

Surgical Approaches of Parotidectomy: Overview

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Abstract: We aimed by this review paper to focus on discussing different aspects concerning parotidectomy, intended to review evidence about the surgical techniques of this surgical intervention, and then discuss the complications and outcomes following this type of surgery. We searched Medline, PubMed, Cochrane, and CINHAI databases for studies reporting and concerning with parotidectomy that was published in English language and in the period of establishment of these databases up to 2016, December. We used parotidectomy and the following free Mesh terms; “surgical techniques, surgical procedures, indications, outcomes, and complications,”. And we restricted our search to the English-language literature on human subjects. Reference lists were screened manually to find more relevant studies. Surgical methods for salivary gland surgical procedure will continuously develop as new modern technologies develop. A detailed understanding of the disease processes as well as anatomy will certainly remain of extremely important value in the effective medical administration of salivary gland disease. Although a number of records in the literature have actually documented the medical technique, as well as the oncological result attained with parotidectomy, just a few articles have actually explained the problems of parotid gland surgical treatment and also their monitoring. Numerous problems have been reported in parotid surgical treatment.

Keywords: Surgical Approaches of Parotidectomy, Cochrane, and CINHAI databases.

1. INTRODUCTION

The parotid gland is a largely serous salivary gland that is located high in the neck in the preauricular location expanding towards the cheek. The extratemporal facial nerve as well as its branches go through the parotid gland as well as supply motor innervation to the muscles of face, as well as to the postauricular muscle mass, the posterior tummy of the digastric muscular tissue, as well as the stylohyoid muscle mass ⁽¹⁾. Parotid tumors represent 2-- 3% of tumors influencing the head and neck, as well as 70-- 85% of those taking place in the salivary glands ⁽²⁾. The majority of sores are benign as well as influence the superficial parotid lobe. Currently, surgical excision is the most efficient treatment for parotid tumors, yet debate continues to be with respect to making use of superficial parotidectomy (SP) ⁽³⁾ or partial superficial parotidectomy (PSP) ⁽⁴⁾. The primary distinction between both procedures is that the branching pattern and place of the facial nerve, as opposed to the size and degree of the tumor, figures out the size of dissection and also the quantity of parotid cells that is gotten rid of in SP ⁽⁵⁾. Regardless of the picked method, potential morbidities adhering to parotidectomy, consisting of pain, facial nerve paralysis, salivary fistulae, Frey's syndrome and also a loss of feeling, may influence lifestyle (QoL) ^(6,7). However, effective surgical procedure should achieve excellent practical results. A number of previous research studies have contrasted the two sorts of parotid surgical treatment by keeping in mind the occurrence of post-operative problems ^(8,9).

We aimed by this review paper to focus on discussing different aspects concerning parotidectomy, intended to review evidence about the surgical techniques of this surgical intervention, and then discuss the complications and outcomes following this type of surgery.

2. METHODOLOGY

We searched Medline, PubMed, Cochrane, and CINHALL databases for studies reporting and concerning with parotidectomy that was published in English language and in the period of establishment of these databases up to 2016, December. We used parotidectomy and the following free Mesh terms; “surgical techniques, surgical procedures, indications, outcomes, and complications.”. And we restricted our search to the English-language literature on human subjects. Reference lists were screened manually to find more relevant studies.

3. RESULTS

The parotid gland is the largest salivary gland and lies in the parotid compartment, a triangular room anterior and inferior to the auricle. Included in this room are the facial nerve (cranial nerve VII) (**Figure 1**),⁽⁴⁾ numerous sensory and also free nerves, the external carotid artery as well as its branches, the retromandibular capillary, as well as parotid lymphatics. The parotid is an irregular wedged-shaped gland that twists around the posterior side of the ramus of the mandible and also expands posteriorly to the outside acoustic canal and also mastoid pointer. Around 80% of the gland overlaps the masseter muscular tissue anteriorly.

There is no structural attribute that officially divides the parotid gland right into surface and also deep wattles, yet the aircraft of the facial nerve (see the image below) typically offers for separation of the shallow and deep portions of the gland (**Figure 1**)^(4,6,7).

