

## Outcomes and Complications of Parotidectomy in Benign and Malignant Salivary Gland Tumors: A Single-Center Retrospective Study

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### Abstract

#### Objective

To retrospectively evaluate the demographic data, imaging, biopsy, and surgical outcomes of 98 patients who underwent parotidectomy.

#### Material and Method

Ninety-eight patients followed up and operated on for parotid masses between January 2020 and December 2023 in the ENT department of Antalya Training and Research Hospital were included in the study. The patient's gender, age, presenting complaints, comorbidities, fine-needle biopsy results, imaging results, surgical procedures performed, pathology results, and complications were evaluated.

#### Results

Among the patients who underwent surgery, 39 were female (39.8%) and 59 were male (60.2%). 96.8% of the patients reported experiencing swelling in front of the ear. Pathological results revealed that 81.7% of the patients were operated on for benign reasons, while 18.3% were operated on for malignant reasons. On average, after 2 years of follow-up, 97% of our patients continue their follow-ups in good health without disease.

#### Conclusion

Most salivary gland tumors are found in the parotid gland, with around 80% of these being benign. In this study, consistent with the literature, 81.7% of the operated cases were benign pathologies.

**Keywords:** Salivary gland, parotidectomy, pleomorphic adenoma, warthin tumor

### Introduction

Salivary gland tumors are uncommon, representing around 0.6% of all body tumors and 26% of head and neck tumors. A significant portion of these gland

tumors, about 75-80%, arise in the parotid gland, and approximately 80% are benign. Studies indicate that pleomorphic adenoma is the most common benign parotid tumor, whereas mucoepidermoid carcinoma is the most common malignant parotid tumor (1).

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Benign tumors typically present as mobile, painless, and slow-growing masses, whereas malignant masses can present with more severe symptoms, such as pain and facial paralysis. It is important to complement the patient's clinical presentation with objective data. A detailed head and neck examination should be followed by, ultrasound (USG), computed tomography (CT), or magnetic resonance imaging (MRI) to help determine the nature of the tumor mass. Fine-needle aspiration biopsy (FNAB) can also help with diagnosis. The literature indicates that FNAB has a sensitivity of 80% and a specificity of up to 95% for parotid masses (2).

The primary treatment for parotid gland masses is surgery, with the procedure varying based on the mass' location (superficial or deep lobe) and whether it is benign or malignant.

In this study, we retrospectively evaluated the treatment of patients who had parotid masses who underwent parotidectomy in our clinic between 2020 and 2023.

### Material and Method

98 patients who had undergone a parotidectomy at the Antalya Training and Research Hospital's Ear, Nose, and Throat (ENT) clinic for various complaints between January 2020 and December 2023 were included in this study. Detailed preoperative ENT examinations, USG, CT, and MRI evaluations, were reviewed from the patient files. Depending on the location of the mass (either superficial or deep lobe), superficial or

total parotidectomy was performed based on the suspected pathology. Intraoperative nerve monitoring was applied, and patients were hospitalized and examined until the drains were removed and the elevated flaps settled. Patients' demographic data findings and postoperative facial examination findings were recorded and evaluated statistically.

The statistical analysis of the obtained data was performed using the SPSS for Windows 11.5 (Chicago INC.) software package. In the evaluations: the Chi-Square test was used to compare categorical variables between groups, the Kappa test was used to assess the concordance of pathology results with FNAB, the independent samples t-test was applied for comparisons of continuous variables between two groups, and One-Way Analysis of Variance (ANOVA) was utilized for comparisons among more than two groups.

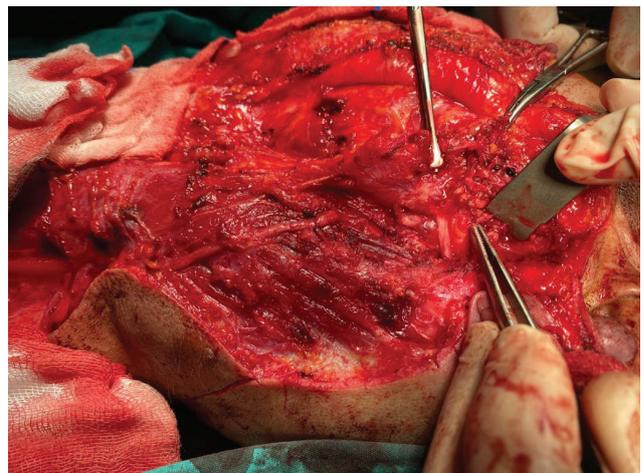
The threshold for statistical significance was set at 0.05.

