Successful preservation of non-functioning oesophageal substitution with jejunal roux loop drainage

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Abstract

Stricture, twist, reflux and dysmotility can complicate oesophageal substitutions in patients with long-gap oesophageal atresia. The use of the Roux loop drainage is described in 3 patients, preserving the oesophageal substitution by anastomosing a jejunal loop to the dependent part of the interposition.

The use of colonic or gastric substitution is well established in the management of long-gap oesophageal atresia. The reasons for the neo-oesophagus failing to drain are poorly understood but may include a twist [1], stricture or dysmotility [2]. In this case series, two patients developed poor gastric emptying after gastric interposition and a third patient developed gross gastro-colonic reflux after colonic interposition. Each patient was successfully managed by anastomosing a Roux loop of jejunum to the dependent part of the interposition.

1. Case 1

A term infant with long-gap oesophageal atresia underwent an unsuccessful colonic interposition that was replaced by gastric transposition a year later. Several months after the gastric transposition, the patient was admitted with recurrent episodes of aspiration pneumonia. Upper gastrointestinal endoscopy, contrast study (Fig. 1a) and CT chest (Fig. 1b and c) revealed poor drainage from the gastric transposition, with pooling of fluid around the level of the diaphragm despite a widely open pyloroplasty. An initial thoracotomy was performed to release dense adhesions at the level of the diaphragm; however the symptoms of reflux and aspiration failed to improve. Further investigations confirmed poor drainage from the interposition. A second thoracotomy was therefore performed 2 months later, at which time a Roux-en-Y limb of jejunum was anastomosed to the dependent portion of the gastric transposition (Fig. 2). Access was achieved via a thoraco-abdominal incision and entailed a peripheral detachment of the diaphragm. The diaphragm and crura were subsequently reconstructed around the Roux limb, and a feeding jejunostomy was positioned distally. The post-operative course was complicated by wound infection and dehiscence. The child is currently tolerating full oral feeds and has had no further episodes of aspiration pneumonia.

2. Case 2

A term infant with oesophageal atresia and distal tracheoesophageal fistula underwent primary repair on day 1 of life. He developed a severe neurological injury secondary to herpes encephalitis and recurrent oesophageal strictures for which he required a gastric transposition at the age of nine. Three years later he presented to our unit having had multiple admissions for recurrent chest infections. Subsequent investigations revealed a modest stricture at the upper anastomosis (which was easily dilated) and a functional hold-up at the lower end of the interposition secondary to a 270° twist at the level of the diaphragm which persisted despite repeated attempts at balloon dilatation. After careful discussions with his family, he was taken to theater for an upper gastrointestinal endoscopy and CT chest, and eventually an exploratory thoracotomy was performed to release dense adhesions at the level of the diaphragm; however the symptoms of reflux and aspiration failed to improve. Further investigations confirmed poor drainage from the interposition. A second thoracotomy was therefore performed 2 months later, at which time a Roux-en-Y limb of jejunum was anastomosed to the dependent portion of the gastric transposition (Fig. 2). Access was achieved via a thoraco-abdominal incision and entailed a peripheral detachment of the diaphragm. The diaphragm and crura were subsequently reconstructed around the Roux limb, and a feeding jejunostomy was positioned distally. The post-operative course was complicated by wound infection and dehiscence. The child is currently tolerating full oral feeds and has had no further episodes of aspiration pneumonia.

Key words:

Jejunal roux loop
Oesophageal atresia
Oesophageal substitution

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and explored through a thoraco-abdominal incision. Following adhesiolysis a Roux-Y-jejunal limb was brought through the diaphragm and anastomosed to the dependent part of the stomach. The procedure was straightforward but he made a slow postoperative recovery that was complicated by neurological issues affecting his lower limbs. He is fed orally, the frequency of chest infections is much reduced and he is now under the care of the adult general surgeons. His family is very happy with the outcome.

3. Case 3

An infant was born with complicated long-gap oesophageal atresia for which he had a colonic interposition at the age of 5 months. This was complicated by gross reflux resulting in a Roux-Y feeding jejunostomy at 6 months of age. Despite this he continued to experience frequent reflux and aspiration episodes which were resistant to medical therapies. Upright contrast studies confirmed the severe gastro-colonic reflux, no stricture at the site of anastomosis and poor emptying of the stomach. Following discussions with the family, he was taken to theater and explored through a thoraco-abdominal incision. At laparotomy a fibrotic mass was noted at the site of the jejunostomy which may have contributed to his symptoms. The colonic neo-oesophagus was detached from the stomach and anastomosed to the Roux-Y jejunal limb, whilst the stomach was repaired and a gastrostomy fashioned (Fig. 3). The procedure was straightforward and the child made a slow but uneventful recovery. At follow up he was noted to be thriving, tolerating full oral feeds with no further significant episodes of aspiration. Months later however he died of a cerebral hemorrhage.

