Am J Otolaryngol 40 (2019) 152–155

Contents lists available at ScienceDirect

Am J Otolaryngol

journal homepage: www.elsevier.com/locate/amjoto

Retrograde parotidectomy under local anesthesia for benign, malignant, and inflammatory lesions

Michael Chang[a,*], Alanna Coughran[a], Yu-Jin Lee[a,b], Jeremy Collins[c], Davud Sirjani[a]

[a] Department of Otolaryngology-Head and Neck Surgery, Stanford University, 801 Welch Road, Stanford, CA, USA 94305
[b] Department of Health Research and Policy, Stanford University, Stanford, CA 94305, USA
[c] Department of Anesthesiology, Perioperative, and Pain Medicine, Stanford University, Stanford, CA 94305, USA

ARTICLE INFO

Keywords:
Parotidectomy
Local anesthesia
Parotitis
Parotid tumor
Salivary cancer

ABSTRACT

Objective: To report the patient selection, surgical technique, and outcomes of parotidectomy using local anesthesia under monitored anesthesia care (MAC).
Methods: A retrospective chart review was performed for patients undergoing parotidectomy under local anesthesia at an academic head and neck surgery center.
Results: Six patients deemed high risk for general anesthesia (GA) due to medical comorbidities or with a strong preference to avoid GA underwent parotidectomy using local anesthesia and MAC. Parotidectomy was performed for several indications, including benign tumors, malignant tumors, and chronic sialadenitis. Mean age of patients was 78.0 ± 7.9 years, and all had an American Society of Anesthesia score ≥ 2 and Charlson comorbidity index ≥4. Mean operative time was 102.8 ± 38.3 min, comparable to that of parotidectomy under general anesthesia. No major complications occurred. Minor complications included three cases of temporary postoperative facial nerve weakness limited to 1–2 lower division branches. At most recent follow up (10 to 48 months), all patients were medically stable and disease free.
Conclusion: In carefully selected patients, parotidectomy under local anesthesia is a viable treatment alternative that can be offered to patients. Successful outcomes require preoperative counseling, meticulous technique, and close collaboration with anesthesia colleagues.

1. Introduction

Parotidectomy is commonly indicated for parotid gland neoplasms of both benign and malignant nature, and it is typically performed under general anesthesia (GA). For patients at high risk for complications from general anesthesia due to medical comorbidities, alternative treatment options are very limited. In cases of malignancy, surgical excision is key to achieving better locoregional control, disease-free survival, and overall survival compared to nonsurgical treatments such as radiation [1]. Parotidectomy under local anesthesia is a treatment option that has been reported in other countries for a wide variety of indications [2–9]. We report our series of six patients undergoing parotidectomy under local anesthesia, which is the largest series reported in the United States to date. We describe our patient selection, anesthetic technique, and surgical technique, all of which are critical to achieving successful surgical outcomes.

2. Materials and methods

2.1. Patient selection

Patients were offered parotidectomy under local anesthesia for conditions in which surgical treatment would otherwise be the standard of care but their medical comorbidity profile would preclude them from surgery under GA. In cases of neoplasm, cases were also reviewed with our institution's head and neck tumor board. All patients underwent preoperative surgical and anesthesia counseling to ensure their suitability to tolerate the entire procedure while remaining conscious.

2.2. Anesthestic technique

All procedures were conducted in an operating room and patient vital signs were closely monitored throughout. Oxygen was administered via nasal cannula at 3 L/min and intravenous sedation was

* Corresponding author.
E-mail addresses: Michael.t.chang@stanford.edu (M. Chang), alannac@stanford.edu (A. Coughran), yujinlee@stanford.edu (Y.-J. Lee), jcoll@stanford.edu (J. Collins), dsirjani@stanford.edu (D. Sirjani).

https://doi.org/10.1016/j.amjoto.2019.01.002
Received 7 December 2018

carefully administered by the anesthesiologist to maintain patient comfort whilst avoiding airway obstruction. Agents chosen for sedation included a combination of two of the following agents: propofol, dexmetomidine, midazolam, fentanyl, or remifentanil. For local anesthetic, 1% lidocaine with 1:100,000 epinephrine was injected to the incision site subcutaneously, typically 5–15 mL total volume. When moving to anesthetize the deeper tissues, we began the initial injection superficially around the lesion and minutes later asked the patient to smile to rule out a deep lobe tumor which would displace the facial nerve superficially thus making the patient subject to paralysis from the local. If facial movement was present following injection, the facial nerve was likely deep to the lesion.

