


Clinical Outcomes of Supraglottic Laryngeal Cancer: Insights from a Decade of Surgical Treatment

Yaşar Kemal Duymaz¹ 

¹University of Health Sciences, Ümraniye Training and Research Hospital, Department of Otolaryngology, İstanbul, Türkiye

ORCID ID: Y.K.D. 0000-0002-4887-4677

Citation: Duymaz YK. Clinical outcomes of supraglottic laryngeal cancer: Insights from a decade of surgical treatment. Tr-ENT 2024;34(1):8-12. <https://doi.org/10.26650/Tr-ENT.2024.1387086>

ABSTRACT

Objective: This study sought to retrospectively examine the clinical outcomes of patients treated for supraglottic laryngeal cancer at a single center over a decade, assess the efficacy of surgical interventions, and evaluate survival rates in comparison to current literature.

Materials and Methods: A retrospective analysis was conducted on 84 patients diagnosed with supraglottic laryngeal cancer who underwent surgical treatment between January 2008 and December 2018. Nonlaryngeal head and neck malignancies and inaccessible patient records were excluded. The study evaluated factors including tumor location, tumor stage, lymph node metastasis, surgical approach, complications, histopathological findings, and adjuvant therapy. Statistical analysis involved descriptive methods, frequencies, and ratios, with outcomes compared to existing literature.

Results: The cohort primarily consisted of male patients (91.7%) with an average age of 58.04 years. Squamous cell carcinoma was the predominant histopathological type (98.8%), exhibiting various degrees of differentiation. Most patients presented with advanced-stage disease (III or IV), with 53.6% undergoing total laryngectomy. Neck dissection was performed in 95.2% of cases, and 69% received postoperative radiotherapy. The 5-year overall survival rate was 72.2%, with a recurrence rate of 7.1%.

Conclusion: This study reveals that supraglottic laryngeal cancer, predominantly affecting older males, is frequently diagnosed at advanced stages. Surgical intervention resulted in a 5-year survival rate consistent with existing literature. Despite the limitation of its retrospective design and the small, single-center sample, the findings support current treatment modalities while underscoring the importance of early detection and further research.

Keywords: Supraglottic laryngeal cancer, squamous cell carcinoma, neck dissection, total laryngectomy, partial laryngectomy

INTRODUCTION

Laryngeal cancer ranks as the second most prevalent type of tumor among upper aerodigestive tract tumors (1), with squamous cell carcinoma representing approximately 95% of cases. Noteworthy risk factors for laryngeal cancer include tobacco smoking and alcohol consumption (2). Predominantly, laryngeal cancers occur in the glottis, followed by the supraglottic region, while subglottic localization is exceptionally rare (3).

For supraglottic laryngeal cancers, a single treatment modality is favored for T1 and T2 tumors, whereas combined treatment is often necessary for T3 and T4 tumors. Surgical options for supraglottic cancers encompass partial laryngectomy and total laryngectomy. Partial laryngectomy is typically utilized for T1

and T2 and selected T3 tumors, while total laryngectomy is reserved for T3 and T4 tumors (4, 5). Supracricoid partial laryngectomy with cricothyroidopexy is particularly indicated for supraglottic carcinomas involving the glottic level or preepiglottic space, demonstrating reduced vocal fold mobility, or displaying limited thyroid cartilage invasion (6). Specifically, total laryngectomy is recommended for supraglottic cancers with interarytenoid extension, extralaryngeal spread, involvement of the posterior supraglottic region, or extensive extension of the tongue root (7).

Supraglottic squamous cell carcinoma (SCC) typically presents with evident clinical signs, and occult regional metastases are frequently observed, with a tendency to spread to levels II, III, and IV. Pathological investigations have indicated that the rates of cervical metastasis vary according to the stage of the

Corresponding Author: Yaşar Kemal Duymaz E-mail: dryasarkemaldyymaz@gmail.com

Submitted: 06.11.2023 • **Revision Requested:** 11.12.2023 • **Last Revision Received:** 25.12.2024 • **Accepted:** 22.01.2024 • **Published Online:** 20.03.2024



This work is licensed under Creative Commons Attribution-NonCommercial 4.0 International License.

disease, with percentages of 10% for T1, 29% for T2, 38% for T3, and 57% for T4 stages of supraglottic lesions (8). Bilateral metastases are also prevalent (9). Due to these differing metastasis rates, the standard approach for managing the neck in supraglottic SCC involves bilateral selective neck dissection of levels II–IV (10).

This retrospective study analyzed patients diagnosed with supraglottic laryngeal cancer who received treatment at our clinic. The objective was to evaluate the efficacy of different treatment modalities across various stages of the disease.