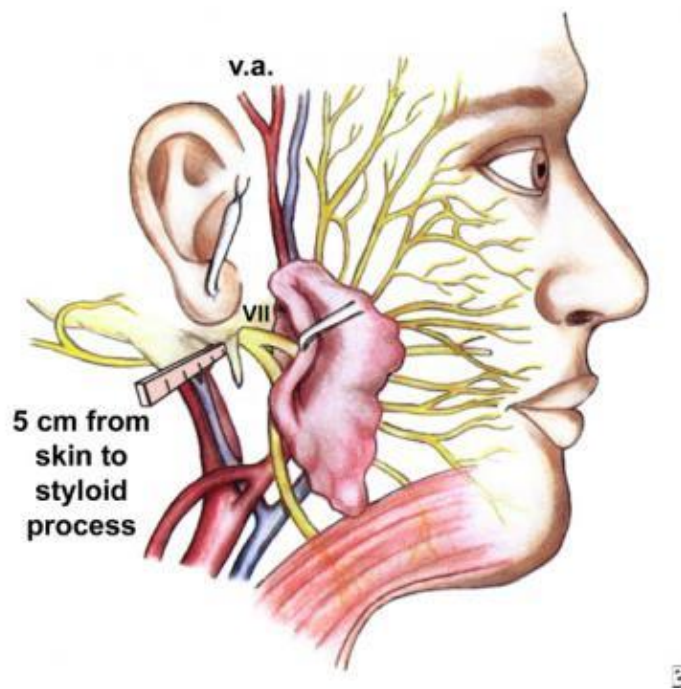


Figure 1: The surgical anatomy and landmarks of the facial nerve.

o Surgical technique of parotidectomy:

Surface Parotidectomy Superficial parotidectomy is indicated for a lot of benign and malignant tumors in the surface wattle, for chronic sialadenitis, and as part of a lymphadenectomy for skin cancer of the scalp. Parotid masses ought to not be enucleated due to risk of tumor reappearance and also the raised risk to the facial nerve throughout alteration surgery. Tumors that expand into the deep lobe may call for total parotidectomy including both the deep as well as superficial wattles⁽¹⁰⁾. The customized Blair incision for shallow parotidectomy begins in a natural crease just anterior to the helix, extends beneath the earlobe and also superiorly over the mastoid, then curves inferiorly over the anterior border of the sternocleidomastoid muscular tissue. The cut proceeds below the angle of the mandible at a distance safe from the marginal mandibular nerve (2 finger breadths). Placing the cut back instead of anterior to the tragus might improve the aesthetic outcome. Breakdown is carried greatly to the depth of the parotid fascia in the preauricular region and with the platysma muscle in the cervical area. Anterior and posterior flaps are elevated along this airplane, exposing the gland

anteriorly as well as the former border of the sternocleidomastoid muscle posteriorly (11). Care needs to be taken to not "button-hole" the skin flap by raising an excessively thin flap. The flaps are then sutured in position or pulled back far from the medical field. Using sharp breakdown, the tail of the parotid gland is after that divided from the sternocleidomastoid muscular tissue, the cartilaginous exterior acoustic canal, and also the posterior digastric as well as stylohyoid muscle mass. The greater auricular nerve is encountered throughout mobilization of the lateral wattle. Its former department must typically be given up to mobilize the gland sufficiently. When possible, the posterior division of the better auricular nerve should be protected to preserve experience to the earlobe ⁽¹²⁾. The tragal guideline as well as tympanomastoid stitch line are also revealed throughout this dissection. Attention is after that focused on the essential job of localizing the facial nerve. Numerous medical spots help in the identification of the 7th nerve.

○ **Outcomes and complications follow Parotidectomy:**

Research studies by Erkan et al ⁽¹²⁾ and Nitzan et al ⁽¹³⁾ reported that, complying with a parotidectomy, the general health condition of the majority of patients excelled. These studies wrapped up that parotidectomy did not show up to severely influence the general QoL, they did not evaluate whether there was a difference in the QoL following different resection types. In today research, it was also observed that most of patients within the total example remained in excellent general health and wellness, which PSP conferred a comparable general wellness outcome compared with SP.

Foghsgaard et al ⁽¹⁴⁾ examined instant post-operative pain complying with SP, and recognized no significant distinction in the pain rating between patients with a transected or preserved posterior branch of the terrific auricular nerve (GAN). It is most likely that the reported pains were an outcome of surgical injury, as well as consequently, whether or not the various surgical strategies had an adverse effect upon pain would certainly require additional examining subsequent to a longer follow-up duration. Wormald et al ⁽¹⁵⁾ analyzed pain following parotidectomy using an aesthetic analogue scale and also identified that pain appeared to have little effect after the patients. Nevertheless, the study did report one patient who presented with serious and consistent pain. A possible explanation for this may have been neuroma development following damages to the GAN. In the here and now research, efforts were made to maintain the GAN posterior branch in each patient. As there were no records of neuroma formation during the follow-up, patients from each of the groups showed high pain ratings. The distinction in these ratings was not recognized to be significant between the teams.

