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Chapter 55 – Pharyngectomy

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A hollow viscus located immediately posterior to the larynx, the hypopharynx is related to the oral pharynx superiorly and the cervical esophagus inferiorly. It is divided into three anatomic sites: the piriform sinuses (bilateral), the postcricoid mucosa, and the posterior pharyngeal wall. The postcricoid mucosa is the mucosa lying on the posterior aspect of the cricoid cartilage, which is in fact the anterior wall of the hypopharynx.

The hypopharynx plays an important role in deglutition, as well as respiration. Coordinated activity in this laryngopharyngeal segment is essential for swallowing and protection of the airway from aspiration.

The hypopharynx is directly related to the carotid sheath, which lies just lateral to the hypopharynx on either side. Sensory fibers are derived from the glossopharyngeal nerve, as well as the internal branches of the superior laryngeal nerve. The motor supply to the inferior constrictor muscles comes via the pharyngeal plexus.

Lymphatic drainage of the hypopharynx is directed toward the upper deep cervical lymph nodes (zones II and III); however, there is concern that some cancers of the hypopharynx may drain to the retropharyngeal lymphatics, and bilateral drainage is also possible. Cancer involving the medial wall of the piriform sinus has a 20% risk of contralateral lymph node metastasis.[1] The lateral wall of the piriform is less likely to metastasize to the contralateral lymphatics. Both postcricoid and posterior pharyngeal sites would be expected to demonstrate potential for bilateral metastasis.

Squamous cell carcinoma is the cancer most commonly encountered in the hypopharynx, and it accounts for more than 90% of malignant tumors originating in this region. Development of squamous cell carcinoma of the hypopharynx is closely associated with the use of both tobacco and alcohol products.[2,3] Most patients have dysphagia, referred otalgia, or evidence of cervical lymph node metastasis at initial evaluation. At least two thirds of patients are initially found to have stage IV cancer.

Direct extension of cancer of the posterior pharyngeal wall to involve the prevertebral fascia or cancer of the piriform sinus involving the carotid sheath is generally considered a sign of inoperability. Postcricoid cancer, the most unusual of the hypopharyngeal tumor locations, may be manifested as vocal cord fixation and stridor.

Assessment of the extent of the cancer may be undertaken with computed tomography or magnetic resonance imaging. These findings can be corroborated at endoscopy. Fixation to the prevertebral fascia or bone can be ascertained preoperatively with video fluoroscopy when fixation of the tumor to the spine is recognized during swallowing.

The standard approach to hypopharyngeal cancer has been surgical excision with postoperative radiation therapy.[4] Primary radiation therapy with surgical salvage of failures has resulted in poor outcomes.[5,6] The most recent data suggest that patients with advanced cancer of the pharynx may benefit more with adjuvant concurrent chemoradiation therapy than with adjuvant radiation alone.[7] The use of so-called organ-sparing protocols in the treatment of hypopharyngeal cancer is currently under investigation.[8] Many investigators have reported that the intense mucositis associated with chemoradiation therapy in this setting often results in pharyngeal stenosis with complete obstruction, which may be total and permanent.

PATIENT SELECTION

Cancer involving the hypopharynx requires histologic confirmation. Examination under anesthesia allows the physician to evaluate the extent of the lesion and the possibility of fixation to the prevertebral fascia and to rule out the presence of a second primary cancer. Most surgeons agree that 15 to 20 mm of tumor-free soft tissue should be left at resection margins. Needless to say, this may not be possible with deep margins at the prevertebral fascia or the carotid artery.

Small cancers involving the medial wall of the piriform sinus or the anterior aspect of the piriform sinus may be treated by partial laryngopharyngectomy, whereas more locally advanced cancer requires total laryngopharyngectomy. It is essential that the surgeon preoperatively estimate the extent of resection required and, accordingly, the amount of pharyngeal mucosa that will be available for reconstruction. Cancer involving the medial wall of the piriform sinus allows primary closure (Fig. 55-1). A cancer that extends to involve the lateral wall

