



The treatment of cancer of the supraglottic larynx is in a continual state of evolution. Clinicians are anxious to provide patients with the best possible functional outcome while controlling tumour. Therapeutic options for patients with cancer limited to the supraglottic region of the larynx include transoral microsurgical resection, chemoradiation therapy, open horizontal supraglottic laryngectomy and supracricoid laryngectomy.

Supraglottic laryngectomy was first introduced to the United States of America over 50 years ago. It effectively controls limited cancer involving the supraglottic portion of the larynx. The overwhelming majority of patients undergoing supraglottic laryngectomy can swallow by mouth 10-14 days after surgery. However, the risk of aspiration pneumonia is significant in patients with inadequate cough and poor pulmonary reserve. It is therefore not appropriate for patients with cardiopulmonary compromise which is so significant that they cannot temporarily tolerate moderate amounts of aspiration. This group of patients should not be offered this procedure.

Patient Assessment

Tumour characteristics

All patients with cancer of the supraglottic larynx require careful pretreatment evaluation which should include laryngoscopy as well as imaging. The ideal candidates are those patients with tumour confined to the supraglottic larynx without involvement of either arytenoid. Cervical metastatic disease is highly prevalent for cancers of the supraglottic cancers. This risk is to both sides of the neck inasmuch as the larynx should be considered a midline structure. Routine bilateral functional neck dissection

of Levels 2, 3, and 4 is therefore advocated for all patients treated with surgery. Patients with bulky or bilateral metastases at presentation are considered a relative contraindication to supraglottic laryngectomy because of the predictable need for postoperative adjuvant radiation. Most patients can tolerate radiation therapy after supraglottic laryngectomy; however, it almost invariably compromises function with increased risk of aspiration.

Resection of tumour extension from the aryepiglottic fold to the medial wall of the pyriform sinus can be accomplished with modifications to become a partial laryngopharyngectomy. Tumour extension to the vallecula and tongue base can be accommodated, but this kind of tumour involvement will require partial tongue base resection, which in turn, will compromise functional outcomes. Additionally, tongue base involvement almost always will call for postoperative irradiation, which, once again, is poorly tolerated after supraglottic laryngectomy.

The *only absolute contraindication* to supraglottic laryngectomy is spread through the paraglottic space inferiorly, such that the plane of resection through the ventricles would result in residual tumour or spread to involve both arytenoids. Under these circumstances, therapeutic alternatives include chemoradiation therapy or total laryngectomy.

Patient physiologic considerations

The patient's cardiopulmonary function is an essential criterion which requires evaluation when considering supraglottic laryngectomy. All patients require temporary tracheotomy which allows the treatment team to provide suctioning and to help to manage aspiration. However, patients with

poor pulmonary reserve should not undergo supraglottic laryngectomy. There are no concrete, objective guidelines for eligibility such as arterial blood gases or spirometry. In general, patients with good functional capacity such that they can walk up a flight of stairs comfortably, can tolerate a supraglottic laryngectomy. Patients who cannot ambulate will, in general, not tolerate supraglottic laryngectomy.

Operative steps

- The procedure is done under general anaesthesia.
- A broad-spectrum antibiotic is administered for 24hrs.
- Position the patient in a supine position with the neck slightly extended on a shoulder roll
- Plan a superiorly based apron flap such that the horizontal portion of the apron overlies the second or third tracheal ring (*Figure 1*)
- Elevate the **apron flap** just underneath the platysma muscle as for total larynx-gectomy

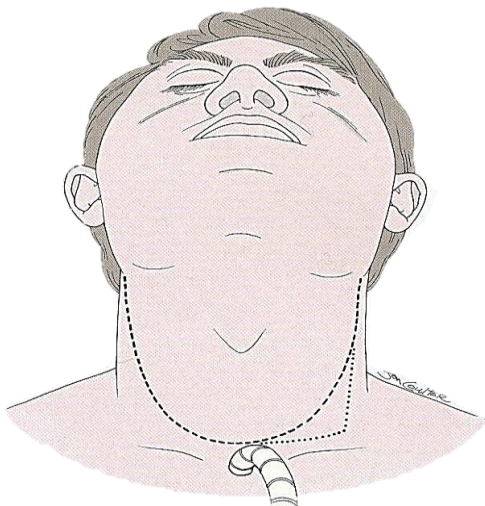


Figure 1: Supraglottic laryngectomy is accomplished through a superiorly based apron flap. The inferior aspect of the flap should not be extended past the midclavicular line because subsequent ischaemia may be associated with wound dehiscence

