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Parotidectomies and Neck Dissections

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Abstract

The organization of the following study reflects, in general, the steps of a review article in parotidectomies and neck dissections. Part one contains the nature of the parotidectomies case study report. Part two contains the Neck dissection techniques analysis which are 1. Radical (RND) 2. Modified Radical (MRND) 3. Supraomohyoid, Parotid gland surgery complications and Neck dissection complications.

Parotidectomies glad tumors can be primary or metastatic. They can affect the superficial or the deep lobe or the whole parotid glad. Superficial or total parotidectomie is a challenging operation due to the presence that must always restored. The parotidectomie operation can be combined with neck dissection depending on the status of the survical nodes.

Materials and Methods: In this study, a retrospective review of 136 patients in a 31 years period from 1982 to 2013 where operated for parotid glad tumors. The primary tumors where 57 and the metastatic tumors 79. The secondary metastatic tumors are 58 squamous cell carcinomas (SCC's), 8 basal cell carcinomas (BCC's), 2 mixed (baso-squamous cell) carcinomas, 9 cutaneous melanomas, one lentigo malignant melanomas and one adnexal skin carcinoma. Seventy nine parotidectomies (due to metastatic tumors) were performed, 53 superficial and 26 total, 24 combined with neck dissection and 55 without. We combined 24 neck dissection with the parotidectomies.

Results: With a minimum of 6 year follow up we had: 4 cases of hypersalivation (sialorrhea), 1 case of temporary total paresis of the facial nerve, 1 paralytic ectropion, 2 partial flap necrosis.

The parotidectomie operation is a demanding surgery that offers good results from oncological and functional point of view in well selected patients.

Keywords: *Parotidectomies; Neck Dissection; RND; MRND*

Introduction

The parotid gland is the largest salivary gland, located in the preauricular area extending towards the angle of the mandible and the cheek. Parotid gland surgery remains a challenge even for the experienced surgeon due to the diversity of lesions and conditions that may potentially involve the gland as well as because of its location and anatomic characteristics [1].

The aforementioned prominent location of the parotid gland in the face, its central role as a lymph node station for skin and soft tissue neoplastic lesions in the pertinent and adjacent anatomic regions, the extratemporal facial nerve and its branches that pass through the gland and the functional and anatomic relations of the gland with the contents of the pharyngomandibular space are all important parameters that determine the outcome of surgery [2].

Metastatic skin tumors and melanomas of the parotid gland comprise a distinct category of tumors which are well differentiated from primary tumors regarding their pathophysiology, prognosis and treatment. Seifert., *et al*. [3] in a series including 10.944 cases of parotid gland tumors, 108 (~1%) metastatic tumors were found and 32 (~0.3%) cases were metastatic tumors originating from non-melanoma skin tumors and 17 from cutaneous melanoma (~0.16%).

Most of metastatic basal cell carcinomas (BCC) arise from neglected giant or mixed (basosquamous) carcinomas and tend to be rare with approximately 300 cases reported [4]. The head and neck is the region of primary presentation of over 80% of cutaneous squamous cell carcinomas (SCC) and 16 - 20 new cases are estimated to occur per 100.000 persons annually [5].

This chapter presents the surgical treatment of metastatic parotid gland tumors, originating from the skin of the head and neck region. Following oncologic surgery, the various types of regional lymph node dissection and their indications are described. Finally the reconstruction of the post tumor extirpation defects is discussed.

Surgical procedure

Superficial parotidectomy (Figure 1)

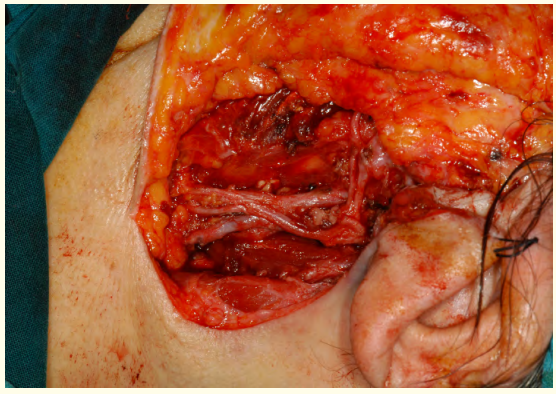


Figure 1: *Adnexal (eccrine) skin carcinoma with metastasis to the left parotid in a 56yo patient. Excision of the tumor, the superficial parotidectomy and the repair using a scalp rotation flap.*

The patient is positioned supine with the head elevated and turned to the side, in a way that allows access to the entire ipsilateral head and neck region. General anesthesia is administered and the patients is intubated. It is important to note that the surgeon must be able to test the facial nerve intraoperatively using a microstimulator and to that end, long acting muscle relaxants are not used throughout the entire procedure. The operative field is prepped including the hemiface, ear, temporal region and neck down to the clavicle. Sterile drapes are then put so as to ensure access and visibility of the operative field, of facial muscle function and of the neck to allow for a neck dissection as well as to protect the field from hair and keep the endotracheal tube aside. The eyelids are kept closed (e.g. with adhesive tape) and moist (e.g. artificial tears) and a piece of gauze is placed in the ear canal.

