatty tissue, according to the condition of the affected eye, was usually delivered in the upper eyelid sulcus, with a blunt cannula via 2 mm cutaneous incision in the lateral area of the upper eyelid (Atta et al., 2023). A McLaughlin lateral tarsorrhaphy with 6/0 nylon suture was performed by removing a 4 mm strip of the lower eyelid margin, including the eyelashes. Only a 2 mm strip of the upper lid margin, including the eyelashes, is removed (Atta et al., 2023; McLAUGHLIN, 1953).

Boahene's temporalis tendon transposition is a minimally invasive technique (Boahene et al., 2011): a 3 cm incision was made through the nasolabial crease and a blunt dissection was performed in the buccal space, laterally to the buccinator muscle and buccal mucosa till the anterior edge of the ascending mandibular ramus, exposing the coronoid process. The periosteum is incised keeping the temporalis tendon attached to the coronoid process. The coronoid process was then osteotomized by piezo surgery to rotate the lower extremity of the temporalis muscle anteriorly and inferiorly by pulling the bone, to better detach the temporalis tendon bony insertions. At the same time, a 6 × 4 cm fascia lata graft was harvested and sutured to the temporalis tendon. The opposite pole of the fascia was attached to the previously placed 2/0 nylon sutures at nasolabial fold. The addition of the fascia lata allowed a better distribution of the effect of the temporalis muscle over the entire nasolabial fold, resulting in a well-defined crease (Boahene et al., 2011) (Fig. 3C). To improve inferior lip symmetry, blunt dissection is performed through a small 2 cm incision medial to the vascular bundle of the facial vessels below the mandibular margin until the branches of the healthy VII nerve leading to the depressor labii inferioris muscle are identified, stimulated with the probe and severed.

3. Results

This study included 15 patients with a parotid neoplasm, with an average age of 64 years (64,5 ± 14,3). The group was homogeneous in term of sex (7 M; 8 F). 11 (73,3%) patients were affected by malign neoplasm, while 4 (26,7%) patients by benign neoplasm; the histological types: 5 (33,3%) patients were affected by squamous cell carcinoma, 3 (20%) pleomorphic adenoma, 2 (7,69%) acinic cell carcinoma, 1 (6,7%) metastasis of clear-cell carcinoma of the kidney, 1 (6,7%) basal cell carcinoma and melanoma, 1 (6,7%) carcinosarcoma and, 1 (6,7%) salivary duct carcinoma and 1 (6,7%) facial nerve schwannoma.

Upper eyelid lipofilling, lateral tarsorrhaphy and midface suspension with fascia lata were done in all. Masseteric to VII nerve (branch for the ZMM) neurorrhaphy was performed in 8 (53,3%) patients, while temporalis muscle tendon transposition according to Boahene's technique was performed in 7 (46,7%) patients. Supplemental supercharged cross-face nerve grafting was performed in 3 cases of pleomorphic adenoma, and in 1 case of malignancy. Table 1 show the post-operative mean values of eFACE scale.