### Results

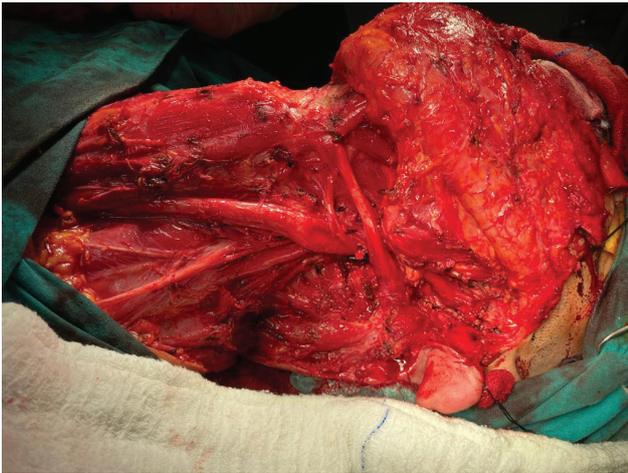
Of the patients who underwent parotidectomy in our clinic, 39 were female (39.8%) and 59 were male (60.2%). Details regarding gender and pathologies are shown in Table 1. The average age of the patients was 52.2 years (range 17-77 years). Almost all operated patients (96.8%) presented with a complaint of swelling in front of the ear. Only one (1%) patient presented incidentally, one (1%) was referred for follow-up MRI, and one (1%) presented with facial paralysis. No additional diseases were found in 59 (60.2%) patients.



**Figure 1**  
High-grade mucoepidermoid carcinoma case, preoperative



**Figure 2**  
High-grade mucoepidermoid carcinoma, Facial nerve involvement (black arrow)



**Figure 3**  
High-grade mucoepidermoid carcinoma case, radical parotidectomy + left radical neck dissection



**Figure 4**  
High-grade mucoepidermoid carcinoma case, reconstruction with sliding skin flap

**Table 1** Diagnosis and gender distribution of the cases

		Pathology				Total	
		Warthin	Pleomorfic	Other bening	Malign		
Gender	f	number % within pathology	10 26,3%	18 60,0%	5 41,7%	6 33,3%	39 40,0%
	m	number % within pathology	28 73,7%	12 40,0%	7 58,3%	12 66,7%	59 60,0%
Total		number % within pathology	38 100,0%	30 100,0%	12 100,0%	18 100,0%	98 100,0%

**Table 2** Distribution of cases diagnosed as malignant

Diagnosis	Number Of Cases	%
Mucoepidermoid carcinoma	6	6,2
Adenoid cystic carcinoma	1	1,02
Asinik cell carcinoma	3	3,1
Squamo cell carcinoma	2	2,04
Myoepithelial carcinoma	1	1,02
Secretuar carcinoma	1	1,02
Oncocytic carcinoma	1	1,02
Dermatofibrosarcoma	1	1,02

Of the patients who underwent surgery, 84 (85.7%) had superficial parotidectomy, and 14 (14.3%) had total parotidectomy. Final pathology revealed Warthin tumors in 38 (38.8%) patients, pleomorphic adenoma in 30 (30.6%) patients, and canalicular adenoma, basal cell adenoma, oncocytoma, oncocytic papillary cystadenoma, lipoma, or chronic sialadenitis in 12(12.2%) patients. Malignant pathologies were detected in 18 (18.3%) of the 98 patients.

Among the malignant tumors, squamous cell carcinoma (SCC), metastatic SCC, high-grade and low-grade mucoepidermoid carcinoma, acinic cell carcinoma, adenoid cystic carcinoma, and oncocytic carcinoma were identified. These are also showed in details in Table 2. Of the patients with at least a 12-month follow-up, one patient with high-grade mucoepidermoid carcinoma died. One patient with a fixed skin tumor and parotid SCC had a recurrence. During the follow-up period of our study, no recurrences were encountered among the other patients who had surgery.