A facelift incision is marked starting from the tragus on the preauricular crease to the lobule where it is curved posteriorly around the ear, about 2mm below the lobule (to avoid Pixie ear deformity), and then inferiorly following the anterior border of the sternocleidomastoid muscle to a point 1.5-2 cm below the mandibular margin. This incision allows full exposure of the parotid gland and of the

anterolateral neck when a neck dissection is required following the parotidectomy. Infiltration solution of xylocaine (2%) and adrenaline (1:1000) is injected along the incision and the subcutaneous tissue in order to reduce intraoperative bleeding and promote hydrodissection (division of tissue planes due to the pressure of the injected fluid). A plane superficial to the parotid fascia and its continuity the superficial musculoaponeurotic system (SMAS) is created and the skin flap of the face is raised primarily anteriorly and slightly posteriorly in order to visualize the borders of the parotid gland. The thickness of the flap should be adequate in order to secure its viability as well as to minimize the extent of the defect after the parotidectomy. The greater auricular nerve can be identified at the posterior margin of the parotid gland and on the surface of the sternocleidomastoid muscle on a parallel course to the external jugular vein. The branches of the external jugular vein that communicate with the facial vein as well as all the branches of the greater auricular nerve entering the gland are ligated leaving the main trunk of the nerve continue its ascending course and leaving sensation to ear intact.

Facial nerve preservation (Figure 2a)

Dissection continues with the identification of the facial nerve main trunk, slightly along and almost in touch with the external ear canal cartilage. This posterior approach for the dissection of the facial nerve beginning at the main trunk, is the technique of our choice although other approaches have also been described such as the anterior of retrograde in which dissection begins at the peripheral branches and progresses towards the main trunk. The nerve is located approximately 1.0 - 1.5 cm deep and slightly anterior and inferior to the tip of the cartilage and approximately 1 cm deep to the medial attachment of the posterior belly of the digastrics muscle to its groove on the mastoid process. The stylomandibular artery, which lies superficial to the nerve as it enters the gland as well as facial vein tributaries on their course towards the external jugular vein which lie immediately deep to the nerve, are ligated and divided in order to avoid possible bleeding. The nerve braches are then gradually identified and dissected along their course, beginning from their origin from the main trunk that has already been identified, and preserved throughout their course. Dissection is blunt (not cutting) systematic and meticulous with small range movements of the scissors along the course of each branch and vertically to its axis. Bipolar coagulation is used to control bleeding. When the entire facial nerve with its branches are dissected and separated from the gland, the superficial lobe is removed and sent for histology.

Total parotidectomy (Figure 2a and 2b)

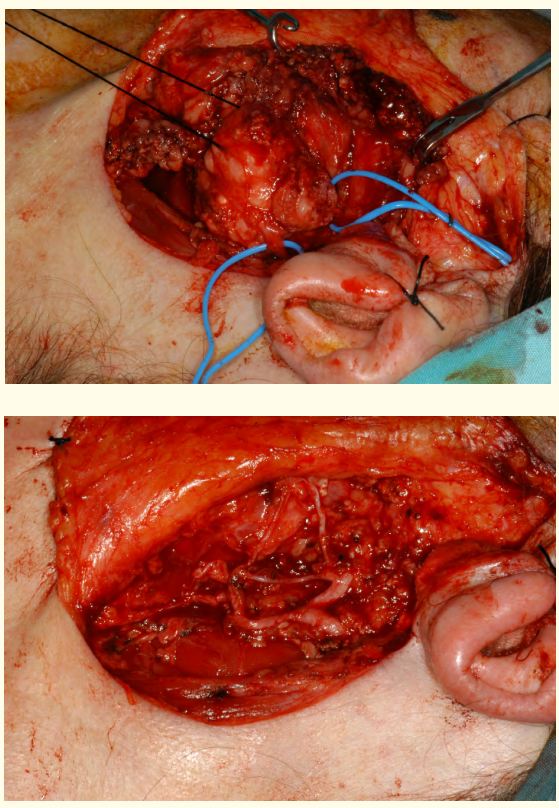
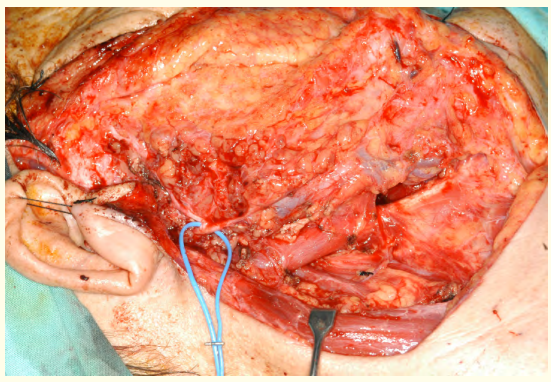


Figure 2a and 2b: *Metastasis to the left parotid from a SCC of the retroauricular area in a 51 year old patient. Total parotidectomy with preservation of the FN.*

In total parotidectomy, following the aforementioned procedure, the facial nerve and its branches are carefully dissected and separated from the deep parotid gland lobe. The deep lobe is then detached from its fibrous connections with the mandible, the stylomandibular membrane and the pharyngomandibular space. The external carotid artery enters the deep lobe before the bifurcation to mandibular and superficial; temporal artery which have to be ligated and removed when involved in the tumor. The deep lobe is also send for histology testing after its removal. The skin flap is then sutured back to place after meticulous hemostasis. In superficial parotidectomy, the parotid gland fascia should be reconstructed or replaced with the local advancement of the SMAS so as the underlying gland and facial nerve do not touch the re-draped skin flap, minimizing the risk of fistulas and inflammation (Figure 3a and 3b). Postoperative care and follow-up are of paramount importance and include checking for facial nerve function changes, hematoma, saliva production and wound healing quality. The sutures are removed after 7-10 days and the patients is enrolled in a standardized follow-up program.



