Original Article

Selective Deep-Lobe Parotidectomy for Benign Parotid Gland Tumors

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Abstract

Background: Deep-lobe tumors have been shown to possess a significantly thicker capsule with less tumor penetration compared to superficial tumors. Thus, more conservative surgical approaches, rather than aggressive methods, have been proposed for treating benign deep-lobe tumors of the parotid gland. **Aim:** To evaluate the surgical outcomes and oncological safety of selective deep-lobe parotidectomy (SDLP) in patients with benign lesions located in the deep lobe of the parotid gland. **Methods:** Twenty-two patients who underwent SDLP were enrolled in the study. Data on age, sex, tumor size, hospitalization duration, recurrence, cosmetic outcomes, and complications—including facial nerve (FN) impairment, Frey's syndrome (FS), sialocele, first-bite syndrome (FBS), wound infection, hematoma, and seroma —were retrospectively evaluated from hospital records. Facial contour symmetry was rated by each patient using a 0–10 VAS score at least six months post-surgery. **Results:** Final histopathological examination revealed that the most common tumor was pleomorphic adenoma (PA) (59.1%). Three patients (13%) experienced temporary paralysis of the marginal branch of the FN, with a House-Brackman Grade III, which resolved spontaneously within two months post-surgery. No cases of permanent FN paralysis, FS, FBS, or sialocele were observed in any patients. The mean VAS score for facial contour symmetry was 9.43 ± 0.78. No recurrence were noted in any patients over a median follow-up period of 71.7 ± 21.2 months. **Conclusion:** SDLP may facilitate the safe surgical removal of benign lesions located in the deep lobe of the parotid gland, with oncological safety, reduced complication rates, and improved cosmetic outcomes.

Keywords: *Benign, deep lobe parotidectomy, parotid gland, postoperative complications*

Introduction

The parotid gland is artificially divided into superficial and deep parts by the facial nerve (FN) rather than by an actual anatomical boundary. The deep lobe accounts for 20% of the total volume of the parotid gland and is located beneath the FN.[1] Approximately 10% of parotid gland neoplasms originate in the deep lobe, and most of them are histologically benign.[2]

In recent years, there has been a shift toward more conservative surgical approaches, including partial or extracapsular parotidectomy for benign parotid gland diseases. These procedures have been shown to provide effective treatment without compromising oncological safety in benign superficial parotid gland lesions.[3-7] Recently, selective or partial parotidectomy techniques have been suggested for benign tumors involving the deep lobe of the parotid gland, without removing the superficial part. Selective deep-lobe parotidectomy (SDLP) was first introduced by Leverstein *et al*.[3] in 1997, with claims of better functional and aesthetic results compared to total or near-total parotidectomy. With this technique, approximately 80% of the parotid volume is preserved by leaving the

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superficial lobe of the gland intact, thereby reducing salivary secretory dysfunction and complication rates.[8,9] However, data on SDLP with preservation of the superficial lobe for benign tumors remains limited in the literature. This study aimed to evaluate the surgical outcomes and oncological safety in patients who underwent SDLP for benign lesions located in the deep lobe of the parotid gland.

Patients and Methods

Between January 2013 and December 2021, 36 patients in our department underwent SDLP for a benign tumor involving the deep lobe of the parotid gland. Fourteen patients were excluded from the study due to incomplete hospital records, loss to follow-up, or a follow-up period of less than two years, or a final histopathological diagnosis of malignancy. Data on age, sex, tumor size, hospitalization duration, recurrence, and complications—including FN impairment, numbness of the earlobe (NE), numbness in the incision area (NIA), Frey's syndrome (FS), sialocele, first-bite syndrome (FBS), wound infection, hematoma, and seroma—were retrospectively gathered from hospital records. All patients attended regular clinical visits, and a USG and/or MRI scan was performed to detect recurrences. Facial contour symmetry was rated by each patient using a 0–10 VAS scores at least 6 months post-surgery. The study was approved by the Kayseri City Hospital Clinical Research Ethics Committee (2023-945).

All surgical procedures were performed by the same surgeon using the nerve integrity monitor (NIM-Response 3.0 System, Medtronic Xomed, Jacksonville, Florida). A modified Blair incision followed by skin flap elevation, with preservation of the superficial musculoaponeurotic system (SMAS) was performed. The initial steps of the procedure were similar to those described in the previous literature.[10] After identifying the main trunk of the FN through classical anatomical landmarks, the nerve was dissected distally along its branches. In all cases, the superficial lobe was divided into two parts (superior and inferior) along the line of the main FN trunk to achieve better exposure of both the FN branches and tumor boundaries. FN branches not close to the tumor tissue were preserved and not dissected. Careful dissection was performed to violate the avoid violating the tumor capsule, and the tumor was removed either below the marginal mandibular branch or between the nerve branches. The two divided parts of the superficial lob were then repositioned and sutured together, as well as to the pretragal soft tissue and sternocleidomastoid muscle, using absorbable sutures. A suction drain was placed in all patients and was usually removed on postoperative day 2 or 3 [Figures 1 and 2].

