Research Article

Superficial Parotidectomy and Extracapsular Dissection as Part of Surgeon's Armamentarium for Benign Parotid Tumors: A Clinical Trial

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Abstract

Background: Superficial Parotidectomy (SP) has been considered the standard treatment for benign parotid tumors. In recent years, extracapsular dissection (ECD) is gaining popularity. Literature addressing the comparison of these techniques is limited.

Objective: To compare SP and ECD among patients with single, mobile, benign tumor in superficial lobe of parotid gland.

Methodology: This randomized trial conducted in King Edward Medical University, Lahore from 2015 to 2018 included patients with solitary, mobile tumor in superficial parotid lobe using non-probability purposive sampling. FNAC confirmed benign tumor and MRI demarcated tumor extent. The patients were randomized for SP or ECD. Post-operatively, the patients were followed up to detect adverse effects and recurrence. Data was analyzed using SPSS 26.0. T-test and Fischer exact test were used considering p-value <0.05 significant.

Results: SP group included 27 and ECD included 19 patients with mean ages 48.7±6.7 and 47.2±6.2 years respectively. 95.65% of patients had pleomorphic adenoma while rest had Warthin's tumor. Temporary facial nerve palsy was most common adverse effect in SP group (18.52%) followed by Frey's Syndrome (11.11%). Parotid fistula was most common adverse effect in ECD group (10.53%). No patient in either group experienced permanent facial nerve palsy or had recurrence at 1 year follow up. The overall adverse effect rate was lower in ECD than SP (21.05% vs 29.63%) Return to work was significantly shorter in ECD group (5.6±1.2 vs 15.2±3.7 days, p-value 0.001).

Conclusion: The adverse effect rate and recovery period in ECD for small mobile tumor of superficial lobe were lower but not statistically significant.

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Key Words: Benign parotid tumor, Superficial Parotidectomy, Extracapsular Dissection

Introduction

Among the salivary glands, parotid is the most frequent site of neoplasms, majority of which are benign.[1,2] In an Eastern Caribbean nation, more than 80% of the tumors were found to be benign; pleomorphic adenoma and Warthin's tumor being the most frequent types.1 The 39 year review of Hiroshima tumor tissue registry also revealed similar epidemiological pattern of salivary gland tumors.[2] Despite being classified as benign, these tumors are important due to pain, cosmetic concerns

and potential for malignant transformation.[3,4] Surgical excision of these tumors is not without risks; recurrence and injury to facial nerve are the major concerns.[3,5]

Parotid tumor surgery has evolved over the years in keeping with these considerations. Enucleation of the tumor aimed to save facial nerve was abandoned due to frequent recurrences (23-43%).6 Superficial parotidectomy (SP) has been established as the treatment of choice since 1950s. In this procedure the facial nerve is identified and preserved. The recurrence rate was also reported to be lower at 2%.[5]

In the recent years, the focus is shifting towards extracapsular dissection (ECD) of parotid tumors.[7,8] The key difference from enucleation is that in ECD the capsule is not incised; rather dissection is carried out in the surrounding healthy gland. Recurrence is less likely as the tumor pseudopodia protruding through the capsule are not violated and the tumor is removed in its entirety.[5] ECD was first introduced almost 2 decades ago but SP is still not considered outdated.[9] Rather, some centers still recommend SP in preference to ECD.[9]

There are limited studies directly comparing both these techniques. Thielker et al noted in their review that even the results of meta-analyses are misleading due to non-randomized, methodical patient selection and that no study has studied the two alternatives in similar patients.[10] At best the techniques have been described as complementary.[10] These gaps in literature may be addressed by a conducting comparative trial of the two techniques with appropriate randomization of the patients. The present study aimed to compare SP and ECD among patients with single, mobile, benign tumor in the superficial lobe of parotid gland.

Methods

This clinical trial was conducted in the Department of Surgery, King Edward Medical University, Lahore from January 2015 to December 2018. 46 male and female patients with solitary, mobile tumor in the superficial lobe of parotid gland were included in the study. Sample size of 40 patients (20 in each group) was calculated using 80% power of study, 5% level of significance and expected transient facial nerve palsy 43.8% in SP group and 6.3% in ECD group.[11] To cater for dropouts, 6 extra patients were included in the study. Patients with peroperative facial nerve palsy (partial or complete), previous surgery of parotid or auricular area, irradiation to head and neck and trauma to facial region were excluded from the study. Patient selection was undertaken by non-probability purposive sampling. The trial was approved by the institutional review board of King Edward Medical University, Lahore (626/RC/KEMU).