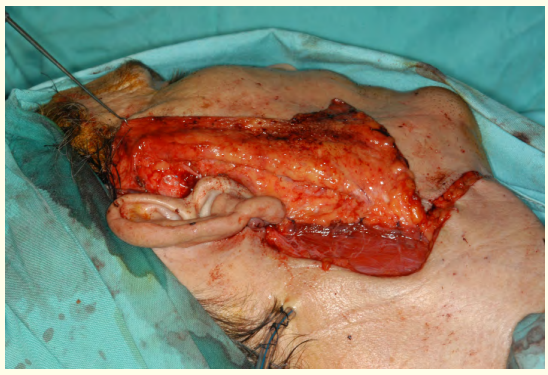


Figure 3a and 3b: *Forehead SCC incomplete excised elsewhere and metastasized to the parotid lymph nodes in a 50yo patient. Note the SMAS plasty to obliterate the dead space and to protect the FN.*

Facial nerve repair (Figure 4a and 4b)

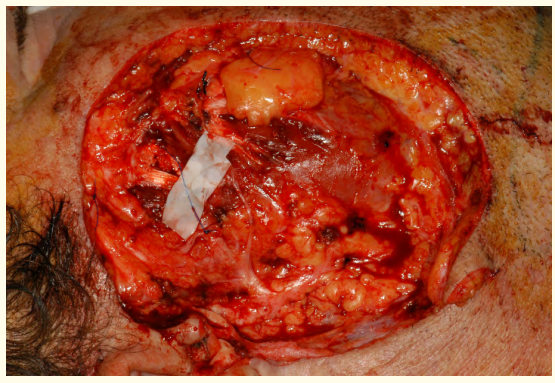


Figure 4a: *Neglected SCC in 39 year old patient without lymph nodes involvement. The specimen. Wide excision of the tumor combined with total parotidectomy was performed, the temporal and the zygomatic branches of the FN involved included.*

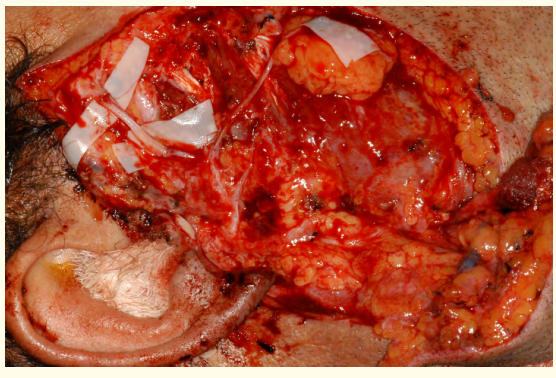


Figure 4b: *Sural nerve grafting.*

When part of the facial nerve is infiltrated by the tumor, it has to be removed along with the gland. When the nerve gap is longer than 1-1.2 cm, a nerve graft has to be used to bridge the proximal with the distal nerve stump (Figure 5a and 5b). When the gap is smaller than 1-1.2 cm, direct nerve repair (primary) with end to end coaptation can be performed (Figure 6). Even when the entire intraparotid part

of the nerve (all of its branches) has to be removed, the peripheral nerve stumps are of adequate diameter to enable a standard end to end repair of each one of them with the proximal end of the trunk using a nerve graft. The sural nerve is our choice of nerve graft donor although other nerves such as the greater auricular nerve and the saphenous nerves have been used. The operative procedure of sural nerve harvesting is beyond the scope of this chapter, however it is important to note that the harvested length of the nerve should provide enough grafts for multiple distal facial nerve ends which are invariably coapted in an end to end fashion with the proximal branches or the proximal main trunk (depending on where the proximal nerve incision was made) keeping in mind to maintain as much as possible the somatotopic organization of the facial nerve fibers (e.g. distal stumps of branches to the depressor complex coapted end to end with cervicofacial nerve fibers etc.). Primary nerve repair with direct or via nerve graft end to end coaptation can be performed within the first 6-9 months after the removal of the facial nerve segment. After that period of time, native facial muscles prolonged denervation result in their gradual fibrosis and their reinnervation with the provision of new motor units from the proximal trunk begins to be problematic. In cases where denervation time is more than 27 months and preoperative electromyographic studies are silent, free or pedicled muscles must be used to substitute the denervated native facial muscles.

