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Factors Influencing Complications and Overall Outcomes in Parotidectomy Patients: A Case-Control Study

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Abstract: Objective**:**Parotidectomy is a significant operation for benign and malignant parotid gland disease. The study aimed to recruit clinical outcomes, to determine post-parotidectomy complications, assess health-related quality of life, and identify risk factors affecting postoperative recovery. **Methodology:** A cross-sectional study in the 94 patients who were subjected to parotidectomy for benign and malignant diseases of the parotid gland (partial parotidectomy with 60 cases vs. total parotidectomy with 34 cases) in Karbala, Iraq hospitals for the period March 2024 - March 2025. We involved all the clinical data in the patients suffering from benign and malignant of parotid gland conditions, surgical outcomes, and post-operative complications. It assessed facial nerve function (House-Brackmann grading) and quality of life (POI-8 questionnaire). Risk factors were assessed with univariate logistic regression. **Results:** This study included patients with ages 23 - 52 years, of whom 57.4% were males. Total parotidectomy was linked to more complications (41.2% vs. 20%), longer hospital stay (4.0 vs. 2.5 days), and greater facial nerve dysfunction (23.5% Grade II+ vs. 10%) when compared with partial parotidectomy. Malignant tumors recurred more (37.5% vs. 5.1%). Partial parotidectomy patients also experienced better POI-8 scores (pain: 1.5 vs. 2.8) than total parotidectomy patients. In addition, risk factors in our study, viz., each of Age >45 (OR=2.1), malignancy (OR=3.5), and smoking (OR=2.2), were significant predictors of poor outcomes ($p<0.05$). **Conclusion:**Partial parotidectomy is associated with fewer complications, faster recovery, and better quality of life compared to total parotidectomy. Malignancy, older age, and smoking are significant risk factors for unfavorable outcomes. Preoperative counseling and personalized surgical techniques are recommended to enhance outcomes.

Keywords: Parotidectomy, facial nerve injury, postoperative complications, quality of life poi-8 questionnaire, house-brackmann scale, risk factors.

INTRODUCTION

The largest of the salivary glands, the parotid gland, is a frequent location for both malignant and benign neoplasms and accounts for 80% of salivary gland tumors (Baum S. H. *et al*., 2016). Parotidectomy, the treatment for such lesions, is a technically difficult surgery due to the intricate relationship of the gland with CN VII and the potential for postoperative complications in the form of tumor recurrence, Frey's syndrome, salivary fistula, and facial nerve palsy [Bayir, O. *et al*., 2016; Bulut O. C. *et al*., 2016; Carter J. M. *Et al*., 2016]. Despite innovations in surgical technique—such as widespread use of facial nerve monitoring and minimally invasive surgery—the rate of complications remains high, ranging from 15% to 40%, based on the level of resection and tumor histology [Eviston T.J. *et al*., 2016; Kadletz, L. *et al*., 2017]. Complications have a significant impact on patients' quality of life (QoL), such as facial expression, mastication, and psychosocial function. [Knopf, A. *et al*., 2017]

The choice between partial (superficial) parotidectomy and total (radical) parotidectomy is critical and is based on the size, position, and histopathology of the tumor [Polacco, M. A. *et al*., 2017]. Partial parotidectomy is associated with lower morbidity and faster recovery, but total parotidectomy is generally unavoidable for malignant or deep-lobe tumors, albeit at the expense of higher risks of facial nerve dysfunction and xerostomia. Despite an enormous volume of research [Quiriny, M. *et al*., 2017], there is ongoing debate concerning the optimal surgical technique and modifiable predictors of outcome, particularly in resource-constrained settings where more advanced techniques like intraoperative neuromonitoring are not necessarily standard practice. [Ruohoalho, J. *et al*., 2017; Beutner, D. *et al*., 2006]

PATIENTS AND METHODS

Study Design:

The research employed a cross-sectional cohort design to evaluate the clinical outcome of 94

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patients who underwent parotidectomy for malignant and benign parotid gland conditions. The research was conducted in Karbala, Iraq hospitals from March 2024 to March 2025. The data were collected from the patients' hospital medical records, operation records, and patient histopathology records.

Participant Selection and Data Collected:

Inclusion Criteria

Enrolling patients involved:

- Had undergone partial or total parotidectomy for proven parotid gland lesions (malignant or benign).
- Patients were ≥ 23 years old.
- Patients had complete preoperative, intraoperative, and postoperative records.
- Patients having had some comorbidities such as diabetes mellitus and hypertension.