MATERIALS and METHODS

The research involved 84 patients diagnosed with and surgically treated for supraglottic laryngeal cancer between January 2008 and December 2018. Ethics committee approval was secured for the study (Approval Date: 20.10.2022, No: 331). It was conducted retrospectively through a review of patient records. Patients with head and neck malignancies other than laryngeal cancer, those with tumors located in the glottis or subglottis, and those with inaccessible files were excluded. Data on tumor location, size, and stage were collected, along with assessment of lymph node metastasis. Detailed records were kept on surgical procedures, postoperative complications, histopathological findings (including surgical margins, lymphovascular invasion, perineural invasion), and postoperative radiotherapy.

Postoperative monitoring of patients included monthly head and neck examinations and laboratory tests during the first year after surgery, followed by examinations every 3 months in the subsequent year and then every 6 months thereafter.

Statistical analysis

The primary data variables, encompassing demographic and clinical characteristics, histopathologic findings, surgical procedures, and treatment results, underwent thorough analysis. Basic statistical techniques were employed to assess data distribution and central tendencies (including mean, median, standard deviation, etc.). Frequency distributions for categorical variables such as tumor staging, degree of

differentiation, and surgical interventions performed were determined, and the associations among these variables were illustrated through percentage distributions and ratios. Descriptive statistics were utilized to present the data, and the outcomes derived within this framework were compared with similar findings from analogous studies in existing literature.

RESULTS

In this study, a total of 84 patients were examined. Among these individuals, 77 (91.7%) were male, while 7 (8.3%) were female. The average age of the patients was 58.04 years (SD: 8.92). Histopathological analysis revealed pleomorphic adenoma in only one patient, with SCC diagnosed in the remaining 83 patients (98.8%). Among the SCCs, 24 (28.9%) were classified as well differentiated, 43 (51.8%) as moderately differentiated, and 16 (19.3%) as poorly differentiated. In terms of tumor staging, 4 (4.7%) tumors were categorized as stage 1, 9 (10.7%) as stage 2, 52 (62%) as stage III, and 19 (22.6%) as stage IV, indicating advanced stage (Table 1).

Among the 45 patients who underwent total laryngectomy, the primary factor guiding this decision was the presence of extralaryngeal spread, which was observed in 32 patients. Total laryngectomy was also conducted for eight patients due to involvement of the interarytenoid region and for five patients due to extensive involvement of the base of the tongue. Supracricoid laryngectomy was performed on 15 patients, primarily indicated for 9 patients with supraglottic carcinomas affecting the glottic level and for 6 patients with limited invasion of the thyroid cartilage. These surgical determinations were based on comprehensive preoperative evaluations, including imaging and histopathological evaluations. Additionally, 25 patients (29.7%) underwent supraglottic laryngectomy, and 1 patient (1.2%) underwent vertical hemilaryngectomy. Neck dissection was carried out in 80 patients (95.2%), while 4 patients did not undergo this procedure. These patients were at the T1 stage with no clinical or radiological evidence of metastatic lymph nodes. However, this approach was not universally applied to all T1 patients with similar clinical and radiological findings, as decisions were based on meticulous evaluation of clinical and radiological aspects. Postoperative adjuvant radiotherapy was administered to 58 patients (69%),

Table 1: Patient demographics and clinical characteristics

		n=84	%
Age		58.04±8.92	
Sex	Male	77	91.7
	Female	7	8.3
Histopathology	Squamous cell carcinoma	83	98.8
	Pleomorphic Adenoma	1	1.2
Stage	Stage I	4	4.7
	Stage II	9	10.7
	Stage III	52	62
	Stage IV	19	22.6

Table 2: Treatment methods and clinical follow-up outcomes

	Patients (n, %)
Total laryngectomy	45 (53.6)
Supraglottic laryngectomy	25 (29.7)
Supracricoid laryngectomy	13 (15.5)
Vertical hemilaryngectomy	1 (1.2)
Neck dissection +	80 (95.2)
Neck dissection	4 (4.8)
Adjuvant radiotherapy	58 (69)
Concurrent chemoradiotherapy	19 (22.6)

with concurrent chemotherapy provided to 19 of these patients (Table 2).

Recurrence was observed in 6 (7.1%) patients during the post-treatment follow-up period. Among them, one patient experienced local recurrence and subsequently underwent total laryngectomy. Regional recurrence occurred in five patients, with two having metastatic lymph nodes in the left neck region (levels 3–4), measuring 2 cm and 3 cm, respectively, and two others having metastatic lymph nodes in the right neck region (levels 4–5), measuring 3 cm and 4 cm, respectively. In one patient, a 3-cm metastatic lymph node was identified at level 2A in the right neck region. Excision was performed for patients with regional recurrence. The average follow-up duration was 68.8 ± 31.53 months. Analysis of patient survival rates revealed a 5-year overall survival of 72.2% across all stages (Figure 1).