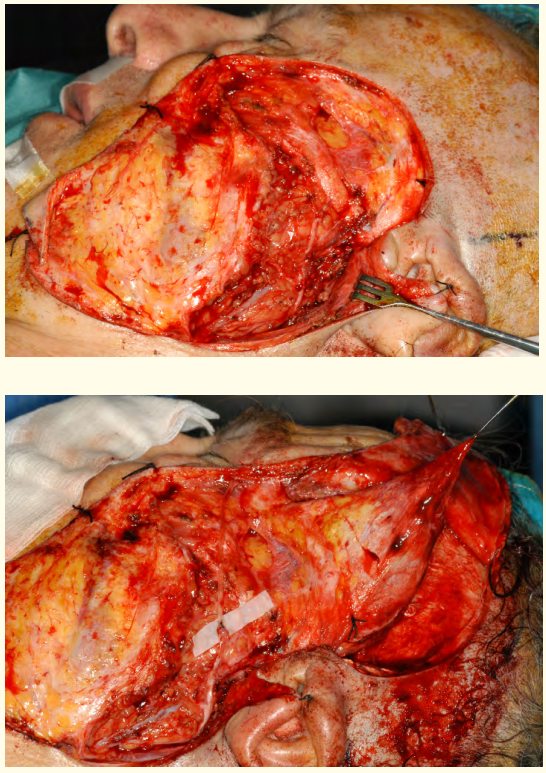


Figure 5a and 5b: *Neglected SCC in a 62yo patient. Tumor excision and the approach for the parotidectomy and the temporalis muscle flap.Wide excision of the tumor with resection of the zygomatic arch combined with superficial parotidectomy. Frontal branch of fascial nerve involvement. Resection and repair using a sural nerve graft (direct neurotization of the orbicularis muscle only). Skin and soft tissues reconstruction using a temporalis muscle flap combined with a supraclavicular FTSG.*

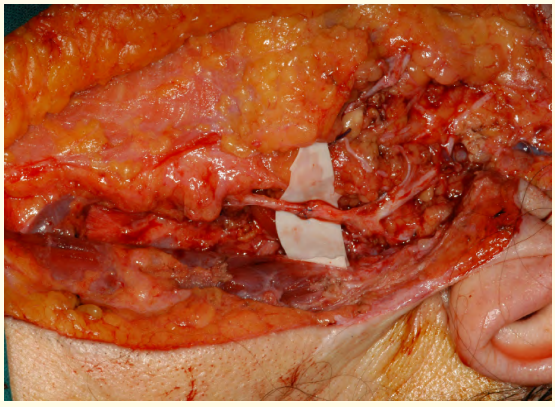


Figure 6: *SSM, Clark IV and Breslow 1.84 mm in a 48 year old patient, Negative SLN biopsy, Left parotid lymph nodes metastasis ten years later, Superficial parotidectomy combined with a SHND, Section of the mandibular branch of the FN, Epineuralneurorrhaphy, Direct wound closure.*

Material and Methods

In this study, a retrospective review on our experience in metastatic parotid gland tumors treatment is presented. A total of 136 patients presenting with parotid gland tumors, 81 males, 55 females, in a period of 31 years from 1982 to 2013 were included in this study. Patients' selection criteria included: patient age ≥ 18 years old, flap surgery at our Center and follow-up ≥ 2 years. Regarding the histological types of the tumors, 57 patients had primary tumors and 79 metastatic tumors originating from the neighboring skin. The secondary / metastatic tumors are to be investigated in this chapter and included 58 squamous cell carcinomas (SCC's), 8 basal cell carcinomas (BCC's), 2 mixed (baso-squamous cell) carcinomas (Figure 7), 9 cutaneous melanomas (Figure 8), one lentigo malignant melanomas (Figure 9) and one adnexal skin carcinoma (Figure 10). The lesions were located in various regions including: 5 lesions infiltrating the scalp, 6 were found on the lips (4 upper, 2 lower), 8 in the temporal area, 9 in the frontal area, 40 in the cheek, 7 in the preauricular area and 4 in the ears.

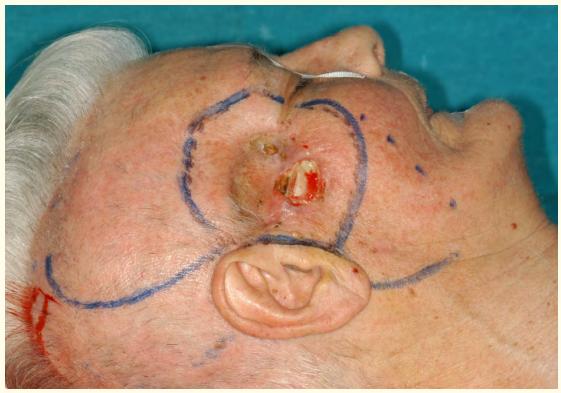


Figure 7: *Recurrent mixed (basosquamous) skin tumor in a 82 year old patient. Design of the excision and the approach for temporalis muscle flap and the parotidectomy.*

Figure 8: *SSM, Clark IV and Breslow 1.84mm in a 48 year old patient. Negative SLN biopsy. Left parotid lymph nodes metastasis ten years later.*

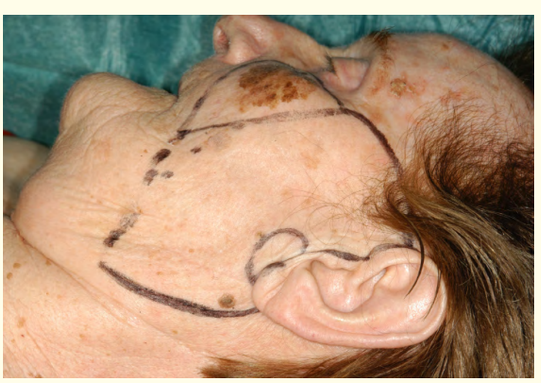


Figure 9: *Neglected LMM in a 84yo patient with metastasis to the parotid gland. Design of the excision, the parotidectomy approach and the cheek rotation flap to repair the defect.*

Figure 10: *Adnexal (eccrine) skin carcinoma with metastasis to the left parotid in a 56yo patient. Design of the excision of the tumor, the superficial parotidectomy and the repair using a scalp rotation flap.*

Seventy-nine parotidectomies (due to metastatic tumors) were performed, 53 superficial and 26 total, 24 combined with neck dissection and 55 without.