After recruitment, patients were explained the purpose of the study and written informed consent was taken. Detailed history was taken and examination carried out. Confounders were controlled by carefully following the exclusion criteria. Benign nature of the tumor was confirmed by FNAC. MRI was done to rule out the involvement of deep lobe. The patients were then randomized by lottery method to undergo either SP (group A) or ECD (group B).

After induction of general anesthesia and preparing the area, Lazy S preauricular-mastoid-cervical incision was made. Skin folds were developed between hair follicles and parotid fascia. In the SP group, facial nerve was identified in antegrade fashion. The posterior margin of the parotid gland was freed by dissection along the anterior border of sternumastoid (Figure 1). Then dissection was carried out anterior to cartilageneous and bony meatus. Once the main trunk of nerve was defined, then dissection was done in perineural plane just above the nerve and the superficial lobe was lifted off the gland. Wound was closed over suction drain.

In the ECD group, the tumor was first marked with ink. Cruciate incision was made over parotid fascia which was then lifted off with artery forceps. Tumor with 2-3mm rim of normal tissue was dissected and removed (Figure 2). Cruciate incision of parotid fascia was closed with 3/0 vicryl. Wound was closed over suction drain.

The patients remained admitted for 2-3 days and were later followed up at intervals for upto 1 year to detect any adverse effects and recurrence. For evaluation of facial nerve paralysis, clinical exami-

nation of facial nerve was done before surgery and at follow up. This included examination for wrinkling of forehead, eye closure, blowing up cheeks and deviation of angle of mouth on baring teeth. Any dysfunction was duly noted. If the dysfunction resolved with 8 weeks, then it was labeled as temporary facial nerve paralysis and dysfunction persisting beyond that was considered permanent facial nerve paralysis. The term parotid fistula was utilized for any abnormal opening on skin in the parotid area through which saliva was discharging in the post-operative period. Frey's syndrome was labeled in any patient experiencing unpleasant flushing or sweating of cheeks, temporal area or retroauricular area during or immediately after eating and/or chewing. All the surgeries and follow-ups were done by the authors themselves to ensure uniformity of data. All the data was collected through a specially designed proforma.

The data was analyzed using SPSS 26.0 the quantitative variables like age, days of hospital admission and return to work were presented as mean±SD while the qualitative variables like gender, type of tumor, presence of adverse effects were presented as frequency and percentages. The baseline characteristics and post-operative complications of the two groups were compared using t-test for qualitative variables and Fischer exact test for qualitative variables considering p-value <0.05 as significant.

Figure 1: *Facial Nerve Exposure During Superficial Parotidectomy:*

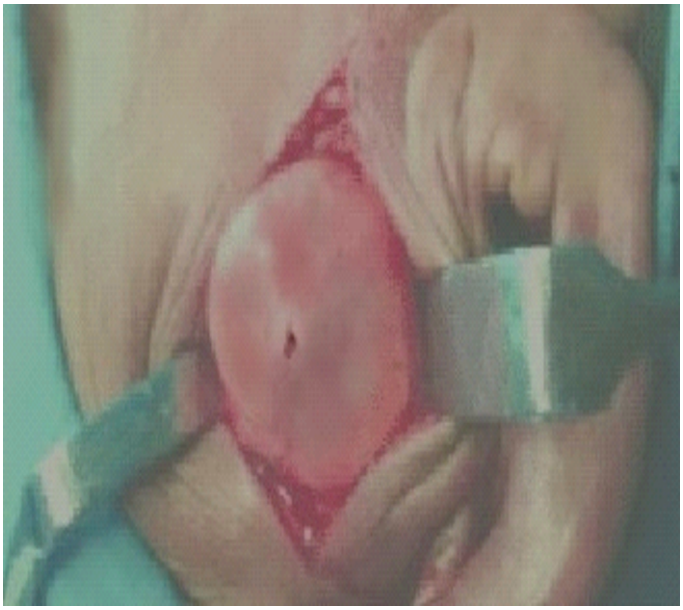

Figure 2: *Tumor Removal During Extracapsular Dissection*

Results

A total of 46 patients were recruited for the study from the department of Surgery, King Edward Medical University, Lahore. Out of these, 24 were allocated to SP group while 22 were allocated to ECD group. In 3 patients (12.5%) originally allocated to ECD group, the tumor was in close proximity to facial nerve. Due to risk of exposure of facial nerve, these patients were intra-operatively transferred to SP group. The final allocation was 27 patients in Group A (SP) and 19 in group B (ECD).

