

Minimally Invasive Approach in the Treatment of Benign Parotid Gland Tumors

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ABSTRACT

Background: Conventional incisions for parotidectomy heal with a hardly discernible scar, which can cause long-term psychosocial difficulties for patients. A minimally invasive method was the best option, when the parotid tumor was mobile, superficially and small in size, contain the preauricular and postauricular incisions without upper cervical or hairline incisions, which shorten the scar, dissection and improves the aesthetic results.

Aim of the study: To evaluate a minimally invasive approach of parotidectomy for benign parotid tumors regarding aesthetics, facial nerve weakness, numbness of the ear, and time of operation.

Materials and Methods: This prospective clinical study included 10 patients with benign parotid lesions treated with a minimally invasive approach via V-shape incision. Age, gender, histological type of the tumor, facial nerve assessment, the sensation of the posterior auricular nerve, operative time, and patient satisfaction were analyzed. Followed-up interval include 1, 2, 4, 12 and 24 weeks.

Results: Visual analogue scale for cosmetic satisfaction revealed 8 patients (very satisfied), and two patients (satisfied). Facial nerves were intact in 9 patients, while one patient's forehead wrinkles showed a slight weakening. PAN sensation showed hypoesthesia in 2 patients only. Mean operative time was relatively about 90 minutes.

Conclusions: Minimally invasive approach, is safe and practical for preserving the facial nerve and posterior auricular nerve, produce no scar on the face or neck marking a significant step forward in the cosmetic evaluation of parotidectomy with no significant complications. So, it turned out to be reasonable for the surgeon and satisfactory for the majority of the patients.

Keywords: Minimally invasive, Parotidectomy, Superficial parotidectomy.

INTRODUCTION

Of all head and neck neoplasms, salivary gland tumors represent 3% to 10% of the total. The parotid gland is the source of about 80% of these tumors, and 80% of them are benign. Guidelines for the surgical removal of benign parotid tumors have evolved ⁽¹⁾. Parotid gland tumors have a high degree of anatomical heterogeneity and are difficult to diagnose and treat. Their wide spectrum of biological behavior and relative rarity make diagnosis and treatment challenging ⁽²⁾. Approximately 75% of all benign tumors of the major salivary glands are pleomorphic adenomas (PAs), also known as benign mixed tumors. In most cases, PAs occur as isolated, symptomless, slowly growing tumors ⁽³⁾. Although superficial parotidectomy is still regarded as the gold standard parotid gland surgery for pleomorphic adenomas, parotid surgery has advanced significantly over the past century ⁽⁴⁾.

Fear of causing facial nerve damage may result in inadequate surgery and a high likelihood of recurrence ⁽²⁾. To precisely identify the facial nerve and prevent facial paralysis, a potentially fatal disease that has a significant influence on the patient's quality of life, a suitable incision and the identification of certain anatomical landmarks are required. The majority of the time, benign and malignant tumors of the primary salivary glands are the reason for parotid surgery ⁽⁵⁾. Parotidectomy, which entails creating a sizable S-shaped incision that runs from the lateral face across the parotid gland and up to the upper neck, has commonly

been performed using the Blair incision. In patients, especially those with skin hues like yellow, brown, or black, this classic incision has a negative cosmetic result of a lengthy visible permanent scar on the face and neck and may heal with a little visible scar. Long-term psychosocial difficulties for patients are a possibility because of the long visible scar ⁽⁶⁾. According to **Ciuman et al.**, cosmetic dissatisfaction with the surgical scar and post-parotidectomy deformities harmed quality of life ratings for both particular symptoms and as a whole. Patients may decline surgery because of the unsightly facial scar before the tumors have become large or displayed clinical indications of malignancy ⁽⁶⁾. The minimally invasive parotidectomy procedure reduces the drawbacks of standard treatment and improves the surgical result ⁽⁸⁾. It is suggested to make a pre- and retro-auricular incision that is not long enough to reach the area that bears hair. This improves the aesthetic results by reducing the extent of dissection and the size of the scar ⁽⁷⁾. This modified procedure involved an incision, flap elevation, facial nerve dissection while keeping the great auricular nerve intact, and postoperative removal ⁽⁸⁾.

