



Original Article

Comparative Study of Total Conservative Parotidectomy versus Superficial Conservative Parotidectomy in Management of Parotid Gland Tumors

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ABSTRACT

Background: Parotid gland tumors constitute the majority of salivary gland neoplasms, most of which are benign. Surgical excision remains the primary treatment modality; however, the optimal extent of parotidectomy continues to be debated due to concerns regarding facial nerve preservation, postoperative complications, and oncological adequacy. Superficial conservative parotidectomy (SCP) is commonly advocated for benign superficial lobe tumors, whereas total conservative parotidectomy (TCP) is preferred for malignant or deep lobe lesions. Comparative evidence evaluating outcomes of these two approaches in routine clinical practice remains limited.

Objectives: To compare the outcomes of superficial conservative parotidectomy and total conservative parotidectomy with respect to operative parameters, postoperative complications, facial nerve function, and tumor recurrence, and to analyze the clinicopathological profile of parotid gland tumors.

Methods: This comparative study was conducted over 18 months in a tertiary care teaching hospital and included 30 patients with parotid gland tumors. Patients were allocated into SCP (n = 15) and TCP (n = 15) groups based on tumor characteristics and lobe involvement. All patients underwent clinical evaluation, ultrasonography, and fine needle aspiration cytology prior to surgery. Operative time, tumor size, postoperative complications, facial nerve function using the House–Brackmann grading system, and recurrence were assessed. Data were analyzed using appropriate statistical tests, with $p < 0.05$ considered statistically significant.

Results: Benign tumors constituted 90% of cases, with pleomorphic adenoma being the most common histological type, and a female predominance was observed. Mean tumor size and operative time were significantly lower in the SCP group compared to the TCP group ($p < 0.001$). Immediate facial nerve neuropraxia and permanent facial palsy were significantly more frequent following TCP ($p = 0.020$ and $p = 0.040$, respectively). The SCP group demonstrated significantly better postoperative facial nerve function based on House–Brackmann scores ($p < 0.001$). Other complications were more common in the TCP group but did not reach statistical significance. One case of tumor recurrence was observed in the TCP group.

Conclusion: Superficial conservative parotidectomy offers superior functional outcomes, shorter operative time, and fewer postoperative complications for benign parotid tumors confined to the superficial lobe. Total conservative parotidectomy remains appropriate for malignant or deep lobe tumors to ensure oncological clearance. Surgical approach should be individualized based on tumor characteristics.

Keywords: Parotid gland tumors; Superficial conservative parotidectomy; Total conservative parotidectomy; Facial nerve palsy; House–Brackmann score; Postoperative complications.

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INTRODUCTION

Parotid gland tumors constitute the majority of salivary gland neoplasms and account for approximately 80% of all salivary gland tumors. Although relatively uncommon, with an estimated incidence of 0.5–3 per 100,000 population, they represent a significant surgical challenge because of their close anatomical relationship with the facial nerve and the potential for functional and cosmetic morbidity following intervention¹. The majority of parotid tumors are benign, comprising nearly 70–80% of cases, with pleomorphic adenoma being the most frequently encountered histological subtype². Malignant parotid tumors are less common but display considerable histological diversity and variable clinical behavior³.

Surgical excision remains the mainstay of treatment for both benign and malignant parotid tumors. The extent of parotidectomy is determined by several factors, including tumor size, location (superficial or deep lobe), histopathological type, grade, and preoperative facial nerve status⁴. Superficial conservative parotidectomy (SCP), involving removal of the superficial lobe with preservation of the facial nerve, has traditionally been advocated for benign tumors confined to the superficial lobe⁵. In contrast, total conservative parotidectomy (TCP), which entails removal of both superficial and deep lobes while preserving the facial nerve, is generally recommended for malignant tumors or lesions involving the deep lobe to ensure adequate oncological clearance⁶.