In a study by Nitzan et al ⁽¹³⁾, 70% of patients reported a change in appearance; 60% because of scarring and 58% as a result of regional depression. Therefore, it is feasible that the domains of look, scarring and also facial contours are connected, and also must for that reason be evaluated together. A research study by Koch et al ⁽¹⁶⁾ determined that the majority of patients were not totally satisfied with the aesthetic result following surgical procedure. Nevertheless, the mean score was relatively high as well as the writers did not show a substantial connection in between cosmetic look and also the extent of surgical procedure (PSP vs. SP). In the present research, it was revealed that most of patients who were satisfied with the cosmetic result, and those that's mean rating was dramatically different to that of the SP group, were those that had undergone PSP. It was for that reason hypothesized that a bigger amount of gland tissue removal resulted in enhanced cosmetic morbidity. The searchings for of Ciuman et al ⁽¹⁸⁾ and also Roh et al ⁽¹⁹⁾ also support this result. The majority of the parotidectomies in today research were carried out making use of modified Blair lacerations. Previous researches ⁽²⁰⁾ have actually suggested that this laceration would cause a famous scar, nonetheless, the majority of patients in the here and now research reported that the scar was hardly obvious. This might be the result of the sutures being executed by an experienced surgeon, or the post-operative application of a mark formation inhibitor.

Loss of experience is a difficulty reported following GAN sacrifice. In a research study by Koch et alia ⁽¹⁶⁾, the mean score for loss of sensation was 4.3, without any substantial distinction determined in between PSP as well as SP. This searching for was consistent with that of today research. By contrast, Ciuman et al ⁽¹⁸⁾ demonstrated statistically substantial distinctions in between sensory impairment and also the degree of surgery. The duration of sensory disability was substantially longer complying with SP compared to PSP. This searching for may be the outcome of varied follow-up times and the opportunity that sensory deficits could lower with time ⁽¹⁶⁾.

Adhering to a parotidectomy, Frey's syndrome has been shown to impact between 1.5 and also 27.7% of patients ^(21,22). The pathogenesis is believed to be the aberrant healing of understanding as well as parasympathetic nerves. In a research by Emodi et alia ⁽²¹⁾, Frey's syndrome happened in 27.7% of the patients: Four situations treated with SP and 9 instances treated with PSP. Likewise, Papadogeorgakis et alia ⁽²⁰⁾ reported that Frey's syndrome influenced 18% of patients who had actually undertaken SP, and 5% who had undertaken PSP. However, these research studies did not reveal a considerable distinction in the occurrence of Frey's syndrome in patients dealt with by PSP or SP, which may have been the outcome of

tiny example sizes.). This could be due to that less parotid tissue was eliminated by SP, and also as the parotid fascia was closed straight (20). In the QoL evaluation, a higher percentage of patients dealt with by SP reported this difficulty. PSP might not only lower the occurrence of Frey's syndrome, however likewise attain excellent QoL results ⁽¹⁸⁾.

Intra-operative complications of parotid gland surgical procedure comprise transection of the facial nerve or one of its branches, rupture of the capsulae of a parotid tumor or insufficient surgical resection thereof. The specialist has to instantly acknowledge an intra-operative complication as well as monitoring thereof have to be performed right away. In case of nerve injury, immediate nerve fixing is necessary. Once the segments have been completely activated and combined without stress, both ends need to be sutured with each other. The nerves are delicately understood with some Bishop forceps. With an 8-0 nylon stitch and also a GS-8 needle, the epineurium is understood at one end and then sutured to the various other, preventing deep cuts in the perineurium. 3 stitches are typically ample to keep the anastomosis. As an alternative to sutures, the doctor may use fibrin cells adhesive. If the nerve size is inadequate, a nerve graft of the higher auricular nerve, can be used ^(23,24).

Intra-operative opening of the pseudocapsule of pleomorphic adenomas is commonly held to raise the risk of recurrence ^(23,25). However, Laskawi et al. examining individual experience on parotidectomy for pleomorphic adenoma located no evidence of reoccurrence in any one of the 18 from 475 patients in whom the tumor capsule had to be opened intra-operatively on account of tough problems ⁽²⁶⁾. The main factor for pleomorphic adenoma reappearance is incomplete surgical resection. In these situations, it is suggested to do post-operative radiotherapy ^(25,27).