The demographics of the two group are presented in Table 1. 40 (88.95%) of the patients presented with painless swelling in front of the ear lobule while 6 (11.5%) also complained of pain. 43 (95.65%) of the patients had pleomorphic adenoma while the rest had Warthin's tumor on histology. Table 2 shows the frequency of adverse effect in the two group as well as the and time to return to work. All 4 patients in either group who developed Frey's Syndrome were managed conservatively. 2 patients in ECD group developed parotid fistula; one of them healed with conservative management while the other one had to undergo radiotherapy. None of the patients in either group had recurrence during 12 months of follow up.

Table 1: *Demographic Profile of the two Groups*

	Group A (SP) (n=27)	Group B (ECD) (n=19)	p-value
Age (years) (Mean ± SD)	48.7 ± 6.7	47.2 ± 6.2	0.445
Gender: (n)			
M	10	7	0.08
F	17	12	
Tumor Type:			
Pleomorphic adenoma	25	18	1
Warthin's Tumor	2	1	

Table 2: *Outcome of Superficial Parotidectomy & Extracapsular Dissection Groups*

	Group A (SP) (n=27)	Group B (ECD) (n=19)	p-value
Temporary Facial Nerve Paralysis	5 (18.52%)	1 (5.26%)	0.377
Permanent Facial Nerve Paralysis	0 (0%)	0 (0%)	-
Frey's Syndrome	3 (11.11%)	1 (5.26%)	0.632
Parotid Fistula	0 (0%)	2 (10.53%)	0.5
Adverse Effect Rate	29.63%	21.05%	0.734
Return to Work in days (Mean ± SD)	15.2 ± 3.7	5.6 ± 1.2	0.001
Recurrence	0 (0%)	0 (0%)	-

Discussion:

Parotid tumors, though most frequent of the salivary gland tumors, remain uncommon in population. For this reason, the debate on the best surgical approach for benign parotid tumors is still open for discussion. Previous cohort studies and their meta-analysis have pointed out that SP and ECD remain at par for treatment of these tumors. The final choice remains at the discretion of the surgeon keeping in view the available expertise and tumor characteristics. Theilker et al noted in their 2018 review that by a study comparing both techniques in similar patients with small mobile tumors in superficial lobe is virtually non-existant.[10] This prospective trial was conducted in an attempt to fill the void.

Epidemiology of the patients enrolled in the current study closely matches that of other study groups. In this study, patients with ages ranging from 35 to 65 years were included. The mean age of group-A (SP) was 48.7±6.7 years and that of group-B was 47.2±6.2 years (pvalue 0.445). The male to female ratio (M:F) in the present study was 1:1.7 with 63% patients being female being male. In literature, the peak incidence of benign parotid gland tumors has been described in the 4th and 5th decades of life. In Eastern Caribbean population, the mean age of patients with benign tumors was 46.8 years.1 Female preponderance was seen for pleomorphic adenoma (M:F of 1:1.23) while Warthin's tumor was more common among male patients.1 However, the Hiroshima tumor registry has reported somewhat different patient characteristics with peak incidence in 6th & 7th decades of life (mean age 54.3 years) and reversed M:F ratio (1.2:1). It is undetermined whether this variance in epidemiology occurred de novo or as an aftermath of the atomic explosion.