- **Tracheotomy** is then done. Generally this is facilitated by division and ligation of the thyroid isthmus
- **Bilateral neck dissection** is done in all patients. In the absence of identifiable pathologic adenopathy, elective neck dissection should remove the fatty lymphatic aponeurosis in Levels 2, 3 and 4. Level 2b superior to the spinal accessory nerve need not be dissected. The spinal accessory nerve, jugular veins, and sternocleidomastoid muscles are preserved
- Release the **suprahyoid strap muscles** from the superior surface of the hyoid bone with diathermy
- Release the **infrahyoid strap muscles** approximately 1cm below the inferior insertion of the muscles to the hyoid bone and reflect them inferiorly to expose the thyroid cartilage
- Release the **external perichondrium** of the thyroid cartilage along the superior and lateral aspects of the thyroid laminae so that it can be reflected inferiorly (*Figure 2*)

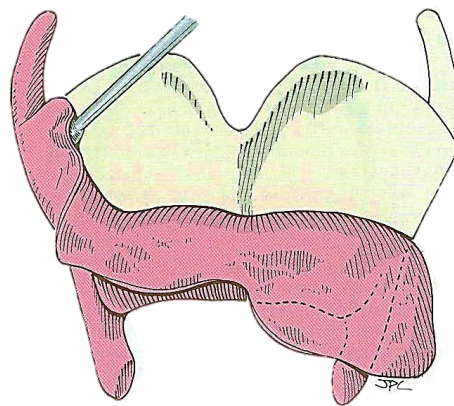


Figure 2: The external perichondrium of the thyroid cartilage is incised along its superior insertion and reflected intact as an inferiorly based flap

- Cut across the thyroid **cartilage horizontally** with an oscillating saw (*Figure 3*)

- As the intention is **to resect the larynx through the ventricle** (Figure 4), the cut is made approximately midway between the thyroid notch and the lower border of the thyroid cartilage in the midline to include the greater cornu of the thyroid cartilage on the side of the lesion (Figure 3)
- The cartilage cut may be slanted laterally toward the superior cornu on the less involved side which allows for preservation of the constrictor inferior insertion (Figure 3)
- The greater cornu may be preserved on the side contralateral to the lesion or may be excised according to the judgment of the surgeon (Figure 3)

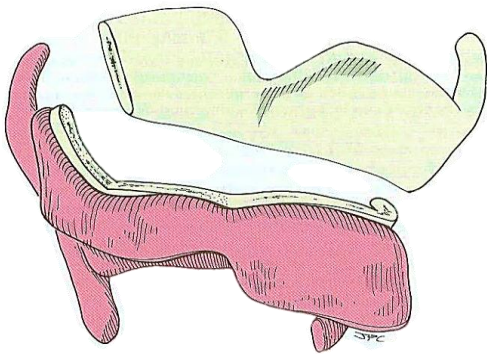


Figure 3: The cartilage incision is carried horizontally midway between the thyroid notch superiorly and the inferior border of the thyroid cartilage

- A **pharyngotomy** is done through the vallecula when tumour is confined to the supraglottic larynx. This allows subsequent mucosal cuts to be made under direct vision (Figure 4)
- **Mucosal incisions** are made laterally along the aryepiglottic folds and then across the face of the arytenoids to resect the entire epiglottis and false vocal folds.
- The **inferior cuts** are made horizontally through the laryngeal ventricles to connect the mucosal cuts with a cartilage cut (Figure 4)
- The specimen is removed (Figure 5)

