

# Supracricoid Partial Laryngectomy for Salvage Surgery After Failure of Transoral Robotic Surgery for Glottic Carcinoma

## Glottik Karsinoma İçin Transoral Robotik Cerrahi Sonrası Nükslerde Suprakrikoid Parsiyel Larenjektominin Yeri

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**ABSTRACT Objective:** Organ preservation strategy in laryngeal carcinoma is now the fundamental treatment choice in laryngeal carcinoma. Endolaryngeal surgery (ELS) is one of the successful treatment modalities for organ preservation. With the introduction of transoral robotic surgery (TORS) into glottic laryngeal cancer treatment options, TORS failure patient management became more important for surgeons interested in head and neck surgery. The aim of this study was to evaluate the functional results, local control, and survival rates in a series of 7 patients who were consecutively managed with Supracricoid Partial Laryngectomy (SCPL) for persistent and recurrence tumors after TORS cordectomy. **Material and Methods:** Patients who underwent SCPL after failed TORS cordectomy over a seven-year period were enrolled in the study. The patients' age, sex, previous cordectomy type, tumor stage, recurrence interval, recurrence stage, neck dissection adjuvant therapy, decannulation time, and start to oral feeding type were recorded. **Results:** After salvage surgery, the mean decannulation time was 17.4±3.49 days in 5 patients who could be decannulated. The mean oral intake time was 26.57±23.66 days. The recurrence rate was 14.28% (1/7). The local control rate and organ preservation rate was 85.72%. The functional preservation rate was 71.42%. All patients are feeding orally (100%). **Conclusion:** With suitable oncologic and functional rates, SCPL is a feasible surgical choice after TORS failure.

**Keywords:** Glottic cancer; partial laryngectomy; recurrence; robotic surgery; larynx

**ÖZET Amaç:** Laringeal karsinomlarda organ koruma stratejisi, temel tedavi seçeneğidir. Endolaringeal cerrahi (ELS) organ korunmasında başarılı tedavi yöntemlerinden biridir. Transoral robotik cerrahinin (TORS) glottik laringeal kanser tedavi seçeneklerine girmesiyle, TORS sonrası nüks etmiş hastaların yönetimi baş ve boyun cerrahisi ile ilgilenen cerrahlar için daha önemli hale gelmiştir. Bu çalışmanın amacı, TORS kordektomi sonrası nüks eden ve Suprakrikoid Parsiyel Larenjektomi (SKPL) ile tedavi edilen 7 hastadan oluşan bir seride fonksiyonel sonuçları, lokal kontrol ve sağkalım oranlarını değerlendirmektir. **Gereç ve Yöntemler:** Yedi yıl içinde TORS kordektomisi sonrası nüks eden ve SKPL uygulanan hastalar çalışmaya alındı. Hastaların yaşı, cinsiyeti, önceki kordektomi tipi, tümör evresi, nüks aralığı, nüks evresi, boyun diseksiyonu adjuvan tedavisi, dekanülasyon süresi ve oral beslenmeye geçilme süresi kaydedildi. **Bulgular:** Kurtarma ameliyatından sonra, dekanüle edilebilen 5 hastada ortalama dekanülasyon süresi 17,4 ±3,49 gündü. Ortalama oral alım süresi 26,57±23,66 gündü. Nüks oranı %14,28 (1/7) idi. Lokal kontrol oranı ve organ koruma oranı %85,72 idi. Fonksiyon koruma oranı %71,42 idi. Tüm hastalarda oral yolla beslenme sağlandı (%100). **Sonuç:** Uygun onkolojik ve fonksiyonel oranlar ile TORS başarısızlığından sonra SKPL uygun bir cerrahi seçimdir.

