

# Segmental superficial parotidectomy in the surgical treatment of benign parotid tumours

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## Abstract

**Objective:** To evaluate the efficacy and safety of segmental superficial parotidectomy in the surgical treatment of benign parotid tumours.

**Methods:** Patients who underwent parotidectomy for benign primary parotid tumours limited to the superficial lobe were retrospectively reviewed. Tumour location, size, surgical procedure, follow-up period, complications and recurrence rates were noted.

**Results:** The study included a total of 39 patients: 22 underwent segmental superficial parotidectomy (group 1) and 17 underwent superficial parotidectomy (group 2). The mean follow-up period was 41.79 months (range, 13–85 months). There were no recurrences in either group during the follow-up period. No significant differences were found between the two groups in terms of tumour size, complications or recurrence rates.

**Conclusion:** Segmental superficial parotidectomy is a safe and effective option in the surgical treatment of benign parotid tumours.

**Key words:** Parotid Neoplasms; Parotidectomy; Adenoma; Partial Parotidectomy

## Introduction

Benign tumours of the parotid gland, particularly pleomorphic adenoma and Warthin tumour, are commonly located in the superficial lobe. Currently, there are several surgical options for benign parotid tumours, such as extracapsular resection, extracapsular lumpectomy, minimal margin extracapsular dissection, partial superficial parotidectomy and superficial parotidectomy.<sup>1–4</sup>

Limited surgical approaches that do not involve identification of the facial nerve remain controversial in light of high recurrence rates and facial nerve risks. After high morbidity rates were reported in superficial parotidectomy cases due to wide resections that are not necessary for the treatment of benign tumours, partial superficial parotidectomy becomes a current issue.

Tweedie and Jacob, in their classification of parotid gland surgery (2009), divided partial superficial parotidectomy into upper, middle and lower segment parotidectomy.<sup>2</sup>

The goal of segmental superficial parotidectomy is total excision of the tumour, without causing facial nerve injury and apparent facial asymmetry. Although previous studies have reported that segmental resection is useful and beneficial in the treatment of benign

parotid tumours, there is still a need for studies evaluating long-term results and recurrence rates.<sup>3</sup>

We evaluated the efficacy and outcomes of segmental superficial parotidectomy in the treatment of benign parotid tumours.

## Materials and methods

A retrospective study was performed at Başkent University, with the support of the Research Council of the Faculty of Medicine at Başkent University and with the approval of the local ethics committee.

The patients who underwent superficial parotidectomy for benign primary parotid tumours in Başkent University Hospital Izmir Zübeyde Hanım and Adana medical and research centres were retrospectively reviewed. Tumour location, size, surgical procedure, follow-up period, complications and recurrence rates were recorded. Some of the patients diagnosed as having benign tumours (according to ultrasonography and sonoelastography examination findings,<sup>4</sup> and fine needle aspiration biopsy results) underwent segmental superficial parotidectomy; others underwent superficial parotidectomy.



FIG. 1

The segments resected in segmental superficial parotidectomy.

Segmental superficial parotidectomy was defined as the resection of at least one segment of the parotid gland after exposing the facial nerve.<sup>5</sup> In accordance with the definition, the truncus facialis was exposed after a classical incision. Thereafter, whilst preserving the nerve branches supplying the segment(s) involving the tumour, the segment(s) with the tumour were resected (Figure 1).

#### Statistical analysis

SPSS<sup>®</sup> software, version 17.0 for Windows, was used in the statistical analysis of data. Categorical variables are presented as numbers and percentages, and continuous variables are presented as means and standard deviations (or medians and ranges where necessary). The chi-square test was used in the comparison of categorical variables. For continuous variables, the normality of the distribution was assessed, and the Mann–Whitney U test was used if the data were not normally distributed. The level of statistical significance was set at  $p < 0.05$  for all tests.

#### Results

The study included a total of 39 patients: 22 underwent segmental superficial parotidectomy (group 1) and 17 underwent superficial parotidectomy (group 2). Patients' demographic and clinical data are summarised in Table I.

TABLE I  
PATIENTS' DEMOGRAPHIC AND CLINICAL DATA

Parameter	Group 1*	Group 2 <sup>†</sup>
Patients ( <i>n</i> )	22	17
Mean age (years)	51	57
Sex (male/female; <i>n</i> )	12/10	8/9
Mean tumour diameter (mm)	25.04	24.76
Mean follow-up period (months)	44.04	38.88
Mean recurrences ( <i>n</i> )	0	0

\*Segmental superficial parotidectomy patients; <sup>†</sup>superficial parotidectomy patients

Of the cases, 19 were pleomorphic adenoma, 15 were Warthin tumour, 2 were monomorphic adenoma, 1 was oncocytoma, 1 was basal cell adenoma and 1 was a benign lymphoepithelial cyst.