of the piriform sinus can be closed primarily if the contralateral mucosa is preserved (Fig. 55-2). Cancer involving the ipsilateral piriform sinus that extends to the midline of the posterior wall cannot be closed primarily (Fig. 55-3). Generally speaking, a minimum of 3 cm of pharynx (measured from side to side) is required to afford an opportunity for primary closure (Fig. 55-4). Similarly, cancer extending into the postcricoid mucosa or cervical esophagus cannot be closed primarily.
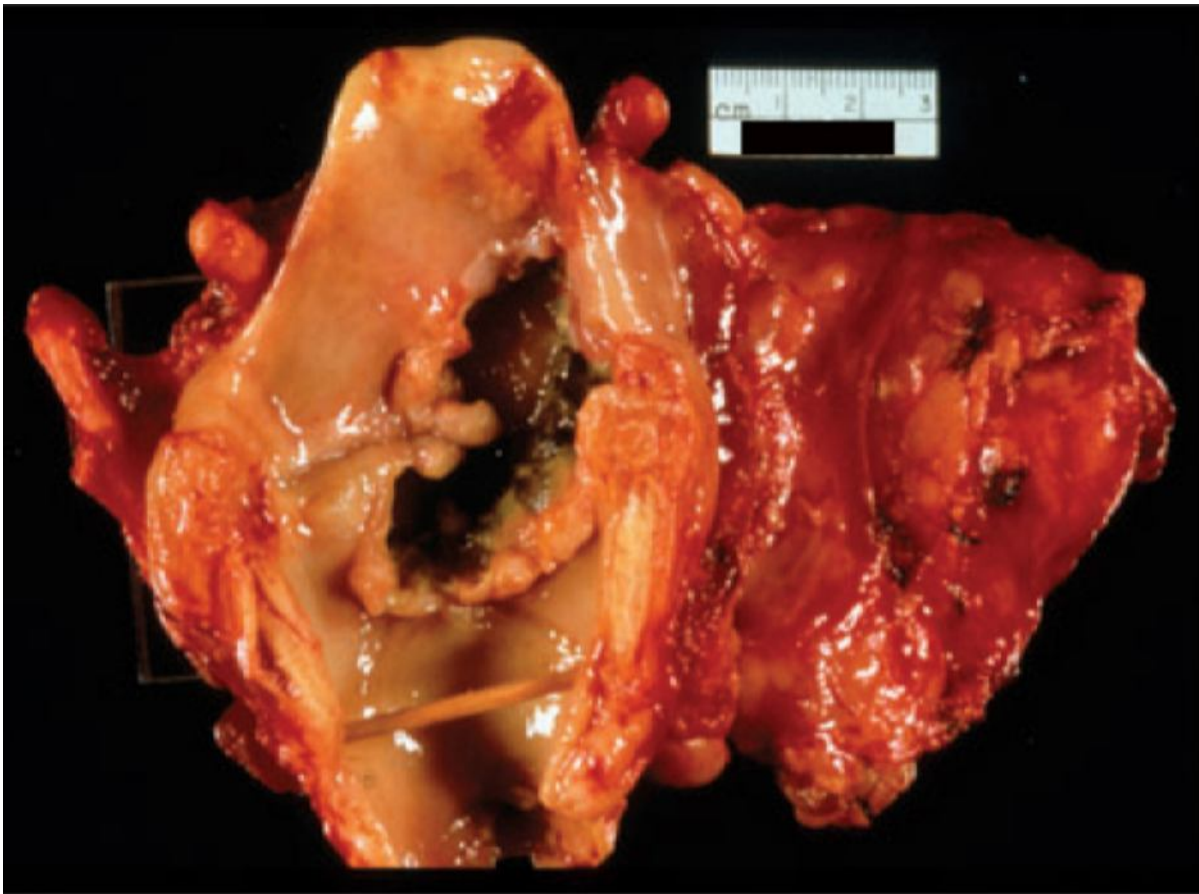