**Anahtar Kelimeler:** Glottik kanser; parsiyel larinjektomi; rekürrens; robotik cerrahi; larinks

Laryngeal cancer is the most common cancer of the head and neck area after oral cavity cancer.<sup>1</sup> Organ preservation strategy in laryngeal carcinoma is now the fundamental treatment choice in laryngeal carcinoma. Glottic carcinoma, which is the most common type of laryngeal

carcinoma, is mostly diagnosed in the early stage. In the last two decades, endolaryngeal laser surgery (ELLS) is the treatment choice in early glottic carcinoma.<sup>2</sup> After the introduction of transoral robotic surgery in limited series, TORS cordectomy has begun to be used in glottic surgery. Although data are limited, it is now a surgical option.<sup>3</sup>

Although both radiotherapy (RT) and endolaryngeal surgery (ELS) are successful treatment modalities, treatment failures can occur. The treatment of patients with failure is also a challenge, but various salvage treatment options exist.<sup>4</sup> In the literature, there are copious data on post-RT salvage treatment. Although the most commonly performed salvage surgery is total laryngectomy (TL), ELLS, vertical hemilaryngectomy (VHL), horizontal partial laryngectomy (HPL), and supracricoid partial laryngectomy (SCPL) are other reported surgical options depending on the tumor stage.<sup>5,6</sup>

Few publications focus on salvage surgery after ELLS, and there is no current standard ELLS failure salvage surgery approach.<sup>7</sup> In the literature, TL is recommended for middle and advanced-stage cancer in ELLS failure, and it is recommended that neck dissection and radio RT/chemotherapy (CT) should be added if necessary. However, partial laryngectomies may be an alternative to total laryngectomies in selected cases.<sup>7</sup>

In cases of failure, there are no data regarding patients undergoing salvage surgery for transoral robotic glottic surgery (TORS). The aim of this study was to evaluate the functional results, local control, and survival rates in a series of 7 patients

who were consecutively managed with SCPL for persistent and recurrence tumors after successful TORS cordectomy.

## MATERIAL AND METHOD

The records of 7 patients who underwent salvage SCPL for glottic TORS failure between 2010 and 2017 were reviewed retrospectively. The patients' age, sex, previous cordectomy type, tumor stage, recurrence interval, recurrence stage, neck dissection adjuvant therapy, decannulation time, and start to oral feeding type were recorded (Table 1). Laryngeal tumors were staged according to the 7th edition of the American Joint Committee on Cancer (AJCC) classification.<sup>8</sup> The cordectomies were recorded according to the European Laryngological Society classification.<sup>9</sup> After the TORS cordectomy procedure, all subjects were followed up according to the American Cancer Society Head and Neck Cancer Survivorship Care Guideline.<sup>10</sup> The salvage SCPL surgery indication criteria were salvage being unable to be performed via endolaryngeal surgery because type 4/5/6 cordectomy was performed with TORS in the primary surgery, total laryngectomy was not definitively indicated because the recurrent tumor did not invade the cricoarytenoid joint or the interarytenoid space or there was massive thyroid cartilage invasion, and patients with recurrent tumor in the anterior commissure with less than 1 cm subglottic invasion in the front and less than 0.5 cm invasion in the back.

Besides demographic data, previous pathology reports, tumor, node, metastasis (TNM) staging, op-

**TABLE 1:** Demographic data, Pre-TORS stage and TORS cordectomy types.

Patient	Age (year)	Sex	T stage during	
			TORS cordectomy	Type of TORS cordectomy
1	49	M	T1a	5a
2	69	M	T1a	4
3	53	M	T1a	5a
4	70	M	T1a	5a
5	52	M	T1a	5a
6	56	M	T1a	4
7	53	M	T2	5c

M: Male.

erative notes, and final pathologic assessments were recorded. Flexible laryngoscopy, neck and chest CT with contrast material, and pulmonary function tests were performed. Laryngeal stroboscopy was not performed. The patients' anamneses were recorded.

Follow-up data were collected via periodic visits to our departments. No subjects were lost to follow-up.

Approval for the study was obtained from the local ethics committee (Approval number: 2017.04.51).