PATIENTS AND METHODS

This prospective clinical study included 10 patients presented to Al- Al-Imamain Alkhademain Medical center with benign parotid lesions. They were treated with a minimally invasive approach via V-shape incision. The variables that were analyzed included age,

gender, histological type of the tumor, facial nerve assessment, the sensation of the posterior auricular nerve, operative time, and patient satisfaction. The patients were followed up for 1, 2, 4, 12 and 24 week's regular follow-up intervals.

Surgical procedure:

Subcutaneous injection of normal saline containing 1:200,000 adrenaline into the subcutaneous tissue just beneath the skin. By hydro-dissecting the subcutaneous tissues from the parotid fascia, this creates a dry surgical field. A V or U-shaped incision was applied, which consisted of pre-and post-auricular incisions. A curved incision around the earlobe was made with a number 15 blade. Since the tumors were in parotid gland (superficial lobe exactly), the skin was raised in the parotid fascia's superficial layer, and the parotid fascia was therefore visible due to its distinctive shining white structure. The assistant then released the ear's lobe and pulled back the skin and the ear. Once the

greater auricular nerve was located, it could be seen passing through the sternomastoid muscle. Dissection of the nerve was done to preserve the sensation of the ear lobe (Figure 1). Small mosquito forceps was used to perform a blind dissection all around the lump, retracting the normal parotid tissue and leaving a 2-3 mm cuff of surrounding normal tissue in the process. Once branches of the facial nerve were identified in the surgical field, it was dissected anterogradely using a curved mosquito (Figure 2). Finger dissection in multiple directions was tried till we noticed that the mass was mobile enough to be removed safely. After delivery of the mass, the surgical site was generously irrigated with normal saline. Ensure hemostasis before closing the parotid fascia with an absorbable suture

(Vicryl 3-0) that was applied precisely. The skin incision was then closed using a subcuticular approach (Nylon 4-0), and the suture stayed in place for 10 days. No drains were used after the end of the surgical procedure (Figure 3).



Figure (1): Greater Auricular Nerve Identification



Figure (2): Main Trunk of the Facial Nerve Identification

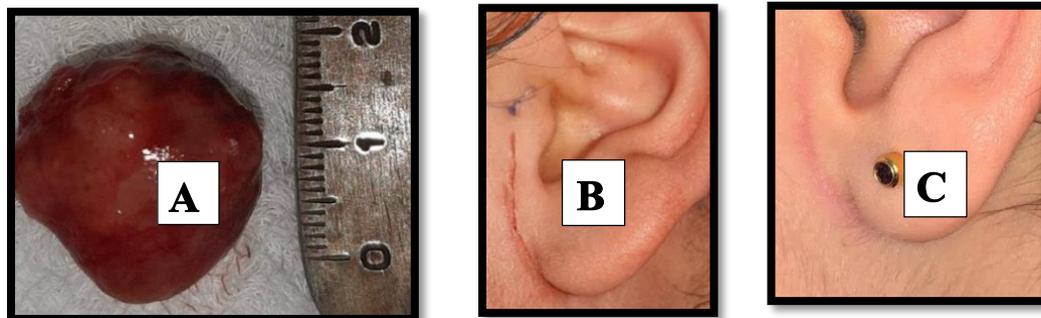


Figure (3): (A) Tumor Post Excision (B) Wound Closure Clinical View (C) Three Months Post Surgery.

Ethical Approval:

The study followed the Ethical Principles of Declaration of Helsinki (2013). Approval to conduct this study was obtained from the Research Ethics Committee of the Scientific Council of Maxillofacial Surgery, the Iraqi Board for Medical Specializations license no. 009 (40121 document no. in 11 / 1 / 2021). Informed written consents were obtained from all participants.

Statistical analysis

In the descriptive analysis, percentages or the mean ± standard deviation were included. Utilizing the Statistical Package for Social Science, version 22 (SPSS, USA) all variables under investigation underwent statistical analysis. Simple and cluster chart bars showed minimum, maximum, mean, Standard Deviation (SD), frequency and percentage.