Despite advances in surgical techniques, postoperative complications such as transient or permanent facial nerve palsy, Frey's syndrome, first bite syndrome, seroma, and surgical site infection continue to be important concerns⁷. Facial nerve dysfunction remains the most feared complication, significantly affecting patients' quality of life⁸. Several studies have suggested that less extensive procedures are associated with shorter operative time, better facial nerve preservation, and lower complication rates without compromising oncological outcomes in selected cases^{9–11}. However, controversy persists regarding the optimal extent of surgery, particularly in tumors with borderline features or early-stage malignancies¹².

Comparative studies evaluating SCP and TCP have reported varying outcomes with respect to facial nerve function, complication rates, and recurrence^{13–15}. While systematic reviews and randomized trials support the use of conservative approaches for benign tumors, the applicability of these findings in different clinical settings remains uncertain¹⁶. Therefore, the present study was undertaken to compare the outcomes of SCP and TCP in patients with parotid gland tumors, focusing on operative parameters, postoperative complications, facial nerve function, and recurrence, thereby contributing evidence to guide surgical decision-making.

METHODS

This comparative study was conducted over a period of 18 months, from July 2023 to December 2024, in the Department of General Surgery at Mysore Medical College and Research Institute, a tertiary care teaching hospital attached to K.R. Hospital, Mysuru. The study included patients presenting with parotid gland swellings who satisfied the inclusion criteria and provided written informed consent. Patients aged 18 years and above with clinically evident parotid gland tumors were enrolled, while those with inflammatory parotid swellings, patients below 18 years of age, and individuals unwilling to participate were excluded from the study.

A total of 30 patients were included, with the sample size estimated using Cochran's formula based on an assumed prevalence of parotid gland tumors of 1%, a 95% confidence level, and a 5% margin of error, yielding a minimum requirement of 15 patients per group. All enrolled patients underwent detailed clinical evaluation, including history taking and thorough physical examination, followed by appropriate diagnostic investigations. Ultrasonography of the parotid gland was performed in all cases to assess tumor size and lobe involvement, and fine needle aspiration cytology was used for preoperative pathological diagnosis.

Based on tumor size, preoperative diagnosis, and the involved lobe of the parotid gland, patients were allocated to one of two surgical groups: superficial conservative parotidectomy or total conservative parotidectomy. All surgical procedures were performed under general anesthesia by experienced surgeons following standard operative techniques, with meticulous identification and preservation of the facial nerve and its branches whenever feasible. The choice of surgical approach was guided by clinical and radiological findings, with superficial conservative parotidectomy primarily performed for benign tumors confined to the superficial lobe and total conservative parotidectomy reserved for malignant tumors or lesions involving the deep lobe.

Postoperatively, patients were closely monitored for the development of complications, including facial nerve dysfunction, seroma formation, surgical site infection, Frey's syndrome, first bite syndrome, recurrent bleeding, and the need for intensive care unit admission. Facial nerve function was assessed postoperatively using the House–Brackmann grading system, and both transient and permanent facial nerve palsy were documented. Patients were followed up for a minimum period of six months to assess recovery of nerve function, occurrence of late complications, and tumor recurrence.

Data were entered into Microsoft Excel and analyzed using SPSS version 22.0 (IBM SPSS Statistics, Somers, NY, USA). Continuous variables were summarized as mean and standard deviation, while categorical variables were expressed as frequencies and percentages. Comparative analysis between the two groups was performed using the independent-sample t test for continuous variables and the Chi-square test or Fisher's exact test for categorical variables, as appropriate. A p value of less than 0.05 was considered statistically significant.