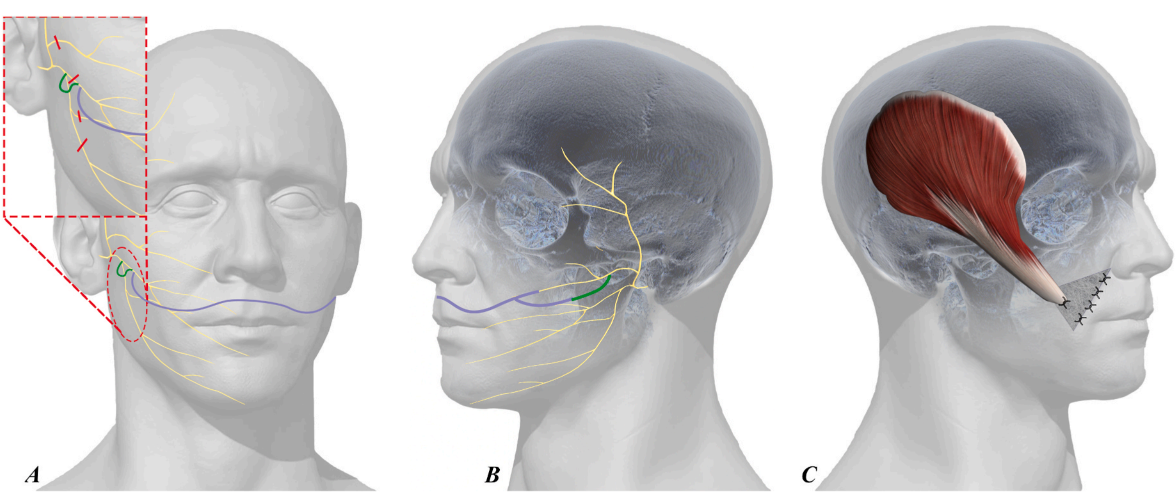

Fig. 3. A) FACIAL PARALYSIS SIDE. Graphical representation of the facial reanimation with masseteric to facial nerve neurorrhaphy: masseteric nerve (green) is connected to the ZMM branch with an end-to-end neurorrhaphy; the supercharged sural nerve cross-face graft (purple) is connected to the affected facial nerve (branch directed to ZMM) with an end-to-side neurorrhaphy. B) HEALTHY SIDE OF THE FACE. The distal stump of the cross-face sural nerve graft is divided into two branches to perform an end-to-end coaptation to the masseteric nerve and a small branch of facial nerve for the zygomaticus major muscle (supercharging). C) The Temporalis Tendon Transposition: the temporalis muscle tendon is turned anteriorly to reach the nasolabial sulcus through the fascia lata graft.

Table 1
Post-operative mean values of eFACE scale for static and dynamic parameters. The first column reports overall mean values and standard deviation (M±SD). The second column reports mean values of those who underwent masseteric to facial nerve neurorrhaphy (M – F), and third column reports mean values of those who underwent temporalis tendon transposition according to Boahene's technique (B).

STATIC PARAMETERS	Overall	M-F	B
Palpebral fissure at rest	95 (±4)	93 (±4)	97(±2)
Nasolabial fold depth at rest	88 (±3)	89 (±4)	87 (±0)
Nasolabial fold orientation at rest	90 (±4)	89 (±5)	92 (±2)
Oral commissure at rest	88 (±4)	88 (±5)	88 (±4)
DYNAMIC PARAMETERS	M (±SD)	M – F (±SD)	B M (±SD)
Gentle eye closure	79 (±3)	80 (±3)	77 (±2)
Full eye closure	85 (±4)	87 (±4)	83 (±4)
Oral commissure movement with smile	80 (±11)	81 (±14)	79 (±6)
Nasolabial fold depth with smile	86 (±13)	86 (±16)	85 (±7)
Nasolabial fold orientation with smile	86 (±12)	86 (±16)	86 (±1)

4. Discussion

Salivary gland tumors are considered rare entities, accounting for 3% to 10% of all head and neck tumors (Carlson and Schlieve, 2019).

The management of salivary gland malignancies remains primarily surgical and facial nerve preservation is advocated whenever it is not infiltrated by the tumor (Bell et al., 2005). Tumor diameter appears to be closely related to the proximity to the facial nerve. Domenik and Johnson (Domenick and Johnson, 2011; David et al., 2021) found that for both malignant tumors and pleomorphic adenomas, the positive predictive value of facial margin positivity for lesion >5 cm was strong (85% and 82% respectively). Conversely, the negative predictive value of smaller tumors (<2 cm) is less significant. These pathologies had a high base value of positivity of the facial margin (53% and 63% for all size pleomorphic adenomas and malignant lesions, respectively). Another important predictor of proximity to the facial nerve is the location of the tumor.

When facial nerve is sacrificed, the primary objectives are corneal protection and restoration of facial symmetry at rest and dynamically such as smile. Several facial reanimation techniques have been described in the literature.