ECD is a surgical procedure which is especially useful for single mobile tumors in the superficial lobe of parotid tumors. To ensure uniformity patients having aforementioned tumor characteristics and benign cytology were selected for the purpose of this study. Post-operative care was given as inpatients for 2-3 days and extended for the next 12 months in the outpatients department. During the period of admission, patients were observed for facial nerve paralysis, parotid fistula formation and Frey's syndrome. After being discharged, periodic monthly follow up was mainly aimed to look for recurrence. The overall rate of adverse effects was 27.59% in SP group and 21.05% in ECD group (p-value 0.734). Among these, temporary facial palsy was the most frequent adverse effect seen in SP group, followed by Frey's Syndrome while parotid fistula formation was the most frequent adverse effect in ECD group. The overall rate of adverse

effects was 27.59% in SP group and 21.05% in ECD group (p-value 0.734). Among these, temporary facial palsy was the most frequent adverse effect seen in SP group, followed by Frey's Syndrome while parotid fistula formation was the most frequent adverse effect in ECD group.

Kato et al reported comparable adverse effect rates of SP & ECD in their study group of benign parotid tumors. ECD was more cost-effective in terms of procedure time, anesthesia time and length of hospital stay.[8] In the present study, procedure time and anesthesia time were not studied but the time to return to work was significantly shorter in the ECD group (pvalue 0.001). Although there was similar number of patients in both the studies but the study by Kato et al was a retrospective medical record review and cost-effectiveness analysis. Cristofaro et al retrospectively studied a cohort of 198 parotid tumor patients and concluded that ECD was superior to SP due to significantly lower rate of transient facial nerve injury and facial paralysis. However, the also stated that there were no significant differences in capsular rupture, recurence, and salivary fistula were observed after SP or ED.[7] There are several differences from the present study; it was a retrospective analysis, not a clinical trial. Three times more patients underwent ECD than SP even though the procedure was arbitrarily allocated. Probably the center was high volume for ECD but same cannot be inferred for SP.

ECD is not the recommended treatment if the tumor is adherent to facial nerve and if already underway, the surgery should proceed on lines of SP with adequate facial nerve dissection. This might be one of the reasons for greater rates of temporary facial nerve palsy in the SP group even when similar patients are selected. In the present study, although not statistically significant, but the rate of facial nerve palsy in SP group exceeded that of ECD group. It is worth mentioning that in the present study few of the patient originally allocated to ECD were transferred to SP group due to close proximity of the tumor to the facial nerve. This may in part explain the higher incidence of facial nerve palsy in our SP group. Ruohoalho et al reported facial palsy in 43.8% SP patients and 6.3% ECD patients in their cohort study and identified age, duration of surgery and use of ultrasound knife as potential risk factors for transient facial nerve palsy.[11] Although it was a prospective study but it was not a randomized clinical trial agaid highlighting the importance of clinical trials for benign parotid tumors.

Mantsopoulos et al noted a shift in paradigm from SP to ECD in their center over a period of 12 years from SP to ECD. They noticed decreased incidence of temporary and permanent facial palsies (from 22.8% to 9% and 9.8% to 5.9%, respectively) and Frey's syndrome (from 11.3% to 1.6%) in the ECD versus SP patients. Although they reported that less radical surgery is associated with better functional outcomes but the still consider that the best therapeutic approach in benign parotid tumor remains a controversial issue.[12] Review studies and meta-analysis have reported the two techniques to be equally effective and safe. Xie at el pooled the date from 3194 patients and concluded that while ECD is a good choice in selected patients but this procedure should be perfomed by a surgeon experienced in dissection facial nerve as the need to convert the surgery to SP arise intraoperatively.[13] This situation arose in 3 of the patients in the present study who were originally planned to undergo ECD. The surgical team successfully converted to SP an all three of the patients. For this Reason, Thielker et al were of the opinion that the two techniques are complimentary rather than competitive and likened the comparison to be that of apples and oranges.[10]

There were some limitations of the study. This is a single center study conducted on a relatively small sample due to relative infrequency of parotid tumors. The study was limited to small, mobile tumor in the superficial lobe of parotid and the utility of ECD for any other tumors is unknown. Follow up period for recurrence was limited to 1 year. Further prospective randomized clinical trials should be conducted to broaden the evidence base.

Conclusion:

Both ECD and SP may be considered as complementary options in parotid surgeon's armamentarium. Although the differences did not reach statistical significance, but, due to lower adverse effect

rate and short recovery period, ECD may be preferred in small mobile tumor of superficial lobe to ensure maximal patient benefit and comfort.

Ethical Approval: Given

Conflict of Interest: The authors declare no conflict of interest

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