Table 1: complications of parotid gland surgery (intra and post-operative)

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	Recurrent tumour
	Skin flap necrosis	Soft tissue deficit
	Cosmetic deformity	Hypertrophic scar or keloid
	Trismus	Frey's syndrome
	Parotid fistula	

Facial palsy follows parotidectomy:

Post-operative facial nerve dysfunction involving some or all the branches of the nerve is one of the most regular early problem of parotid gland surgery. Momentary facial nerve paresis, including all or just one or two branches of the facial nerve, as well as long-term total paralysis have happened, specifically, in 9.3% to 64.6% and in 0% to 8% of parotidectomies, reported in the literary works. The cases of transient facial nerve paresis typically resolved within 6 months, with 90% within 1 month ^(28,29,30). Short-term paresis normally resolves, inning accordance with Laccourreye, within the 18th post-operative month ⁽²⁸⁾. The occurrence of facial nerve paralysis is greater with total, compared to with surface parotidectomy, which could be connected to stretch injury or as outcome of surgical interference with the vasa nervorum. Modification parotidectomy or parotidectomies for parotid fistula are usually associated with a greater incidence of face weakness. The branch of the facial nerve most in danger for injury during parotidectomy is the marginal mandibular branch. Older patients seem extra susceptible to facial nerve injury. Short-lived facial nerve weakness is a cosmetic problem, as well as patients ought to be informed their appearance will go back to normal. Nonetheless, eye defense must be ensured. If facial paresis triggers incomplete closure of the eye, the patient should be recommended to utilize ophthalmic wetness drops regularly during the day and also a sensory ointment and eye defense during the night. Routine follow-up with an ophthalmologist is obligatory ⁽³⁰⁾.

4. CONCLUSION

Surgical methods for salivary gland surgical procedure will continuously develop as new modern technologies develop. A detailed understanding of the disease processes as well as anatomy will certainly remain of extremely important value in the effective medical administration of salivary gland disease. Although a number of records in the literature have actually documented the medical technique, as well as the oncological result attained with parotidectomy, just a few articles have actually explained the problems of parotid gland surgical treatment and also their monitoring. Numerous problems have been reported in parotid surgical treatment.

REFERENCES

- [1] Emerick KS, Fabian RL, Deschler DG. Clinical presentation, management, and outcome of high-grade mucoepidermoid carcinoma of the parotid gland. *Otolaryngol Head Neck Surg.* 2007 May. 136(5):783-7.
- [2] Upton DC, McNamar JP, Connor NP, Harari PM, Harting GK. Parotidectomy: ten-year review of 237 cases at a single institution. *Otolaryngol Head Neck Surg.* 2007;136:788–792. doi: 10.1016/j.otohns.2006.11.037.
- [3] Pia F, Policarpo M, Dosdegani R, Olina M, Brovelli F, Aluffi P. Centripetal approach to the facial nerve in parotid surgery: personal experience. *Acta Otorhinolaryngol Ital.* 2003;23:111–115.
- [4] Bhattacharyya N, Richardson ME, Gugino LD. An objective assessment of the advantages of retrograde parotidectomy. *Otolaryngol Head Neck Surg.* 2004;131:392–396. doi: 10.1016/j.otohns.2004.03.012.
- [5] Emodi O, El-Naaj IA, Gordin A, Akrish S, Peled M. Superficial parotidectomy versus retrograde partial superficial parotidectomy in treating benign salivary gland tumor (pleomorphic adenoma) *J Oral Maxillofac Surg.* 2010;68:2092–2098. doi: 10.1016/j.joms.2009.09.075.
- [6] Erkan AN, Yavuz H, Ozer C, Ozer F, Ozluoglu L. Quality of life after surgery for benign disease of the parotid gland. *J Laryngol Otol.* 2008;122:397–402. doi: 10.1017/S0022215107008547.
- [7] Nitzan D, Kronenberg J, Horowitz Z, et al. Quality of life following parotidectomy for malignant and benign disease. *Plast Reconstr Surg.* 2004;114:1060–1067. doi: 10.1097/01.PRS.0000135326.50939.C1.
- [8] Koch M, Zenk J, Iro H. Long-term results of morbidity after parotid gland surgery in benign disease. *Laryngoscope.* 2010;120:724–730. doi: 10.1002/lary.20822.
- [9] Zhang SS, Ma DQ, Guo CB, Huang MX, Peng X, Yu GY. Conservation of salivary secretion and facial nerve function in partial superficial parotidectomy. *Int J Oral Maxillofac Surg.* 2013;42:868–873. doi: 10.1016/j.ijom.2013.03.014.
- [10] Futran ND, Parvathaneni U, Martins RG, et al. Malignant salivary gland tumors. Part A: general principles and management. In: Harrison LB, Sessions RB, Hong WK, editors. *Head and neck cancer: a multidisciplinary approach.* 3rd edition. Philadelphia: Lippincott Williams & Wilkins; 2009. p. 589–610.
- [11] Elluru RG, Kumar M, et al. Physiology of the salivary glands. In: Cummings CW, Haughey BH, Thomas JR, et al, editors. *Cummings otolaryngology: head and neck surgery,* 4th edition 2. Philadelphia: Mosby Inc.; 2005. p. 1293–312.
- [12] Lore J, Medina J. The parotid salivary gland and management of malignant salivary gland neoplasia. In: Lore J, Medina J, editors. *An atlas of head and neck surgery.* 4th edition. Philadelphia: WB Saunders; 2004. p. 861–91.
- [13] Erkan AN, Yavuz H, Ozer C, Ozer F, Ozluoglu L. Quality of life after surgery for benign disease of the parotid gland. *J Laryngol Otol.* 2008;122:397–402.
- [14] Nitzan D, Kronenberg J, Horowitz Z, et al. Quality of life following parotidectomy for malignant and benign disease. *Plast Reconstr Surg.* 2004;114:1060–1067.
- [15] Foghsgaard S, Foghsgaard J, Homøe P. Early post-operative morbidity after superficial parotidectomy: a prospective study concerning pain and resumption of normal activity. *Clin Otolaryngol.* 2007;32:54–57.
- [16] Wormald R, Donnelly M, Timon C. ‘Minor’ morbidity after parotid surgery via the modified Blair incision. *J Plast Reconstr Aesthet Surg.* 2009;62:1008–1011.
- [17] Koch M, Zenk J, Iro H. Long-term results of morbidity after parotid gland surgery in benign disease. *Laryngoscope.* 2010;120:724–730.
- [18] Ciuman RR, Oels W, Jaussi R, Dost P. Outcome, general, and symptom-specific quality of life after various types of parotid resection. *Laryngoscope.* 2012;122:1254–1261.
- [19] Roh JL, Kim HS, Park CI. Randomized clinical trial comparing partial parotidectomy versus superficial or total parotidectomy. *Br J Surg.* 2007;94:1081–1087. doi: 10.1002/bjs.5947.