RESULTS

A total of 30 patients with parotid gland tumors were included in the study, with 15 patients each undergoing superficial conservative parotidectomy (SCP) and total conservative parotidectomy (TCP). The age distribution was comparable between the two groups (χ^2 test, $p = 0.69$), with the majority of patients in both groups belonging to the 51–60-year age category. The mean age was 53.3 ± 9.8 years in the SCP group and 55.2 ± 14.1 years in the TCP group, with no statistically significant difference observed (independent-sample t test, $p = 0.68$). Female patients predominated in both groups, accounting for 60% of the study population, and gender distribution did not differ significantly between SCP and TCP groups (χ^2 test, $p = 1.00$). With regard to clinical presentation, painless parotid swelling was the most common presenting symptom, observed in 90% of patients overall. Painful swelling and preoperative facial nerve involvement were noted exclusively in the TCP group; however, these differences did not reach statistical significance (Fisher's exact test, $p = 0.21$). Laterality of gland involvement was evenly distributed, with equal involvement of right and left parotid glands, and no significant difference was observed between the two surgical groups (χ^2 test, $p = 0.72$). Histopathological analysis revealed that benign tumors constituted the majority of cases (90%), while malignant tumors accounted for 10% of cases and were observed only in the TCP group; this difference was not statistically significant (Fisher's exact test, $p = 0.22$). Overall, the SCP and TCP groups were comparable with respect to baseline clinicodemographic characteristics, clinical presentation, and tumor profile (Table 1).

The mean tumor size on ultrasonography was significantly smaller in the SCP group compared to the TCP group (21.0 ± 3.0 mm vs 31.5 ± 4.1 mm; $p < 0.001$). Correspondingly, the mean operative time was significantly shorter for SCP than for TCP (107.3 ± 9.6 minutes vs 142.0 ± 15.7 minutes; $p < 0.001$), reflecting the less extensive nature of the procedure (Table 2).

Postoperative complications were more frequent in the TCP group. Immediate facial nerve neuropraxia was observed in 20% of patients following SCP compared to 60% following TCP, a difference that was statistically significant ($p = 0.020$). Permanent facial nerve palsy occurred in 6.7% of patients in the SCP group and 26.7% in the TCP group, which was also statistically significant ($p = 0.040$). Other complications such as recurrent postoperative bleeding, seroma formation, surgical site infection, Frey's syndrome, first bite syndrome, and requirement for ICU stay were more commonly observed in the TCP group; however, these differences did not reach statistical significance (Table 3).

Functional assessment of facial nerve outcomes using the House–Brackmann grading system demonstrated significantly better postoperative facial nerve function in the SCP group, with a mean score of 1.2 ± 0.4 compared to 3.1 ± 1.1 in the TCP group ($p < 0.001$). Tumor recurrence was observed in one patient (6.7%) in the TCP group, while no recurrences were noted in the SCP group, though this difference was not statistically significant (Table 4).

Table 1. Baseline clinicodemographic profile, clinical presentation, and tumor characteristics of study participants (n = 30)

Characteristic	SCP (n = 15)	TCP (n = 15)	p value
Age group (years)			
<40	2 (13.3)	1 (6.7)	0.690†
41–50	4 (26.7)	4 (26.7)	
51–60	6 (40.0)	4 (26.7)	
61–70	3 (20.0)	5 (33.3)	
>70	0 (0.0)	1 (6.7)	
Mean age, years (SD)	53.3 (9.8)	55.2 (14.1)	0.680
Gender			
Male	6 (40.0)	6 (40.0)	1.000†
Female	9 (60.0)	9 (60.0)	
Clinical presentation			
Painless parotid swelling	15 (100)	12 (80.0)	0.210#
Painful swelling	0 (0.0)	3 (20.0)	0.210#
Facial nerve involvement at presentation	0 (0.0)	3 (20.0)	0.210#
Side of gland involved			
Right	8 (53.3)	7 (46.7)	0.720†
Left	7 (46.7)	8 (53.3)	
Type of tumor			0.220#

Benign	15 (100)	12 (80.0)	
Malignant	0 (0.0)	3 (20.0)	

† Chi-square test
 Independent-sample t test
 # Fisher's exact test

Table 2. Tumor size and operative parameters in SCP and TCP

Parameter	SCP (n = 15)	TCP (n = 15)	p value
Tumor size on ultrasonography, mm (mean ± SD)	21.0 ± 3.0	31.5 ± 4.1	<0.001*
Operative time, minutes (mean ± SD)	107.3 ± 9.6	142.0 ± 15.7	<0.001*