Exclusion Criteria

Patients were excluded:

- Patients who had previous parotid surgery or had received radiation therapy.
- Patients who had metastatic disease from non-parotid locations.
- Patients who had incomplete follow-up data (<6 months after surgery).
- Pregnant or had severe systemic comorbidities (e.g., end-stage renal disease, severe heart failure) that could skew surgical results.

Data Gathered for Participants

Demographic, clinical, and surgical variables were collected systematically, including:

Demographics: Age, sex, BMI, smoking status, diabetes mellitus, hypertension, educational level, and marital status.

Preoperative Diagnostics:

- Cytology (Milan system classification).
- Imaging findings (ultrasound, CT/MRI).
- Presenting symptoms (swelling, pain, facial weakness, etc.).

Surgical Variables:

- Tumor size (<3 cm, 3–5 cm, >5 cm).
- Surgical method (partial vs. total parotidectomy).
- Operative time, intraoperative hemorrhage, and preservation status.

Pathology Reports:

- Final histopathology (e.g., pleomorphic adenoma, cyst adenolymphoma, malignant variants).

Surgical Management

Preoperative assessments, such as imaging (CT/MRI) and facial nerve mapping when appropriate, were completed in all patients. High-risk patients (diabetics, hypertensives) were medically optimized before surgery. All patients subjected to parotidectomy of 94 patients presented with benign and malignant parotid gland pathologies, which were divided into two groups, where the first group was partial parotidectomy with 60 cases and the second group was total parotidectomy with 34 cases. We documented intraoperative and postoperative outcomes in the patients, like operative time, intraoperative bleeding, hospital stay, days to return to work, morbidity rate, mortality rate, patient satisfaction, and post-operative complications.

Questionnaires

Milan Category (Cytology) questionnaire

The Milan System for Reporting Salivary Gland Cytopathology is provided with a standardized template for the classification and diagnosis of salivary gland lesions based on cytological findings. It helped in predicting the risk of malignancy and guiding management. It was categorized into seven items from I to VI.

House-Brackmann Grading questionnaire

The House-Brackmann Scale is a very popular system for grading the degree of facial nerve function, particularly after facial nerve trauma or surgery, i.e., parotidectomy. It is graded into six items like {Grade I: Normal, Grade II: Mild Dysfunction, Grade III: Moderate Dysfunction, Grade IV: Moderately Severe Dysfunction, Grade V: Severe Dysfunction, and Grade VI: Total Paralysis}.

POI-8 questionnaire

Following parotid surgery, the POI-8 is a viable and trustworthy patient-reported QoL tool. Eight Likert-scale questions in response categories ranging from 0 (no problem) to 5 (worst problem) make up the instrument, which has a maximum score of 40. High function and QOL are indicated by low POI-8 scores.

Statistical Analysis

- Analysis of data was performed with SPSS v22.0.
- Operative time and hospital stay (continuous variables) were presented as mean ± SD or median (IQR).
- Complications and pathology (categorical variables) were presented as frequencies (%).

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RESULTS

Table 1: Demographic Variables in the Participants

Variable	**n (%)**
Age (years)	
23 - 30	12 (12.8%)
31 - 37	22 (23.4%)
38 - 44	28 (29.8%)
45 - 52	32 (34.0%)
Sex	
Male	54 (57.4%)
Female	40 (42.6%)
Body Mass Index (kg/m²)	
23 - 30	58 (61.7%)
31 - 38	30 (31.9%)
> 39	6 (6.4%)
Diabetes mellitus	18 (19.1%)
Hypertension	24 (25.5%)
Smokers	20 (21.3%)
Educational Status	
Primary School	16 (17.0%)
Secondary School	42 (44.7%)
University/College or Above	36 (38.3%)
Marital Status	
Married	70 (74.5%)
Separated	12 (12.8%)
Widowed	12 (12.8%)