Pharyngocutaneous fistula formation occurred in 7 (15.6%) out of 45 patients who underwent total laryngectomy. Stoma narrowing necessitating tracheostoma revision surgery was observed in three (6.7%) of the total laryngectomy patients. Aspiration pneumonia was reported in 4 out of 15 patients (26.7%) who underwent supracricoid laryngectomy and 4 out of 25 patients (16%) who underwent supraglottic laryngectomy. Hematoma developed in 4 out of 80 patients (5%) who underwent neck dissection, requiring reoperation for bleeding control.

DISCUSSION

The larynx is composed of three primary regions: the glottis, supraglottic, and subglottic. Supraglottic region cancers represent approximately 50% of all laryngeal cancers (11). Cancers in the supraglottic site are typically identified later than those in the glottic site, often resulting in more advanced disease stages. Patients frequently seek medical attention at an advanced stage, primarily due to the nonspecific symptoms of the disease (12, 13). Consistent with the literature, most patients in our study (74.6%) were diagnosed at stage III or IV.

Laryngeal cancers are more prevalent in men than in women (14). Studies have reported that estrogen receptors offer protective effects in women (15). The most common age group affected is individuals over 50 years old (14). In our study, over 90% of the patients were male and the average age exceeded

50 years. These findings align with those reported in existing literature.

Literature reports indicate that up to 95% of laryngeal cancers manifest as SCCs (2). Similarly, in our study, 98.8% of patients received a diagnosis of SCC based on histopathological evaluations. This underscores the predominance of SCC in most cases of supraglottic cancer. Furthermore, it has been noted that a majority of SCCs exhibit moderate differentiation (16). Correspondingly, intermediate differentiation was the most common finding in our study.

In the treatment of laryngeal cancers, surgery or radiotherapy is typically favored as the primary intervention. Following surgery, neoadjuvant radiotherapy and chemotherapy may be administered based on histopathological findings. Treatment planning takes into account factors such as tumor location, disease stage, patient's nutritional status, overall health, and individual preferences (17-19). Cancers affecting the supraglottic region can be managed with either partial or total surgical approaches. Numerous studies in the literature have explored this topic. Partial surgery has shown comparable efficacy to total laryngectomy in patients meeting appropriate criteria (20-24). In our study, partial surgery was chosen for patients deemed suitable candidates.

Assessing the neck is crucial in managing supraglottic cancers, as the likelihood of lymphatic metastasis increases significantly from 15% at T1 stage to 75% at T4 stage (25). Supraglottic tumors have the potential to spread bilaterally to the neck (26). Recurrence in the neck region can lead to treatment failure. Due to the approximately 20% risk of occult metastasis in N0 stage supraglottic cancers, elective neck dissection is generally recommended (27). In our study, neck dissection was conducted, and radiotherapy was administered based on histopathological examination results of surgically removed tissue samples, considering factors like positive surgical margins, cartilage invasion, and lymph node metastasis.

The 5-year survival rate for supraglottic laryngeal cancers is around 70%, with survival rates decreasing as the stage advances (28, 29). In our investigation, the 5-year survival rate across all was 72.2%, consistent with literature findings.

In existing literature, the incidence of pharyngocutaneous fistula formation following total laryngectomy ranges from 8.7% to 22% (30). In our research, fistula formation was observed in 15.6% of total laryngectomy patients. Reported rates of tracheostomy stenosis vary between 4% and 40% in the literature (31). In our study, 6.7% of patients experienced tracheostomal stenosis, necessitating surgical intervention in all cases. Aspiration pneumonia rates after supraglottic and supracricoid laryngectomy may exceed 20% (32). Similarly, in our investigation, rates of aspiration pneumonia following these procedures aligned with literature findings. The literature reports a risk of neck hematoma after major head and neck surgery at approximately 4%, a potentially life-threatening complication (33). Consistent with existing literature, our

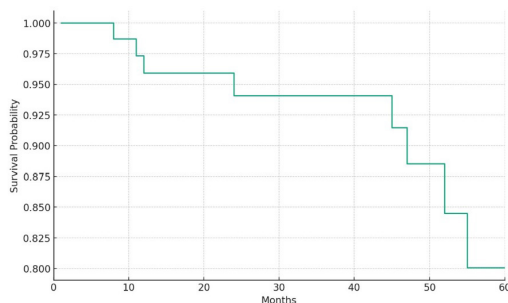


Figure 1: Survival curve by Kaplan–Meier

study observed hematoma development at a rate of 5%, with successful management of bleeding in all cases.