In the same period of time, lymph node neck dissection was performed in 63 patients, 24 in combination with parotidectomy (due to metastatic parotid gland tumors) and 39 without (due to other metastatic skin tumors in the region) and included 12 modified radical, 26 radical and 25 suprahomohyoid neck dissections.

The reconstruction of the defects that tumor extirpation and parotidectomy resulted in, were addressed using a wide range of techniques. Specifically, the following were used: 4 rotational cervicofacial flaps (Figure 11), 3 temporalis muscle flaps (Figure 12), 14 submental flaps (Figure 13), 13 platysma musculocutaneous flaps (Figure 14), 6 pectoralis major musculocutaneous flaps, 3 vertical trapezius musculocutaneous flaps (Figure 15), 1 sternocleidomastoid muscle flap, 2 rotational Imre flaps, 4 full thickness skin grafts, 2 retroauricular (flip-flop) flaps and 18 direct closures.

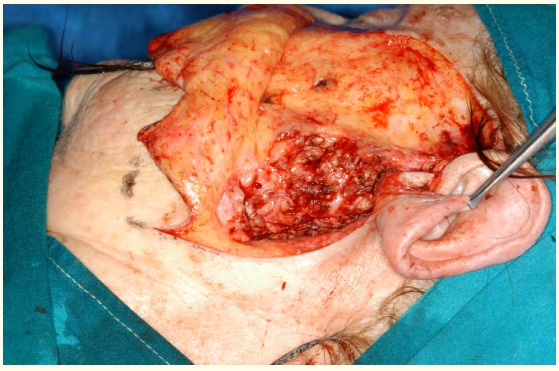


Figure 11: *Neglected LMM in a 84yo patient with metastasis to the parotid gland. Excision of the lesion, the superficial parotidectomy defect and the dissection and the rotation of the flap.*

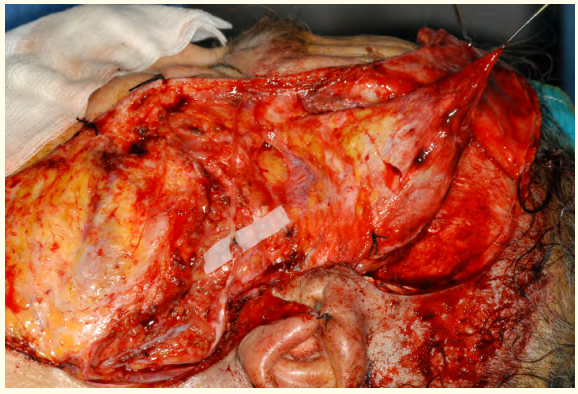


Figure 12: *Neglected SCC in a 62yo patient. Wide excision of the tumor with resection of the zygomatic arch combined with superficial parotidectomy. Frontal branch of fascial nerve involvement. Resection and repair using a sural nerve graft (direct neurotization of the orbicularis muscle only).Skin and soft tissues reconstruction using a temporalis muscle flap combined with a supraclavicular FTSG.*

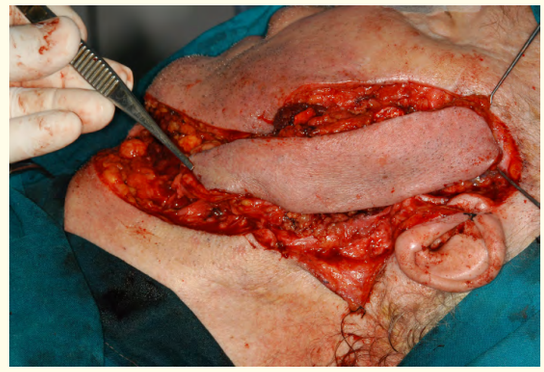


Figure 13: *Neglected SCC involving the left parotid gland in a 74 year old patient. Tumor excision, total parotidectomy and the submental flap to repair the defect.*

Figure 14: *Neglected SCC in a 74-year-old patient. The flap sutured on the defect and the donor site was closed directlyafter excision of the tumor and the superficial parotidectomy.*

Figure 15: *Recurrent tumor after surgery and X-ray therapy in a 62 year old patient. The defect after excision of the tumor, the external ear involved included, and the superficial parotidectomy.A two stage vertical trapezius musculocutaneous flap was used to repair the defect, Conservation of the external auditory canal.*

Soft tissue reconstruction

The established reconstruction procedures for the defect in which tumor extirpation/ parotidectomy results, usually includes: primary closure, skin grafting, V-Y, rhomboid, cervicofacial and forehead flaps, the facial artery and submental artery perforator flaps, the pectoralis and trapezius musculocutaneous flaps, the supraclavicular fasciocutaneous flap and free tissue transfer are described in detail in Chapter "S.C. and M. from Plastic and Reconstructive Surgery point of view". The platysma and the sternocleidomastoid flaps that were also used in the current study are described below.

