

Reconstruction of Cervical Defects



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KEYWORDS

• Cervical defect • Larynx • Hypopharynx • Reconstruction • Esophagus

KEY POINTS

- Reconstruction of various cervical defects can be quite challenging; prior oncologic resection combined with radiation therapy compounds the level of difficulty.
- The judicious application of vascularized flaps, either pedicled or free flaps, can significantly improve the quality of life of cancer survivors with these issues.
- To prevent or reduce the incidence of postoperative pharyngocutaneous fistulas or esophageal strictures, a variety of pedicled or free flaps can be used. Some surgeons temporarily use a salivary bypass tube to potentially further decrease the risk of pharyngocutaneous fistulas.

Introduction

The topic of reconstruction of cervical defects can entail a wide range of patient problems and possible solutions. This article is limited to the anterior and lateral neck region, where the level of complexity of the reconstruction of defects can be compounded by the prior use of ionizing radiation. Although most reconstructions are related to oncologic defects and the complications arising from such treatment, these techniques can be equally applicable to traumatic and other causes. Specific topics covered include pharyngeal and cervical esophageal reconstruction, pharyngocutaneous fistula (PCF) repair, carotid artery coverage, release of cervical wound contracture, and correction of esophageal stricture and cutaneous cervical defects.

Pharyngeal and cervical esophageal reconstruction

Patients with tumors involving the larynx or hypopharynx can be a reconstructive challenge. After completion of the ablative surgery, part of the reconstructive task is to repair or recreate a conduit from the base of tongue to the proximal cervical esophagus. In the nonirradiated neck that has not previously been operated on, this can usually be accomplished with good success via primary closure of the residual pharyngeal mucosa. The minimum amount of mucosa this requires is approximately 2.5 cm.¹

To prevent or reduce the incidence of postoperative PCFs or esophageal strictures, a variety of pedicled or free flaps can be used. Some surgeons temporarily use a salivary bypass tube to potentially further decrease the risk of PCFs.

Pectoralis major myocutaneous flap

The pectoralis major myocutaneous (PMMC) flap, originally described by Ariyan,² is a reliable and robust flap that provides extensive well-vascularized tissue; one of its potential drawbacks can be the excessive amount of tissue. Furthermore, it is an easy flap to harvest, and does not require microvascular skills, thereby decreasing operative time.

The skin portion of the flap can be used to reconstruct the pharynx by suturing the edges to the residual mucosal edges, or by tubing it in cases of circumferential pharyngeal defects. The muscle adds a second layer of vascularized tissue between the pharyngeal closure and cervical skin, which decreases the risk of PCF. The muscle can also be used to cover and protect the carotid artery in irradiated patients. A skin graft can be used to cover the area of exposed muscle if the clinician is unable to primarily close the cervical skin.

The rate of PCF formation with the use of PMMC flap has been reported to be approximately 10% to 15%, compared with 36% to 50% without the flap.^{3,4} Studies have shown a median esophageal stenosis rate of approximately 17% with the use of a PMMC flap,⁵ versus 33% without it.⁶

Drawbacks of the PMMC flap for pharyngeal reconstruction can include impaired swallowing and speech articulation if a significant portion of the base of tongue is involved. The weight of the flap can pull the residual tongue down, causing difficulty with speech and swallowing. This effect can be minimized by suturing the flap down to the prevertebral fascia. Other drawbacks include limitation of contralateral neck turning, and a bulky area where the flap traverses over the clavicle, although this may improve with time with muscle atrophy. Furthermore, patients can experience postoperative shoulder joint dysmotility.

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Supraclavicular artery island flap

The anatomy of the supraclavicular artery island flap (SCAIF) was originally described by Toldt.⁷ This flap is based off the supraclavicular artery, which typically branches from the thyrocervical trunk. It is easy to harvest, with minimal donor site morbidity. It provides thin and pliable tissue; ideal for head and neck reconstruction. For pharyngeal defects, it can be used as a patch graft or as a tubed, interpositional graft. The rate of PCF with the use of SCAIF has been reported to be approximately 20%.⁸

Fasciocutaneous free flaps

Multiple fasciocutaneous free flaps have been described for use in the head and neck region. However, the radial forearm free flap (RFFF) and anterolateral thigh (ALT) free flap, described by Yang and colleagues⁹ and Song and colleagues,¹⁰ are the most widely used flaps for soft tissue reconstruction in the head and neck region.