2.3. Surgical technique

After injection, patients were draped in a sterile fashion. The face was left exposed, both to enable visualization of facial movement, and to avoid accumulation of an oxygen reservoir that might otherwise present a fire risk. For patient comfort, no shoulder rolls or monopolar cautery were used. Additionally, no facial nerve monitors or nerve stimulators were used. Facial nerve monitoring was achieved by careful visual inspection of all facial movements occurring spontaneously or following commands. Skin was incised through a modified Blair incision, with extension inferiorly to the neck if a limited neck dissection was anticipated. Standard sub-platysmal flaps were raised until the macroscopic anterior border of the lesion was exposed. Fish hook retractors set at low tension were used to retract soft tissue. In all cases, facial nerve was identified through retrograde dissection (Fig. 1). With the jaw in the closed position, the angle of the mandible was used as a palpable landmark where the facial nerve lower division branches were identified reliably within a 1 cm radius of this landmark. The plane of dissection into the parotid gland bisected the angle of the mandible. In cases where the tumor was directly over the angle, the plane of dissection was moved anterior to the tumor but maintained in a plane perpendicular to the inferior edge of the mandible. Once a distal branch was identified, it was traced in a retrograde fashion to the main trunk. Intraoperative local injections of the deeper tissues as the pes was approached often paralyzed the nerve, thus facial nerve monitoring was limited to purely visual inspection. Warm water irrigation was often used to optimize visualization and hemostasis. With the facial nerve visualized, the lesion of interest was then circumscribed and removed. A neck dissection then followed if indicated; in this series neck dissections were only limited to level IIb-III for pathologic staging of clinically negative nodal disease. Hemostasis was achieved using 1:1000 epinephrine pledgets, surgical clips, and bipolar cautery. A Jackson-Pratt drain was placed in the wound bed, and all wounds were closed primarily.

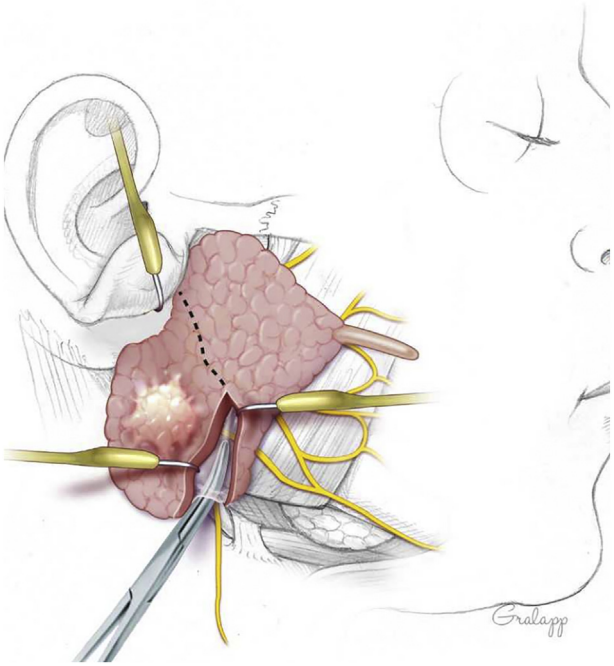

Fig. 1. Retrograde parotidectomy technique. Identification of distal branches of the facial nerve with retrograde dissection to the main trunk, which can decrease risk of traction injury to the facial nerve.

2.4. Institutional Review Board (IRB)

This single-center retrospective case series at an academic institution was deemed IRB-exempt at Stanford University under 45 CFR 46 or 21 CFR 50, 56.

3. Results

Six patients elected to undergo parotidectomy under local anesthesia with MAC, summarized in Table 1. The mean patient age was 78.0 ± 7.9 years. All patients either had significant medical comorbidities that placed them at high risk for GA or had a strong preference to avoid GA; 2 patients were ASA class 2, and 4 patients were ASA class 3. Charlson comorbidity index for all patients was four or greater, which prognosticates greater than a 50% mortality rate in 10 years.