Platysma flap (Figure 14)

Although the platysma myocutaneous flap (PMF) was introduced for oropharyngeal reconstruction by Futrell in 1978 [6], it has not gained widespread acceptance due to a perceived lack of flap's reliability. PMF is a type II flap (Mathes and Nahai Classification), superiorly-based, supplied by the facial and submental arteries. Venous drainage is accomplished by small anterior communicating veins (between superior thyroid vein and anterior jugular vein or facial vein). Less frequently it can be posteriorly-based with a random pattern blood supply from the occipital artery and drained by the external jugular vein.

Indications for its use include: defects of the lower 1/3 of the face, intraoral defects, thin full thickness defects (eg oral angle defects). Contraindications are: prior radiotherapy to the head and neck area, ligation of the facial artery, prior radical neck lymph nodes dissection, large defects > 5x7 cm, patients with extremely thin skin and a poorly-developed platysma muscle (not ideal candidates for this procedure). Additionally, the flap should not be used if the sternocleidomastoid muscle will be removed as a part of the planned neck surgery.

Platysma flap is marked including usually an area within the lower two thirds of the neck(from the inferior border of the clavicle to the line between the upper and the middle third of the neck). In the current study the average size of the flap was 6.4 x 5.2 cm. The flap is raised with the external jugular vein and caution should be exercised during dissection as the mandibular and cervical branches of the facial nerve as well as the anterior and external jugular veins course immediately deep to the muscle.

Advantages of the PMF are [7]:

1) The tissue provided is sufficient in size for most substantial soft tissue resections in head and neck area
2) It is thin and pliable, and thus able to conform to the defect
3) The arc of rotation permits the flap to reach well beyond midline in the pharynx and slightly beyond the anterior floor of the mouth midline
4) Harvesting requires only approximately 15-30 minutes
5) The donor site is easily closed after undermining the superior chest wall skin over the clavicle
6) No special skills or equipment are required for raising the flap.

Disadvantages could be considered [8]:

1) The tissue bulk provided is limited for very large defects. This drawback is sometimes addressed with the use of tissue expansion techniques e.g. using an expander in a pocket under the muscle before its harvesting.
2) The tenuous nature of the blood supply to the skin paddle results in a substantial rate of postoperative complications
3) The main complication of using a superiorly-based PMF is venous congestion
4) Rates of complications between 10% and 40% have been reported and have been linked to surgical technique, the surgeon's experience, and preoperative factors such as chemotherapy or radiation therapy, significant lymph node involvement, and risk of carotid artery exposure [9].

Sternocleidomastoid flap

The superiorly based sternocleidomastoid rotation muscle flap is an established reconstructive procedure for the defect under the skin following parotidectomy.

Indications include creating a glandular cover to close orocutaneous fistula and obliterating dead space. It is a well vascularized flap, safe to use in an irradiated tissue bed. Based on the dominant branch from the occipital artery (and vein), the superior 2/3 of the muscle can be deeply dissected to the level of the carotid sheath towards the carotid bifurcation where the branches of the superior thyroid artery to the muscle are found and ligated. When enough length is dissected to achieve tensionless rotation and placement, the muscle is raised and rotated upwards and anteriorly in order to fill in the post parotidectomy defect. The inferior third of the muscle is primarily supplied by the inferior thyroid artery and it is left behind. The spinal accessory nerve is dissected and carefully separated from the muscle in order to denervate it. Then, the muscle flap is covered with the local skin flap and if this is not adequate, with a split thickness skin graft. The latter option should be carefully considered though as it results in very poor aesthetic outcomes.

Neck Dissections

Radical (RND)

The primary purpose of radical neck dissection (RND) is the removal of all lymphatic tissue in the cervical region lying between the platysma and the deep layer of the deep cervical fascia from the lower margin of the mandible to the clavicle and from the midline of the neck anteriorly to the anterior border of the trapezius muscle posteriorly. In the RND, in addition to removing the contents of all five levels of the neck, the accessory nerve, the sternocleidomastoid muscle and the internal jugular vein are also removed (Figure 16).

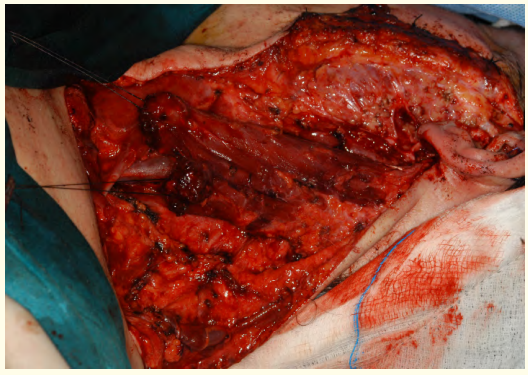


Figure 16: *Neglected skin tumor in a 77 year old patient.The defect after total parotidectomy, resection of the FN involved included and radical neck dissection (RND).*

The five levels of the neck are:

Level 1: Which includes the submandibular triangle and lies below the inferior mandibular margin and above the of the two bellies of the digastric muscle.