## RESULTS

During the seven-year period, 7 patients were identified. The mean age of the subjects was  $57.42 \pm 7.87$  years. All 7 were male. Four of the 7 of the patients underwent a type 5A cordectomy, two patients underwent a type 4 cordectomy, and one underwent an initial type 5c cordectomy. None of the patients had a neck dissection with cordectomy and postoperative RT was not applied during the initial treatment (Table 1).

For salvage surgery, all patients were able to climb the 3-fold stairs without stopping, and the forced expiratory volume in one second/forced vital capacity (FEV1/FVC) ratio was over 60% in all patients. Six patients underwent SCPL+CHEP and one patient underwent SCPL+CHP. In one of the patients who underwent CHEP, one arytenoid had to be resected because of arytenoid invasion. In the remaining 6 patients, two arytenoids were secured.

With laryngectomy, 5 of the 7 patients underwent a type 3 modified radical neck dissection. One subject underwent an ipsilateral level 3-4 selective neck dissection, and no neck dissection was performed in one subject. None of the subjects had clinical positive neck metastases at the time of recurrence. Preoperative gastrostomy was not performed. A temporary nasogastric tube was used in all subjects. Negative surgical margins were reported in all patients in intraoperative frozen sections and postoperative final pathology reports. One patient had a suspension suture at the level of the neo-glottis in the early postoperative period and the suture was later removed under direct laryngoscopy. Apart from that, none of the subjects had postoperative complications. Post-operative chemoradiotherapy was given to one patient whose tumor was close to the lower surgical margin (the patient who underwent ipsilateral arytenoid resection).

## ONCOLOGIC OUTCOMES

After SCPL surgery, the mean follow-up time was  $41.28 \pm 20.14$  months. No patients were lost during follow-up. One subject (1/7, 14%) experienced second recurrence in the 15<sup>th</sup> follow-up month and total laryngectomy and postoperative RT was performed. The patient is alive and disease-free 24 follow-up months after the second recurrence. At the time of writing, all of the patients included in this study were alive and disease-free (Table 2).

All subjects had a minimum of 9 months' follow-up. The mean follow-up time was  $41.28 \pm 20.14$  months.

**TABLE 2:** Patients' status and treatment after TORS surgery.

Patient	Recurrent Time (month)	Stage During		Neck Dissection	Adjuvant Therapy	Second Recurrence	Second Salvage Approach
		Recurrence	Reconstruction				
1	57	T3N1	CHEP*	Bilateral MRND 3	RT-CT	No	-
2	23	T1bN0	CHEP	NO	No	No	-
3	11	T2N0	CHEP	Left Level 3-4 ND	No	No	-
4	8	T1bN0	CHEP	Bilateral MRND 3	No	No	-
5	5	T1bN0	CHEP	Bilateral MRND 3	No	No	-
6	5	T2N0	CHEP	Bilateral MRBD 3	No	No	-
7	3	T2N0	CHP	Bilateral MRND 3	NO	Yes	TL+RT

\* One arytenoid preserved.

CHEP: Cyclophosphamide, adriamycin, etoposide, prednisolone; CHP: Cyclophosphamide, prednisone; MRND: Modified radical neck dissection; ND: Neck dissection; RT-CT: Radiotherapy, chemotherapy; TL+RT: Total laryngectomy-radiotherapy.

## FUNCTIONAL OUTCOMES

Six subjects' larynxes were preserved using SCPL (6/7, 86%). Five patients were decannulated successfully. All patients began oral intake after SCPL successfully; no patients had permanent / temporary percutaneous endoscopic gastrostomy (PEG) tubes for aspiration reasons (decannulation rate was 71%, oral intake rate was 100%). The mean decannulation time was  $17.4 \pm 3.49$  days in 5 patients who could be decannulated. The mean oral intake time was  $26.57 \pm 23.66$  days (Table 3).