An interposition of a nerve graft is used when a single facial nerve branch is resected. The most commonly donor nerves used for grafting are the sural nerve, the greater auricular nerve, the lateral antebrachial cutaneous nerve (LCAN), the cervical sensory nerve and the anterior division of the medial antebrachial cutaneous nerve (MACN) (Millesi, 1979; CONLEY, 1955). None of these nerve grafts have sufficient branches to reconstruct the 5-8 branches of VII nerve with a single neurorrhaphy at the main trunk. Biglioli et al., in 2016 proposed the use of thoracodorsal nerve (Biglioli et al., 2016), whose trunk easily matches in diameter the trunk of the extracranial VII nerve and its distal branches are similar to the branches of the facial nerve, both in number and size. The vastus lateralis motor nerve (VLMN) can be harvested simultaneously to anterolateral thigh free flap dissection: it is difficult to harvest for a pure nerve graft, as it runs along the descending branch of the lateral circumflex vessels (Revenaugh et al., 2012; Kim, 2016; Nichols et al., 2004; Ali et al., 2019). Regarding the source of the motor impulse, the ideal nerve connection would be with the trunk of the ipsilateral facial nerve, due to its good quality and its spontaneous stimulus. However, the main trunk may be all or partially affected by disease and thus may not be useable (Biglioli et al., 2016). Moreover, the risk of using the main trunk of the facial nerve as the only donor motor source is a mass facial movement and not selective and fine, so other motor nerve options have been used. Using either hypoglossal nerve (XII) or spinal accessory nerve (XI), imply higher morbidity, in terms of ipsilateral tongue palsy, atrophy and therefore an high risk of speech and swallowing impairment or neck pain, asymmetrical shoulders, inability to shrug the shoulder, or weakness in the neck area, respectively (Biglioli, 2015a, 2015b). The masseteric nerve has less morbidity than either and has more powerful stimulus. It is easier to smile by clenching the teeth rather than moving the tongue, and this is so significant in terms of rehabilitation after the surgery to recover the facial movements. Another advantage of the masseteric nerve is its proximity to the branch of the facial nerve for the ZMM (Biglioli et al., 2012). When it is not possible to restore neural input, muscle tendon unit (MTU) transfer offers the possibility of restoring facial tone, symmetry and movement (Figs. 4 and 5). In MTU transfer, the tendon of a functioning muscle is detached, mobilized and then reattached to another target muscle to replace the action of a non-functioning muscle (Hasmat et al., 2019). Temporalis muscle tendon transfer is the most commonly used (Sedlmayr et al., 2009; Labbé and Huault, 2000; Lu and Byrne, 2021).

When the facial muscles and surrounding soft tissues or bone have been resected due to tumor extension, microvascular free flap enables the restoration of large soft tissue and cutaneous defects and for face contour. Hasmat S (Hasmat et al., 2019). described a chimeric vastus lateralis and anterolateral thigh flap that allow to reconstruct large cutaneous defects concurrently with a long pedicle and long perforator vessels that allow the skin and muscle components to be placed independently. Other useable free flaps are latissimus dorsi free flap (Guyonvarch et al., 2021), gracilis free flap (Harii et al. 1976; Faris et al., 2018; Chiesa-Estomba et al. 2022) and anterolateral thigh free flap