## Discussion

According to the World Health Organization (WHO), salivary gland tumors account for approximately 3-6% of all head and neck tumors. The annual incidence worldwide ranges between 0.5-2 cases per 100,000 people (3). These tumors can be benign or malignant, with malignant tumors being either primary or metastatic. Most salivary gland tumors (80%) occur in the parotid gland, and about 80% of these are known to be benign (1). While studies on parotid tumors do not show a distinct gender predominance, some subtypes, such as Warthin tumors, can be prevalent in males (4,5).

Parotid tumors can occur at any age but are mostly diagnosed between ages 40 and 60 years. The average age of the patients in our study was 52.2 years, with a patient-gender ratio of 39.8% females to 60.2% males.

95.8% of our patient cohort complained of swelling in front of the ear. Considering this, it should be noted that a patient presenting with a swelling in the parotid region is likely to be directed toward surgical evaluation.

According to WHO data, approximately 22.3% of the global population was smoking in 2020 (6). Although cigarette use has declined worldwide in recent years, this trend does not apply to Turkey. In our study, 37.8% of the patients were active smokers, while 3.1% were ex-smokers. Regarding pathologies, 69.4% of

the patients who were operated on for Warthin tumors were active smokers, while 5.6% reported smoking use in the past. Only 23.3% of patients who were operated on for pleomorphic adenoma were smokers. Similarly, only 16.7% of patients with other benign tumor diagnoses were smokers. Surprisingly, only 11.8% of patients diagnosed with malignant parotid tumors had a history of smoking.

In this study, and consistent with the literature, 81.7% of the patients underwent surgery for benign pathologies. Benign tumors are typically characterized by well-defined borders, and encapsulation, and are not aggressive in nature. According to the current literature, the most frequently observed benign parotid tumors are pleomorphic adenomas, followed by Warthin tumors (7).

In our study, the commonest observed benign pathologies were Warthin tumors (38.8%), followed by pleomorphic adenomas (30.6%).

Pleomorphic adenoma is a benign tumor with significant morphological variability and includes both epithelial and myoepithelial elements. Although the rates for malignant transformation in the literature vary (1.6%- 9.4%), this tumor group is known for its potential for malignant change (8,9). In our cohort, no cases of malignant transformation were identified.

Pathologically, Warthin tumors are reported to originate from heterotopic salivary duct inclusions found in intraparotid or periparotid lymph nodes (10). Bilateral Warthin tumor cases have been reported to range between 5- 17% (11). In our study, bilateral Warthin tumors were detected in 2 (5.8%) patients.

We think it would be proper to note the changing prevalence of warthin tumors since its original description in 1929 (12). During the last years, several European studies showed the increasing prevalence of warthin tumors; where the most common explanation was the increase of tobacco consumption (13). However, a study from Austria showed that WT prevalence continued to increase even with the decreasing tobacco use (14). Therefore, it was stated that not only smoking but also other etiological factors, such as an increased body mass index (BMI) or metabolic syndrome should be taken into consideration.

In our study, we found that 34% of patients diagnosed with WT had diabetes, hypertension, or both. Additionally, 38% of these patients did not even smoke. Therefore, although we could not access

BMI data, considering the etiology of these chronic diseases, we can suggest that obesity might also be an etiological factor in the development of WT. It is also possible that the observed differences in the ratios of pleomorphic adenoma and Warthin tumors in our study could be related to the limited number of cases.

12.6% of the cases in our cohort, consisted of other benign tumoral masses. Among these, the most common were chronic sialadenitis (3.1%), lipoma (2%), basal cell adenoma (3.1%), and oncocytoma (2%).

Basal cell adenoma is a rare tumor of the salivary gland and reported to occur at a rate of 1-3.7%. Basal cell adenoma is a trabecular lesion with round isomorphic cells, a prominent basal membrane, interwoven and present in adult patients. It is also characterized by the presence of loose and hyaline stroma (15). This lesion, mostly located in the parotid gland, can be treated with partial parotidectomy. However, if the membranous subtype of basal cell adenoma is present, total parotidectomy is preferred. Although very rare, recurrence and malignant transformation have been reported in membranous basal cell adenoma (16). In this study, three (3.1%) of 98 cases were basal cell adenomas. All patients, diagnosed when older than 50 and 70 years, underwent superficial parotidectomy, with no malignant transformation or recurrence observed.

