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# Pharyngo-cervical Esophageal Reconstruction

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The unreconstructed discontinuity between the oral cavity/pharynx superiorly and the thoracic esophagus inferiorly after a pharyngolaryngecto–cervical esophagectomy is a physically, socially, and emotionally crippling condition. This condition leaves the patient feeding-tube–dependent, socially isolated, and suffering from recurrent aspiration of swallowed or refluxed secretions, with the attendant problems of chronic sleep deprivation and, almost inevitably, recurrent pulmonary sepsis. Finding a surgical remedy for this iatrogenic situation has been recognized as a high priority for many decades. The ideal surgical reconstruction would be a reliable, single-stage procedure to restore normal swallowing, with low morbidity and operative mortality. It would be characterized by primary wound healing and would result in a rapid resumption of swallowing and a short hospitalization. It would also permit good speech rehabilitation. If these results could be achieved, the patients would experience a greatly improved quality of life, even if they are rarely cured of their disease. At present, after the definitive resection, the average time to recurrence is 9.7 months, with death occurring at an average of 10.7 months [1]. Reconstruction, therefore, is primarily a palliative treatment to restore swallowing without impeding speech rehabilitation.

## Epidemiology

Most patients who present with major pharyngo-esophageal defects have undergone surgical resection of hypopharyngeal or cervical esophageal malignancies, either after radiation or chemoradiation or as the primary step in such a multiphase treatment plan. Hypopharyngeal cancers account for 8% to 10% of head and neck malignancies [2,3]; they afflict approximately 1 per 100,000

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population per year in Canada, the United States, and Britain, but 14.8 per 100,000 population in France [4]. Typically, these patients are heavy consumers of tobacco and alcohol [5,6] with a heavy male predominance, which ranges from 5 to 20:1 [7–9] to as high as 50:1 in France [10]. Postcricoid carcinomas are the exception: a disease that is more common in women [11–14]. Most patients are older than 60 years at presentation. Patients with hypopharyngeal carcinoma typically present with advanced disease, with over 70% at stage III or IV [15]. This condition is often due to advanced primary site disease [5], although advanced regional nodal stage or both combined are also common. Practically speaking, this information is highly relevant to surgeons, because the primary sites often need a total pharyngectomy. Treatment of neck nodes that are heavily involved in cancer often requires neck dissections that deplete the neck of many potential recipient vessels for free flaps, complicating reconstructive options. Thus the typical patient is an older man who has a strong history of tobacco smoking and alcohol consumption and who may be malnourished and suffering from dysphagia and, possibly, from recurrent aspiration.

## History of pharyngo-esophageal reconstruction

The history of the efforts to reconstruct the pharyngo-esophageal segment go back to Czerny (1877) [16], Mikulicz (1888) [17], and Trotter (1913) [18]. However, their treatment methods were complicated by the problems of aspiration, sepsis, hemorrhage, stricture, and unreliability, which led most surgeons to abandon these techniques. The modern era started in 1942 with Wookey [19], who used a random-pattern anterior neck skin flap to restore the upper digestive tract in stages. This procedure, although modified by others, remained unreliable [20]. A major advance was the development of the more reliable pedicled fascio-cutaneous flap, the deltopectoral flap, by Bakamjian (1965) [21], although it remained a two-stage treatment. In 1979, the even more reliable pedicled myocutaneous flap was first reported, starting with the pectoralis major flap [22]. This flap was quickly followed by the trapezius [23] and then by others, such as the transaxillary latissimus dorsi flap [24]. Pedicled visceral flap development, which commenced in the 1930s, continued into the 1960s and was primarily applied to the defect after a total esophagectomy had been performed. These flaps included the colon [25], the stomach as a gastric transposition/pull-up (first described in 1936 [26] but popularized by Ong and Lee [27]), and the seldom-used pedicled jejunum [28,29]. This last technique never gained wide acceptance, probably because of the tenuous viability of the flap and the emergence of the other, more robust visceral transposition flaps. More recently, the "superchanging" of the blood supply has been reported, leading to a limited resurgence in the use of the pedicled jejunal flap [30]. The gastric transposition and the colonic interposition flaps have become the first- and second-line choices, respectively, for reconstructing the defect of a total esophagectomy.

The microvascular free flaps are the newest on the scene. They include the gastric antrum [31], of which small series have been reported [32–34]. Perhaps because the physiologic impacts of this flap and its variants have never been fully investigated, it has not gained wide acceptance [35]. The gastro-omental flap, either as a tube or a patch [36,37], is still used occasionally [38]. The colon [39,40] used as a free segment has been reported, but by far the most prominent microvascular visceral flap is the free jejunum. Seidenberg et al [41] published the first case of microvascular reconstruction of the esophagus using the free jejunal segment, but more widespread use had to await technical developments in instrumentation and microsurgical techniques. Jurkiewicz [42] reported the first significant clinical series. With microsurgical technical refinements, the free jejunal flap has become the most reliable, trouble-free, and common method of pharyngocervical esophageal reconstruction [**Fig. 1**] [43].

Free fascio-cutaneous flaps, either used as a patch on partial circumferential defects or tubed for reconstruction of total circumferential defects, have also become popular over the past 20 years. These include the radial forearm free flap [44], the ulnar forearm free flap [45], and the anterolateral thigh flap [46].

## Important factors in microsurgical reconstruction

### *Role of the microsurgical reconstructive team*

This situation is different from other major head and neck cancer procedures, in which the microsurgical team knows preoperatively that its expertise will be needed and that both the ablative and reconstructive teams will work simultaneously for major parts of the surgery. It may be impossible to know preoperatively whether a total esophagectomy will be required. If it is, then the microsurgical team will not be needed in the reconstruction, because a pedicled visceral flap will be employed. However, once the pharyngolaryngectomy, with or without an en bloc cervical esophagectomy, has been performed and the lower margin of the resection has