Level 2: Which includes the upper jugular region and lies horizontally between the lateral border of sternohyoid muscle and the posterior border of the sternocleidomastoid muscle and vertically between the base of the skull base and the bifurcation of the carotid artery, at the level of the hyoid bone (lymph nodes: upper jugular and jugulodigastric)

Level 3: Referring to the middle jugular region which lies horizontally between the same structures as level 2 and vertically between the bifurcation of the carotid artery and thehomohyoid muscle, at the level of the cricothyroid membrane (lymph nodes: middle jugular)

Level 4: Including the lower jugular region which has the same horizontal boundaries as level 2 and 3 and vertically lies between the homohyoid and the clavicle (lymph nodes: lower jugular and the thoracic duct on the left side)

Level 5: Which is the posterior triangle with the posterior edge of the sternocleidomastoid muscle as its anterior border and the the anterior edge of trapezius along with the inferior border is the clavicle as its posterior border (lymph nodes: spinal accessory nodes/deep cervical)

Level 6: Which corresponds to the anterior compartment, between the lateral border of sternohyoid muscle and the neck midline (lymph nodes: pretracheal, paratracheal)

Although the exact indications for neck dissection remain debatable, there is a consensus on that RND is usually performed in patients with high grade N2 tumors, with recurrent tumors and patients with invasive nodal disease. On the other hand, contraindications for RND usually used to include disease involving the base of the skull and major adjacent structures such the carotid artery and vertebral spine. However, these contraindications were primarily determined by the fact that in some cases the tumor was considered unresectable (or that the attempt to extirpate it would result in leaving behind residual tumor) which has changed as a concept with the advances in oncologic and reconstructive surgery. Consequently, with the exception of reasons pertaining to the overall condition of the patient, RND contraindications are patient specific and set mainly on an individual basis.

More conservative types of neck dissections include:

Modified Radical (MRND): During the MRND the same steps are followed in which the fibrofatty tissue has to be carefully divided and removed so that the spinal accessory nerve is freed all along its course and preserved (Figure 17).

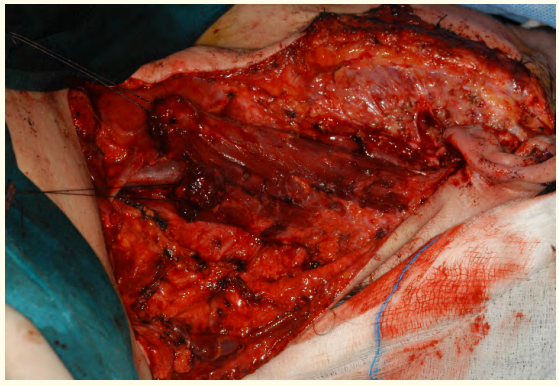


Figure 17: *Excisional biopsy of a NM, Clark IV and Breslow 3 mm ulcerated in a 31 year old patient. Parotid lymph nodes involvement. Excision of the tumor and the approach for the parotidectomy and the neck dissection.Section of the sternal and clavicular origins and elevation of the muscle for the dissection of the internal jugular vein's lymph nodes.*

Supraomohyoid: In which the goal is to completely remove level 1 and 2 lymph nodes (Figure 18).

Figure 18: *Neglected SCC in a 67 year old patient. Wide excision of the lesion combined with bilateral SHND and repair using a right Pec. Major musculocutaneous flap (not shown).*

Results and Complications

Oncological control was achieved in all patients with a metastatic parotid tumor, within a follow-up of at least 2 years. No recurrence of the metastatic tumor was noted. Among the 79 patients who underwent parotidectomy, the facial nerve was preserved in 46 patients, excised with primary repair in 25 patients and sacrificed without repair in 8 cases due to extensive involvement in the tumor.

Parotid gland surgery complications

Concerning the parotidectomy: 4 cases of hypersalivation (sialorrhea), 1 case of temporary total paresis of the facial nerve, 1 paralytic ectropion, 2 partial flap necrosis.

Facial nerve injuries can take place during the parotidectomy intentionally, when the facial nerve is infiltrated by the tumor and needs to be excised or by error. Injuries due to oncologic resection result in total paralysis that is addressed as previously described. Iatrogenic injuries by error usually result in temporary facial nerve paresis and are due to blunt nerve manipulation during dissection. Persistent paresis may be due to partial nerve damage during dissection or suturing when part of the nerve could be crushed or trapped in a tissue fold within the 'bite' of the suture. Exploration and nerve release with neuroma (if present) excision follows as well as the assessment of the residual facial nerve function and whether nerve repair is required. Nerve braches to the midface are usually more likely to be injured during parotidectomies while the marginal mandibular branch is more likely to injured during the neck lymph node dissection, when performed.

Therefore, facial asymmetry due to facial nerve injury is addressed as described above. In cases where there is no apparent intraoperative nerve damage and the patient presents with paresis, initial effort to prevent individualized care should be made depending on which facial muscle has been functionally impaired. Thus, the use of moisturizing drops or gel to avoid corneal drying and injury should be provided when the orbicularis oculi muscle seems denervated. If primary nerve repair or grafting is not possible, static procedures such as gold weight or eye spring insertion in the upper eyelid, tarsorrhaphies and facial slings could improve the function of a partially denervated orbicularis oculi. Sometimes following nerve damage, synkinesis may appear which consists of abnormal, undesired facial contractions that accompany voluntary facial movements during recovery from facial nerve injury. In most cases synkinesis is temporary or can be treated with physical therapy, electro stimulation and biofeedback. In more severe cases different strategies are followed including

the use of botulinum toxin, selective neurectomies and/or myectomies, direct muscle neurotization and cross facial nerve grafting with microcoaptations depending on the age of the patient and the severity of the synkinesis [10,11]. Steroids are not used in our department except for very special cases when surgical treatment cannot be implemented in time or when the condition of the patient demands it.