Figure 55-1 This patient has advanced laryngeal cancer. Most of the cancer is confined to the intrinsic larynx; however, resection of the medial wall of the ipsilateral piriform sinus is required to get a deep margin. Preservation of the contralateral piriform sinus, as well as the ipsilateral lateral wall, will allow primary closure.
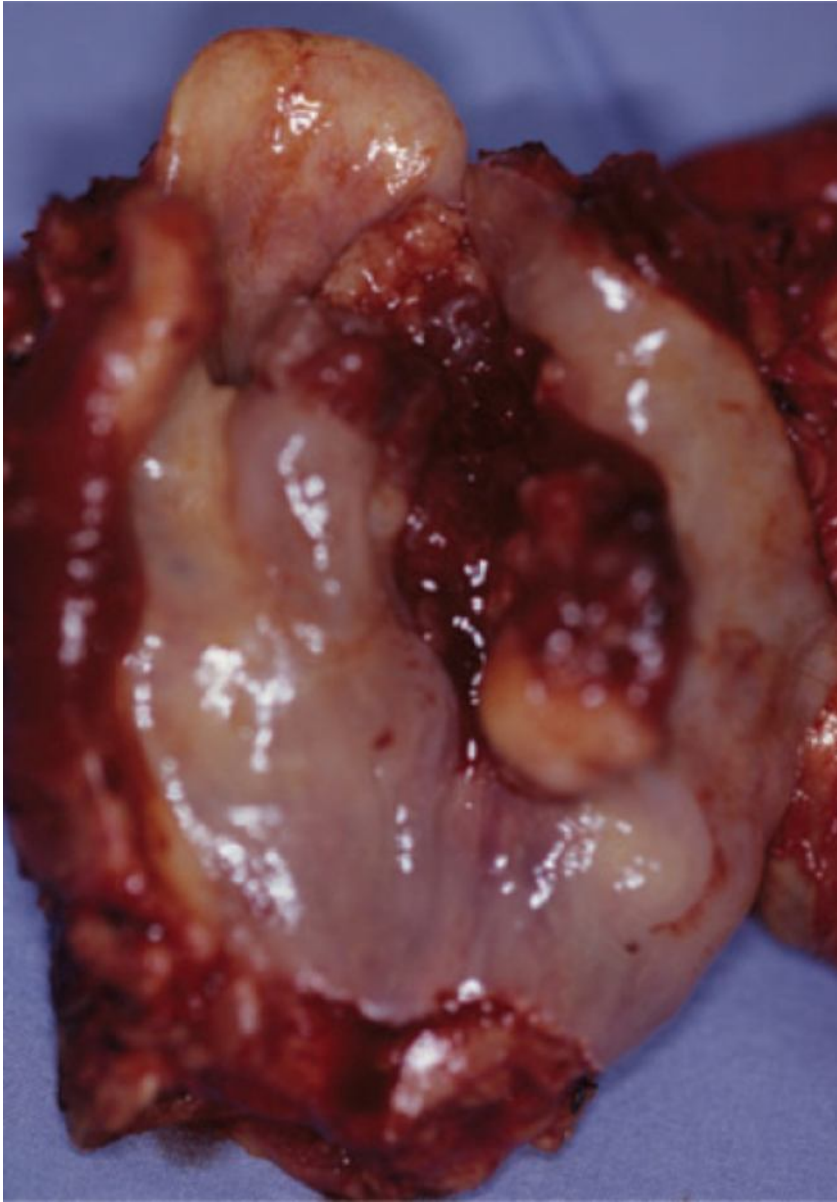
Figure 55-2 This cancer of the piriform sinus extends to involve the entire lateral wall. During resection, the contralateral piriform sinus was carefully preserved.
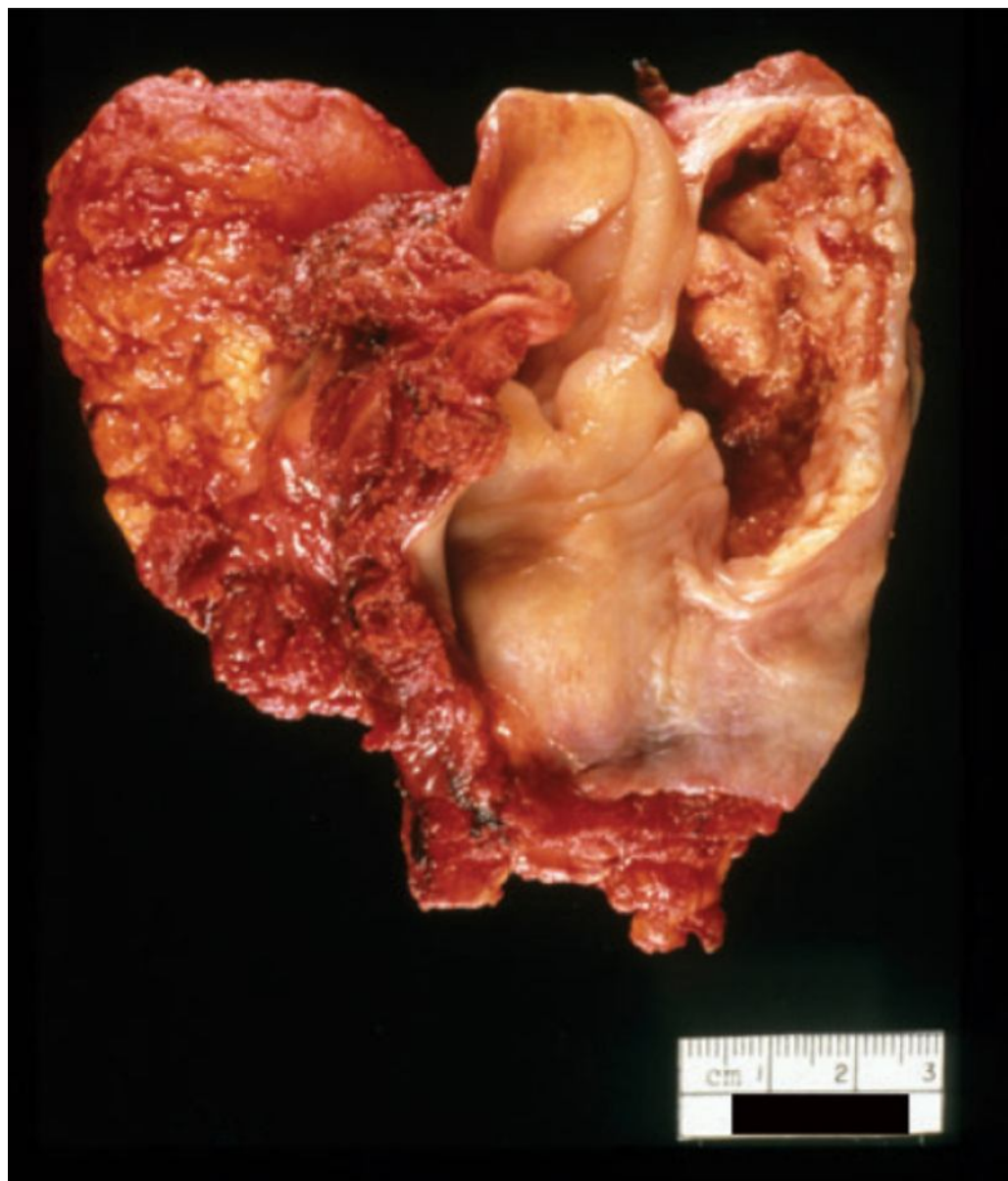