- [20] Papadogeorgakis N. Partial superficial parotidectomy as the method of choice for treating pleomorphic adenomas of the parotid gland. *Br J Oral Maxillofac Surg*. 2011;49:447–450.
- [21] Emodi O, El-Naaj IA, Gordin A, Akrish S, Peled M. Superficial parotidectomy versus retrograde partial superficial parotidectomy in treating benign salivary gland tumor (pleomorphic adenoma) *J Oral Maxillofac Surg*. 2010;68:2092–2098.
- [22] Ali NS, Nawaz A, Rajput S, Ikram M. Parotidectomy: a review of 112 patients treated at a teaching hospital in Pakistan. *Asian Pacific J Cancer Prev*. 2010;11:1111–1113.
- [23] Bailey BJ. *Head and Neck Surgery-Otolaryngology*. 3rd Edn. Philadelphia, PA: Lippincott Williams & Wilkins; 2001.
- [24] Dulguerov P, Marchal F, Lehmann W. Postparotidectomy facial nerve paralysis: possible etiologic factors and results with routine facial nerve monitoring. *Laryngoscope* 1999;109:754-62.
- [25] Natvig K, Soberg R. Relationship of intraoperative rupture of pleomorphic adenomas to recurrence: an 11-25 year follow-up study. *Head Neck* 1994;16:213-7.
- [26] Laskawi R, Schott T, Mirzaie-Petri M, Schroeder M. Surgical management of pleomorphic adenomas of the parotid gland: a follow-up study of three methods. *J Oral Maxillofac Surg* 1996;54:1176-9.
- [27] Piekarski J, Nejc D, Szymczak W, Wronski K, Jeziorski A. Results of extracapsular dissection of pleomorphic adenoma of parotid gland. *J Oral Maxillofac Surg* 2004;62:1198-202.
- [28] Laccourreye H, Laccourreye O, Cauchois R, Jouffre V, Menard M, Brasnu D. Total conservative parotidectomy for primary benign pleomorphic adenoma of the parotid gland: a 25-year experience with 229 patients. *Laryngoscope* 1994;104:1487-94.
- [29] Laskawi R, Schott T, Mirzaie-Petri M, Schroeder M. Surgical management of pleomorphic adenomas of the parotid gland: a follow-up study of three methods. *J Oral Maxillofac Surg* 1996;54:1176-9.
- [30] Olsen KD. Superficial parotidectomy. *Oper Techn Gen Surg* 2004;6:102-14.