Exposed gland surface can result in a collection of saliva below the skin (sialocele) or leakage of saliva from the wound (salivary fistula) in 1 - 14% of patients. Hypersalivation and saliva leakage treatment include drainage of potential sialoceles with pressure dressings. Salivary fistula can be treated with local wound revision if low-flow leakage is present and if persistent with surgical field exploration and parotid duct repair and/or rerouting in some cases. Botulinum toxin inhibits the production of acetylcholine from postganglionic parasympathetic fibers, resulting in decreased salivation and has been reported to be effective. The coverage of the remaining gland with parts of the remaining proparotidic fascia/ SMAS following the parotidectomy, helps restore this complication.

Partial flap necrosis requires local debridement and reconstruction depending of the size of the new defect. Functional and aesthetic assessment is required before surgical planning. Total flap necrosis also needs meticulous surgical planning and psychological support for the patient.

Almost all patients undergoing parotidectomy, present with numbness and/or hypoesthesia in the distribution of the greater auricular nerve which decreases over time. To avoid this complication, effort to preserve the greater auricular nerve should be made and when it must be sacrificed, primary nerve repair or grafting is appropriate when possible.

Frey syndrome presentation due aberrant innervation of postganglionic parasympathetic salivary nerves resulting in sweating during eating, may be positively correlated with the amount of gland removed. By covering the remaining gland with fascia, SMAS, local, regional, or free tissue transfer and / or artificial alloplastic material, may help minimize the incidence of the syndrome.

Tumor recurrence is also one of the complications with poor prognosis especially when it concerns metastatic tumors. Positive margins, microsatellite disease, unidentified nerve infiltration, poor primary tumor oncologic control may be some of the reasons.

Parotid tumors can recur as a result of incomplete resection. A full discussion of the different parotid tumors, the extent of parotid surgery, and the need for postoperative radiation is beyond the scope of this article. A few basic principles should be followed to ensure adequate extirpation and minimize recurrence. The use of radiation therapy in recurrent metastatic tumors is unclear and has primarily a palliative role.

Paralytic ectropion is addressed according to the degree of orbicularis oculi muscle functional impairment starting with milder ectropion to more severe: lower lateral tarsal strip, medial conjunctival spindle procedure, lateral tarsorrhaphy, standard lower lid pentagonal wedge excision, Kunt Szymanowski technique, a mini tendon (palmaris longus graft) transfer to the lower lid for bilateral canthal suspension and mini temporalis muscle slit transfer for functional reconstruction.

Neck dissection complications

Concerning the neck dissection: 3 cases of temporary marginal mandibular branch, 1 case of hematoma, 1 retractile scar, 1 great thoracic duct trauma with resulting lymphorrhea, and 1 case of shoulder and upper arm dysfunction due to accessory nerve trauma.

Hematomas may be severe due to the small space and the vulnerability of the underlying anatomic structures. On the first signs of an increasing in size hematoma, more likely after the first 48 hours, the trauma and the entire surgical field needs to be explored in order to find and ligate potential bleeders as well as to clean and remove the hematoma. The patient's platelet count and coagulation status needs

to be investigated and any underlying conditions treated accordingly. Rarely, volume restoration is required with IV fluids while blood transfusions are reserved for extremely severe cases.

Surgical site infection (SSIs) can complicate recovery in 5% of patients. Potential risk factors include intra-operative exposure to endogenous organisms, prolonged surgery and impaired immunity (e.g. immunosuppression). Management require antibiotics, possible suture removal and debridement with open wound care [12].

Seromas are usually self limiting but if persistent the underlying cause should be investigated. Dead spaces and excessive tissue trauma are the more likely causes that should be treated with the appropriate soft tissue reconstruction technique. Vacuum or standard draining tubes may helps during the first days but they shouldn't remain for long as they increase the risk of infection and they sometimes increase serum production instead of limiting it.

Lymphorrhea due to major thoracic duct trauma is difficult to treat due to the very subtle wall of the duct and the difficulty to identify the exact location of injury. Vacuum drain and compression dressings may help, otherwise exploration and repair of the duct is mandatory.

The marginal mandibular branch of the facial nerve may be injured during the neck lymph node dissection. If unnoticed during surgery, meticulous electrophysiological studies are recommended and primary nerve repair when there is no improvement in time.

Shoulder and upper arm dysfunction due to nerve trauma should be addressed as soon as possible with primary nerve repair (with or without interposition nerve grafts depending on the size of the gap). Alternatively, long periods of denervation lead to muscle fibrosis and to the need for free muscle substitution of the non-functional muscles.

Conclusion

Metastatic parotid gland tumors demand complex restorative surgery along with the effective oncologic surgery in order to achieve oncologic control, functional and aesthetic repair of the involved anatomic areas. Plastic surgery has the central role in the planning, coordination and application of the available treatment modalities.

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