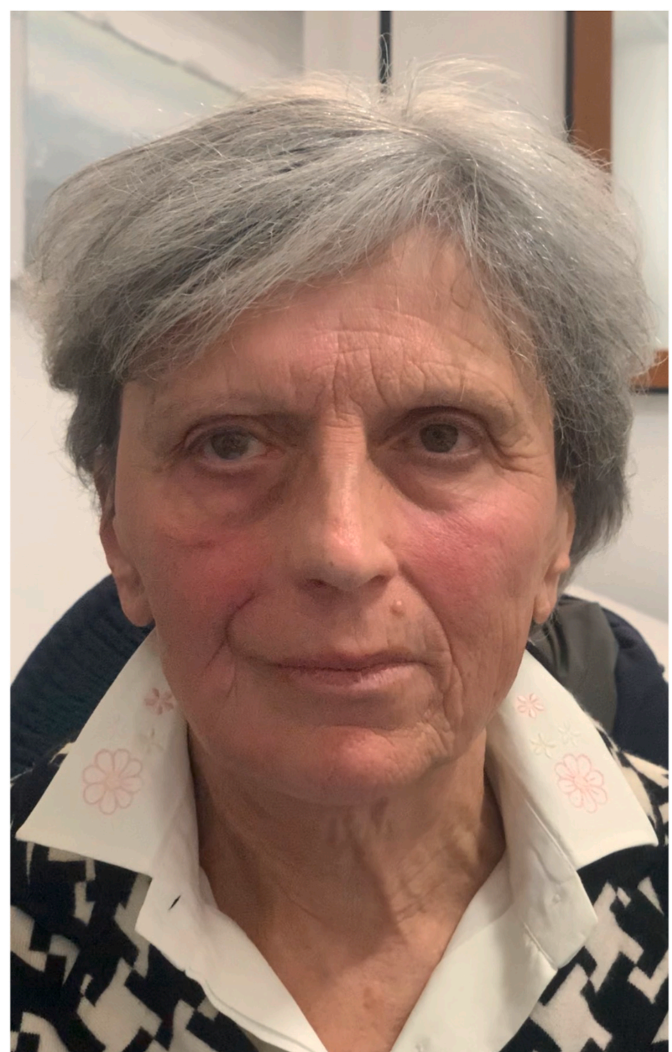

Fig. 4. Postoperative picture of patient who underwent temporalis muscle tendon transposition according to Boahene's technique: face at rest.

Fig. 5. Postoperative picture of patient who underwent temporalis muscle tendon transposition according to Boahene's technique: smile.

(Knott, 2012; Fritz and Rolfes, 2016).

The surgical workflow developed at our Center is based on the combination of static and dynamic facial reanimation techniques, which address ocular protection, symmetry at rest and smile recovery simultaneously. Masseteric to facial nerve (branch for the ZMM) neurorrhaphy is an excellent motor source that delivers a powerful quantitative stimulus, with a less morbidity than using XI or XII nerve. Physical rehabilitation is easier to learn as clenching the teeth produces a smile (Biglioli and Allevi, 2023). A cross-face sural nerve graft can be included, especially in case of benign tumors, to improve the spontaneity of smile and emotional movements. It can be supercharged by masseteric nerve and a small branch of VII nerve for the ZMM of the healthy side of the face, through end-to end neurorrhaphies. The sural nerve represents the most commonly used donor nerve for cross-face nerve grafting in facial reanimation procedures since Scaramella's first publication (Scaramella, 1996). Traditionally, the sural nerve graft has been used to reconstruct individual damaged branches of the facial nerve through multiple neurorrhaphies or to reconstruct the main trunk of the facial nerve. However, this strategy presents an intrinsic limitation: at the level of the facial nerve trunk, the specific muscular targets of individual fascicles cannot be clearly distinguished. As a consequence, reinnervation may lead to mass facial movement or synkinesis, resulting in less selective and less refined facial reanimation. For this reason, in our protocol the masseteric nerve is preferentially used as the primary motor donor for the branch directed to the zygomaticus major muscle, providing a strong and reliable motor stimulus for smile restoration without the need for interposition grafting. The cross-face sural nerve graft is instead used with the specific aim of introducing spontaneous emotional input from the contralateral facial nerve, which may contribute to a more natural facial expression. The concept of supercharging the cross-face nerve graft derives from previously described techniques combining dual neural inputs, in which the graft receives both a quantitative motor stimulus and a qualitative spontaneous stimulus (Bianchi et al., 2022; Tomita et al., 2010). The supercharged cross face has the advantage of mixing within the same nerve a quantitative nerve impulse from the masseteric nerve and a qualitative nerve impulse from the facial nerve on the healthy side. This configuration aims to combine the strong motor input provided by the masseteric nerve with the spontaneous facial activation originating from the contralateral facial nerve, potentially enhancing both the strength and the spontaneity of smile restoration. In our preliminary experience, although not yet supported by a large dataset, this configuration appears to be associated with a faster clinical response and earlier detection of Tinel's sign, suggesting a potentially improved regenerative process.

Since this technique provides faster recovery and a more powerful stimulus, it can be used in reconstructions after either malignant or benign tumor resection, even in cases of adjuvant radiotherapy, which is known to be detrimental for nerve regrowth. An additional advantage of this approach is therefore the possibility of performing facial reanimation in a single surgical stage, which may be particularly advantageous in oncologic patients who may require adjuvant therapies. The use of the cross-face nerve graft was reserved for carefully selected cases. Patient selection considered overall clinical condition and expected prognosis, as the addition of cross-face grafting increases operative time and requires careful surgical planning. In our protocol, this technique is primarily employed in patients with benign tumors, such as recurrent pleomorphic adenoma, or in selected low-grade malignancies located near the stylomastoid foramen, where facial nerve sacrifice is required but the region of cross-face neurorrhaphy remains oncologically safe.

