

# Transcervical Conservation Laryngeal Surgery

## An Anatomic Understanding to Enhance Functional and Oncologic Outcomes



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### KEYWORDS

- Transcervical conservation laryngeal surgery • Glottic carcinoma
- Supraglottic carcinoma • Open partial laryngectomy

### KEY POINTS

- In order to appropriately manage and counsel patients with laryngeal cancer, the physician must not only be aware of the armamentarium of treatment options, but also have a thorough understanding of the complex laryngeal anatomy that impacts tumor growth and behavior.
- Surgical and nonsurgical approaches should be considered with appropriate referrals as indicated; surgical options include transoral and transcervical approaches.
- The fibroelastic framework of the larynx provides distinctive barriers that may limit tumor extension in the early stages, but also guide predictable migration patterns in advanced cases.
- The paraglottic spaces form a conduit for extension to different laryngeal regions, which must be understood to better determine optimal treatment options.
- Understanding the distinctive anatomic associations within the larynx will enhance tumor mapping, and allow for superior outcomes.



**Videos of Laryngeal Framework Anatomy; Horizontal Partial Laryngectomies; SGPL; SCPL-CHEP; and SCPL-CHP accompany this article at <http://www.oto.theclinics.com/>**

### BACKGROUND

The understanding of the complex 3-dimensional anatomy of the larynx presents as a challenge to many beginning surgeons and clinicians. When presented with carcinoma of the larynx, an insufficient grasp of this intricate landscape may hamper the

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clinician's ability to adequately counsel, refer, and direct appropriate therapeutic options for the patient. The objective of this article is to enhance the reader's understanding of the critical anatomic structures that influence the evolution of laryngeal carcinoma and its functional impact on the larynx, in order to define the indications and contraindications of conservation laryngeal surgery.

Conservation options in ablative laryngeal surgery include both transoral and open transcervical approaches. The mainstay surgical treatment option for most early lesions is typically via a transoral approach, with shorter hospitalizations, lower morbidity, and improved functional results.<sup>1</sup> However, this review will focus on transcervical approaches and discuss their seminal anatomic principles. Open approaches can be considered in situations where exposure is inadequate for transoral resection, or the transoral technique is not in the purview of the institution, as well as for salvage surgery after radiation failure. This topic will serve as a guide for clinicians seeking to understand management options beyond transoral laser surgery, radiation therapy, and total laryngectomy.

The different categories of open organ preservation surgery and their indications and contraindications will be summarized. The anatomic bases for these indications will be subsequently described.

## GUIDING PRINCIPLES AND UNDERSTANDING OF TUMOR SPREAD

One should have familiarity with the complex normal laryngeal anatomy and the ability to establish an accurate assessment of tumor extent. Tumor mapping is performed through a combination of office-based, surgical clinical examination, and radiographic studies. The clinician should be astute to the extent of mucosal involvement, depth of invasion, as well as mobility of the vocal folds and arytenoids.

The guiding principles of organ-sparing surgery are to provide oncologically sound outcomes while preserving the sphincteric, respiratory, and phonatory capabilities of the larynx. An attempt should be made to maintain the 3 fundamental functions by preserving at least 1 functional cricoarytenoid unit. In addition, the cricoid cartilage is the only complete cartilaginous ring in the airway, and must be preserved in order to prevent airway compromise.

### Anatomic Point #1

Bilateral compromise of the cricoarytenoid units or the structural integrity of the cricoid cartilage should preclude organ preservation surgery as an option.

Certain properties of the laryngeal cartilaginous and fibrous framework should be taken into account, particularly in the way they impact tumor growth and extension capabilities ([Fig. 1](#), [Video 1](#)). In Brennan and colleagues'<sup>2</sup> review of the literature, the majority of squamous cell carcinoma (78%) invasion was through direct extension, with only 10% (11 of 107) of cases exhibiting documented involvement via lymphatic spread.

Early glottic lesions may respect the fibroelastic framework of the larynx, whereas larger lesions may utilize the framework for further extension. Laryngeal regions most susceptible to spread are at the anterior angle of the thyroid cartilage and the cricothyroid membrane.<sup>3,4</sup> Histopathologic studies have shown that tumor spread seems to occur along collagen bundles where the connective tissue membranes attach to the cartilage. As the tumor expands, it causes expansion of the collagen bundles, resulting in a direct pathway for the spread of the lesion through the

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