Figure 55-3 This extensive hypopharyngeal cancer crossed the midline posteriorly. Near-total pharyngectomy was required.
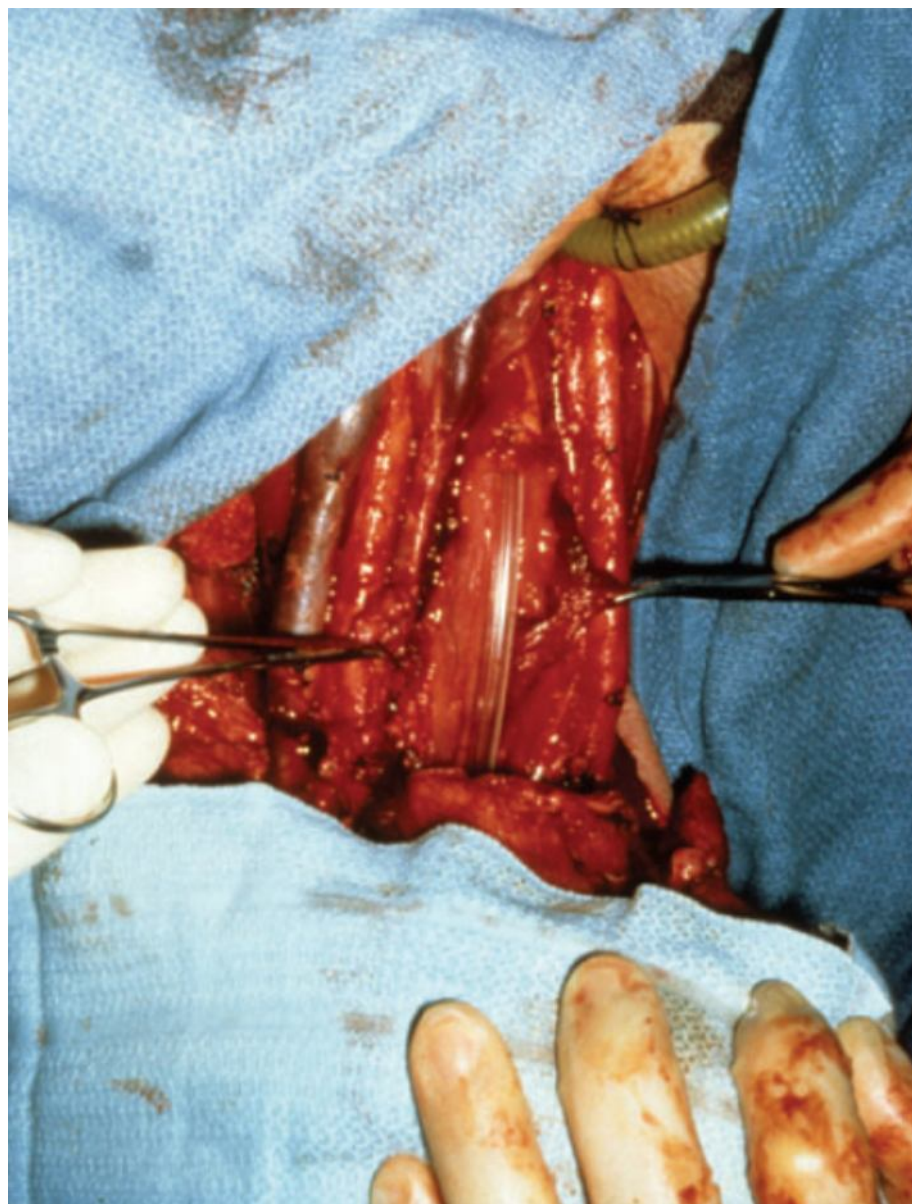
Figure 55-4 This narrow island of residual hypopharynx cannot be closed primarily. It needs to be supplemented with a tissue transfer or resected and replaced with new tissue.

