Endoscope-Assisted Extracapsular Resection of Benign Parotid Tumors Via Temporal and Retroauricular Approach

Jian-Hua Zhu, MD, Zheng He, MD,† and Lei Zhang, MD**

Objective: To evaluate the feasibility of endoscope-assisted extracapsular resection of benign parotid tumors via temporal and retroauricular approach.

Materials and Methods: A total of 12 patients with parotid gland tumors had endoscope-assisted extracapsular resection performed via temporal and retroauricular approach (4 versus 8) between January 2018 and January 2019.

Results: All tumors were benign with a median diameter of 2.32 ± 0.49 cm. The mean length of the skin incision was 3.5 ±0.35 cm. The mean operating time 86.7 ± 10.8 minutes. The median blood loss was 30.4 ± 5.94 ml. The median volume of drainage was 27.1 ± 8.88 ml and the duration of drainage was 2 ± 0.71 days. The mean aesthetics scoring assigned by patients was 9.67 ± 0.51. Two patients had numbness of the earlobe and 1 patient developed a transient salivary sialocele. No facial nerve paresis was observed and no tumor recurrence occurred during the follow-up period.

Conclusions: The minimally invasive endoscope-assisted extracapsular resection of benign parotid tumors provide both a safe and reliable technique for benign parotid tumors with excellent cosmetic results.

Key Words: Complications, endoscopic surgery, invisible scar, parotidectomy, tumor

From the *Department of Oral and Maxillofacial Surgery, Peking University School and Hospital of Stomatology; National Center of Stomatology & National Clinical Research Center for Oral Diseases; National Engineering Laboratory for Digital and Material Technology of Stomatology; Beijing Key Laboratory of Digital Stomatology; and †Department of Oral and Maxillofacial Surgery, Peking University International Hospital, Beijing 102206, PR China.

Received December 29, 2021.

Accepted for publication January 15, 2022.

Address correspondence and reprint requests to Lei Zhang, MD, Department of Oral and Maxillofacial Surgery, Peking University School and Hospital of Stomatology; National Center of Stomatology & National Clinical Research Center for Oral Diseases; National Engineering Laboratory for Digital and Material Technology of Stomatology; Beijing Key Laboratory of Digital Stomatology; No. 22 Zhongguancun South Avenue, Haidian District, Beijing 100081, PR China; E-mail: zhlei_doctor@sina.com

This work was supported by the National Key Technologies R&D Program of China [grant number 2016YFC1102104].

The authors report no conflicts of interest.

Supplemental Digital Content is available for this article. Direct URL citations are provided in the HTML and PDF versions of this article on the journal's website, www.jcraniofacialsurgery.com.

ISSN: 1049-2275

DOI: 10.1097/SCS.0000000000008525

(*J Craniofac Surg* 2023;34: 1054–1057)

Most tumors arising from the parotid gland are benign and located in the superficial lobe. The minimally invasive technique of extracapsular resection is gradually being adopted for the management benign parotid tumors as it facilitates tumor resection with safe tissue dissection.[1] The conventional operative treatment is usually performed through a modified Blair incision, which may leave a visible scar or keloid on the preauricular and submandibular extension of the incision.[2] Certain population groups, who are culturally averse to postoperative surgical scars, have promoted a drive towards more minimally invasive procedures. Several different surgical approaches have been introduced, such as a face-lift, postauricular, and a hairline skin incision.[3,4] Although these procedures produce good cosmetic result as the scar is hidden by the auricle and the patient's hair the surgery takes place down an extended surgical corridor. This results in the limited surgical view provided by the naked eye and compromised illumination. This in turn can make the surgery more difficult and increase the tissue damage along the surgical corridor.

In the past three decades, major changes have occurred in surgical perspective with a drive to reduce the magnitude of surgery but keep the outcome the same.[2] In response to this, endoscope-assisted surgery has been adopted by numerous surgical disciplines and is now the standard of care for many disciplines. Endoscope-assisted surgery has also been introduced to the head and neck with a focus on sinus and thyroid surgery.[5] But endoscopic surgery is still a new development in parotid surgery because of the anatomic nature and complexity of the surgery.[2] In this study, we demonstrate that the combination of endoscope-assisted parotid surgery and extracapsular resection of benign parotid tumors is feasible and a safe surgical technique in selected cases.