This study has several limitations. First, it utilized a retrospective design, which typically introduces more bias compared to prospective studies. The retrospective review of patient files may have influenced the results due to potential missing information or biases in the records. Second, the study sample consisted of 84 patients, which might not adequately represent variations observed in larger patient populations. Lastly, the study was conducted at a single center, raising concerns about the generalizability of the findings to the broader population or other healthcare facilities. These limitations should be taken into account when interpreting the study results.

CONCLUSION

This study conducted a retrospective analysis of patients diagnosed with supraglottic laryngeal cancer, indicating a higher incidence among men, predominantly diagnosed at advanced stages, with SCC being the most prevalent type. The study emphasized the effectiveness of treatment regimens, underscored the significance of neck dissection and adjuvant therapies, and found that 5-year survival rates were consistent with existing literature. However, limitations such as the retrospective design, limited patient cohort, and data collection from a single center restrict the generalizability of the results. These findings are pertinent for evaluating treatment strategies, guiding future prospective research, and stressing the importance of early detection and tailored treatment approaches. While the observed survival rates support the efficacy of current treatments, they also indicate the necessity for more comprehensive investigations to enhance the management of this cancer subtype and develop personalized therapies.

Ethics Committee Approval: This study was approved by the Ethics Committee of University of Health Sciences, Ümraniye Training and Research Hospital (Approval Date: 20.10.2022, No: 331).

Informed Consent: Written informed consent was obtained.

Peer Review: Externally peer-reviewed.

Conflict of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

- Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. *CA Cancer J Clin* 2019;69(1):7-34.
- Cioloan MS, Vlăescu AN, Mogoantă CA, Ioniță E, Ioniță I, Căpitănescu AN, et al. Clinical, histological and immunohistochemical evaluation of larynx cancer. *Curr Heal Sci J* 2017;43(4):367-75.
- Hoffman HT, Porter K, Karnell LH, Cooper JS, Weber RS, Langer CJ, et al. Laryngeal cancer in the United States: changes in demographics, patterns of care, and survival. *Laryngoscope* 2006;116(9 Suppl 2):1-13.
- Tufano RP. Organ preservation surgery for laryngeal cancer. *Otolaryngol Clin North Am* 2002;35(5):1067-80.
- Bron LP, Soldati D, Monod ML, Mégevand C, Brossard E, Monnier P, et al. Horizontal partial laryngectomy for supraglottic squamous cell carcinoma. *Eur Arch Oto-Rhino-Laryngology* 2005;262(4):302-6.
- Weinstein GS, Laccourreye O, Brasnu D, Tucker J, Montone K. Reconsidering a paradigm- the spread of supraglottic carcinoma to glottis. *Laryngoscope* 1995;105(10):1129-33.
- Myers EN, Alvi A. Management of carcinoma of the supraglottic larynx: Evolution, current concepts, and future trends. *Laryngoscope* 1996;106(5):559-67.
- Spriano G, Piantanida R, Pellini R, Muscatello L. Elective treatment of the neck in squamous cell carcinoma of the larynx: Clinical experience. *Head Neck* 2003;25(2):97-102
- Redaelli De Zinis LO, Nicolai P, Tomenzoli D, Ghizzardi D, Trimarchi M, Cappiello J, et al. The distribution of lymph node metastases in supraglottic squamous cell carcinoma: therapeutic implications. *Head Neck* 2002;24(10):913-20.
- Group BH. End results of a prospective trial on elective lateral neck dissection vs type III modified radical neck dissection in the management of supraglottic and transglottic carcinomas. *Head Neck* 1999;21(8):694-702.
- De Stefani E, Boffetta P, Deneo-Pellegrini H, Brennan P, Correa P, Oreggia F, et al. Supraglottic and glottic carcinomas: epidemiologically distinct entities? *Int J Cancer* 2004;112(6):1065-71.
- Hashibe M, Boffetta P, Zaridze D, Shangina O, Szeszenia-Dabrowska N, Mates D, et al. Contribution of tobacco and alcohol to the high rates of squamous cell carcinoma of the supraglottis and glottis in Central Europe. *Am J Epidemiol* 2007;165(7):814-20.
- Patel TD, Echanique KA, Yip C, Hsueh WD, Baredes S, Park RCW, et al. Supraglottic squamous cell carcinoma: a population-based study of 22,675 cases. *Laryngoscope* 2019;129(8):1822-7.
- Nocini R, Molteni G, Mattiuzzi C, Lippi G. Updates on larynx cancer epidemiology. *Chinese J Cancer Res* 2020;32(1):18-25.
- Verma A, Schwartz N, Cohen DJ, Boyan BD, Schwartz Z. Estrogen signaling and estrogen receptors as prognostic indicators in laryngeal cancer. *Steroids* 2019;152:108498.
- Sak SD, Dursun G, Ereku S, Keser R, Beder E. The prognostic significance of histopathologic parameters in squamous cell carcinoma of the larynx. *Turkish J Med Sci* 1993;11(4):199-201.
- Shuman AG, Larkin K, Thomas D, Palmer FL, Fins JJ, Baxi SS, et al. Patient reflections on decision making for laryngeal cancer treatment. *Otolaryngol Head Neck Surg (United States)* 2017;156(2):299-304.
- Gourin CG, Dy SM, Herbert RJ, Blackford AL, Quon H, Forastiere AA, et al. Treatment, survival, and costs of laryngeal cancer care in the elderly. *Laryngoscope* 2014;124(8):1827-35.
- Crosetti E, Caracciolo A, Arrigoni G, Fantini M, Sprio AE, Berta GN, et al. Management of T4a laryngeal cancer. *Curr Otorhinolaryngol Rep* 2017;5(1):69-82.
- MR M. Transoral robotic supraglottic laryngectomy in laryngeal squamous cell carcinoma. *Int J Otorhinolaryngol* 2017;4(2):1-2.

