

Research Article

Comparative Study Between Superficial Parotidectomy and Extracapsular Resection in Benign Parotid Tumor

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ABSTRACT

Background: The purpose of this study was to gather evidence supporting the use of a more suitable method out of extracapsular resection and superficial parotidectomy for benign parotid tumors with minimal postoperative complications.

Objective: To compare the outcome of superficial parotidectomy and extracapsular resection in benign parotid tumor.

Subjects & Methods: This was a quasi-experimental study carried out at surgical unit II of Jinnah Hospital, Lahore from February, 2024 to February 2025. A total of sixty patients who met the specified criteria were segregated equally into two groups. Patients in group A had superficial parotidectomy while patients in B group had extracapsular resection. The duration of the operation was recorded. The patients underwent follow-up visits in the outpatient department (OPD) after 3 and 6 months to observe for facial nerve palsy and recurrence. The data was inputted and analysed using SPSS version 25.0. Appropriate tests were applied for determine the statistical significance. A significance level of $p < 0.05$ was used to determine statistical significance.

Results: In group-A, 18(60.0%) patients were males and 12(40.0%) were females, while in group-B, 19(63.3%) patients were males and 11(36.7%) were females. Age range in this study was from 20 to 70 years. The mean age of patients in group-A was 53.43 years and 52.77 years in group-B. The mean BMI of patients in group-A was 28.5 kg/m² and 28.7 kg/m² in group-B. The mean duration of disease in group-A was 8.5 months and 8.7 months in group-B. In group-A (Extracapsular resection), 3(10.0%) had facial nerve palsy and 7(23.3%) in Group-B (Superficial parotidectomy).

Conclusion: Extracapsular resection emerges as a feasible approach for the management of superficial benign parotid gland tumours in terms of post-operative facial nerve palsy, recurrence, neuropraxia, wound infection, bleeding and pain.

Keywords: Benign Parotid Tumor, Superficial Parotidectomy, Extracapsular Resection, Complication.

INTRODUCTION

The tumours of salivary glands make up only about 3%–6% of all head and neck tumors, and about 70% of these neoplasms occur in the parotid gland¹. Majority of these tumors are pleomorphic adenomas (about 70%); other tumor types include Warthin tumors, oncocytomas, sebaceous adenoma, basal cell adenoma, sclerosing polycystic adenoma and other less common adenoma subtypes^{2,3}. The primary objective of surgical intervention for benign parotid tumours is to achieve total excision of the mass while ensuring the preservation of the facial nerve.

The available choices encompass less severe resections such as extracapsular resection and superficial parotidectomy, as well as more comprehensive and conventional approaches like lateral parotid lobectomy and complete parotidectomy⁴. One of them is intra-capsular dissection. The technique has higher recurrence rates as suggested by some literature⁵. The next researched surgical technique for tumor removal is called superficial parotidectomy (SP)⁶. It removes the complete gland superficial to facial nerve. As it has lesser recurrence, it was routinely used. The complications, however, included Frey's

syndrome, loss of facial contour, and facial nerve palsies etc⁷. Hence, Nicholson and Gleave, in 1940s, introduced the extracapsular dissection (ECD). The tumor along with a cuff of normal tissue is removed in this technique without delineating the facial nerve. This technique had complication rate equivalent to superficial parotidectomy with almost comparable recurrence rates. A metanalysis by Xie et al showed that it has favourable outcomes as compared to superficial parotidectomy⁸. Orabona et al have claimed in their study that the retromandibular depression linked with superficial parotidectomy is avoided with extracapsular dissection which has poor cosmesis. They found that facial nerve palsy was observed in 26.8% of patients who underwent superficial parotidectomy, compared to 3.9% of patients who underwent extracapsular resection ($p < 0.05$). However, there were no significant differences in recurrence rates between extracapsular resection and superficial parotidectomy (4.5% vs. 3.6% [$p = 0.10$], respectively)⁹.

The study by Lee YC et al shows that the operative and anesthesia time and length of stay are also shorter with ECD as compared to SP¹⁰. Jansen V et al conducted a study regarding post-operative pain after the procedure. They claimed that previous studies showed that 75% of patients complained of paresthesia after superficial parotidectomy. They also found that pain was usually maximum on visual analog score. Their own study showed similar results. Almost 34% of patients in study of Koch et al showed that the pain was of medium intensity after ECD¹¹. Some other systematic analysis have also discovered similar findings¹².