RESULTS

There were 10 patients enrolled in this clinical study in whom micro-parotidectomy incisions were used, the studied patients underwent parotidectomy at the Oral and Maxillofacial Surgery Units of at Al-Imamain Al-Khademain Medical City in Baghdad. The study patient’s ages ranged from 12-63 years old with mean of 34.12 ± 15.59 . There were 10 participants in total (5 males and 5 females; female to male ratio = 1:1) (Tables 1 and 2). The most frequent histopathological type of tumor was pleomorphic adenoma, which was reported in 9 patients and lipoma was found only in one patient (Table 3). By using the Sunnybrook grading system for facial nerve assessment⁽⁹⁾, it was obvious that the facial nerve remained intact in 9 patients and one patient had mild weakness in forehead wrinkles. The findings showed that 1 out of 10 (10%) cases only with 96% facial nerve assessment and 9 cases (90%) with 100% facial nerve assessment (Table 4).

Regarding the posterior auricular nerve (PAN) sensation, the tactile sensation test was used to test the numbness of the ear⁽¹⁰⁾. After testing the ear it we found that there were no patients who demonstrated paresthesia. Hypoesthesia of PNA was found in 2 patients only while normal sensation is 8 patients.

The findings showed that PAN sensation, in no case demonstrated paresthesia. Hypoesthesia was found in 2 cases only (20%) while normal sensation is 8 cases (80%) (Table 5). The mean operative time was relatively about 90 minutes. The mean surgical operative time in minutes for 10 subjects was 114.26 ± 28.005 and ranged from 74.78-160 minutes, with 2 cases (20%) ≤ 90 minutes. While, 8 cases (80%) with more than 90 minutes for their surgeries (Table 6). Based on the visual analogue scale (VAS)^[11], Scar’s satisfaction was 10 in 8 patients (extremely satisfied) and 2 patients were satisfied and gave a score of 8. The period of evaluation of the scar was 6 months. Findings

showed that analogue scar score 8 was found in 2 cases (20%) while score 10 was found in 8 cases (80%) (Table 7).

Table (1): Age Distribution of Study Sample

≤35 years	5	50%
35+ years	5	50%
Mean ± SD=34.2 ± 15.59, Range (12-63)		

Table (2): Gender Distribution of Study Sample

Males	5	50%
Females	5	50%

Table (3): Distribution of study patients by Histological type of tumor

	Total	
	N	% T
Lipoma	1	10%
Pleomorphic adenoma	9	90%
Total	10	100%

Table (4): Distribution of study patients according to facial nerve assessment (Sunnybrook scale)

Assessment	N	%	
		96	100
	1	10%	
	9	90%	
Total	10	100%	

Table (5): Distribution of study patients by PAN

sensation (Tactile sensation test)

PAN	N	%
Paraesthesia	0	0%
Hypoesthesia	2	20%
Normal	8	80%

Table (6): Patient Sample Distribution According to Surgical Operative Time (mins.)

Cats.	N	%
≤ 90mins.	2	20%
90+mins.	8	80%

Table (7): Distribution of study patients by patient satisfaction scar (Analogue scar)

Score	N	% T
8	2	20%
10	8	80%

DISCUSSION

The classic incisions used in parotidectomy have a long visible permanent facial scar, even if it may heal with a hardly perceptible scar. The patients may

experience long-term psychosocial difficulties as a result of the lengthy of visible scar⁽⁶⁾. Only the preauricular and postauricular incisions are made in a new V-shaped incision for parotidectomy; neither the hairline nor the upper cervical incision are made. It can be utilized to minimize scar in the majority of the superficial parotid regions⁽¹²⁾. This modified technique involved an incision, flap elevation, dissection of the facial nerve, preservation of the great auricular nerve, and postoperative disposal⁽⁷⁾. In this study, ten patients with benign parotid tumors were treated with extracapsular dissection of tumors via a minimally invasive parotidectomy (V-shaped incision). There were a total of 10 patients, 5 males and 5 females. The patients' mean ages were 35 y. According to the findings of **Graciano et al.**⁽¹³⁾ that the majority of people who have minimally invasive incisions are young adults and women (67.9%).

The Sunnybrook grading scale was utilized to evaluate the integrity of the facial nerves⁽⁹⁾. Our results showed that the facial nerve remained intact in 9 patients. These results agree with **Ahn et al.**⁽¹²⁾ who did a study on 15 patients with V-shaped incisions and after procedures through the V-shaped incision, which exposed all the key markers utilized to identify the facial nerve, none of the 15 patients experienced facial nerve complete or partial paralysis. The sternocleidomastoid and digastric muscles' mastoid attachments are one of these landmarks.