Main indications for parotidectomy were neoplastic: two pleomorphic adenomas (one of which was recurrent), one carcinoma ex pleomorphic, and one metastatic squamous cell carcinoma. Two additional parotidectomies were performed for chronic inflammatory disease refractory to medical treatment.

Mean operative time was 102.8 ± 38.3 min, including cases that required a limited neck dissection. For cases without neck dissection, mean operative time was 89.0 ± 20.4 min.

This is on par with typical cited operative times for standard parotidectomy [10].

Three patients had mild postoperative weakness isolated to the marginal mandibular branch of the facial nerve (House-Brackmann score 2/6). One of these patients recovered full movement within three weeks. Otherwise there were no other minor or major complications. Two patients were discharged home on the same day. The remaining patients had uneventful recoveries and were discharged home on postoperative day one.

With respect to oncologic outcomes, both pleomorphic adenomas were benign and excised to negative margins on final pathology. At 36- and 48-month follow up visits, both patients were doing well without evidence of recurrence. One patient with carcinoma ex pleomorphic adenoma had a positive microscopic deep margin. Two left level II lymph nodes were excised and negative for carcinoma. Given the high grade pathology, the patient received postoperative radiation therapy as planned, with 66 Gy to the tumor bed, 54 Gy to intermediate risk regions (skull base, preauricular, postauricular, left neck II–III), 50 Gy to low risk region (left level IV). Because of his advanced cardiovascular and renal disease, chemotherapy was contraindicated. At 36 months follow up, the patient was doing well without evidence of recurrence. One patient with squamous cell carcinoma, presumed metastatic from a known prior cutaneous lesion, had an inadequate deep margin (< 5 mm) given its proximity to the facial nerve. A limited neck dissection of level II-IIIb yielded 0/16 positive nodes. He underwent adjuvant chemoradiation and at 10 months following treatment is disease free. All patients reported satisfaction with their surgical experience.

4. Discussion

Parotidectomy is one of the most common surgical procedures for

Table 1
Summary of patients undergoing parotidectomy under local anesthesia.

Age/Sex	Pathology	Comorbidities	ASA	CCI	Procedure	Tumor size (cm)	Surgical time (min)	HB Postop	Adjuvant treatment	Follow up
72/M	Pleomorphic adenoma	CHF, AFib, asthma	2	5	Superficial parotidectomy	3.5 × 2.5 × 2.0	63	1/6	None	Disease free at 3.5 years
84/M	Pleomorphic adenoma (recurrent)	COPD	3	6	Revision superficial parotidectomy	3.5 × 3.0 × 2.8	113	2/6	None	Disease free at 4 years
72/M	Carcinoma ex pleomorphic	CKD, CHF	3	8	Total parotidectomy, limited neck dissection	2.4 × 2.2 × 1.9	86	1/6	RT	Disease free at 3 years
87/M	Metastatic squamous cell carcinoma	HTN	3	6	Total parotidectomy, limited neck dissection	4.8 × 3.9 × 3.8	174	2/6	RT + cetuximab	Disease free at 8 months
83/M	Severe sialadenitis	Aortic stenosis	2	5	Superficial parotidectomy	n/a	91	1/6	n/a	No sialadenitis for 3 years
68/F	Refractory sialadenitis	AFib, HTN, CAD, OSA	3	4	Revision superficial parotidectomy	n/a	90	2/6	n/a	No sialadenitis for 1.5 years

Abbreviations: ASA: American Society of Anesthesiologists scale, CCI: Charlson comorbidity index. HB: House-Brackmann score. CHF: congestive heart failure. AFib: atrial fibrillation. COPD: chronic obstructive pulmonary disease. CKD: chronic kidney disease. HTN: hypertension. CAD: coronary artery disease. OSA: obstructive sleep apnea. RT: radiotherapy.

head and neck surgeons, performed for a wide variety of indications including benign neoplasms, malignancies, and chronic inflammatory disease. By and large, this procedure is performed under general anesthesia, which facilitates facial nerve monitoring and allows for more meticulous dissection in the immobile, anesthetized subject. However, the majority of parotid tumors occur during the sixth and seventh decade of life [11], which increases the likelihood that accumulated medical comorbidities may present a very high risk of undergoing general anesthesia. Surgery remains the most effective treatment for salivary malignancies with improved cure rates by the addition of adjuvant radiotherapy for high grade carcinomas. Here we describe a viable surgical alternative in patients that would otherwise be poor GA candidates. To date, this is the largest series reported in the United States of parotidectomy under local anesthesia.