The purpose of this study is to examine and compare the outcomes of superficial parotidectomy and extracapsular excision in the treatment of benign parotid tumours in terms of . The literature demonstrates that extracapsular resection exhibits greater efficacy and has the potential to supplant alternative surgical approaches. However, earlier study has presented contradictory findings. Furthermore, it is worth noting that no prior trials have been conducted in Pakistan to guide the use of a more suitable strategy for the excision of benign parotid tumours. Hence, this study is to gather empirical evidence supporting the use of a more suitable approach with minimal postoperative complications. The findings of this study will provide guidance to surgeons in selecting the most effective methods for the

removal of benign parotid tumours. Consequently, the results can be applied in local healthcare settings, facilitating the enhancement of clinical practises and the development of local guidelines for the management of benign parotid tumours. Ultimately, this will contribute to improved patient outcomes with reduced risks of complications.

MATERIALS AND METHODS

This was a quasi-experimental study conducted at Department of Surgery, Jinnah Hospital, Lahore from February 2024 to February 2025 after approval from the hospital ethical review board through letter number 198/17/02/2022/S1 ERB dated 9th March. 2022. Informed consent was taken from all the participants. A total of sixty patients aged between 20 to 60 years, both genders and diagnosed with benign parotid tumors (diagnosed by histopathology and radiology findings) excluding chronic kidney disease (creatinine > 1.8 mg/dl or on dialysis), chronic liver disease (hepatitis B or C, cirrhosis), patients with recurrent disease and undetermined type of tumor (on medical record) were selected for the study. The sample size of 60 cases was calculated with 80% power of test, 5% significance level and percentage of facial nerve injury i.e. 3.9% with extracapsular dissection and 26.8% with superficial parotidectomy by using Open Epi Online Calculator⁹.

Demographics like name, age, gender, duration of disease, and h/o diabetes (BSR > 200 mg/dl) were noted. Then patients were divided into two groups (30 in each group) using random number table generated by Microsoft excel. The patients underwent superficial parotidectomy in group B while extracapsular resection in group A. The procedure was performed under general anesthesia with the neck slightly extended, and the head was turned away from the operated side. A modified Blair incision, starting in a preauricular skin crease around the lobule posteriorly and extending inferiorly into a cervical skin crease was placed. After incising the dermis and platysma, an anterior skin flap was raised in a plane between the superficial musculoaponeurotic system (SMAS) and the superficial capsule of the parotid in group B. Careful dissection was done along the nerve after its identification while raising the cervical subplatysmal flap; at the level of the bifurcation, the anterior branch is divided. The gland was retracted and divided off its

attachments. With a fine hemostat, the main trunk of the facial nerve was located and followed distally. Divided the parotid tissue overlying the area of the facial nerve that has been dissected. Hemostasis was ensured with bipolar diathermy and fine ties. Whole superficial lobe was removed in superficial parotidectomy group while only tumour with capsule and a cuff of normal tissue was removed in extracapsular resection. Hemostasis was secured and a redovac suction drain placed. The wound was closed in layers. The post-operative bleeding by ooze from wound was collected in the redovac drain. The drain was removed when the output fell to 10 ml/ day. Patients were followed-up in OPD for 7 days and then 3 and 6 months. During follow-up, patients were evaluated for facial nerve palsy, if facial nerve injury was noted. If lesion recurred again, then recurrence was labeled.

Patients with complications were managed as per standard protocol.

The data was inputted and analysed using SPSS version 25.0. The Shapiro-Wilk test was utilised to assess the normality of the data. The mean and standard deviation were used to display quantitative information such as age. The frequencies and percentages of qualitative characteristics, such as gender, facial nerve palsy, and recurrence, were reported. The two groups were assessed for the presence of facial nerve palsy and recurrence by the utilisation of a Chi-square test. A significance level of $p < 0.05$ was utilised to determine statistical significance. The data was categorised into strata based on age and gender. Post-stratification was employed, and relevant tests of significance were conducted to compare the two groups in terms of the outcome variable.