In group one, upper segmental superficial parotidectomy was performed in two cases, middle segmental superficial parotidectomy in five cases, lower segmental superficial parotidectomy in nine cases, and middle plus lower segmental superficial parotidectomy in six cases. One patient had an 18 mm tumour in the upper segment of the parotid gland and underwent upper segmental superficial parotidectomy. The tumour was diagnosed as malignant on frozen section, and the surgical approach was changed to total parotidectomy. The pathology report was low-grade mucoepidermoid carcinoma.

There was transient marginal mandibular nerve injury in three cases (7.69 per cent), salivary gland fistula in two cases (5.12 per cent), wound infection in one case (2.56 per cent) and transient facial paresis in one case (2.56 per cent). All complications resolved within the first month. Tumour size, surgical intervention, follow-up period and complications are summarised in Tables II and III.

When the groups were compared, no significant differences were found in terms of tumour size or recurrence rate ( $p > 0.05$ ).

#### Discussion

The most undesirable situation in the treatment of benign parotid tumours is injury to the branches of the facial nerve during parotidectomy. The facial nerve is always under risk in minimally invasive surgical procedures such as extracapsular resection and minimal margin extracapsular dissection, because it is not identified during surgery. Similarly, all branches of the facial nerve can be exposed to surgical trauma in superficial parotidectomy because of wide excision. The reported rates of transient nerve injury (1.4–3.5 per cent) and permanent facial nerve injury (2–64 per cent) vary in these surgical procedures.<sup>3,5–8</sup>

Segmental superficial parotidectomy provides a safer approach, as the facial nerve truncus is exposed during surgery. Furthermore, as only the nerve branches in the relevant tumour segment are exposed to surgical trauma, it poses less risk in terms of facial nerve injury.

In the present study, transient marginal mandibular nerve paresis occurred in two cases (10 per cent) with the largest tumour size in the segmental superficial parotidectomy group. This indicates that segmental superficial parotidectomy is quite safe in lower segment resections of upper, middle and small sized tumours, but the marginal mandibular nerve is under risk if the tumour size is larger than 2.5 cm in lower segmental superficial parotidectomy.

Depending on the surgical procedure, post-operative facial nerve injury occurs in more than half of the patients undergoing surgery for a benign parotid lesion, and the

TABLE II  
CHARACTERISTICS OF PATIENTS WHO UNDERWENT SEGMENTAL SUPERFICIAL PAROTIDECTOMY

Case no.	Sex	Mean age (years)	Pathological diagnosis	Mean tumour diameter (mm)	Surgical intervention	Mean follow-up period (months)	Complications
1	M	50	Pleomorphic adenoma	20	Upper SSP	85	–
2	M	62	Warthin tumour	25	Middle SSP	78	–
3	F	68	Warthin tumour	18	Middle SSP	67	–
4	M	61	Pleomorphic adenoma	11	Middle SSP	62	–
5	M	58	Pleomorphic adenoma	28	Lower SSP	58	Transient marginal mandibular nerve injury
6	M	62	Warthin tumour	19	Lower SSP	52	–
7	F	41	Pleomorphic adenoma	21	Middle SSP	42	Salivary gland fistula
8	M	56	Pleomorphic adenoma	20	Upper SSP	40	–
9	F	47	Pleomorphic adenoma	35	Lower SSP	34	Transient marginal mandibular nerve injury
10	M	79	Pleomorphic adenoma	19	Lower SSP	32	Wound infection
11	M	71	Warthin tumour	19	Lower SSP	28	–
12	F	34	Pleomorphic adenoma	21	Lower SSP	27	–
13	F	27	Pleomorphic adenoma	25	Lower SSP	15	–
14	M	58	Warthin tumour	50	Middle-lower SSP	58	–
15	F	18	Pleomorphic adenoma	37	Middle-lower SSP	53	–
16	M	58	Warthin tumour	32	Middle-lower SSP	52	–
17	M	52	Warthin tumour	45	Lower SSP	48	–
18	F	47	Warthin tumour	35	Middle-lower SSP	42	–
19	M	60	Oncocytoma	25	Middle-lower SSP	36	–
20	F	28	Pleomorphic adenoma	25	Middle-lower SSP	32	Salivary gland fistula
21	F	61	Warthin tumour	12	Lower SSP	15	–
22	F	44	Pleomorphic adenoma	9	Middle SSP	13	–