One case of 10 patients experienced transient facial dysfunction; mild weakness in forehead wrinkles (sunny brook scale 96) due to retraction during surgery and edema which resolved spontaneously after one week. This agrees with another study by **Iro et al.**⁽¹⁴⁾ who found that 6 out of 76 (7.9%) showed temporary facial nerve weakness. Our study was also designed to assess the posterior auricular nerve sensation following minimally invasive parotidectomy, and the results showed that the nerve was preserved in 8 patients, while 2 of the 10 patients complained of numbness and hypoesthesia of the nerve that recovered within three months of surgery for both of them. In research done on 32 patients, **Su et al.**⁽¹⁵⁾ found that all 32 patients' posterior greater auricular nerves were preserved and that the lobe's sensation showed varied degrees of numbness following surgery. The sensation fully returned after three months. According to **Colaianni et al.**⁽¹⁶⁾ a V-shaped incision for parotid surgery improves cosmetic results by concealing the scar in the skin's natural creases around the ear and avoiding visible scars in the neck.

In our present study, based on visual analogue scale (VAS) assessments, patients were asked to give the cosmetic satisfaction score. Of 10 patients 8 patients gave a score of 10\10, representing 80% and 2 patients were given 8\10. This conclusion is consistent with the findings of a study that was conducted by **Min-Gyu et al.**⁽¹⁷⁾. That study found that V-shaped incisions

recorded superior cosmetic satisfaction results when patient satisfaction score for scars was used to measure the results.

Operative time has been formally evaluated in many studies. Our study revealed that the total mean surgical operative time in minutes for 10 participants was 114.26 ± 28.005 and that it ranged from 74.78 to 160.32 minutes. These variations depended on many factors experience of the surgeon, the size and depth of the tumor, and its relation to the facial nerve. In this study, the time of anesthesia induction and recovery was excluded. Our result approximates other study done by **Colaianni et al.**⁽¹⁶⁾ who found that the average duration of surgery for all patients conducted with the V-shaped incision was 111.1 minutes (95% confidence interval [CI], 100.9-121.3 minutes).

We adopted FNAC preoperatively in our study to confirm benign parotid tumors as **jiboon et al.**⁽¹⁸⁾ who said that a reliable diagnostic method for superficial masses, including masses of the salivary glands, is fine needle aspiration cytology (FNAC). In our study, we also found that pleomorphic adenoma was accounting for 90% of cases which agrees with many authors **Kligerman et al.**⁽¹⁹⁾, **Zhan et al.**⁽²⁰⁾ and **Thielker et al.**⁽²¹⁾ where they stated that pleomorphic adenoma is the most common benign salivary gland tumor. In this study, there was one case with lipoma of ten cases representing 10% and this agrees with **Agimy et al.**⁽²²⁾ who addressed that parotid lipomas account for 0.6-4.4% of documented benign parotid tumors⁽²²⁾.

Limitations: There are several potential limitations to the V-shaped incision. First, due to the restricted inferior access it offers for lower end exposure of tail tumor of the parotid. It is not recommended for patients with big parotid tail tumors involving the upper neck or malignant cases suspicion where the upper neck compartment is to be dissected on purpose. Additionally, Patients who required a complete parotidectomy or those who had a tumor in the deep lobe of the gland were not discussed while employing this approach. In terms of the cosmetic outcomes, their validity is constrained because we only employed subjective VAS ratings of the scar's look. Also, during the accomplishment of this study, another limitation was encountered that it was conducted in a single institution with a small sample size.

CONCLUSIONS

With the minimally invasive approach, no scar is left behind on the face or neck, marking a significant step forward in the cosmetic evaluation of parotidectomy. Also, when treating benign, small-sized parotid gland's tumor. The facial nerve and posterior auricular nerve can be preserved using this practical and safe technique. **Suggestions:** we suggest increasing the sample size over a longer length of time. Also, the results should be of a larger, multi-center study conducted in different parts of the country that would be more definitive. And

to demonstrate the cosmetic benefits more objectively, future studies should compare the scars to those from other incisions and conduct a blind examination of the scars.

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