Lipofilling and lateral tarsorrhaphy are crucial to eye protection immediately after surgery. Effective blinking distributes the tear film, fundamental for preserving corneal health. Blinking happens spontaneously 10-19 times per minute, while voluntary closure of the eyelid has only a minimal role in corneal lubrication (Atta et al., 2023). Hence voluntary eyelid closure is not a primary goal of this surgery. The aim of upper eyelid lipofilling is to enhance the effect of the elevator palpebrae superioris muscle relaxation rather than achieving complete eye closure, thus enhancing the blinking and proper corneal lubrication. In fact, the eFACE results for "gentle eye closure" and "full eye closure" parameter are lower than the others. Autologous fat has been demonstrated to integrate spontaneously into the host tissue and can improve the skin quality, the texture, the scars, representing an advantage specially after radiotherapy (Coleman, 2006; Coleman, 2001; Rigotti et al. 2007). Additionally, autologous tissue has a lower risk of astigmatism and minimizes the risks or exposure and migration encounted with other techniques such as gold or platinum implants.

The aim of lateral tarsorrhaphy is to enhances the mechanical efficiency of the upper lid closing (Joseph et al. 2016) by moving the lower lid posteriorly and hence closer to the cornea, thus making more effective tear film distribution and reducing corneal exposure, particularly in patients with reduced corneal sensation, or when the eye does not roll upward during eye closure (Bell's phenomenon). Lateral tarsorrhaphy together with lipofilling of the upper eyelid and suspension of the midface with the fascia lata maximizes eye protection immediately in the postoperative period (Atta et al., 2023). Wesley et al. found that 4 mm represents the optimal amount of lower eyelid resection, as it allows for limit eye exposure by around 70% of the surface area. This reduction often enables for adequate corneal protection and patient satisfaction (Wesley et al., 2000).

Furthermore, fascia lata mid face suspension and selective neurectomies of the healthy facial nerve branches directed to the DLI, are performed to provide better facial symmetry immediately after the surgical procedure.

Within approximately 4–6 months after surgery, nerve regeneration originating from the masseteric nerve enables the achievement of good dynamic symmetry in terms of smile excursion, as evidenced by the postoperative e-FACE results (Figs. 6 and 7).

As facial reanimation techniques are done at the same time as the ablative surgery, they provide an immediate solution to the common problems and consequences of facial paralysis, such as ocular discomfort and progressive atrophy of the facial muscles. Rather than proposing a novel isolated surgical technique, the present work aims to describe a structured reconstructive algorithm integrating multiple established procedures into a single workflow tailored to radical parotidectomy with complete facial nerve sacrifice. This integrated strategy, which we refer to as the *Milan proposal*, combines dynamic reanimation techniques with immediate static procedures to address both functional and aesthetic consequences of facial paralysis.

The main limitation of this study includes the small sample size. However, our data show that the reconstructive strategy described produces stable and reliable results, significantly improving patients' postoperative quality of life. (Biglioli, 2015a, Biglioli, 2015b, Biglioli et al., 2012, Biglioli and Allevi, 2023; Atta et al., 2023; Filipov et al. 2023).