MATERIALS AND METHODS

Patients

Twelve patients (3 males and 9 females) with parotid gland tumors were treated by extracapsular dissection (ECD) from January 2018 to January 2019. The median age was 34 years (range 17–49). Each patient was given detailed information and all were consented to the procedure with the possibility of conversions to conventional open surgery. The study was approved by the local ethics committee. Inclusion criteria dictate a benign tumor (determined by fine needle aspiration cytology) and these were <4 cm and located in the superficial lobe of the parotid gland. Exclusion criteria included cases suspicious of malignant disease, immune and inflammatory disorders, and recurrent parotid tumors. All the patients had preoperative CT or MRI imaging. Evaluation of aesthetic outcome was based on

patient satisfaction by assigning a score (range 0–10) during follow-up.

Surgical Techniques

Preparation of Working Space

The procedure is performed under general anesthesia. The head is turned to the healthy side in supine position with a pillow under the patient's shoulder. To optimize the approach to the parotid gland, it is divided into 2 parts (regions I and II); the boundary was defined as a line between the earlobe and the middle of alae nasi and angle of mouth based on the body surface anatomically (Fig. 1). A 3 to 4 cm incision is, respectively, selected in the temporal region of the scalp above the hairline (region I) or along the retro-auricular skin crease (region II) according to the tumor location (Fig. 2A-B). A skin flap is elevated in a plain just below the superficial temporal fascia or platysma muscle using Metzenbaum scissors combined with a high-frequency electrotome. The dissection is undertaken by a combination of direct vision and magnified endoscopic images (4 mm diameter, 0°; Karl Storz, Tuttlingen, Germany) delivered by an experienced assistant. The tunneling process continues until the full circumference of the tumor is exposed. Then, the superficial layer of the parotid and the temporalis muscle or sternocleidomastoid muscle is clearly exposed with the introduction of a retractor in order to make adequate working space (Fig. 3A). During the tunneling process, it is important when using the temporal approach to identify, dissect, and protect the auriculotemporal nerve and the greater auricular nerve for retroauricular approach unless involved in the tumor.

Tissue Dissection and Extracapsular Resection of Tumors

Appreciating the precise positioning of the tumor is crucial for extracapsular resection. In the conventional approach, the lump can be palpated while with endoscope-assisted surgery, the magnified image and favorable illumination provided more intuitive assistance for identifying the tumor. The blunt and sharp dissection is then used to develop a connective tissue plain around the periphery of the parotid gland using a harmonic scalpel and elastic separating forceps. The harmonic scalpel is then used to carefully and safely divide these tissues (Fig. 3B). The dissection of the facial nerve was performed with the aid of facial nerve monitoring (Medtronic, NIM-Response 3.0, Jacksonville, FL). The magnified image provided by the endoscope make the facial nerve (Fig. 3C) and other structures such as the parotid duct easy to identify. Once the peripheral branch of the facial nerve is observed in the surgical field, it is gently dissected free of the tumor and then its magnified presence in the endoscopic visual field acts to protected it from any additional trauma. Manipulation of the endoscope by the assistant and use of different mirror angle's provides optimal visualization around the whole periphery of the tumor particularly the edge of the tumor facing away from the operator. The dissection proceeds through the parotid

FIGURE 2. The incision design and postoperative scar: (A) temporal approach; (B) retroauricular approach; (C) postoperative scar of temporal incision; and (D) postoperative scar of retroauricular incision (black arrow).

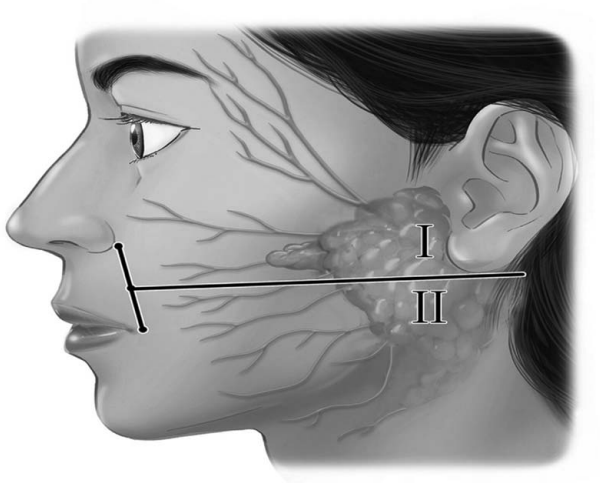

FIGURE 1. The parotid was divided into 2 parts named as I and II regions, respectively. The boundary was defined as a line between the earlobe and the middle of alae nasi and angle of mouth.