Their use in the reconstruction of pharyngeal and cervical esophageal defects is well recognized. Their ease of harvest, even with the anatomic variation associated with the ALT, and minimal donor site morbidity, make them attractive options. The vessel diameter of both vascular pedicles is large, allowing easier vascular anastomoses, which is particularly important in previously irradiated necks. Although the ALT flap allows a larger amount of tissue to be harvested, both flaps can be designed and used in multiple ways to adequately reconstruct the defect. However, inherent in the use of microvascular free flaps is the risk of flap failure, which, although low, can have serious consequences. The increase in operating time may also be detrimental to patients, particularly for those who are medically compromised, as are most patients with head and neck defects (Figs. 1–5).

The mean rates of PCF and esophageal stenosis for the RFFF and ALT flaps are less than 25% and around 10%, respectively.⁵ It has also been reported that patients who have been reconstructed using either of these fasciocutaneous free flaps have perhaps the best recovery in terms of voice rehabilitation and swallowing function compared with all other forms of reconstruction (Figs. 6–8).^{5,11}

Jejunal free flaps

The jejunal free flap was originally described by Seidenberg and colleagues,¹² and is the oldest form of circumferential pharyngeal reconstruction still being used. Patients who have received this form of reconstruction typically have good voice rehabilitation and swallowing capabilities. The PCF and stricture rates are similar to those of the fasciocutaneous free flaps. However, their decreased operative ischemia time and high morbidity rate, compared with the fasciocutaneous free flaps, have led to their decreased use.⁵

Pharyngocutaneous fistula repair

The neck can be the site of a variety of PCFs, often arising following laryngectomy or laryngopharyngectomy, particularly in previously irradiated patients. Many PCFs following laryngectomy are successfully managed by standard measures, such as the use of a nasogastric or gastrostomy feeding tubes, keeping the patient nil by mouth optimization of thyroid function, and serial wound packing, thus allowing them to heal

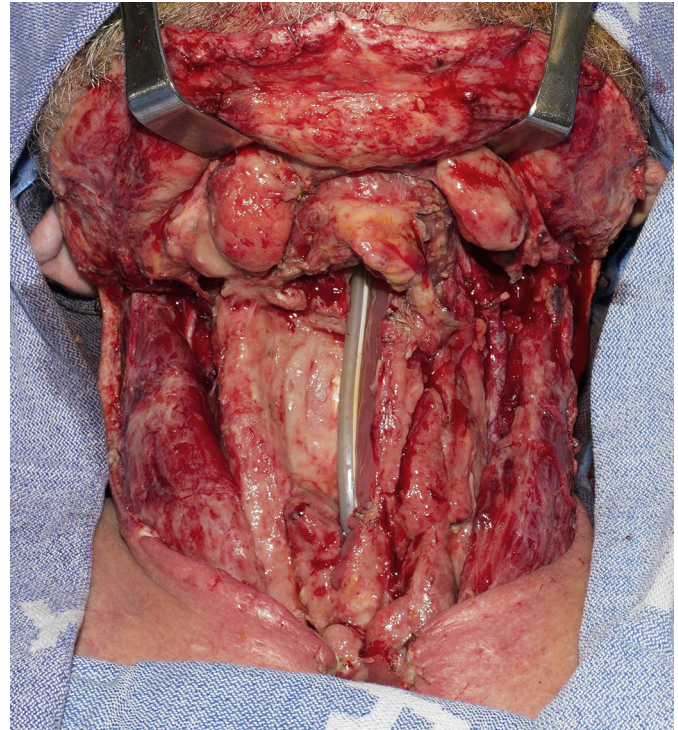


Fig. 1 Defect after total laryngectomy and partial pharyngectomy in a previously irradiated patient. There is a remnant of posterior hypopharynx present. The nasogastric tube passes into the cervical esophagus.

by secondary intention. Therefore, most PCFs should be managed conservatively for an extended period of time, with surgical intervention and reconstruction reserved only for defects that have proved refractory to local measures and nutritional optimization.

For persistent PCF, surgical intervention is required, which entails resection of the fistula, and flaps to reconstruct the residual defect. Similar to the partial pharyngeal defect repair described earlier, flaps commonly used for persistent PCF are the PMMC, SCAIF, and RFFF, either alone or in combination. A skin graft may also be required if primary closure of the cervical skin is not possible (Figs. 9 and 10).

Smaller fistulae occurring in the region of a tracheal stoma in the lower neck can occasionally be addressed using a local sternocleidomastoid flap rotated medially. This procedure should not be attempted in previously irradiated patients. A



Fig. 2 Harvested RFFF with separate skin paddle for external monitoring.

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