Pharyngo-Esophageal Reconstruction by Free Jejunal Graft and Microvascular Anastomosis in a 10-Year-Old Girl

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Pharyngeal and upper esophagus substitution is an ordinary procedure in adults, performed mainly for oncologic purposes, but it is rarely done in children. The authors present a case report of a free jejunal graft pharyngo/esophageal reconstruction with microvascular anastomosis to the primitive carotid artery and the internal jugular vein in a a 10-year-old girl who had a loss of lower pharynx and cervical esophagus secondary to esophageal perforation by foreign body. Other surgical approaches for pharyngo-esophageal reconstruction in children are revisited.
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INDEX WORDS: Foreign body, esophageal perforation, free graft, esophageal replacement, pharyngeal replacement, witness loop.

ESOPHAGEAL PATHOLOGY varies widely with age. Pediatric surgeons treat mainly congenital malformations (atresia, fistula, stenosis), gastroesophageal reflux (GER), and caustic lesions. In children, however, esophageal perforations are rare, and its oncologic pathology is seen even less frequently. In adults, however, it is common to perform a radical pharyngectomy with the subsequent reconstruction. Hence, we present a case of a 10-year-old girl who required a pharyngoesophageal reconstruction for which a jejunal-free graft with microvascular surgery was chosen. The primary problem was an esophageal perforation caused by a foreign body complicated with the loss of the cervical portion of the esophagus. We have not found any reports in the current literature of this technique in children. Other therapeutic alternatives are revisited.

CASE REPORT

A 10-year-old neurologically impaired girl had a loss of lower pharynx and cervical esophagus secondary to the management of esophageal perforation by foreign body. The contrast studies showed a 6-cm gap between proximal and distal esophageal ends (Fig 1). The pharyngoesophageal reconstruction was carried out with 2 teams. Team "A," through a median supraumbilical laparotomy, produced a free graft from the second jejuneal loop with conservation of its vascular pedicle. The graft was not subjected to perfusion or any other treatment. Simultaneously, team "B" performed a wide left anterolateral cervicotomy taking care of preserving laryngeal structures, in particular, the left recurrent laryngeal nerve. At the proximal end of the graft, an isoperistaltic terminolateral pharyngojejunal anastomosis was performed as well as a termino-terminal jejune-esophageal anastomosis at the distal end. In both cases, a continuous 3-0 absorbable monofilament was used. Microvascular anastomosis was performed under the microscope using 10-0 nylon sutures. Recipient vessels were the common carotid artery and internal jugular vein, respectively (Fig 2). A segment of the graft was designed as a witness loop segment of the transposed jejunal graft was designed and left out through the cervicotomy for monitoring the graft vascular status in the postoperative period as was described by Bradford et al[1] (Fig 3). Although surgery lasted 7 hours, the ischemic phase was reduced to about 60 minutes owing to this double team approach. Small heparin dosages were used from the operative day until postoperative (PO) day 10. Postoperative time was uneventful. Only a small pharyngo-cutaneous fistula developed on PO day 5, which healed spontaneously on PO day 10. Pedicle ligature for witness loop elimination was performed bedside on PO day 7 when monitoring was no longer necessary. Oral liquid intake was initiated in PO day 9. Results of barium meal study showed esophageal integrity with a transient slight airway aspiration, which disappeared spontaneously later. The patient was re-educated to swallow and was discharged on PO day 20. In late follow-up, the girl was asymptomatic and presented neither dysphagia nor respiratory symptoms. Follow-up endoscopy findings showed no stenosis with an easy pass through the graft (Fig 4).

