

Treatment of complications of parotid gland surgery

Il trattamento delle complicanze della chirurgia della parotide

R. MARCHESE-RAGONA, C. DE FILIPPIS, G. MARIONI, A. STAFFIERI

Department of Otolaryngology-Head Neck Surgery, University of Padua, Padua, Italy

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Parole chiave

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Summary

Although several reports in the literature have documented the surgical technique, and the oncological outcome achieved with parotidectomy, only a few articles have described the complications of parotid gland surgery and their management. Several complications have been reported in parotid surgery. We reclassified the complications of parotidectomy in intra-operative and post-operative (early and late). The commonest complications after parotidectomy are temporary or permanent facial palsy and Frey's syndrome.

Riassunto

Sebbene esistano in letteratura numerosi articoli che descrivono la tecnica chirurgica ed i risultati oncologici delle parotidectomie, soltanto pochi articoli descrivono le complicazioni della chirurgia parotidea ed il loro trattamento. Sono numerose le complicazioni descritte nella chirurgia della parotide. Noi abbiamo classificato le complicazioni della chirurgia parotidea in intraoperatorie e postoperatorie (precoci e tardive). Le più comuni complicanze della parotidectomia sono la paralisi temporanea o permanente del nervo facciale e la Sindrome di Frey.

Introduction

Few operations in the head and neck region present the challenges and contradictions of parotidectomy. The tumours detected are usually benign and patients expect normal function post-operatively. However, complications may arise. Numerous reports in the literature have described the surgical technique and the oncological outcome achieved by parotidectomy, however, few reports have documented the complications of parotid gland surgery¹⁻⁵. Complications of parotid surgery may be intra-operative or post-operative. Post-operative complications can be classified as early and late (or long-term) complications. In this report, the most frequent complications of parotid surgery and relative management are taken into consideration. Attention is focused on the treatment of those complications in which we achieved more experience.

Intra-operative complications of parotid gland surgery (Table I)

Intra-operative complications of parotid gland surgery comprise transection of the facial nerve or

one of its branches, rupture of the capsulae of a parotid tumour or incomplete surgical resection thereof. The surgeon has to immediately recognize an intra-operative complication and management thereof must be performed without delay. In the event of nerve injury, immediate nerve repair is mandatory. Once the segments have been fully mobilized and brought together without tension, the two ends should be sutured together. The nerves are gently grasped with a Bishop forceps. With an 8-0 nylon suture and a GS-8 needle, the epineurium is grasped at one end and then sutured to the other, avoiding deep cuts in the perineurium. Three sutures are usually adequate to maintain the anastomosis. As an alternative to sutures, the surgeon may use fibrin tissue adhesive. If the nerve length is inadequate, a nerve graft of the greater auricular nerve, can be applied¹⁻⁶⁻⁸.

Intra-operative opening of the pseudocapsule of pleomorphic adenomas is traditionally held to increase the risk of recurrence¹⁻⁹. Nevertheless, Laskawi et al. reviewing personal experience on parotidectomy for pleomorphic adenoma found no evidence of recurrence in any of the 18 out of 475 patients in whom the tumour capsule had to be opened

Table I.

Intra-operative complications	Post-operative complications	
	Early	Late
Transection of facial nerve	Facial nerve paralysis	Facial sinkinesis after facial palsy
Rupture of capsulae of parotid tumour	Haemorrhage or haematoma	Hypoesthesia of greater auricular nerve
Incomplete surgical resection of parotid tumour	Infection Skin flap necrosis Cosmetic deformity Trismus Parotid fistula	Recurrent tumour Soft tissue deficit Hypertrophic scar or keloid Frey's syndrome

intra-operatively on account of difficult conditions³. The main reason for pleomorphic adenoma recurrence is incomplete surgical resection. In these cases, it is suggested to perform post-operative radiotherapy^{5,9}.

Post-operative complications of parotid gland surgery (Table I)

FACIAL PALSY

Post-operative facial nerve dysfunction involving some or all of the branches of the nerve is the most frequent early complication of parotid gland surgery. Temporary facial nerve paresis, involving all or just one or two branches of the facial nerve, and permanent total paralysis have occurred, respectively, in 9.3% to 64.6% and in 0% to 8% of parotidectomies, reported in the literature. The cases of transient facial nerve paresis generally resolved within 6 months, with 90% within 1 month²⁻⁷. Temporary paresis usually resolves, according to Laccourreye, within the 18th post-operative month². The incidence of facial nerve paralysis is higher with total, than with superficial parotidectomy, which may be related to stretch injury or as result of surgical interference with the vasa nervorum. Revision parotidectomy or parotidectomies for parotid fistula are generally associated with a higher incidence of facial weakness. The branch of the facial nerve most at risk for injury during parotidectomy is the marginal mandibular branch. Older patients appear to be more susceptible to facial nerve injury. Temporary facial nerve weakness is a cosmetic problem, and patients should be told their appearance will return to normal. However, eye protection must be ensured. If facial paresis causes incomplete closure of the eye, the patient must be advised to

use ophthalmic moisture drops frequently during the day and an ophthalmic ointment and eye protection at night. Regular follow-up with an ophthalmologist is mandatory^{1,4}. Moreover, use of botulinum toxin to induce temporary ptosis avoids the need of surgical tarsorrhaphy.