Fig1: Extracapsular Resection



Fig 2: Superficial Parotidectomy

RESULTS

Total of sixty patients were recruited in the study and divided into two groups according to methodology. Age range in this study was from 20 to 70 years. The mean age of patients in group-A was 53.43 ± 8.74 years and 52.77 ± 9.02 years in group-B. In group-A, 14 (23.3%) had ages ≤ 50 years and 16 (26.6%) had >50 years,

while in group-B, 16 (26.6%) had ages ≤ 50 years and 14 (23.3%) had >50 years (Table-1). In group-A, 18 (30%) patients were males and 12 (20%) were females, while in group-B, 19 (31.6%) patients were males and 11 (18.3%) were females (Table-1).

In group B, 3 (10.0%) had neuropraxia and 1 (3.3%) in Group-A (Extracapsular resection)

with a p-value 0.301(Table-2). In group-B, 11(36.7%) had pain and 3(10.0%) in Group-A with a p-value 0.015. In group-B, 8(26.7%) had bleeding and 2(6.7%) in Group-A with a p-value 0.038. In group-B, 2(6.7%) had wound infection and 1(3.3%) in Group-A with a p-

value 0.554. In group-B, 7(23.3%) had facial nerve palsy and 3(10.0%) in Group-A with a p-value 0.166. In group-B, 3(10.0%) had recurrence and 1(3.3%) in Group-A with a p-value 0.301 (Table-2).

Table 1: Demographics of Patients

Characteristic		Superficial parotidectomy n (%)	Extracapsular resection n (%)
Age	≤50 years	14 (23.3%)	16 (26.6%)
	>50 years	16 (26.6%)	14 (23.3%)
Gender	Male	18 (30%)	19 (31.6%)
	Female	12 (20%)	11 (18.3%)

Table 2: Comparative Results of Study

Outcome	Superficial parotidectomy	Extracapsular Resection	P-value
Neuropraxia	10%	3.3%	0.301
Post-operative pain	36.7%	10%	0.015
Post-operative bleeding	26.7%	6.7%	0.038
Wound infection	6.7%	3.3%	0.554
Facial nerve palsy	23.3%	10%	0.046
Recurrence	10%	3.3%	0.301

DISCUSSION

The removal of parotid gland is indicated for benign tumors which are either symptomatic or cause significant facial disfigurement. The techniques for this surgery have evolved over time. Intracapsular removal was advocated in the beginning of the 20th century due to low facial nerve injury rate despite 45% recurrence rate. Almost half a century later, superficial parotidectomy became popular because of reduced recurrence rate (2%). In this technique, whole of tumor along with the superficial lobe of parotid gland is removed. This technique has its own complications like Frey's syndrome, loss of sensation of face as well as facial nerve damage. Extracapsular resection has been under consideration for almost 25 years, and tumor is removed along with its capsule in it. This technique does not require the dissection of the main facial nerve trunk. It has lesser incidence of both recurrence and Frey's syndrome in literature¹³. The extracapsular resection (ECR) group exhibited a statistically significant decrease in mean operation time compared to the superficial parotidectomy (SP) group in our study. The prolonged surgery time seen in the SP group can be attributed to the additional time needed

for facial nerve identification. Following the surgical procedure, the group receiving the Extra Capsular Resection (ECR) treatment exhibited a reduced duration of hospitalisation, as the majority of patients in this group were released on the same day while still having a drain in place.

In their study, Kato et al. observed that the mean surgery times for the ECR patient group and SP patient group were 83 minutes and 139 minutes, respectively, being statistically significant. The research also found a notable disparity in the duration of hospitalisation, with ECR patients experiencing an average length of stay of 0.5 days, whereas SP patients had an average length of stay of 1.3 days. In a separate investigation, Barzan and Pin documented an average duration of 60 minutes for the execution of ECR, whereas the implementation of SP required an average time of 150 minutes^{14,15}. The findings align with those seen in the current investigation, demonstrating that the duration of SP surgery is almost twice as long as that of ECR surgery. Hence, the potential for doing two ECR operations during the duration of a single SP emerges. Reduced hospitalisation duration and procedural interventions are expected to

provide decreased healthcare expenditures for both individual patients and society as a whole. No scholarly literature pertaining to this subject matter was discovered¹⁴.

The finding in our study regarding low incidence of facial nerve palsy in ECR group aligns with previous researches which have documented reduced occurrences of temporary and permanent facial nerve palsy when utilising the ECR approach. The meta-analysis conducted by Xie et al. and the research conducted by Mantsopoulos et al. both found a statistically significant decrease in the prevalence of Frey syndrome following ExtraCapsular Resection (ECR)^{15,16,17}.