Fig. 1. a) Upper gastro-intestinal contrast study shows failure of gastric transposition to empty with no distal flow of contrast. b) Coronal thoracic CT scan with oral contrast showing stasis within the gastric transposition. c) Sagittal thoracic CT scan with oral contrast showing gastric outlet obstruction at the level of the diaphragmatic hiatus.

Fig. 2. Diagrammatic illustration of the anatomy described in cases 1 and 2.

Fig. 3. Diagrammatic illustration of the anatomy described in case 3.
Data regarding the long-term outcomes after oesophageal substi-
tution is limited [3]. There is no perfect replacement for the
oesophagus, and the optimal treatment for patients with long-gap
oesophageal atresia remains controversial [3]. Gastric pull-ups have
an associated 5% mortality and 20% stricture rate [4], 84% of colonic
interpositions develop one or more complications [5]. Alternative
procedures such as gastric tubes and jejunal interpositions have
higher complication rates than the more conventional techniques
[6,7].

Poor drainage following gastric interposition is a rare but chal-
 lenging complication which may occur despite the presence of a
pyloroplasty. It is difficult to explain why the two gastric pull-ups
drained so badly. In case 1 the pull-up was angulated at a scarred
hiatus and in case 2 the pull-up was twisted. Surgery to widen the
oesophageal hiatus [8] was undertaken in case 1 with endoscopic
guidance to ensure a clear anatomical route into the duodenum,
however this was not effective. Despite endoscopically demonstra-
ting a clear anatomical route out of the stomach in both cases,
the degree of physiological hold-up was sufficient to prevent the
adequate drainage of stomach contents. The majority of oesoph-
agel substitutes are dependent upon gravity for emptying. Feeding
and contrast studies in these patients were therefore performed
upright to avoid erroneous interpretation of their function. Prior to
definitive surgery the patients were nursed upright with a naso-
gastric drainage tube in the gastric pull-up which effectively pre-
vented aspiration events.

Further replacement surgery is technically challenging, in-
volving removal of the interposition and the risks of a replace-
ment pedicled graft. Moreover, previous surgery and co-morbid-
ities such as anorectal anomalies may limit suitable alternative
substitute grafts. The rescue surgery described in cases 1 and 2 can
be hypothesized to work by offering a wider and more direct route
(the Roux-limb) through which the stomach could empty. In case 3
the Roux-limb worked because the stomach was disconnected
from the colon and could no longer reflux. This rescue procedure
does entail major surgery with extensive intestinal adhesiolysis in
nutritionally compromised patients and therefore parenteral
nutrition was commenced prior to surgery. However the surgery
remains well within the competence of an experienced gastroin-
testinal surgeon, and has achieved effective drainage without
compromising the viability of the existing interposition.

Reflex-related problems after oesophageal substitution may
be difficult to treat because the normal anatomy has been dis-
rupted and because the morphology of the interpositions does
not lend itself to conventional anti-reflux surgery. The rescue
surgery described in case 3 entails the disconnection of the
stomach from the neo-oesophagus (thus making gastro-oes-
ophageal reflex impossible) and the use of a jejunal Roux-Y limb to
restore gastro-intestinal continuity. The use of Roux-Y limbs is
well established in other areas of gastrointestinal surgery [9],
and it has shown itself to be a straightforward and reliable concept.
In this instance, the Roux-Y limb proved a simple solution to what
had previously seemed an intractable problem.

Late functional problems may lead to partial resection or revi-
sion of colon grafts, after which it may be impossible to use the
colon or stomach to fully bridge the gap necessary to restore
gastrointestinal continuity. The use of a free jejunal graft with
microvascular anastomosis to the internal mammary vessels has
been described in such situations [10]. However, significant com-
pliances have been described with this procedure, which include a
graft-failure rate of up to 50% [7].

5. Conclusion

Jejunal Roux-Y drainage preserves the existing oesophageal substi-
tution when faced with poor drainage or severe reflux. This tech-
nique is a useful addition to the armamentarium available to surgeons
managing patients with complex long-gap oesophageal atresia.

Consent

Written informed consent was obtained from the patient for
publication of this case report and accompanying images. A copy of
the written consent is available for review by the Editor-in-Chief of
this journal on request.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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