HYPOESTHESIA OF GREATER AURICULAR NERVE

Hypoesthesia of the greater auricular nerve is a frequent consequence of parotidectomy. Patients are told that they will feel numbness around the ear, especially at the lobule. The area of numbness will improve within one year of the operation but a small area of skin may remain anaesthetized. Some Authors recommend preservation of the posterior branches of the greater auricular nerve to achieve faster and more complete recovery in sensory function⁸.

AMPUTATION NEUROMA

An amputation neuroma of the greater auricular nerve can occur following parotidectomy and can be managed by simple excision.

COSMETIC PROBLEMS

The "surgical depression" caused by removal of the parotid gland is most noticeable immediately after the operation, when the surrounding skin is slightly oedematous, enhancing the contrast. This depression also decreases with time, but does not disappear entirely. The magnitude of this depression depends on the amount of gland removed. A superiorly or inferiorly based sternomastoid flap has been proposed to reconstruct the hollow cavity after parotidectomy. Albeit, one should be aware that, although the transposition of a sternomastoid muscle flap can, without doubt, improve the facial contour or symmetry of the parotid region, it also creates a 'donor' – site hollow deformity or asymmetry of the upper neck, especially in slim patients^{10,11}.

Skin-flap necrosis is rare and is usually located in the distal tip of the post-auricular skin flap especially when a modified rhytidectomy incision has been used. Care must be taken in designing the parotid flap to avoid curving too far posteriorly, to avoid this complication ⁴.

Other cosmetic complications of parotidectomy are hypertrophic scar and keloid. Scar revision with steroid injections may sometimes be necessary.

HAEMORRHAGE OR HAEMATOMA

Haemorrhage or haematoma after parotidectomy is uncommon and usually related to inadequate haemostasis at the time of the surgical procedure. Treatment consists in evacuation of the haematoma and controlling the bleeding sites.

INFECTION

Infection is rare following parotidectomy and is avoided by using an aseptic technique and antibiotic prophylaxis. Treatment of infection consists of drainage and wide spectrum antibiotics.

TRISMUS

Mild trismus may be related to inflammation and fibrosis of the masseter muscle. This complication is usually mild and transient and improves with jaw-opening exercises.

WOUND SEROMA

Wound seroma is a rare complication that can usually be successfully managed with aspiration of the accumulated fluid.

FREY SYNDROME

The best described and more frequent complication following parotidectomy is gustatory sweating or Frey syndrome. The pathogenesis of Frey syndrome is based on the aberrant regeneration of sectioned parasympathetic secretomotor fibres of the auriculotemporal nerve with inappropriate innervation of the cutaneous facial sweat glands that are normally innervated by sympathetic cholinergic fibres. As a consequence, Frey syndrome is a disorder characterized by unilateral sweating and flushing of the facial skin in the area of the parotid gland occurring during meals that becomes evident usually 1-12 months after surgery. The clinical incidence of Frey syndrome, after parotidectomy, has been reported, in various studies, to be as high as 50% (severe in 15%). Gustatory sweating is detected in almost 100% of cases, evaluated by means of a post-operative iodine-starch test (Minor test) ¹²⁻¹⁷. Many surgical and non-surgical attempts have been made to prevent the clinical appearance of Frey's syndrome. Systemic or topical application of various anticholinergic agents (scopolamine, glycopyrrrolate, diphenhydramine, methylsulphate)

and the use of stellate ganglion blockade have been unsuccessful. Surgical treatment has included cervical sympathectomy, tympanic neurectomy, sternocleidomastoid transfer and dermis-fat grafts and the use of various materials, as interpositional barriers, but the outcome of these techniques has been disappointing since only temporary relief is achieved ¹²⁻¹⁷. Better results have been reported with some prophylactic measures, including the use of the superficial musculoaponeurotic system (SMAS) as a flap or the superficial temporal artery fascial flap. These techniques aim to create a physical barrier between the divided fibres of the auriculotemporal nerve and the sweat glands in the facial skin.

More recently, good results have been obtained with local injection of botulinum toxin (BTX) ¹²⁻¹⁸. Botulinum toxin is a polypeptide produced by the bacterium *Clostridium botulinum*. There are seven serologically distinct, but structurally similar, types designated A through G, each with its own antigenic specificity and therapeutic profile. Botulinum toxins prevent the release of acetylcholine at the neuromuscular junction of striated muscles and thus produce chemical denervation and paralysis of the muscles. This chemical denervation is effective both for striated muscle and eccrine glands. There are two commercial products of BTX-A available: Botox (Allergan Ltd, Ireland) and Dysport (Ipsen Ltd, UK). The dose of botulinum toxin is expressed in mouse units (U). Clinically, 1 U of Botox is equivalent to approximately 3 U of Dysport.