The documented consequences have the potential to negatively impact an individual's quality of life, hence highlighting the advantages of employing ECR since it is associated with a reduced occurrence of difficulties. When making comparisons between the two surgical modalities, it is important to take into account the quality of life. Brennan et al. and Mantsopoulos et al. demonstrated comparable patterns. Recurrence rates and importance for ECR and SP have been shown with variability in the literature. In their study, Foresta et al. observed a significantly elevated recurrence rate in the SP group, with a rate of 2.3 cases per 1000 person-years, in contrast to the ECR group which had a rate of 0.2 instances per 1000 person-years^{18,19}. A latest study by Lee et al also shows that ECR has considerably lower risk of facial nerve injury as compared to superficial parotidectomy (HR: 0.458; 95% CI: 0.273–0.768). They also documented on the other hand that there was no significant difference in postoperative bleeding (HR: 0.905; 95% CI: 0.471–1.742)²⁰.

The study conducted by Martin et al. revealed a greater recurrence rate within the SP group, as indicated by a recent meta-analysis. Nevertheless, the meta-analyses employed ECR for parotid gland tumours of lesser sizes compared to SP, leading to a potential selection bias. This bias was also observed in the current investigation and may contribute to the elevated recurrence rate associated with SP, as reported in the above mentioned publications. Due to the inherent disparities between the two methodologies, it might be postulated that ECR may exhibit tighter margins as a consequence of the dissection in close proximity to the capsule²¹.

Extra-capsular resection is a surgical technique that offers the advantage of avoiding the aesthetically undesirable consequence of

retromandibular depression, which is commonly encountered following superficial parotidectomy. A study found that facial nerve palsy was observed in 26.8% of patients who underwent superficial parotidectomy, compared to 3.9% of patients who underwent extracapsular resection ($p < 0.05$). However, there were no significant differences in recurrence rates between extracapsular resection and superficial parotidectomy (4.5% vs. 3.6% [$p = 0.10$], respectively)⁹.

The efficacy of extracapsular resection was shown to be comparable to that of superficial parotidectomy, with the added benefit of fewer adverse effects. Therefore, it may be regarded as the preferred therapeutic option for tumours situated in the superficial region of the parotid gland. Extracapsular resection exhibits a recurrence rate that is equivalent to that of superficial parotidectomy, hence suggesting its potential suitability as an alternative approach. In the management of benign parotid tumours located in the superficial lobe, which are characterised by their small size (diameters less than 4cm) and mobility, extracapsular resection (ECR) exhibits a decreased incidence of facial nerve palsy compared to superficial parotidectomy⁹.

The timely excision of a lesion is imperative in order to avoid the necessity of an additional dissection procedure, which has an increased risk of recurrence in the context of SP. By preserving a cuff of healthy tissue, the potential risks of capsule rupture and subsequent leakage of tumour contents, both of which have been identified as variables associated with cancer recurrence, are mitigated.

The presence of a healthy tissue barrier contributes to a reduction in the occurrence of residual pseudopodia and tumour satellites. The existing literature on ECR lacks a standardised guideline pertaining to the optimal thickness of surrounding tissue to be preserved around the tumour. Various authors have reported varied thickness measurements in their respective studies²². Lee et al conducted a meta-analysis and included fourteen studies on the same topic. They showed that ECR was associated with shorter operative duration (mean difference [MD], – 15.42 min; 95% confidence interval [CI], – 23.47 to – 7.37), lower drainage volume (MD, – 31.32 mL; 95% CI, – 32.88 to – 29.76), shorter hospital stay (MD, – 0.54 days; 95% CI, – 0.78 to – 0.29), and reduced rates of both Frey syndrome (risk difference [RD], – 0.03; 95% CI, – 0.05 to – 0.00) and temporary FN injury (RD, – 0.12;

95% CI, -0.20 to -0.05)²³. The study, however, has some limitations. It is a single centered study with small sample size. A multicentric larger study can help in generalizing the results.

CONCLUSION

The findings of the study indicate that extracapsular resection resulted in a decrease in complications in comparison to superficial parotidectomy. After conducting a

comprehensive assessment, extracapsular excision emerges as a feasible approach for the management of superficial benign parotid gland tumours. The potential increase in cost-effectiveness is expected due to the decreased duration of surgery, anaesthesia, and hospitalisation associated with extracapsular resection.

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