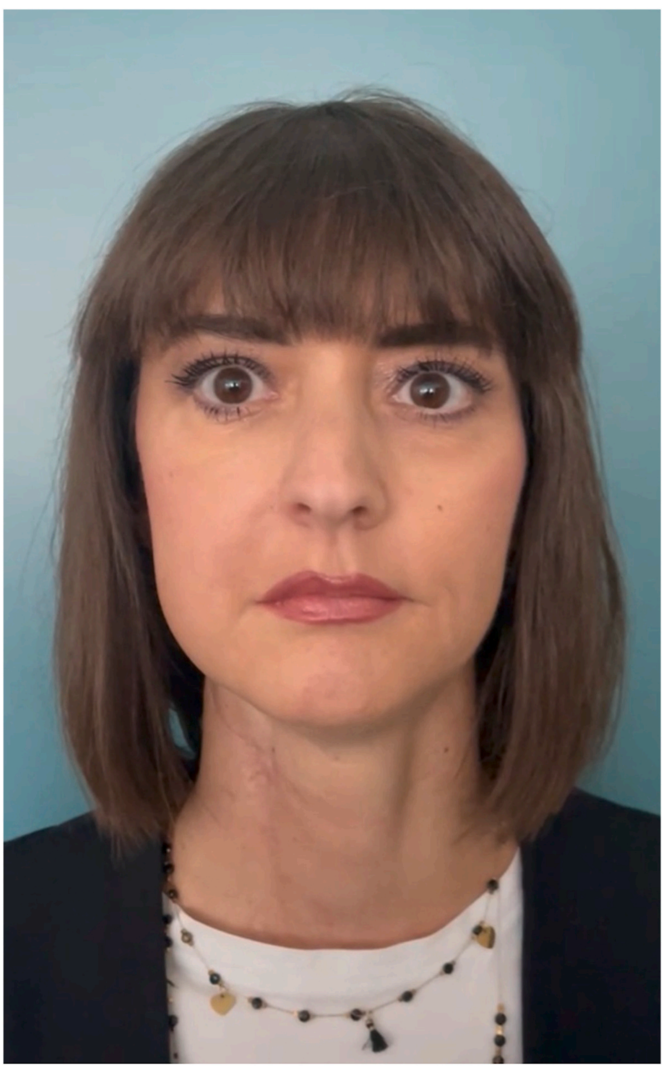

Fig. 6. Postoperative picture of patient who underwent masseteric to facial nerve (branch for the zygomaticus major muscle), supercharged cross face nerve upper eyelid lipofilling, lateral tarsorrhaphy and midface suspension with fascia lata were performed on the patient: face at rest.

Fig. 7. Postoperative picture of patient who underwent masseteric to facial nerve (branch for the zygomaticus major muscle), supercharged cross face nerve upper eyelid lipofilling, lateral tarsorrhaphy and midface suspension with fascia lata were performed on the patient: smile.

5. Conclusions

Facial paralysis is a condition that alters the appearance and function, and often is associated with psychological issues, including withdrawal and isolation, as well as anxiety and depression (Hotton et al., 2020; Fujiwara et al., 2022; Vargo et al., 2023), which may be worse if the patient has a malignancy. This study proposes a comprehensive surgical strategy aimed at minimizing the sequelae of facial paralysis following radical parotidectomy. Masseteric to facial nerve (branch for the ZMM) neurorrhaphy represents an excellent option for restoring smile excursion in such cases where frozen section excludes a perineural invasion by the tumor. Temporalis muscle tendon transposition according to Boahene's technique represents an excellent option when it is not possible to preserve facial nerve branches for neural connections. Upper eyelid lipofilling, lateral tarsorrhaphy and midface suspension with fascia lata are always useful, to ensure immediate ocular protection and static facial symmetry. In benign tumors or in case of selected malignant tumors a supercharged cross-face sural nerve graft can be added to provide spontaneity to the movement.

In conclusion, the reconstructive strategy algorithm described in this study provides a comprehensive and flexible approach to facial reanimation after radical parotidectomy. The combination of selective masseteric nerve transfer, cross-face nerve grafting, and immediate static procedures allows restoration of facial symmetry and dynamic function while respecting oncologic safety and patient-specific conditions. Further studies with larger patient cohorts and longer follow-up are needed to validate the indications and clinical outcomes of this reconstructive protocol. Preliminary observations regarding the potential advantages of the supercharged cross-face sural nerve graft are promising but require further validation through more robust evidence.

Informed consent statement

Informed consent was obtained from relatives of all subjects involved in the study.

Data availability statement

Data available on request from the Authors.

Funding

This research received no external funding.

Conflicts of interest

The authors declare no conflict of interest.

ABBREVIATIONS

ZMM	Zygomatic major muscle
PA	Pleomorphic Adenoma
PNI +	Positive for perineural invasion
PNI –	Negative for perineural invasion
M±SD	Mean and standard deviation
M-F	Masseteric to facial nerve neurorrhaphy
B	Temporalis tendon transposition according to Boahene's technique
LCAN	Lateral antebrachial cutaneous nerve
MACN	Medial antebrachial cutaneous nerve
VLMN	Vastus lateralis motor nerve
MTU	Muscle Tendon Unit
DLI	Depressor labii inferioris muscle

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