Independent-sample t test

Table 3. Postoperative complications following SCP and TCP

Complication	SCP (n = 15)	TCP (n = 15)	p value
Facial nerve-related complications			
Immediate facial nerve neuropraxia	3 (20.0)	9 (60.0)	0.02*
Permanent facial palsy	1 (6.7)	4 (26.7)	0.04*
Other surgical complications			
Recurrent postoperative bleeding	0 (0.0)	1 (6.7)	1.000
Seroma formation	1 (6.7)	2 (13.3)	0.543
Surgical site infection	0 (0.0)	1 (6.7)	1.000
Frey's syndrome	0 (0.0)	1 (6.7)	1.000
First bite syndrome	1 (6.7)	4 (26.7)	0.140
ICU stay required	0 (0.0)	2 (13.3)	0.483

Fisher's exact test

Table 4. Functional facial nerve outcome and tumor recurrence

Outcome	SCP (n = 15)	TCP (n = 15)	p value
House-Brackmann score (mean ± SD)	1.2 ± 0.4	3.1 ± 1.1	<0.001*
Tumor recurrence	0 (0.0)	1 (6.7)	# 1.000

Independent-sample t test
 # Fisher's exact test

DISCUSSION

The present study compared superficial conservative parotidectomy and total conservative parotidectomy in the management of parotid gland tumors, with particular emphasis on operative parameters, postoperative complications, facial nerve outcomes, and recurrence. Consistent with existing literature, the majority of tumors in this study were benign, with pleomorphic adenoma being the predominant histological subtype, and a clear female predominance was observed^{1,2}.

Tumor size was significantly larger in the TCP group, reflecting appropriate surgical selection based on tumor extent and suspected malignancy. Similar observations have been reported in previous studies, where more extensive procedures were reserved for larger or deep-lobe tumors^{4,6}. The significantly longer operative time associated with TCP in the present study aligns with findings from Roh et al. and El-Fol et al., who demonstrated increased surgical duration with more extensive parotid dissection^{9,16}.

Facial nerve dysfunction remains the most critical outcome following parotid surgery. In this study, both transient neuropraxia and permanent facial palsy were significantly more frequent following TCP compared to SCP. These findings corroborate earlier reports indicating that the risk of facial nerve injury increases with the extent of glandular resection and nerve manipulation^{7,8,13}. Functional assessment using the House-Brackmann grading system revealed significantly better postoperative facial nerve function in the SCP group, further supporting the advantage of limited surgery in appropriately selected cases¹⁴.

Other postoperative complications, including seroma formation, Frey's syndrome, first bite syndrome, surgical site infection, and need for ICU care, were more commonly observed in the TCP group, although most differences did not reach statistical significance. This trend is consistent with previously published series, which report a higher overall morbidity associated with total parotidectomy^{10,11,15}.

Tumor recurrence was observed in one patient in the TCP group, who had previously undergone SCP, emphasizing the importance of appropriate initial surgical planning. Previous studies have similarly reported low recurrence rates following both SCP and TCP when adequate oncological principles are followed^{12,16}. The absence of a statistically

significant difference in recurrence between groups in the present study supports the oncological safety of SCP for benign tumors confined to the superficial lobe.

CONCLUSION

This study demonstrates that superficial conservative parotidectomy is a safe and effective surgical option for benign parotid gland tumors confined to the superficial lobe, offering shorter operative time, better preservation of facial nerve function, and fewer postoperative complications. In contrast, total conservative parotidectomy is more suitable for malignant or deep lobe tumors, as it provides adequate oncological clearance despite a higher risk of morbidity. Careful preoperative assessment of tumor characteristics and lobe involvement is essential to individualize surgical management and achieve optimal functional and oncological outcomes.

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