21. Remacle M, Lawson G, Hantzakos A, Jamart J. Endoscopic partial supraglottic laryngectomies: techniques and results. *Otolaryngol Head Neck Surg* 2009;141(3):374-81.
22. Topaloğlu I, Bal M, Salturk Z. Supracricoid laryngectomy with cricothyroidopexy: oncological results. *Eur Arch Oto-Rhino-Laryngology* 2012;269(8):1959-65.
23. Mohamed Rifai, MD, Mohamed Salah Hassouna, MD, Ahmed El Farouk Abdel Fattah, MD, Hatem Badran M. Experience with supracricoid laryngectomy variants. *Head Neck* 2011;33(8):1177-83.
24. Hazarika B. Supracricoid partial laryngectomy: the second coming. *An Int J Otorhinolaryngol Clin* 2010;2(3):201-5.
25. Esposito EDAVE, Motta S, Cassiano B, Motta G. Occult lymph node metastases in supraglottic cancers of the larynx. *Otolaryngol Neck Surg* 2001;124(3):253-7.
26. Kürten CHL, Zioga E, Gauler T, Stuschke M, Guberina M, Ludwig JM, et al. Patterns of cervical lymph node metastasis in supraglottic laryngeal cancer and therapeutic implications of surgical staging of the neck. *Eur Arch Oto-Rhino-Laryngology* 2021;278(12):5021-7.
27. Zhang Y, Xu S, Liu W, Wang X, Wang K, Liu S, et al. Rational choice of neck dissection in clinically N0 patients with supraglottic cancer. *Head Neck* 2020;42(3):365-73.
28. Sessions DG, Lenox J, Spector GJ. Supraglottic laryngeal cancer: analysis of treatment results. *Laryngoscope* 2005;115(8):1402-10.
29. Scola B, Fernández-Vega M, Martínez T, Fernández-Vega S, Ramirez C. Management of cancer of the supraglottis. *Otolaryngol Head Neck Surg* 2001;124(2):195-8.
30. Markou KD, Vlachtsis KC, Nikolaou AC, Petridis DG, Kouloulas AI, Daniilidis IC. Incidence and predisposing factors of pharyngocutaneous fistula formation after total laryngectomy. Is there a relationship with tumor recurrence? *Eur Arch Oto-Rhino-Laryngology* 2004;261(2):61-7.
31. Wax MK, Touma BJ, Ramadan HH. Tracheostomal stenosis after laryngectomy: Incidence and predisposing factors. *Otolaryngol - Head Neck Surg* 1995;113(3):242-7.
32. Gallo O, Deganello A, Gitti G, Santoro R, Senesi M, Scala J, et al. Prognostic role of pneumonia in supracricoid and supraglottic laryngectomies. *Oral Oncol* 2009;45(1):30-8.
33. Shah-Becker S, Greenleaf EK, Boltz MM, Hollenbeak CS, Goyal N. Neck hematoma after major head and neck surgery: Risk factors, costs, and resource utilization. *Head Neck* 2018;40(6):1219-27.