The first report of parotid surgery under local anesthesia came from Japan in 1987, which was a lumpectomy performed for adenocarcinoma [2]. The first report of a formal superficial parotidectomy under local anesthesia was reported by a British group in 2000, for a pleomorphic adenoma in a patient that was otherwise healthy but refused general anesthesia [3]. Several international series have followed, with variations in indications and technique. The largest two series have come from Greece describing 16 patients with benign parotid lesions [4] and from Hong Kong describing 50 patients with benign parotid lesions [5].

Several groups have described parotidectomy using regional block techniques (an ascending cervical plexus + auriculotemporal nerve combination or a V2 + V3 + greater auricular nerve combination) which provide a larger field of anesthetic effect while still allowing for volitional facial movement [6–8].

A parotidectomy under local anesthesia and MAC should not be a substitute for parotidectomy under GA if the latter can be performed safely. Rather, the procedure under local anesthesia should be reserved for specific cases, namely: 1. Definitive diagnosis or treatment in cases of suspected malignancy in a patient with high GA risk, 2. Excision of parotid lesions in patients that are unwilling to undergo general anesthesia, with a clear understanding and acceptance of the risk of postoperative facial nerve weakness, 3. Chronic inflammatory disease refractory to medical therapy in a patient with high GA risk. Our case series is the first to report successful utilization of this technique for chronic inflammatory parotid disease.

In this series, all cases utilized retrograde facial nerve dissection technique, which in the setting of a local anesthesia MAC procedure may offer complementary benefits. In the absence of a facial nerve monitor, the retrograde technique decreases the chance of major functional defect should a nerve injury occur [13]. The traditional anterograde technique often requires retraction against the main trunk at the beginning of the case during identification of the facial nerve deep in the preauricular region, which may be paralyzed from the local anesthetic. The anterograde technique thus may increase risk of traction injury at the main trunk. The retrograde technique can decrease the risk of this potential complication, as the facial nerve is identified via peripheral branches prior to exposure of the main trunk. Even if the marginal mandibular or cervical branch is paralyzed from the local anesthetic, stimulation of the pes can still confirm facial nerve viability via stimulation of the remaining branches.

Additionally, the retrograde technique may be a more expedient technique. A series of 13 patients from Brazil describes parotidectomy under local anesthesia using primarily a classic facial nerve dissection, with identification of the nerve at the tragal pointer and a subsequent anterograde dissection of the branches [8]. Their mean operating time was 118.2 ± 16.4 min, compared to this series of 102.8 ± 38.3 min (89.0 ± 20.4 min when excluding cases with neck dissection). Because prolonged operative times are known to correlate with increased complication rates [12], it is important to utilize the most efficient techniques for patients with significant medical comorbidities.

The advantages and disadvantages should be reviewed in a dialogue

between the patient, otolaryngologist, and anesthesiologist. MAC is most suitable for patients who are motivated to maintain consciousness during the procedure, remain still for a prolonged period of time, and participate in facial nerve identification intraoperatively. It is less suitable for patients who may be more likely to demonstrate restlessness (chronic pain, anxiety, claustrophobia) and patients with a low threshold for upper airway collapse at moderate levels of sedation (OSA, obesity). Because sedation induces a tendency for disinhibition, patients must be highly motivated and understand that their cooperation is essential throughout. As the patient's airway remains close to the surgical field but distant from the anesthesiologist, patient safety relies on careful communication between all members of the surgical team.

