Radial forearm free flap as the last resort for oesophageal reconstruction

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ABSTRACT

Strategies for oesophageal reconstruction following resection vary according to the nature of the pathology encountered, patient factors and surgeon preference. However, reconstruction in patients with multiple previous failed attempts poses specific management challenges. We present the case of a 61-year-old man who underwent oesophageal reconstruction with a radial forearm flap as a last resort.

KEYWORDS

Oesophagus – Reconstructive surgical procedures – Free tissue flaps

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Case history

A 61-year-old man was referred to our unit. He had a complex surgical history, with excision of a benign paraoesophageal mass and Belsey hiatus hernia repair undertaken 25 years previously, resulting in oesophageal stricture requiring multiple dilations. Ten years later, he underwent left thoracoabdominal oesophageal resection with a short pedicled jejunal interposition graft in a thoracic unit. This leaked and attempted control with a T-tube failed. Following oesophagostomy formation, a second attempt at reconstruction was made with left-sided colonic interposition. This also failed owing to stricture and chronic sepsis at the proximal anastomosis. The colonic graft was subsequently removed. Reconstruction was attempted a third time with a gastric pull-up approach a year later. This again leaked so a permanent oesophagostomy was created and the patient relied on enteral nutrition via tube feeding.

There were persistent problems with oesophagostomy stenosis, requiring multiple surgical revisions and dilations. The patient also had multiple revisions of his abdominal feeding tube and was known to have a hostile abdomen. He was referred to our unit having not eaten normally for over ten years. After appropriate investigation and debate, a decision was made to attempt reconstruction with a radial forearm free flap.

Prior to surgery, computed tomography (CT) showed the previous gastric conduit in a substernal position, with 3cm between the proximal end of the gastric conduit and the oesophagostomy. A contrast study performed via gastrostomy delineated the gastric anatomy. A joint procedure was planned with oesophagogastric, maxillofacial and cardiothoracic surgeons.

The procedure began by raising platysmal neck flaps bilaterally to obtain access (Fig 1). The proximal oesophagus and internal jugular vein were mobilised, and the superior thyroid artery was identified. Cardiothoracic surgeons carried out a proximal sternal split to allow access to the conduit (Fig 2).

The radial forearm flap was harvested using standard procedure and the radial cutaneous nerve was preserved. The forearm was closed with abdominal skin graft. The right manubrium and sternal head were resected to allow space for the graft.

The flap was anastomosed around a covered oesophageal stent with multiple interrupted 3/0 polydioxanone sutures in a U-shape configuration (Fig 3). The blood supply was maintained by anastomosing the radial artery to

Figure 1 Right-sided oesophagostomy and marking for bilateral cervical access

Figure 2 Sternal split revealing proximal oesophageal remnant (A) and gastric conduit (B)

the superior thyroid artery and the cephalic vein to the internal jugular vein.

The patient had a planned postoperative intensive care unit stay. He was commenced on enteral feeding and treated for hospital acquired pneumonia. CT one week after surgery revealed collections in the neck but no definitive anastomotic leak. Water soluble contrast swallow two weeks following the procedure demonstrated a small contained proximal anastomotic leak (Fig 4). This was managed conservatively with nil by mouth, antibiotics and antifungals, as guided by microbiology. He continued to

Figure 3 Radial forearm flap anastomosed around covered oesophageal stent

Figure 4 Contrast swallow two weeks after surgery demonstrating contained proximal anastomotic leak

Figure 5 Contrast swallow six weeks after surgery demonstrating resolution of anastomotic leak

Figure 6 Endoscopic view six months after surgery

make satisfactory progress and was discharged after 18 days in hospital.

The patient continued to show improvement and further outpatient contrast swallow demonstrated resolution of the leak (Fig 5). He was treated for *Clostridium difficile* infection on readmission to hospital weeks after discharge. The oesophageal stent was removed after eight weeks as a day case. Follow-up endoscopy at six months showed satisfactory healing (Fig 6). The patient managed oral nutrition and required overnight supplementary feeding. He died of causes unrelated to his surgery nine months later.

Discussion

Our case report describes the novel approach of using a radial forearm flap to reconstruct the oesophagus in a patient with multiple failed attempts. Its use will be unfamiliar to oesophagogastric surgeons. The flap first gained popularity in head and neck cancer reconstruction more than 30 years ago. Its benefits include minimal donor site morbidity, allowing a two-team synchronous operative approach.¹ The resulting flap is thin and pliable, and can be used to reconstruct a variety of defects.

Such flaps demonstrate excellent survival in different sites, largely because of their vascularity,^{2,3} making this an attractive option for our patient. Furthermore, the nature of the skin flap allows for formation of either a partial or

complete tube depending on the nature of the defect and the tube diameter can be tailored to the remaining native lumen.⁴ In our patient, a U-shape configuration was utilised to minimise postoperative structuring, which can be seen with fully tubularised grafts. Another novel feature of our case is the use of a covered oesophageal stent as a scaffold for the graft.

Radial forearm flaps have some shortcomings. Difficulties in monitoring viability have been noted.² In our case, the graft could be assessed at endoscopy if required. In the postoperative period, assessment of arterial inflow was achieved with CT angiography.

A review of fasciocutaneous free flaps in pharyngolaryngo-oesophageal reconstruction found that radial forearm and anterolateral thigh flaps were the most commonly studied.⁵ Fistula and stricture rates were 13% and 16.1% respectively, and were higher than in jejunal and gastro-omental flaps. When comparing speech, swallowing and feeding, and flap failure rate, patients with fasciocutaneous flaps had consistently better outcomes, with 75% achieving a normal diet and a total flap failure rate of less than 2%. This is also thought to contribute to the lower overall mortality compared with jejunal free flaps.

Given our patient's extensive history, reconstruction options were limited. We were keen to avoid abdominal entry because of his hostile abdomen; otherwise, a free jejunal graft could have been considered. Despite suffering postoperative complications, the procedure allowed reversal of a problematic oesophagostomy, restoration of oesophageal continuity and, ultimately, resumption of oral intake, thereby improving the patient's quality of life.

Conclusions

The radial forearm flap remains an option for oesophageal reconstruction in carefully selected patients where the use of gastrointestinal conduits is not possible.

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