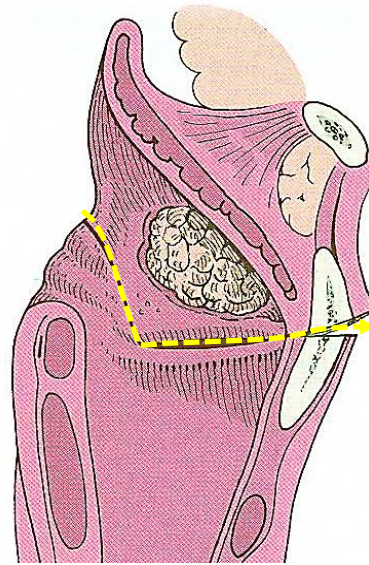


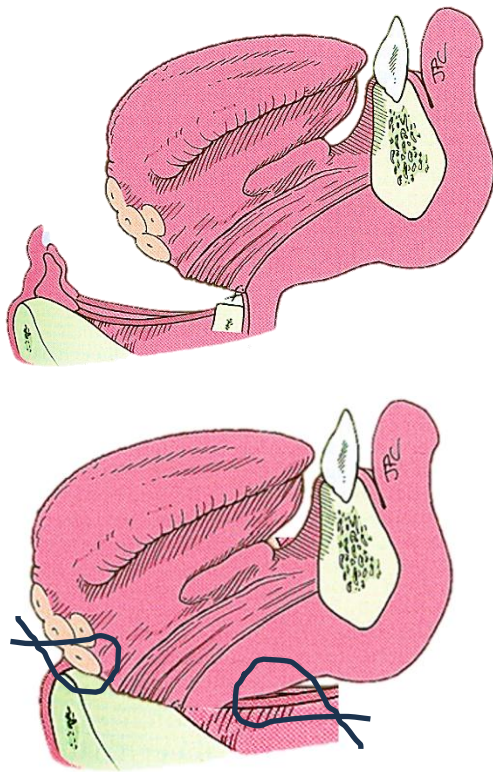
Figure 4: Mucosal cuts are made under direct vision. Inferiorly, the cut is made through the ventricle at the level of the true vocal cord. Posteriorly, the mucosal incision is made across the face of the arytenoid unless extension of tumour requires an extended procedure

- The resected specimen is carefully evaluated and frozen sections done to assure complete tumour removal (Figure 5).
- Haemostasis must be complete. This may be especially difficult along the cut edge of the tongue base where intermittent haemostatic suture ligatures are recommended.



Figure 5: Specimen includes epiglottis, hyoid bone, false vocal cords and upper half of thyroid cartilage

- A **nasogastric tube** is inserted before the closure is accomplished
- Approximate the tongue base to the glottic larynx with interrupted Vicryl sutures in such a way that the tongue base is set back over the glottis to reduce the potential for aspiration (*Figure 6*)
- This requires that the yellow fibrofatty aponeurosis of the tongue base is directly approximated to the external perichondrium of the thyroid cartilage (*Figure 6b*)

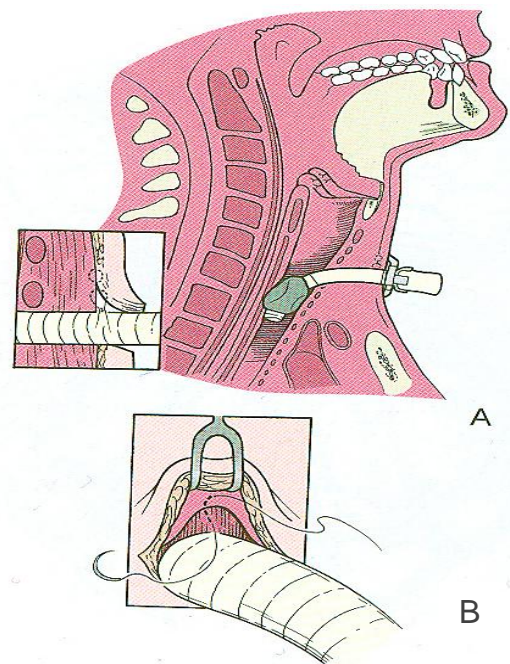


Figures 6a, b: The external perichondrium of the thyroid cartilage is approximated to the fibroaponeurotic layer of the tongue base to set the tongue back over the glottis