Statistical analysis was performed using the Statistical Package for the Social Sciences (v. 21, SPSS Inc., Chicago; IL). Data were presented as mean ± standard deviation.

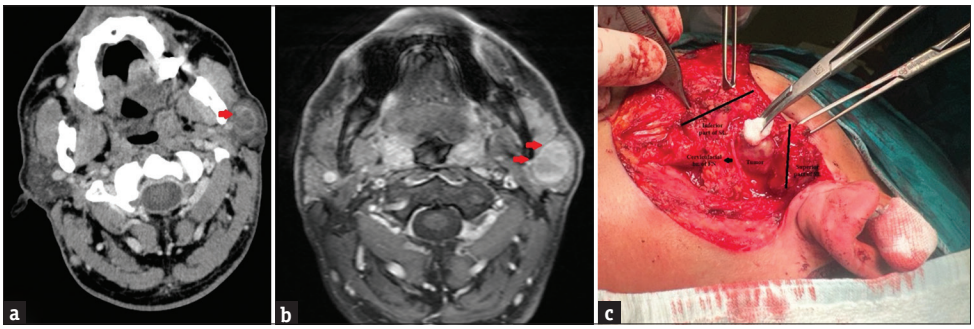

Figure 1: Selective deep-lobe parotidectomy with the superficial lobe splitting technique. (a) Axial CT image showing a heterogeneously contrast-enhanced lesion in the deep lobe of the parotid gland, (b) Axial T1-weighted gadolinium-enhanced MRI image showing a deep-lobe lesion with peripheral and septal contrast enhancement, (c) The superficial lobe was divided into two parts (superior and inferior) along the line of the main trunk of the facial nerve (black lines)

Figure 2: Selective deep-lobe parotidectomy with the superficial lobe splitting technique. (a) The tumor was removed with the preservation of the facial nerve, (b) Two divided parts of the superficial lob repositioned and sutured together and to the pretragal soft tissue and sternocleidomastoid muscle (br: branch, FN: facial nerve, SL: superficial lobe), (c) Macroscopic image of a tumor with an intact capsule (Warthin tm)

Table 1: Demographic, clinicopathologic, and postoperative data on the patients

Age	Gender	Primary diagnosis	Tumor size (cm)	Length of hospital stay	Follow-up (months)	Complications	Facial contour
59	F	PA	5	3	119	TPFN	8
30	F	PA	3	4	48	TNE	10
30	F	PA	2	6	88	-	10
52	M	WT	4	4	77	-	10
38	F	PA	4	3	81	TNE, TNIA	10
46	M	PA	2	2	81	TNE, TNIA	10
72	M	WT	3	4	67	TNE, TNIA	10
59	M	WT	2	2	49	-	10
45	F	PA	3	3	55	TNE, TNIA	10
27	F	PA	3	4	56	-	9
63	F	PA	4	4	59	S	9
63	M	PA	4	5	67	-	10
49	M	PA	3	3	59	TNE	8
69	F	PA	4	4	66	TNE, TNIA	10
41	M	PA	5	6	65	TPFN, TNE, TNIA	9
59	M	WT	2	2	25	TNE	8
51	F	PA	3	7	96	-	10
21	M	WT	3	4	90	-	10
41	F	WT	4	4	76	-	9
60	F	Reactive LAP	3	3	95	-	10
13	M	Hemangioma	5	5	100	-	10
52	F	Schwannom	3	5	48	TPFN, TNE, TNIA	8

F: Female, FS: Frey Syndrome, LAP: Lymphadenopathy, M: Male, No: Number of patients, PA: Pleomorphic adenoma, S: Seroma, TNE: Temporary numbness of earlobe TNIA: Temporary numbness of incision area, TPFN: Temporary paralysis of the facial nerve, WT: Warthin tumor

Results

Demographic, clinicopathologic, and postoperative data on the patients are presented in Table 1. The mean age of the patients was 47.3 ± 15.8 years, with 54.5% being female. According to the final histopathological examination, the most common tumor type was PA (59.1%). The mean tumor size was 3.4 ± 0.9 cm, and the mean hospital stay after surgery was 3.9 ± 1.3 days.

Three patients (13.6%) experienced temporary paralysis of the marginal branch of the FN with a House-Brackman Grade III, which resolved spontaneously within two months. One patient (4.5%) developed a seroma that resolved within 14 days with drainage and alternate-day dressing. Ten patients (45.4%) reported temporary NE, with temporary NIA accompanying it in seven cases. No cases of permanent FN paralysis, FS, FBS, or sialocele were observed in any patients. None of the patients reported dry mouth during the follow-up visits. The mean VAS scores for facial contour symmetry were 9.45 ± 0.8. No recurrences were observed in any patients during a median follow-up period of 71.2 ± 21.6 months.