## DISCUSSION

As nonsurgical, organ-sparing treatment modalities become more important in the treatment of laryngeal carcinoma, the choice of treatment after failure of these treatments becomes important.<sup>7</sup> Although total laryngectomy is still the most frequently recommended salvage surgery, partial laryngectomy is an option in selected cases.<sup>4</sup> In the literature, there is an abundance of articles regarding the management of post-radiotherapy failure in patients with laryngeal cancer.<sup>6</sup> However, data with regards salvage management after endolaryngeal surgery are limited and existing literature is related to endolaryngeal laser surgery.<sup>7</sup> The present report presents 7 patients who underwent salvage SCPL in a very specific condition. To date, no reports exist in the literature for salvage partial laryngectomy in the case of TORS after glottic cordectomy failure.

In a review written by Mario et al., in a subject group of rt-failure where SCPL was used as the

main method, the local control rate was 84.5%. In the same study, it was stated that in the event of second recurrence, SCPL was a surgical technique that allowed secondary salvage surgery.<sup>5</sup> Paleri et al. assessed partial open laryngectomies as salvage therapy for cases of radiotherapy failure. Their meta-analysis results for local control rate at the 24th month, disease-free survival (DFS) rate, and overall survival (OS) rate were 86.9%, 91.2%, and 83.1%, respectively.<sup>6</sup> Another meta-analysis performed by Leone et al. included 291 patients with radiotherapy failure. The authors found the 5-year DFS rate as 89.5%, and the 5-year OS rate 80.2%.<sup>11</sup>

It is clear from previous literature that a small proportion of the authors preferred to perform partial laryngectomy in patients with recurrence after ELS. The reason for this is the use of ELS in early stage recurrence, and total laryngectomy in middle and advanced-stage recurrence.<sup>12-17</sup> The question that should be answered is whether organ and function-preserving surgeries can be used as salvage surgery in middle-stage recurrent tumors that cannot be treated with ELS.

Lallenamt et al. reviewed their preliminary results of early-stage glottic and supraglottic cancers treated with TORS. They had 2 recurrences, one treated with salvage total laryngectomy and bilateral neck dissection + radiotherapy, and one only with radiotherapy, among 13 glottic carcinomas.<sup>18</sup> Their mean follow-up period was 15.7 months; the local recurrence rate was 15% (2/13), and the laryngeal preservation rate was 8% (1/13) for glottic carcinomas. They stated that TORS was feasible for early-stage laryngeal carcinoma.

**TABLE 3:** Follow-up and functional results after salvage SCPL (df: disease-free).

Patient	Decannulation Time (day)	Oral Intake Time (day)	Follow-up Time After SCPL (Month)	Final Outcome
1	Not Decannulated	84	32	df
2	21	20	26	df
3	13	12	8	df
4	16	15	52	df
5	22	21	72	df
6	15	14	60	df
7	Not Decannulated	20	24	df

SCPL: Supracricoid partial laryngectomy; df: Disease-free.

The local control rate with SCPL was 86% in the present study. A patient with recurrence underwent TL and was provided local control. This patient was followed up for 24 months with no further recurrence. The organ preservation rate was 86% and the function preservation rate was 71%. The local control rates, organ preservation rates, and functional results obtained in this study are compatible with the literature.<sup>5,7</sup>

In this subject group, during salvage SCPL, safe resection limits were achieved in all patients, and total laryngectomy had to be performed in no patients because of positive frozen sections. However, especially if SCPL is performed as salvage surgery, the possibility of expanding the resection margin should absolutely be discussed with the patient and TL approval should be obtained even if the tumor sizes are not borderline.<sup>4</sup>

The main limitations of this study are the small number of cases and the retrospective design. On the other hand, its main strength lies in the very homogeneous population considered because all patients underwent salvage SCPL after failure of the primary transoral laser microsurgery, and all procedures were consecutively performed by the same surgical team.

## CONCLUSION

Although performed with a small patient group, our study shows that SCPL can be performed safely with 100% oral intake 71% decannulation in patients with robotic surgery failure, which is seen as the future of surgery.

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### Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

### Authorship Contributions

This study is entirely author's own work and no other author contribution.

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