In patients affected by gustatory sweating, a Minor test is performed. In Minor's test, a solution containing 15 g iodine, 100 g ricine oil, and 88.5 of absolute alcohol is painted on the skin of both cheeks. After drying, potato starch is powdered onto the skin. Chewing some bread, for a some minutes, produces blue colouring of the iodine-starch in the affected region. We usually mark the margins with a skin pencil before cleaning the skin with alcohol, then the whole area is divided into 1.5 cm squares. The test result is photographed to enable objective evaluation at follow-up. Two units of BTX-A (Botox, Allergan) are injected, subcutaneously, into each square to achieve a diffuse, homogeneous effect. The total amount of drug used for treatment depends, of course, on the surface area of sweating. Patients with a large hyperhidrotic area will require more injections and larger dosages. The individual BTX dosage can range from 10 to 175 U. The mean dose is 30-50 U. BTX treatment has always been well tolerated without needing anaesthesia. The gustatory sweating usually ceases in the treated area, within 48-72 hours. No significant adverse effects have been described and only transient paresis of the *orbicularis oris*, in very few cases, has been reported in literature ^{1 2 14}. A marked long-lasting improvement, ranging from 11 to 36

months after a single injection, has also been described.

In summary, it can be concluded that Botox A injection is a safe and effective method and the treatment of choice for patients with extensive gustatory sweating.

At present, BTX therapy is considered the gold standard for curative treatment of Frey syndrome.

PAROTID FISTULA AND SIALOCELES

A parotid fistula is a communication between the skin and a salivary duct or gland, through which saliva is discharged. Parotid salivary fistula is a relatively common complication after parotidectomy. Salivary fistula or sialocele occurs if the resected edge of the remaining salivary gland leaks saliva and drains through the wound or collects beneath the flap (sialocele). Flow through the fistula increases during meals, particularly during mastication¹⁹⁻²⁶. In dubious cases, analysis of the fluid can confirm parotid secretion due to high amylase content. Wax and Tarshis, in 1991, reported an overall post-parotidectomy fistula rate of 14%, Laskawi et al. described persistent parotid fistula in 4% of patients following parotidectomy^{3 26}.

Salivary fistula and sialoceles are usually self-limiting problems and are initially submitted to conservative treatment. The first step to reduce salivary secretion is to reduce oral intake by means of enteral or parenteral feeding. Repeated needle aspiration and pressure dressing are carried out. In a few rare cases, insertion of a suction drain, in combination with a pressure dressing, is necessary. Anticholinergic drugs induce a temporary decrease in salivary secretion and are consequently considered useful in fistula management, but cause distressing side-effects. However, if a sialocele or a fistula are resistant to this form of treatment, a more aggressive approach is necessary. Various forms of treatment have been described for parotid gland fistula, including tympanic neurectomy with or without chorda tympani section, radiotherapy and even completion of the parotidectomy¹⁸⁻²⁷. Tympanic nerve section may have a low success rate, however, and it could take a long time to achieve healing of the fistula²¹. The major secretomotor fibres to the salivary gland are cholinergic parasympathetic and are susceptible to inhibition by the BTX.

Staffieri et al. first proposed, in 1999, BTX in the treatment of salivary fistula and sialoceles after conservative treatment failure²³. Several studies have confirmed the efficacy and safety of botulinum toxin in fistula and sialocele management^{20 22-25}.

Fistulas and sialoceles are managed with botulinum toxin injection after conventional conservative management techniques fail. The residual substance of the gland is injected percutaneously with a total of 10-20 mouse units (U) of BTX-A (Botox, Allergan) in two-three spots. The botulinum toxin injection is performed on an outpatient basis with little discomfort for the patient. The localised cholinergic block achieved with botulinum toxin injections, avoids the side-effects caused by systemic anticholinergic drugs and avoids surgical risks. Inhibition of parotid secretion leads to a temporary block in salivary flow followed by glandular atrophy, thus allowing healing of the fistula.

Conclusions

Surgeons have to pay attention to minimize the risk of complication during parotidectomy.

The best means of reducing iatrogenic facial nerve injury, in parotid surgery, still remains a clear understanding of the anatomy, good surgical technique with the use of multiple anatomic landmarks. Pre-operative discussion and consent for surgery, tailored according to the age and health of the patient as well as the behavior of the tumor, are mandatory. The goals, rationale, and risk of the operation, such as the general complications associated with the surgical procedure, must be clearly explained. Furthermore, the patient has to be informed about the cosmetic sequelae of the incision and all patients have to be told that facial nerve paralysis or paresis is possible and can be partial or total, temporary or permanent.

In conclusion, parotid gland surgery has now reached the point at which the surgeon, in most cases, should be able to match expectations of the patient. However, this operation continues to be a challenge on account of the wide range of tumours encountered and the variations in size and location. It is, therefore, mandatory that this operation be performed by experienced surgeons.

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