DISCUSSION

The pharyngo-esophageal reconstruction by free jejunal graft is widely accepted in adult patients. It was originally described in 1945 as having poor results. By the 1980s, the technique was improved, results were satisfactory, and acceptance was growing. Today, the main indications of this technique are pharyngeal reconstructions after large oncologic ablations (eg), circular laryngo-pharyngectomies or large oropharyngeal defects and as a rescue procedure for patients that were operated on with other techniques and experienced fistula, stenosis, or atonia as complications. There are some reports of its use in animal models mimicking newborn patients.[2]

Because of the low frequency of cervical esophageal pathology, there is a small number of reports of its use in thoracic esophageal replacement for pediatric patients[3,4]: (1) patients with esophageal atresia in which esophageal

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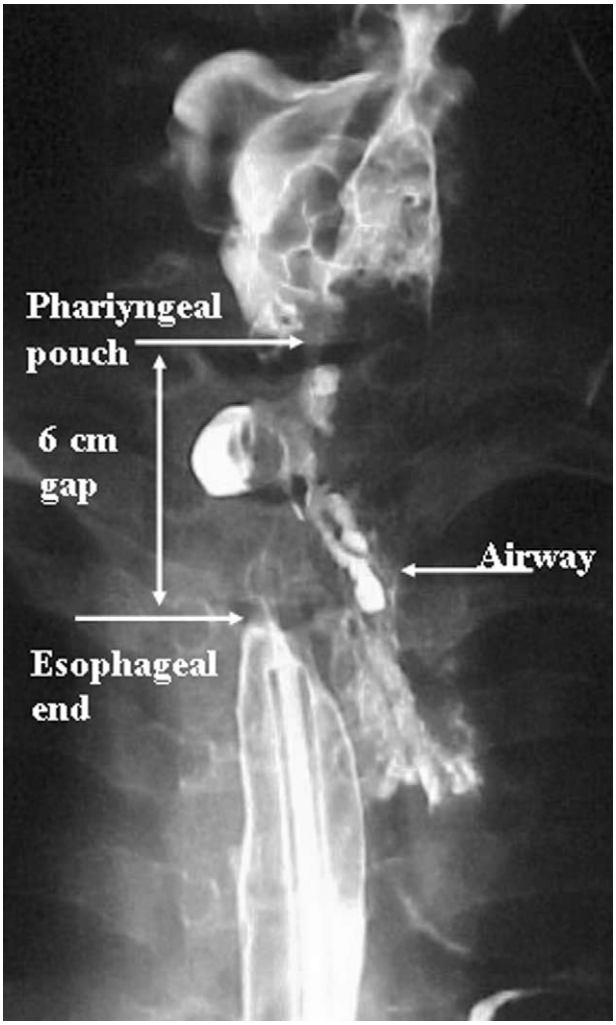

Fig 1. Preoperative contrast study shows a 6-cm cervical esophageal gap between upper pharyngeal pouch and distal esophageal end. Airway aspiration is evident.

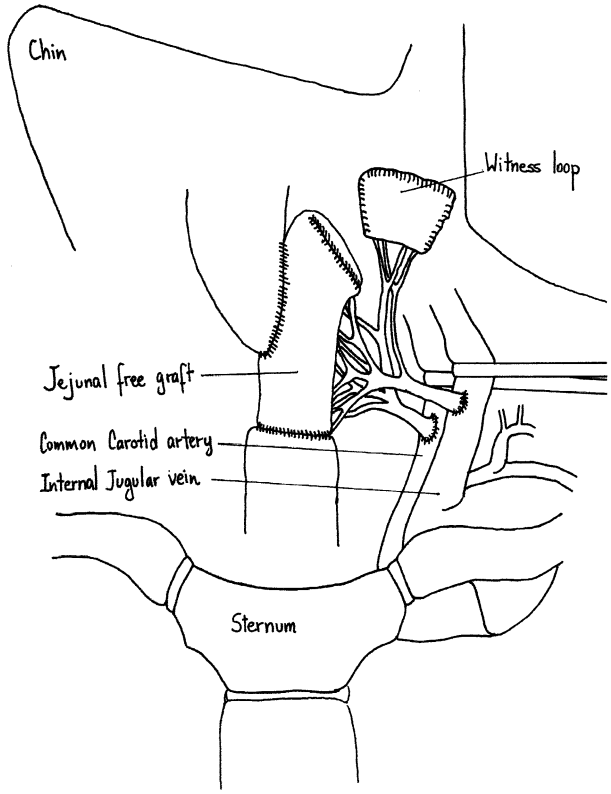

Fig 3. Drawing of witness loop from the jejunal graft was left out through the wound for vascular status assessment in the postoperative period.