When a narrow strip of mucosa is maintained that is less than 3 cm in transverse measurement, tissue augmentation will be required to afford successful re-construction and allow postoperative swallowing. The pectoralis major myocutaneous flap and a variety of free flap alternatives such as the radial forearm free flap (fasciocutaneous), lateral arm flap, or lateral thigh flap may be reliable alternatives for reconstruction.

When the entire pharynx is resected (total laryngopharyngectomy), 360-degree reconstruction of the pharynx is required. We favor free jejunal transfer, although others have suggested a tubed free tissue transfer (such as the radial forearm) or gastric pull-up.

Advanced cancer involving the postcricoid mucosa invariably requires total laryngopharyngectomy and total pharyngeal reconstruction. The proximity of these tumors to the larynx and the high likelihood of direct involvement make laryngectomy mandatory. The narrow circumference of the lumen at the level of the postcricoid mucosa makes total pharyngectomy necessary (Fig. 55-5).
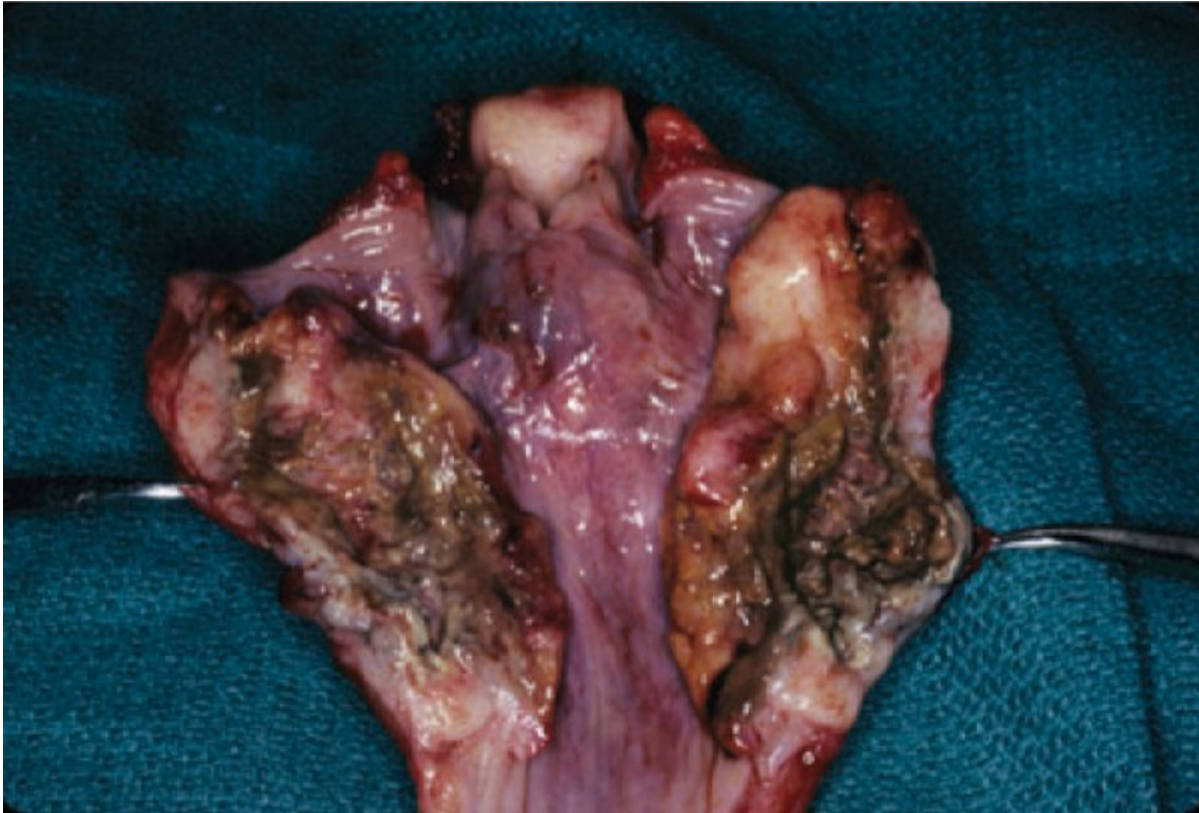
Figure 55-5 This circumferential postcricoid lesion required total laryngectomy and reconstruction.

