Temporary Banking of the Jejunal Flap for a Difficult Esophageal Reconstruction

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In this report, we describe a case of difficult esophageal reconstruction using temporary banking of a jejunal free flap. This flap was temporarily placed on the patient's chest wall using the internal mammary vessels (IMVs) as recipient vessels. After 15 days, the jejunal flap was transferred to the neck region, and permanent coverage was provided using a pedicled latissimus dorsi musculocutaneous flap.

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Esophageal defects requiring either partial regional or total reconstruction can be resolved using several well-described methods [1]. Intestinal flaps represent the best alternative because of their physiologic properties [2]. Free jejunal transfer for pharyngoesophageal defects is a safe reconstructive technique with good functional outcomes [3–5]. However, reconstruction of esophageal defects after tumor extirpation remains a therapeutic challenge [6]. In this report, we present a case of difficult esophageal reconstruction using the jejunal free flap temporary banking technique.

In 2005, a 55-year-old male patient underwent total laryngectomy with total cervical esophagectomy, bilateral neck dissection, radiotherapy, and chemotherapy. An extensive defect developed in the neck region from radionecrosis. Attempted esophageal reconstruction with a radial forearm free flap in another institution failed.

The patient was transferred to our center's intensive care unit in poor systemic condition, with a severe neck wound, an almost total cervical esophageal defect, and a permanent tracheostomy (Fig 1).

The patient received total parenteral nutrition using femoral vein access. Sudden acute abdomen syndrome developed. Ultrasonography and computed tomographic scanning revealed fluid in the abdominal cavity. Gastrointestinal perforation was suspected, and an emergency operation was performed by a general surgery team. We, the plastic surgery team, decided to take part in the operation. During the procedure, we noticed that the femoral vein had been punctured by the catheter and observed retroperitoneal extravasation of the nutritional fluids in the abdomen. It was clear that the acute abdomen syndrome was caused by the rapid onset of chemical peritonitis. Because we were planning to reconstruct the esophageal defect after complete lavage of the abdominal and peritoneal cavities, we harvested a free jejunal flap to avoid an additional laparotomy. Definitive reconstruction was delayed in light of the patient's poor general status. The jejunal flap was banked on the patient's chest wall using the internal mammary vessels (IMVs) as recipient vessels. The IMV and internal mammary artery were exposed and divided in the fourth intercostal space to achieve a longer recipient pedicle after upper rotation. Microvascular anastomosis was performed in an end-to-end fashion using the microscope.

We temporarily placed the jejunal flap on the patient's chest wall partially covered by a subcutaneous pocket (Fig. 2A). The flap was followed by a wet-gauze wound closure and monitored by direct inspection of the mucosal color and bleeding and Doppler monitoring. No anticoagulants were used to maintain patency. The defect in the neck region was cleaned, and the wound dressing was changed frequently (2 or 3 times per day). In the postoperative period, the patient's blood test results showed overall improvement, with a low C-reactive protein level, an albumin level greater than 2.5 g/dL, and

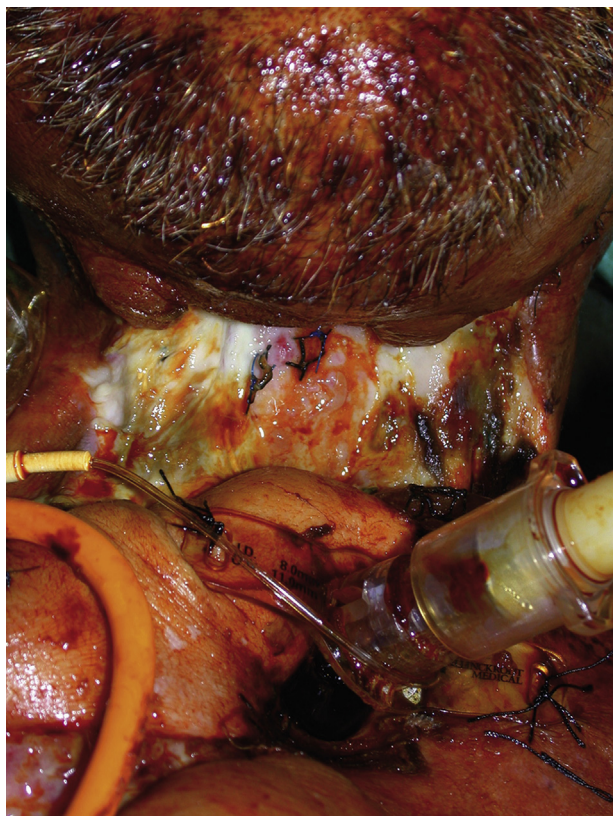


Fig 1. Preoperative close-up view of defect in neck region.

