



Salvage Surgery for Jejunal Necrosis After a Free Jejunal Transfer

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Onoda and Masahito are congratulated on facing a challenging problem in pharyngoesophageal reconstruction.¹ To care for these patients is to manage complications, and conduit failure is among the most dire and difficult. This article explores the management of free jejunal necrosis by developing a treatment algorithm. The authors compare five re-free jejunum cases with six external fistula formation cases from a total of 600 total free jejunum cases. Findings suggest an improved return to oral diet, as well as improved wound healing in those treated with another free jejunum. Therefore, Onoda and Masahito recommend early debridement and another free jejunal transfer to replace the necrotic segment for those with early-stage jejunal necrosis. They present scenarios in which they recommend external fistula formation instead of free jejunum surgery.

Segmental reconstruction of the pharyngoesophagus has long relied on free tissue transfer for conduit reconstruction and establishment of enteric continuity. The free jejunum was first described in 1957 by Seidenberg² and became the workhorse flap for circumferential defects of the pharynx due to its relatively low incidence of fistula.³ More recently, tubed fasciocutaneous flaps such as the anterolateral thigh (ALT) have been popularized due to a high success rate and comparatively low donor site morbidity when compared with laparotomy.³ Although the free jejunum is a reasonable choice, abdominal donor site complications, low tolerance of ischemia, short pedicle, and poor speech quality render it a second-line option in our practice.

First, and importantly, in the article by Onoda and Masahito no clear distinction is made between segmental pharyngoesophageal reconstruction and total esophageal reconstruction. These generally result from two distinct problems, the first being pharyngeal/laryngeal squamous cell carcinoma, requiring total laryngectomy, bilateral neck dissection, and adjuvant radiotherapy; and the second being adenocarcinoma of the esophagus resulting in some form of total or subtotal esophagectomy. This distinction is important because total laryngectomy defects are localized to the neck. Spanning this defect can be performed using a segment of jejunum, or, in our algorithm, a tubed fasciocutaneous flap.

Esophageal tumors are usually handled using a gastric pull-up procedure because resection includes some portion of the thoracic esophagus. When gastric pull-up fails or there is a recurrence, a supercharged pedicled jejunum is performed. The reason for pedicling is that there is no distal target in the neck for re-establishing enteric continuity, and therefore complete bypass of the thoracic esophagus is necessary. This procedure, which we describe as total esophageal reconstruction, is fundamentally different from segmental pharyngoesophageal reconstruction, for which we prefer a fasciocutaneous flap.

We agree with much of the thought process described in the article regarding management of complications, however our algorithm for segmental defects is fundamentally different. Rather than primary use of the bowel for segmental reconstruction, we use a fasciocutaneous flap whenever possible. At our institution, the ALT has become the workhorse flap for segmental pharyngoesophageal defects. Our own data suggest that the ALT performs well, with an overwhelming majority of patients regaining oral diet (91%) and speech via tracheoesophageal puncture (100%).⁴ Furthermore, this can be performed with a relatively low complication profile (2% flap loss, 9% fistula in this study) and markedly less donor site morbidity (3%).

For total esophagectomy defects, as stated above, we recommend use of a supercharged pedicled jejunal flap. It is our practice to pedicle a jejunal flap off the fourth or fifth mesenteric arcades, span the esophageal defect, and supercharge the proximal jejunum to the internal mammary or neck vessels. This flap can also be combined with concurrent laryngectomy defects, although this is less common.^{5,6}

Although not explicitly stated, 11 flap failures from any cause out of 600 is approximately a 10% failure rate. This is somewhat high but not outside the range of normative values. The authors describe clinical scenarios of jejunal failure in which re-jejunum may not be possible. In these cases, diversion in the form of a fistula may be necessary. In those with florid infections related to fistula, repeated free flap failure or clinical instability may require external fistula formation with or without negative pressure wound therapy or local pedicled flap reconstruction, such as the pectoralis muscle flap. Here, a distinction should be made about the causes and prospects of repair. For total flap failure, a new flap is required. Again, for a simple segmental defect, we would perform a new fasciocutaneous flap. If the patient cannot tolerate a new flap due to gross infection or hemodynamic instability, a spit fistula should be performed. In these cases, a delayed reconstruction can be performed once the infection has resolved, the wound matured, and the patient optimized.

The authors describe factors contributing to vascular ischemia of the free jejunum. They list these factors as either surgical- or patient-related. Surgical factors include a short vascular pedicle, issues with edema, technique, pedicle kinking or position, and choice of high-flow recipient vessels. Patient factors include issues with atherosclerosis of the arcade vessels, which they suggest are unique to the jejunum. In our experience, pedicle length problems and kinking can be avoided, regardless of flap type, with proper planning and consideration of the multiple recipient vessel options. Furthermore, in our experience, the mesenteric artery system has large compliant vessels that are more protected from atherosclerosis than other flaps such as the ALT, or even the recipient site vessels. We agree that the selection of the recipient vessels is of paramount importance, but find that the numerous large-caliber recipient veins present in the head and neck are adequate, obviating the need for dual outflow. Data exist to suggest that dual outflow may even create a low flow state, and ultimately hinder adequate venous drainage.^{7,8} We typically use the branches of the external carotid artery system and internal jugular venous system for our segmental reconstructions. We reserve use of the internal mammary vessels for our pedicled jejunums or cases where neck vessels are unsuitable due to previous neck dissection and radiotherapy.

Necrosis from vessel thrombosis leading to flap loss and necrosis from enteric anastomotic failure, fistula, and infection are different complications and should be handled differently. The authors describe scenarios where necrosis occurred without anastomotic vessel issues. They describe patients with delayed necrosis who underwent re-free jejunum, and again experienced necrosis of a second flap, and another that had external fistula formation. They inferred that mesenteric ischemia unrelated to the anastomotic site contributed to these failures. In our experience, it is important to consider other factors that may contribute to flap failure and fistula. Ischemia time, tissue handling, and enteral anastomosis type/technique are all factors outside the primary anastomosis that may contribute to flap success or failure. Those with evidence of vessel thrombosis require immediate reoperation to address a thrombosis with continued close flap monitoring. Those with fistula require timely washout and reclosure, sometimes with a pectoralis flap for reinforcement. If infection is severe and reclosure impossible, externalization and diversion is performed in anticipation of a subsequent reconstructive effort.

In conclusion, the authors describe a treatment algorithm for the management of jejunal necrosis. They recommend another free jejunum for those with florid infection and in patients for whom the cause of necrosis can be identified; otherwise an external fistula is created. The use of fasciocutaneous flaps is only utilized when reoperation with a free jejunum is not possible. At our institution, the treatment of these defects is quite different. We use ALT flaps or other fasciocutaneous flaps for circumferential, segmental defects of the laryngopharynx and cervical esophagus. Only when fasciocutaneous flaps are not a option do we consider a free jejunum, which in our experience is rare. In cases where the defect extends past the cervical esophagus, we routinely perform pedicled supercharged jejunal flaps for reconstruction of a total esophagectomy and bypass of the thoracic esophagus. For this defect type, a free segmental jejunum is inadequate.

DISCLOSURES Ashley C. Mays and Jesse Selber have no disclosures to declare.

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