Depending on the preferences of the anesthesiologist, MAC offers an advantage for patients with a specific set of perioperative risk factors such as severe pulmonary hypertension, complex congenital heart disease, cardiomyopathy, severe valvular pathology and patients with poor pulmonary function with potential for postoperative respiratory depression.

The main limitations of this study are its retrospective nature and small number of cases. Future prospective studies are needed to better elucidate patient perceptions, safety, and long term outcomes of patients undergoing this procedure. Nonetheless this series suggests that in carefully selected patients, parotidectomy under local anesthesia can be offered as a viable treatment option for several indications including benign tumors, malignant tumors, and chronic salivary disease, with good functional and survival outcomes.

5. Conclusion

The retrograde parotidectomy under local anesthesia is a viable treatment alternative in patients with benign, malignant, and inflammatory lesions who are poor general anesthesia candidates, with operative time, complication rates, functional outcomes, and oncologic outcomes that are comparable to traditional parotidectomy.

Sources of funding

This work was supported by the National Institutes of Health TL1 Clinical Research Training Program of the Stanford Clinical and Translational Science Award to Spectrum (NIH TL1 TR 001084).

Conflict of interest

All authors confirm that there are no conflicts of interest associated with this publication.

Acknowledgements

The authors would like to thank Christine Gralapp for her assistance in illustrations.

References

[1] Mendenhall WM, Morris CG, Amdur RJ, Werning JW, Villaret DB. Radiotherapy alone or combined with surgery for salivary gland carcinoma. Cancer 2005;103:2544–50. https://doi.org/10.1002/cncr.21083.
[2] Fujimara T, Yonemura Y, Kamata T, et al. A case of parotid tumor showing remarkable regression following hyperthermo-chemo-radiotherapy. Jpn J Cancer Chemother 1987;14:723–7.
[3] Reece PH, Papesch ME, Tolley NS. J Laryngol Otol 2000;114:983–4.
[4] Safioleas M, Stamatakos M, Safioleas P, Diab A, Iannescu R, Safioleas C. Superficial parotidectomy under local anesthesia. Chirurg 2008;103:453–4.
[5] Cheung SH, Kwan WYW, Tsui KP, Chow TL. Partial parotidectomy under local anesthesia for benign parotid tumors – an experience of 50 cases. Am J Otolaryngol 2018;39:286–9. https://doi.org/10.1016/j.amjoto.2018.03.008.
[6] Sethna KS, Sengupta MA, Prabhakar S. Local anesthesia for parotidectomy — a new technique. Ambul Surg 1996:93–4.
[7] Shahid K, Siddiqui BK, Tahir MH, et al. Total parotidectomy under local anesthesia: a novel technique. J Coll Physicians Surg Pak 2007;17:116–7. (DOI:02.2007/JCPSP.116117).
[8] Tesseroli MA, Zasso FB, Hepp H, Priante AV, de Mattos Filho AL, Sanabria A. Parotidectomy under sedation and locoregional anesthesia with monitoring of brain activity. Head Neck 2018;39(4):744–7. https://doi.org/10.1102/hed.24674.
[9] Singh ID, Galagali JR, Hota MA. A case series of superficial parotidectomy under local anesthesia. Int J Oto Head Neck Surg 2015;1(1):27–30. https://doi.org/10.18203/issn.2454-5929.ijohns20150583.
[10] Bhattacharyya N, Richardson ME, Gugino LD. An objective assessment of the advantages of retrograde parotidectomy. Otolaryngol Head Neck Surg 2004;131:392–6. https://doi.org/10.1016/j/otohns.2004.03.012.
[11] American Cancer Society. What are the key statistics about salivary gland cancer? www.cancer.org/cancer/salivary-gland-cancer/about, Accessed date: 22 October 2018.
[12] Pederson T, Eliasen K, Henriksen E. A prospective study of risk factors and cardiopulmonary complications associated with anaesthesia and surgery: risk indicators of cardiopulmonary morbidity. Acta Anaesthesiol Scand 1990;34:144–55.
[13] Kligerman MP, Song Y, Schoppy D, et al. Retrograde parotidectomy and facial nerve outcomes: a case series of 44 patients. Am J Otolaryngol 2017;38:533–6. https://doi.org/10.1016/j.amjoto.2017.05.003.