replacement with stomach or colon failed[3,4] and (2) as the primary technique of repair in a long gap esophageal atresia patient.[4] In both reports, jejunum[3,4] was used, keeping its mesentery blood supply and making a second vascular supply by cervical microvascular anastomosis. In 2 of 5 cases, the distal mesenteric supply occluded and had to be divided. It was concluded that the exclusive

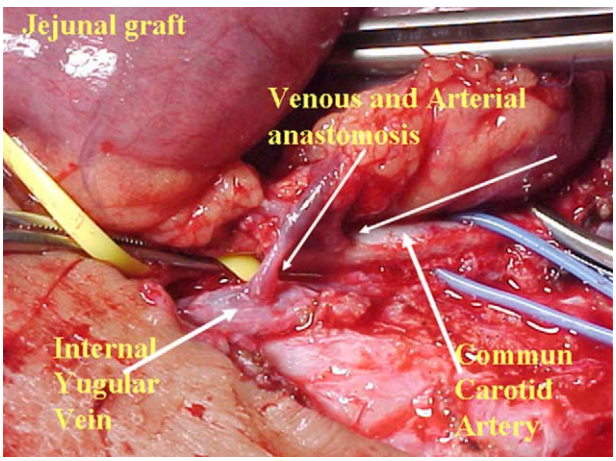

Fig 2. Operative field shows free jejunal graft and microvascular anastomosis.

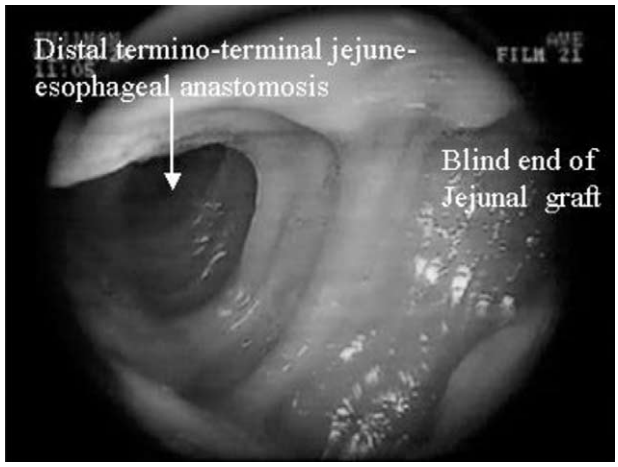

Fig 4. Late postoperative (6 month) endoscopy shows jejunal segment from upper pharyngo jejunal anastomosis.

cervical microvascular anastomosis was superior to the double supply technique owing to the anatomic difficulty of the double supply technique to keep blood vessels tension and compression free. This technique has been used successfully in caustic esophageal injury, esophageal achalasia, and pharyngo-esophagic stenosis.[5] The jejunum would be the proper segment for cervical esophageal replacement because of its anatomic and physiologic features (ie, size, diameter, excellent vascularization, and spontaneous peristaltic activity[4]), which make colon and stomach secondary choices. Furthermore, when morbidity and mortality occurrence is compared, jejunum is superior than colon or stomach for the replacement in adult patients undergoing circular cancer resections[7] and better than other techniques involving muscular or muscle–skin grafts.[6-8,10]

Once microvascular anastomosis skill is achieved, this procedure seems to be less traumatic and less complicated than alternative procedures for replacement.[6] Large adult series report up to 90.5% of graft success.[8-10] Some complications have been reported, mainly arterial thrombosis of the graft. These patients may undergo a second grafting procedure with good results.[6] The monitoring technique designed by Bradford et al[1] is simple to perform and a reliable method to asses graft vitality. Another way to watch graft status is by endoscopy.[6] Unrecognized graft necrosis would have severe and potentially lethal consequences.[1,4]

The advance in microsurgical techniques, magnifying lenses, suture materials, children-size animal model training for surgeons, and smaller surgical instruments make real the feasibility of using these techniques in pediatric patients.

We fully recomend the pharyngo-esophageal reconstruction by free jejunal graft using microvascular techniques when possible because it appears to be more physiologic and less traumatic than alternatives for pharyngo-esophageal replacement.

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