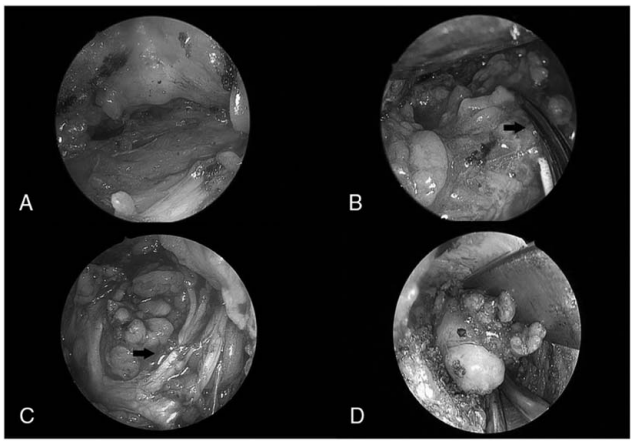

FIGURE 3. (A) Working space. (B) Dissection of tissues using a harmonic scalpel (black arrow). (C) Dissection of facial nerve (black arrow). (D) The specimen.

parenchymal to leave the tumor with a surrounding cuff of ~0.5 cm of normal tissue (Fig. 3D).

Treatment of Surgical Wound

The surgical field is irrigated and bleeding controlled by bipolar cautery. The residual parotid gland and fascia are reapproximated to avoid salivary fistula. The exposed facial nerve can be covered by gelatin sponge and a small negative pressure drain was inserted if required. A pressure bandage always applied for a 72 hours period to help avoid sialoceles. Sutures are normally removed 7 days after the surgery.

RESULTS

A total of 12 consecutive patients with superficial parotid tumors (4 in region I; 8 in region II) underwent successfully endoscope assisted ECD without the need to convert to conventional open surgery (as shown in Supplementary Digital Content, Table 1, http://links.lww.com/SCS/D803). The postoperative pathology of tumors was benign in all cases. The median diameter of the tumor was 2.32 ± 0.49 cm, the skin incision was 3.5 ± 0.35 cm, and the duration of operation 86.7 ± 10.8 minutes. The median blood loss was 30.4 ± 5.94 ml. The median volume of drainage was 27.1 ± 8.88 ml and the duration of drainage was 2 ± 0.71 days. The incisions healed without event and the mean aesthetics score assigned by patients was 9.67 ± 0.51. Two patients had numbness of the earlobe which had recovered by 3 months post surgery. One patient developed a salivary sialocele which dried up over a period of 10 days with the help of aspiration and a pressure dressing. There was no injury to the facial nerve paresis or evidence of tumor recurrence at follow-up (range 24–32 months).

DISCUSSION

The conventional parotidectomy is essentially a dissection of the facial nerve usually undertaken through a long S-shaped skin incision. Although it is a safe approach that provides a wide surgical exposure it often leaves an unsatisfactory scar some degree of asymmetry due to loss of the superficial lobe of the parotid and a real risk of Frey syndrome. In theory, endoscopic surgery is not an ideal technique for head and neck tumors because of the absence of the natural cavities. But the improved esthetic effect, fewer wound-related complications, and shorter recovery time are appealing attributes to both surgeon and patient and have spurred on the development of minimally invasive surgery in head and neck.[6] In sealed body cavities insufflation with CO2 creates an adequate workspace but this is not possible in the head and neck. The workspace was created after making a pocket between the platysma muscle and the surface of the superficial parotid gland which was maintained by conventional retractors held by an assistant. A custom device to lift the skin flap would be an advantage.

The scar located in natural auricular skin crease or hidden by the auricle and hair is almost imperceptible. Huang et al[7] presented 18 cases of endoscope-assisted partial parotidectomy through two skin incisions; one was made below the inferior border of the angle of the mandible or in the neck skin crease and another was made at the inferior border of the auricular lobule, which were close to the operative fields to get a better surgical view. However, although patients were satisfied with the cosmetic results, the retromandibular incision could be seen laterally. Woo et al[2] performed endoscope-assisted parotid surgery via a single 50 to 70 mm hairline incision and reported it suitable for a benign tumor located in the tail of the parotid gland. The limitation of the hairline approach is a greater distance from the incision to the site of the dissection particularly for the anterior or superior lobe of the parotid gland.[8] Besides, a single small incision is insufficient to develop an effective working space and exposure of the total parotid gland.[9] In this study, the retroauricular and temporal approaches were selected based on the site of the tumor. The decision on which approach to use was defined by simple anatomical landmarks. It should be noted that the resection of tumors in the accessory parotid gland pose a challenge because of the balance between the safety of dissection and the potentially compromise of cosmetic and minimally invasive objectives. Xie et al[10] performed endoscopic-assisted resection of benign tumors in the accessory parotid gland via incision in the margin of the tragus and the preauricular crease. Although the postoperative scar was acceptable, the preauricular keloid or hypertrophic scar is still easily observed on the skin surface. Based on our experience, the combination of the retroauricular and temporal incision is an alternative approach and provides both adequate surgical access and scar hidden by hair and auricle. Kim et al[11] reported the endoscope-assisted resection of accessory parotid tumors by a transoral approach. Although there is no external scar, it carries other potential risks such as the facial nerve injury, a limited working space, a contaminated surgical field, and difficulty in bleeding control.