No. = number; M = male; SSP = segmental superficial parotidectomy; F = female

TABLE III  
CHARACTERISTICS OF PATIENTS WHO UNDERWENT SUPERFICIAL PAROTIDECTOMY

Case no.	Sex	Mean age (years)	Pathological diagnosis	Mean tumour diameter (mm)	Surgical intervention	Mean follow-up period (months)	Complications
1	M	62	Pleomorphic adenoma	18	Superficial parotidectomy	61	Transient marginal mandibular nerve injury
2	F	66	Pleomorphic adenoma	50	Superficial parotidectomy	44	–
3	F	49	Monomorphic adenoma	10	Superficial parotidectomy	44	–
4	F	29	Pleomorphic adenoma	25	Superficial parotidectomy	39	–
5	M	47	Monomorphic adenoma	25	Superficial parotidectomy	49	–
6	F	56	Warthin tumour	20	Superficial parotidectomy	28	–
7	F	65	Pleomorphic adenoma	30	Superficial parotidectomy	30	–
8	F	56	Pleomorphic adenoma	12	Superficial parotidectomy	22	–
9	M	57	Warthin tumour	26	Superficial parotidectomy	17	–
10	M	53	Basal cell adenoma	25	Superficial parotidectomy	16	–
11	F	67	Benign lymphoepithelial cyst	35	Superficial parotidectomy	55	Transient facial paresis
12	M	69	Warthin tumour	30	Superficial parotidectomy	51	–
13	F	59	Pleomorphic adenoma	18	Superficial parotidectomy	49	–
14	M	75	Warthin tumour	22	Superficial parotidectomy	47	–
15	F	54	Pleomorphic adenoma	15	Superficial parotidectomy	46	–
16	M	53	Warthin tumour	30	Superficial parotidectomy	41	–
17	M	62	Warthin tumour	40	Superficial parotidectomy	38	–

No. = number; M = male; F = female

risk is enhanced with prolonged surgery time.<sup>9</sup> Of the patients with facial nerve injury, 90 per cent recover within six months.<sup>9</sup> In our study, the patients with facial nerve injury recovered within one month.

Capsule and/or tumour rupture in minimally invasive parotidectomy are reported at varying rates.<sup>1–3,5</sup>

Besides tumour rupture, inadequate excision due to pseudopods, particularly in pleomorphic adenomas, may play a role in recurrence. Superficial parotidectomy with a wide safety margin has dramatically decreased the recurrence rates, and minimal margin surgery is not recommended for pleomorphic

adenomas.<sup>8</sup> However, in the meta-analysis of Albergotti *et al.*, the recurrence rates following extracapsular dissection and superficial parotidectomy were reported as 1.5 per cent and 2.4 per cent, respectively.<sup>10</sup> In the present study, there were no recurrences in the follow-up period, which we postulate is because of the relatively wide safety margins provided by segmental superficial parotidectomy.

Complications such as cosmetic defects, salivary gland fistula, Frey syndrome and facial asymmetry are more common in surgical procedures with wide excision, such as superficial parotidectomy.<sup>11</sup> The cosmetic results of segmental superficial parotidectomy are better because of the more limited resection. None of the patients in our study developed Frey syndrome. Two patients developed a salivary gland fistula and one had a wound infection. All complications resolved within one month.

As the tumour can recur within 20 years post-operatively,<sup>3</sup> a mean follow-up period of 28.46 months may seem short. However, Witt, in a 10-year follow-up study, compared the partial superficial parotidectomy procedures performed with 1 cm and 2 cm safety margins, and found no difference in the recurrence and complication rates. He concluded that a safety margin of 1 cm is also safe.<sup>12</sup> Although the facial nerve is exposed in segmental superficial parotidectomy, it is a minimally invasive surgery with a sufficient safety margin.

The most important limitation of this present study is the low number of cases. Nevertheless, it is known that parotid surgery outcomes are associated with surgeon experience, independent from the surgery type.<sup>8</sup> In our study, all surgical procedures were performed by two experienced surgeons.

- **The goal of segmental superficial parotidectomy is total tumour excision without facial nerve injury and facial asymmetry**
- **The efficacy and outcomes of segmental superficial parotidectomy in treating benign parotid tumours were evaluated**
- **This study showed segmental superficial parotidectomy to be an effective and safe option for benign primary parotid tumours limited to the superficial lobe**

Complete tumour removal with preservation of the facial nerve is the goal of surgery performed for benign parotid tumours.<sup>13</sup> Segmental superficial parotidectomy is a minimally invasive parotidectomy technique that allows total excision of the tumour with preservation of the facial nerve, which is the goal when treating benign parotid tumours, to avoid

recurrence in the long-term. Segmental superficial parotidectomy is an effective and safe option in the treatment of benign primary parotid tumours limited to the superficial lobe. However, long-term follow-up studies in the form of large case series are needed to highlight the value of these surgical methods.

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