Discussion

Enucleation of benign parotid gland tumors carries a high risk of recurrence due to microscopic tumor projections penetrating the tumor capsule, especially in pleomorphic adenomas.[11] Hence, these tumors typically require surgical procedures such as superficial or partial parotidectomy, which involve removing macroscopically normal surrounding gland tissue along with the tumor to ensure oncological safety. However, excising a surrounding cuff of normal parotid gland tissue is generally not feasible with deep-lobe tumors.[1] Fortunately, this does not appear to increase recurrence rates to the same extent as with tumors in the superficial lobe, likely due to the distinct histopathological characteristics of superficial versus deep-lobe tumors. Studies have shown that deep-lobe tumors have a significantly thicker capsule with less tumor penetration compared to superficial tumors. Thus, more conservative surgical procedures rather than aggressive methods have been proposed for benign deep-lobe tumors of the parotid gland.[12] Conservative techniques, such as SDLP, aim to preserve gland function while achieving lower complication rates and comparable oncological outcomes to standard approaches.

Although randomized trials comparing the efficacy of total parotidectomy versus SDLP for deep-lobe tumors are rare, several studies have reported the high oncological safety of SDLP.[9,13-17] In a recent study, Wallerius *et al*.[13] compared SDLP and total

parotidectomy with regard to complications, recurrence, and other surgical outcomes in a large group of patients with benign deep-lobe tumors. The authors reported that tumor control was not compromised by SDLP. As FN dissection is limited in SDLP, the incidence of FN paralysis was shown to be reduced with this technique. Additionally, the risk of impaired salivary secretion and the occurrence of FS were reported to be significantly lower with SDLP due to the preservation of the superficial lobe.[10,13-15] In the present study, the superficial lobe of the parotid gland was divided into two halves (superior and inferior) along the line of the main trunk of the FN during SDLP for all patients. We thought that splitting the superficial lobe ensures better exposure of tumor boundaries, which may reduce the risk of violating the tumor capsule and improve tumor control, especially in larger tumors. This approach also facilitates the dissection of FN branches from the tumor and surrounding gland tissue, potentially decreasing FN impairments. After the removal of the primary tumor, the superior and inferior parts of the superficial lobe were approximated with absorbable sutures to restore anatomical integrity. In the study by Sesenna *et al*.,[15] the authors divided the superficial lobe during SDLP to achieve an easier and quicker approach to the deep lobe in seven of 11 patients. They reported that this technique further reduced dissection of the facial nerve branches while adequately exposing the tumor area. In the present study, no violations of the tumor capsule violation or spillage occurred during surgery. Additionally, no tumor recurrences were observed during follow-up, supporting the oncological safety of the procedure. No cases of permanent facial paralysis or FS were observed after surgery, which is consistent with reported rates in the literature. Wallerius *et al*.[13] reported that FBS was more common in patients undergoing SDLP than in those undergoing total parotidectomy. In contrast, our study found no cases of FBS, which may be attributed to the smaller sample size compared to Wallerius *et al*.[13] Other complications, such as FS and sialocele, were also absent, aligning rates reported in the literature. Although none of the patients complained of dry mouth, the present study did not include any objective assessment tools to measure salivary gland function, such as salivary scintigraphy.

Cosmetic outcomes have been reported to be better with SDLP in the literature.[14,15] Preservation of the superficial lobe helps prevent depression in the parotid bed, resulting in improved facial contour and requiring fewer facial reconstruction techniques, such as an abdominal dermal fat grafts.[13-15] In the present study, a modified Blair incision was utilized to improve surgical exposure and facilitate access to the tumor. However, a visible scar, especially in the upper neck and preauricular area, is a major drawback of this incision. More aesthetic approaches, such as modified facelift or retroauricular hairline incisions, have been reported to achieve improved cosmetic outcomes by concealing scars.[18] Roh[14] demonstrated that SDLP for pleomorphic adenoma can be performed via a retroauricular hairline incision, which ensured patient satisfaction regarding the incision scar. Due to the visible scar caused by the modified Blair incision, only facial contour was evaluated through subjective assessments of the patients in the present study. The patients reported high VAS scores for facial contour symmetry, which may confirm the success of the SDLP in achieving an improved facial contour.

The present study has several limitations. First, the small number of patients may limit the strength of the conclusions that can be drawn. Due to the retrospective nature of the study, a heterogeneous group of patients with lesions of varying sizes and histopathologic types was enrolled in the study. Salivary function could not be objectively evaluated, as salivary scintigraphy is not routinely included in the postoperative follow-up schedule at our clinic. Additionally, the absence of patient groups undergoing alternative procedures for the removal of deep-lobe tumors, such as total or near-total parotidectomy, restricts any comparisons between surgical techniques.

Conclusion

SDLP may ensure the surgical removal of benign lesions located in the deep lobe of the parotid gland with oncological safety, reduced complication rates, and improved cosmetic outcomes. Splitting of the superficial lobe during SDLP may provide better exposure, which facilitates the meticulous dissection of the tumor boundaries and FN branches.

Declaration of generative AI and AI-assisted technologies in the writing process

AI and AI-assisted technologies were not used in the writing process of this manuscript.

CRediT authorship contribution statement

Ali Bayram: Writing – original draft, Validation, Conceptualization, Supervision, Project administration.

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Conflicts of interest

There are no conflicts of interest.

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