A bloodless surgical field is important as it is essential for the safe dissection of the tumor and avoidance of injury to the facial nerve. Also if the tip of the endoscope is not repeatedly contaminated with blood then it helps shorten the operation time. The harmonic scalpel is a method for accurate dissection and punctilious hemostasis.[12] It has been shown to reduce operative time and intraoperative blood loss for parotidectomy.[13] The coagulation of tissues including vessels can be achieved at a much lower temperature[12] and there is no adverse electrical energy transferred to adjacent tissue such as the facial nerve.[13] Smoke is avoided in the ultrasonic system,[12] which greatly facilitates the endoscopic surgery by maintaining clear vision in the small cavity. Unfortunately, the expensive cost of the disposable harmonic scalpel is a limitation of the procedure.

Facial nerve paresis is an ever present threat in parotid surgery. The present study only contained 12 patients but no injury was encountered. This is a feature of the minimally invasive ECD technique and is further facilitated magnification of the surgical field and excellent illumination provided by the endoscope. In such circumstances, the facial nerve is easily and clearly identified during surgery and can be handled accurately and gently throughout the dissection. Continual nerve monitoring adds additional security,[2,14] particularly for inexperienced surgeons in the parotidectomy. However, only as an auxiliary method, it cannot substitute the facial nerve dissection under direct vision.[14] The risk of facial nerve paresis is related to the length of facial nerve exposed and isolation during surgery.[15] Paradoxically, although historically the routine dissection of the nerve was undertaken to minimize inadvertent injury the process of stripping the parenchyma encompasses a network of tiny interconnecting fibers and transient facial palsy is a recognized sequalae.[1] ECD is an alternative approach to the removal of neoplasms, which allows meticulous dissection immediately outside the tumor capsule, the preservation of the uninvolved parotid parenchymal tissue, and the freedom from extensive facial nerve dissection.[2,8] It is associated with significantly less transient nerve injury, no changes in the contour of the parotid and almost no risk of Frey syndrome. The combination of ECD and a minimal endoscopic ap-

proach seems an ideal combination in the appropriate parotid tumor. In the present series, 2 patients reported numbness of the earlobe which had recovered at 3 months review. This is normally a very common event in parotid surgery as a preauricular dissection down to the facial nerve risks the integrity of the small branch of sensory fibers from the greater auricular as they run into the lobe of the ear. The ECD technique does not normally address the trunk of the facial nerve and both greater auricular and auricular temporal nerves are undisturbed. Although the risk of a sialocele is reduced with the use of a harmonic scalpel,[12] 1 patient had a temporal salivary leak. This was managed successfully with a pressure dressing. Experience shows this can occur if there is the dissection of the parotid duct with edema and subsequent obstruction to salivary flow. Careful reapproximating of the layer of parotid fascia and routine use of a pressure dressing minimizes the risk of this event.

Endoscope-assisted parotidectomy is still in evolution and the indications need to be carefully controlled until the technique is fully developed. The technique is suitable for the benign tumors as previous reported.[1–3,7,8,10,16] But some low-grade cancers, however, can masquerade as benign lesions although this group seem to have a good prognosis.[17] The preoperative pathology is essential and the fine needle aspiration cytology was used in the present study. Gao et al[9] reported 2 patients with malignant parotid tumors treated by an endoscope-assisted approach. Neither tumor has recurred at 24 months' follow-up. However, it is still worthy to be discussed because of the absence of a larger series of patients with longer follow-up. Current data on ECD indicate a similar recurrence rate to conventional parotidectomy.[18] However, the risk of recurrence can't be addressed in this study group as the median time to recurrence for pleomorphic adenoma is 8 to 10 years. A second limitation is the length of the retroauricular incision. The patients with tumors >4 cm were excluded in case of unwanted tumor rupture. Finally, the disadvantage of endoscopic surgery is more time consuming than conventional surgery. This limits its application in patients who are not fit for long general anesthesia. The median duration of endoscopic surgery was 86.7 minutes (range 65–105 minutes) but this reduces with surgical experience.

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