Small cancers of the posterior wall of the hypopharynx may occasionally be encountered. We have successfully treated them by transhyoid pharyngotomy and excision (Fig. 55-6) (refer to Chapter 29 for details oftechniques). The defect can be reconstructed with either a split-thickness skin graft or direct approximation of the mucosa to the prevertebral fascia, which allows healing by secondary intention. In either circumstance, scar contracture may compromise the eventual swallowing result.
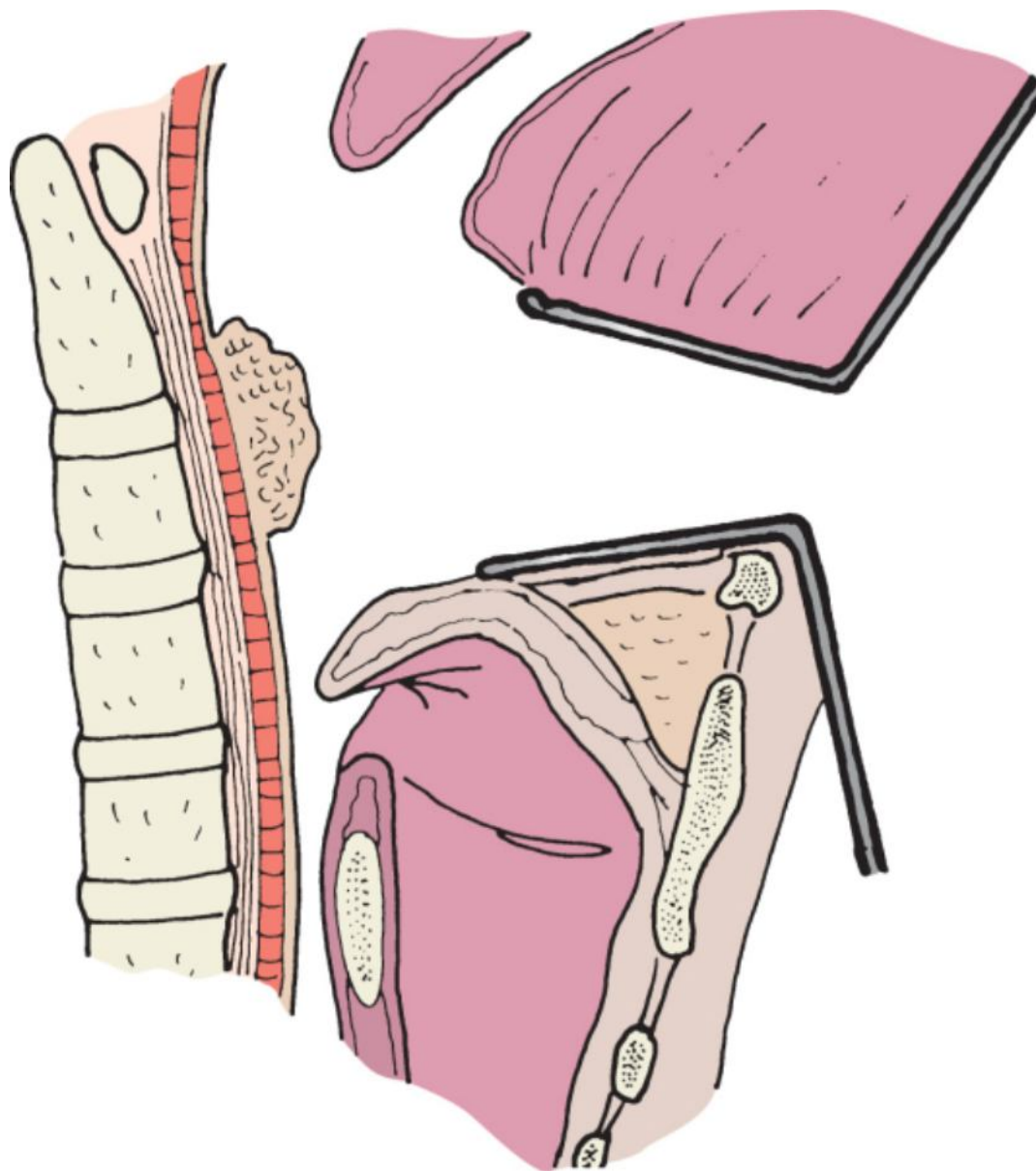
Figure 55-6   Direct access to the posterior wall of the hypopharynx can be accomplished via transhyoid pharyngotomy.

Larger cancers of the posterior hypopharynx can occasionally be accessed through either transhyoid pharyngotomy or lateral pharyngotomy. The cancer is resected and the defect repaired with a free flap. The outcome in terms of swallowing is not entirely predictable. At least 50% of these patients never swallow successfully. Most patients with advanced cancer of the posterior hypopharynx require total laryngopharyngectomy and reconstruction.

Patients with hypopharyngeal cancer have a very high risk for the development of cervical lymph node metastasis. Overall, metastatic cancer develops in 60% to 80% of patients with hypopharyngeal cancer. Occult metastasis is present in at least 20% to 40% of patients. The risk is bilateral in patients with tumors involving the postcricoid mucosa, the medial wall of the piriform sinus, or the posterior wall of the pharynx. Accordingly, most patients treated surgically benefit from either therapeutic or elective neck dissection. In the case of an N-0 neck, selective neck dissection should include at least levels II to IV.

SURGICAL APPROACHES

Partial Laryngopharyngectomy

This procedure is appropriate for patients with cancer limited to the aryepiglottic fold, medial wall of the piriform sinus, and anterior wall of the piriform sinus, as long as they have adequate pulmonary function. Extension to the apex or lateral wall of the piriform sinus is a contraindication to this procedure.

The surgeon proceeds as though performing a supraglottic laryngectomy (see Chapter 47). The supraglottic larynx

is removed with the adjacent hypopharyngeal mucosa in an effort to achieve a 15-mm margin in the mucosa in all directions. Reconstruction is accomplished by impacting the base of the tongue into the residual larynx. Closure of the residual hypopharyngeal mucosa is indirect and requires a second layer consisting of the residual strap muscles and digastric muscle. All wounds are drained with negative pressure, and perioperative antibiotic prophylaxis is administered.