- If difficulty is experienced with tearing of the external perichondrium, the sutures may be passed through free edge of the cut thyroid cartilage
- This initial layer of closure is then reinforced by approximating the suprahy-

oid muscles to the infrahyoid muscles with interrupted Vicryl sutures

- Carry the closure laterally to assure there is no evidence of salivary leak in the area of the pyriform sinus
- Place **suction drains** on either side of the neck and over the mucosal suture line, and bring them out through separate stab wounds.
- Replace the **apron flap over the neck**
- Take great care to assure that the **tracheotomy site is isolated** from the potential spaces on both sides of the neck dissections by suturing the soft tissues around the tracheostomy to the deep aspect of the apron flap (*Figures 7A & B*)



Figures 7A & B: At completion of the procedure, the tracheotomy site must be isolated from the potential dead space created through flap elevation and neck dissection

- Failure to isolate the tracheotomy from the potential spaces created by the neck dissection may result in transmission of contaminated mucus from the trachea

underneath the cervical flap and subsequent wound infection

- The anaesthesia tube is removed and replaced with a *cuffed tracheotomy tube*

Postoperative Management

- Care is taken to assure the integrity of the suction drains
- Routine tracheotomy care is instituted
- Patients are ambulated as soon as possible to assure restoration of tidal volume and to prevent atelectasis
- Speech and swallowing therapy is an essential part of overcoming the challenges related to aspiration
- Most patients will have some temporary aspiration which can be suctioned
- The tracheotomy tube can be removed when the patient demonstrates that he/she can protect the airway and is no longer aspirating. This usually takes 7-14 days
- One practical method is to deflate the cuff of the tracheotomy tube with the patient seated
- Thereafter determine if the patient can tolerate an uninflated tracheotomy tube without excessive coughing and aspiration for 24hrs
- Having achieved this milestone, the cuffed tracheotomy tube is removed and replaced with a smaller tracheotomy tube without a cuff, which can be plugged so that the patient breathes past the tube and through the larynx, to ascertain if the patient's airway is satisfactory to allow decannulation
- The overwhelming majority of patients will tolerate an *oral diet* best when the tracheotomy site has healed
- Introduction of an oral diet before the tracheotomy site is closed is difficult because the tracheotomy is associated with a less effective cough, tethering of the larynx, and diminished proprioception such that aspiration is more likely.

Longer term recovery

Following recovery from the acute phases of healing, supraglottic laryngectomy patients have remarkably good *voices* with few limitations to diet.

Postoperative irradiation therapy may significantly or severely challenge recovery. Radiation causes lymphoedema and stasis, which compromises swallowing and may cause airway obstruction and may induce obstructive sleep apnoea.

Patients who have had *prior irradiation* therapy can tolerate supraglottic laryngectomy. However, healing is delayed, recovery of deglutition is prolonged and some element of chondroradionecrosis of the residual thyroid cartilage may be observed. All these factors can be managed, and a successful functional outcome will be achieved in properly selected patients.

AfHNS Clinical Practice Guidelines

- Cancer of Glottis
<https://developingworldheadandneckcancer.org/guidelines.com/index-page-glottic-cancers/>
- Cancer of Supraglottis
<https://developingworldheadandneckcancer.org/guidelines.com/index-page-supraglottic-cancers/>
- Cancer of Hypopharynx
<https://developingworldheadandneckcancer.org/guidelines.com/index-page-hypopharyngeal-cancers/>

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Author

Jonas T. Johnson, M.D.
Emeritus Dr Eugene N. Myers Professor &
Chair
Department of Otolaryngology
Eye and Ear Institute
200 Lothrop Street, Suite 500
Pittsburgh, PA 15213, USA
johnsonjt@upmc.edu

Editor

Johan Fagan MBChB, FCS(ORL), MMed
Emeritus Professor and Past Chair
Division of Otolaryngology
University of Cape Town
Cape Town, South Africa
johannes.fagan@uct.ac.za

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