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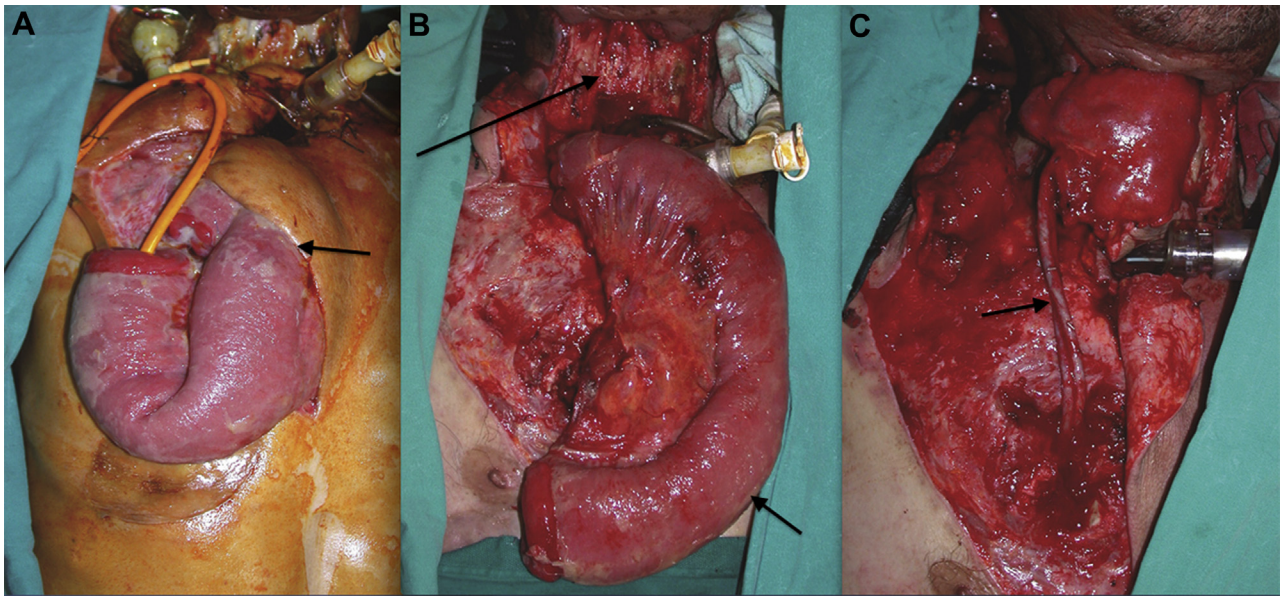


Fig 2. (A) Immediate postoperative view of jejunal flap banking partially covered by subcutaneous pocket (arrow). (B) Intraoperative view of jejunal segment (short arrow) and debrided neck defect (long arrow). (C) Intraoperative view of vascular pedicle extended using interposition of 2 saphenous vein grafts (arrow) and placement of intestinal segment.

a creatinine level of 0.9 mL/dL. Pulse and blood pressure measurements were good and body weight was stable (62 kg).

After 15 days, the patient's health improved sufficiently to attempt the definitive reconstruction.

After neck debridement, jejunal interposition was performed using 2 saphenous vein grafts of 15 cm each for arterial and venous anastomoses to the internal mammary artery and the IMV. The jejunum was anastomosed to the proximal esophagus after debridement to healthy tissue at the level of the pharyngoesophageal junction and to the distal esophagus 2 cm above the sternal notch, using 2 layers with 3-0 absorbable sutures (Figs 2B, 2C).

In the same operation, coverage of the jejunal flap was achieved with a pedicled latissimus dorsi musculocutaneous flap, and the chest wall defect was covered with skin grafts (Fig 3). Two nasogastric tubes were inserted to prevent any stricture in the anastomotic junction. These were removed 10 days later. The patient had no fistula or stricture problems, and oral nutrition commenced on the 10th day postoperatively. The patient was then transferred to another department, where he died from complications of chemotherapy 40 days after the reconstruction. Swallow and leak test results and other late observations are therefore not available.

Comment

Reconstruction of esophageal defects represents a therapeutic challenge for a variety of reasons [6]. The anatomy and availability of recipient vessels in the neck area are frequently compromised as a consequence of previous operations or chemotherapy and radiotherapy, which cause significant fibrotic changes in the surgical bed and vasculature [6]. Although IMVs are frequently used in free tissue transfers for breast reconstruction, there are only a few reports of the IMV being used for head and neck reconstruction [7–8]. The consistent anatomy of the IMVs significantly reduces the time needed to perform



Fig 3. Immediate postoperative image. Jejunal segment and defect in neck were covered by pedicled latissimus dorsi myocutaneous flap (short arrow). Chest wall defect was covered with skin grafts (long arrow).

the anastomosis, and the flap is exposed to ischemia for a much shorter period [7]. Because of their location, IMVs are not usually affected by previous radiation treatment [7]. The major challenge of using IMVs for esophageal reconstructions is the long pedicle length required to reach the neck area. We overcame this problem using interposition vein grafts. The use of interposition vein grafts is associated with a higher risk of anastomotic thrombosis, and they should be used carefully. The postoperative flap viability was regularly monitored with a Doppler probe and direct observation of the flap mucosa.

The novel technique used in this challenging case emerged as a valid strategy for achieving permanent esophageal reconstruction with the ideal flap for the defect type. The jejunal flap is associated with a successful level of swallowing because of intrinsic peristaltic activity, requiring no tube preparation, and therefore involving a lower incidence of fistula formation and absence of itching and hair-bearing tissue. Based on these considerations, we excluded alternative methods of reconstruction, such as the anterolateral thigh flap.

Banking the jejunal flap on the patient's chest wall during the emergency abdominal operation prevented a second laparotomy and avoided a lengthy operating time. Indeed, harvesting the flap and performing the anastomosis to the recipient IMVs took only 45 minutes.

Banking the flap in the patient's chest wall also made it possible to keep the flap in a safe area close to the defect. This permitted better cleaning of the intestinal flap lumen before the insertion of the flap, thus reducing the risk of complications such as esophageal anastomotic leakage, infection, and fistula formation. However, the technique described requires a complex 2-stage surgical procedure and should therefore be considered only in selected cases.

In conclusion, temporary banking of the jejunal free flap using IMVs as recipient vessels represents a valid strategy for performing complex head and neck microvascular reconstructions. It should be considered for patients in poor general health or in the case of a particularly challenging vessel-depleted neck.

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