Total Laryngectomy and Partial Pharyngectomy

This procedure is most commonly performed in patients with carcinoma of the piriform sinus that extends to involve the larynx medially, the apex of the piriform sinus inferiorly, or the lateral wall of the hypopharynx laterally.

The patient is prepared for total laryngectomy. We prefer a superiorly based apron flap. Neck dissection is accomplished bilaterally for cancer involving the medial wall of the piriform sinus. Unilateral neck dissection may suffice for patients with cancer isolated to the lateral wall.

After completion of the neck dissection, the pharynx is opened in the vallecula contralateral to the tumor. Effort is made to preserve 100% of the uninvolved piriform mucosa, which can be accomplished by releasing the piriform sinus after having first incised the contralateral constrictor muscles along the posterior lamella of the thyroid cartilage. The piriform sinus is then gently dissected free from the endolarynx. The resection is next carried from the vallecula down along the lateral aspect of the epiglottis to the bilateral aspect of the contralateral arytenoids. The remaining incisions in the mucosa are made under direct visualization so that the surgeon can ensure an adequate (15 to 20 mm) mucosal margin around the cancer.

At the completion of the resection, frozen section assessment of margins is mandatory. Patients with 3 cm of residual mucosa in the transverse dimension can usually undergo primary closure. If less than 3 cm of mucosa remains, pedicle flap or free flap reconstruction may be required.

Postoperative Management

All patients have negative pressure drains in the neck bilaterally. Perioperative antibiotics are administered for 24 hours. Nasal gastric feeding is maintained until the patient is able to swallow saliva comfortably, at which time the integrity of the pharyngeal closure can be ascertained by either diatrizoate meglumine (Gastrografin) swallow or the administration of colored juice by mouth, after which the physician can observe the cervical drains for evidence of a pharyngeal fistula.

Total Laryngopharyngectomy

Cancer involving the postcricoid mucosa, advanced cancer of the posterior hypopharyngeal wall, and cancer involving the piriform sinus with extension across the midline posteriorly require total laryngopharyngectomy. More extensive lesions that extend into the cervical esophagus are resected via total laryngoesophagectomy (Fig. 55-7). Reconstruction is usually accomplished with a gastric pull-up.

Figure 55-7 When tumor extends into the cervical esophagus, total laryngoesophagectomy is required, primarily because reconstructive techniques are not adequate to allow a suture line in the mediastinum.

Bilateral neck dissection is always performed. Elective neck dissection would require removal of zones II, III, and IV. Reconstruction requires free jejunum or tubed free tissue transfer such as the radial forearm (Fig. 55-8). Drains are placed bilaterally. When free jejunum is chosen for reconstruction, a jejunostomy tube is placed at the time of surgery to allow early renewal of nutritional support (Fig. 55-9).

Figure 55-8   The radial forearm free flap provides thin pliable tissue for partial pharyngeal reconstruction. It can be tubed for total pharyngeal reconstruction.

Figure 55-9 The jejunum has vascular arcades, each serving approximately 25 cm of small intestine. This offers an ideal opportunity for free tissue transfer.

Postoperative Management

Perioperative antibiotics are always administered for 24 hours. The integrity of the mucosa suture lines is determined by contrast barium swallow between 7 and 10 days postoperatively. If the suture lines are intact, oral alimentation with clear liquids is initiated. The diet can be advanced gradually as tolerated.

PEARLS

- Some cancers of the posterior wall may be resected through a transhyoid pharyngotomy.
- At least 3 cm of mucosa measured from side to side is needed to close the pharynx without a flap.
- Most hypopharyngeal cancers have a high risk of bilateral metastasis.
- Involvement of the postcricoid mucosa or extension across the midline requires total laryngopharyngectomy with appropriate reconstruction.
- Involvement of the prevertebral fascia by the cancer indicates inoperability.
- Chemoradiation protocols are exploring the potential for organ preservation.

PITFALLS

- Hypopharyngeal cancers extending into the esophagus will not allow primary closure.
- Failure to administer prophylactic antibiotics may result in wound infection.
- Failure to preserve uninvolved mucosa may make closure more complex.
- Failure to recognize airway obstruction may result in an emergency tracheotomy.
- Tight closure with inadequate mucosa may result in fistula and dysphagia.