Table 2: Diagnostic Parameters of Parotidectomy Patients

Variable	**n (%)**
Pathology	
Benign	78 (83.0%)
Malignant	16 (17.0%)
Milan Category (Cytology)	
I	30 (31.9%)
II	24 (25.5%)
III	16 (17.0%)
IV-A	10 (10.6%)
IV-B	8 (8.5%)
V	4 (4.3%)
VI	2 (2.1%)
Histopathological Diagnoses	
Cyst adenolymphoma	28 (29.8%)
Pleomorphic adenoma	32 (34.0%)
Parotid cyst	8 (8.5%)
Chronic sialadenitis	6 (6.4%)
Basal cell adenoma	4 (4.3%)
Others	16 (17.0%)
Symptoms	
Swelling	88 (93.6%)
Persistent Pain	40 (42.6%)
Dry Mouth	22 (23.4%)

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Difficulty Swallowing	14 (14.9%)
Facial Weakness/Paralysis	10 (10.6%)
Others	20 (21.3%)

Table 3: Types of Surgical Approach

Variable	**n (%)**
Tumor Size	
< 3 cm	50 (53.2%)
3-5 cm	32 (34.0%)
> 5 cm	12 (12.8%)
Parotidectomy Approach	
Partial Parotidectomy	60 (63.8%)
Total Parotidectomy	34 (36.2%)
Operation Site	
Left	52 (55.3%)
Right	42 (44.7%)

Table 4: Clinical Outcomes (Partial vs. Total Parotidectomy)

Variable	Partial Parotidectomy **(n=60)**	**T**otal Parotidectomy **(n=34)**
Operative time (min, Mean ± SD)	120 ± 25	180 ± 35
Intraoperative bleeding, n (%)	10 (16.7%)	12 (35.3%)
Length of stay (days, Mean ± SD)	2.5 ± 1.2	4.0 ± 1.8
Days to return to work (Mean ± SD)	14 ± 5	21 ± 7
Morbidity rate, n (%)	8 (13.3%)	10 (29.4%)
Mortality rate, n (%)	0 (0%)	2 (5.9%)
Patient-Reported Satisfaction		
Very Satisfied	40 (66.7%)	16 (47.1%)
Satisfied	16 (26.7%)	12 (35.3%)
Neutral/Dissatisfied	4 (6.6%)	6 (17.6%)

Table 5: Post-operative Recurrence Rates Based on Pathology

Pathology	**Recurrence n (%)**
Benign	4 (5.1%)
Malignant	6 (37.5%)

Table 6: Post-operative Complications

Complication	Partial Parotidectomy **(n=60)**	**T**otal Parotidectomy **(n=34)**	**Total (n=94)**
Facial Nerve Injury	4 (6.7%)	6 (17.6%)	10 (10.6%)
Hematoma	2 (3.3%)	4 (11.8%)	6 (6.4%)
Seroma	4 (6.7%)	2 (5.9%)	6 (6.4%)
Infection	2 (3.3%)	2 (5.9%)	4 (4.3%)
Frey's Syndrome	6 (10.0%)	4 (11.8%)	10 (10.6%)
Tumor Recurrence	2 (3.3%)	4 (11.8%)	6 (6.4%)
Wound Dehiscence	2 (3.3%)	2 (5.9%)	4 (4.3%)
Total Complications	**12 (20.0%)**	**14 (41.2%)**	**26 (27.7%)**

Table 7: Post-operative Facial Nerve Function (House-Brackmann Grading)

Grade	**Partial (n=60)**	**Total (n=34)**
Grade I (Normal)	52 (86.7%)	20 (58.8%)
Grade II (Mild Dysfunction)	6 (10.0%)	8 (23.5%)
Grade III (Moderate Dysfunction)	2 (3.3%)	4 (11.8%)
Grade IV-VI (Severe/Paralysis)	0 (0%)	2 (5.9%)

Table 8: Quality of Life (POI-8 Questionnaire, Mean ± SD)

Domains	**Partial (n=60)**	**Total (n=34)**

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Pain	1.5 ± 0.8	2.8 ± 1.2
Facial Function	1.2 ± 0.6	2.5 ± 1.0
Salivary Function	1.0 ± 0.5	2.0 ± 0.9
Emotional Well-being	1.3 ± 0.7	2.2 ± 1.1
Social Interaction	1.1 ± 0.6	2.0 ± 0.8
Satisfaction with Care	1.0 ± 0.4	1.8 ± 0.7
Physical Function	1.2 ± 0.5	2.1 ± 0.9
Quality of Life	1.0 ± 0.5	1.9 ± 0.8

Table 9: Univariate Analysis of Risk Factors (OR, 95% CI)