Oncocytic adenomas are rare salivary gland tumors composed of oncocytes, accounting for 1-2% of these tumors (17). These cases are typically diagnosed in patients older than 60 years, with a history of radiotherapy in approximately 20% of them. In our study, 2% of the patients were reported to have oncocytic adenoma. Superficial parotidectomy was performed on patients diagnosed at ages older than 50 and 70 years. Apart from diabetes mellitus and hypertension, no significant comorbidities were observed in the patients.

Parotid malignant tumors, while not constituting a high proportion among head and neck malignancies, hold significant importance among salivary gland tumors. In our study, 18.3% of the surgical cases were reported as malignant. Consistent with the literature, the most frequently observed malignancy in this study was mucoepidermoid carcinoma.

Mucoepidermoid carcinoma is the most common malignant salivary gland tumor in pediatric and adult patients, with a prevalence of 10-15%. Although observed in both major and minor salivary glands,

mucoepidermoid carcinoma is most frequently detected in the parotid gland (18). The photographs of a patient operated on for parotid mucoepidermoid carcinoma are shown in Figures 1, 2, 3, and 4.

Mucoepidermoid carcinomas present in two patterns: high-grade and low-grade. The low-grade subtype has a very good prognosis with a 5-year survival rate of up to 98%, while the high-grade subtype has a much lower survival rate of around 67% (19). In our study, mucoepidermoid carcinomas were observed in six (6.2%) of 98 patients and 33.3% of malignant tumors. By the end of the 3-year follow-up, one of our two patients diagnosed with high-grade mucoepidermoid carcinoma had died.

Although adenoid cystic carcinoma is the second most common malignancy of the parotid gland, it constitutes the most common malignancy in salivary glands overall and is reported to have an affinity for the minor salivary glands. Considering perineural invasion, which is a specific characteristic of this tumor, caution should be exercised in terms of late metastasis. The lung is the most common site of distant metastasis: unfortunately, long-term survival is found to be as low as 20-40% (20).

Acinic cell carcinoma is the third most common malignancy of the parotid gland and is the second most common salivary gland malignancy in pediatric patients. Acinic cell carcinoma is a slow-growing tumor with relatively good early-stage survival rates; however, the 20-year disease-free survival rate drops to 42% (21). In our study, acinic cell carcinoma accounted for 16.7% while adenoid cystic carcinoma constituted 5.5% of the malignant pathology group. All cases continued to be followed up and were tumor-free at 2 years.

Primary SCC of the salivary glands is rare; however, considering metastatic cases, it constitutes 11% of major salivary gland malignancies. These tumors are highly aggressive, with a 5-year survival rate of approximately 50% (22). Considering the patient group in our study, two (11.1%) of 18 malignant cases were SCCs. One of these cases was primary SCC, while the other presented as skin tumor metastasis. At their 3-year follow-up, both patients receive additional treatment due to recurrence.

Salivary gland tumors have a wide range of diagnoses, given the diverse group of cells they originate from. This diversity can sometimes complicate the decisions of both the pathologist and the surgeon. However, in cases with suspected malignancy, it is

more appropriate to perform a fine needle aspiration and decide whether to perform a total parotidectomy intraoperatively using frozen tissue section analysis. For benign tumors not located in the deep lobe and for many low-grade malignant tumors, partial parotidectomy is a sufficient surgical treatment.

### Conflict of Interest Statement

The authors have no conflicts of interest to declare.

### Ethical Approval

This study was conducted in accordance with decision No. 3/12, dated March 21, 2024, which was granted by the Clinical Research Ethics Committee of Antalya Training and Research Hospital. The study adhered to the Helsinki Declaration.

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### Availability of Data and Materials

Data are available on request due to patients' privacy.

### Authors Contributions

RTS: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Validation; Visualization; Writing-original draft.

YY: Conceptualization; Formal analysis; Investigation; Methodology; Validation.

MY: Investigation; Validation; Writing-original draft.

NE: Formal analysis; Investigation; Visualization

ÖEG: Resources; Supervision; Writing-review & editing.

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