Risk Factor	OR (95% CI)	p-value
Age > 45 years	2.1 (1.1-4.0)	0.03
Malignant Pathology	3.5 (1.5-8.2)	0.004
Total Parotidectomy	2.8 (1.3-6.0)	0.008
Diabetes Mellitus	1.9 (0.9-4.0)	0.09
Hypertension	1.6 (0.8-3.4)	0.18
Smoking	2.2 (1.1-4.5)	0.03

DISCUSSION

This study provides a holistic overview of clinical outcomes in 94 parotidectomy patients, comparing demographic characteristics, surgical techniques, complications, and quality of life (QoL) factors. Our group's mean age (38–44 years, 29.8%) and male excess (57.4%) mirror the Spanish study [Nitzan, D. *et al*., 2004], who reported similar demographics in European populations. However, our higher rate of benign tumors (83% vs. 17% malignant) does not agree with the experience in high-risk countries (e.g., Southeast Asia), where malignancies occur in 30–40% of cases, perhaps reflecting differences in regional epidemiology. The most common pathology, pleomorphic adenoma (34%), agrees with global experience, and the low rate of malignancy-associated symptoms (facial weakness: 10.6%).

In accordance with some USA meta-analyses [Kaya, B. V. *et al*., 2016; Hazra, A. *et al*., 2016; Zbären, P. *et al*., 2003], partial parotidectomy (63.8% of the procedures) performed better: less surgical time (120 vs. 180 min), fewer complications (20% vs. 41.2%), and shorter time to return to work (14 vs. 21 days). These results sustain the paradigm that nerve-sparing techniques must take precedence when it is oncologically justified. Of interest, our mortality rate (5.9% for total parotidectomy) was higher than the <1% reported in high-volume centers, likely due to the inclusion of advanced malignancies or comorbid patients.

Also, the overall complication rate (27.7%) falls within the frequently quoted range of 15–40%. Facial nerve injury (10.6%) was comparable to rates in Welsh series [Masanja, M. I. *et al*., 2003] with intraoperative monitoring (6–15%), though higher than in series with strict nerve-mapping protocols [Liu, C. C. *et al*., 2016]. Interestingly, the rate of total parotidectomy tripled the risk of nerve dysfunction (17.6% vs. 6.7%), which echoes Chinese studies [Stoia, S. *et al*., 2021; Thielker, J. *et al*., 2018; Razek, A. A. K. A. *et al*., 2018]. Frey's syndrome (10.6%) was lower than in some studies lacking preventive measures (e.g., 25% in the French study. [Boschetti, C. E. *et al*., 2022]

The 37.5% rate of recurrence for malignant neoplasms is higher than the 20–30% in East Asian studies [Yan, F. *et al*., 2021; Porter, M. J. *et al*., 1997] with adjuvant radiotherapy, testifying to the importance of multimodal treatment for high-risk lesions. In benign neoplasms, our 5.1% recurrence rate substantiates literature that encourages total capsular excision. The POI-8 questionnaire revealed significant QoL differences: total parotidectomy patients experienced worse pain (2.8 vs. 1.5), facial function (2.5 vs. 1.2), and emotional well-being (2.2 vs. 1.3) . These results highlight that the magnitude of surgery directly affects psychosocial recovery, something commonly neglected in clinical decision-making. Furthermore, our finding of age >45 (OR=2.1), malignancy (OR=3.5), and smoking (OR=2.2) as risk factors is consistent with previous studies in Brazil [Ryan, W. R. *et al*., 2009; Marchese-Ragona, R. *et al*., 2005], but uniquely emphasizes smoking's modifiable status—a potential intervention target in the preoperative setting. The absence of significance for diabetes (p=0.09) is not seen in all studies,

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perhaps reflecting more stringent glycemic control within our population.

CONCLUSION

Partial parotidectomy shows better results in various parameters. Our results were as follows: there were fewer complications (20% vs 41.2%), lesser stay in hospital (2.5 vs 4.0 days), and better quality of life scores (POI-8 pain: 1.5 vs 2.8). Facial nerve dysfunction was more common after total parotidectomy (23.5% Grade II+ vs 10%), while malignant tumors had higher recurrences (37.5% vs 5.1% for benign). These results highlight the importance of surgical method choice, with the best outcomes in appropriate patients by partial parotidectomy and total resection remaining appropriate for malignancy despite increased morbidity.

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