



# Gastric transposition in children

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## KEYWORDS

Esophageal replacement;  
Gastric transposition

**PURPOSE:** To analyze the outcome in 192 children (116 males, 76 females) undergoing transposition since 1981.

**METHODS:** The most common indications for esophageal replacement included failed repair of different varieties of esophageal atresia (138), caustic injury (29), and peptic strictures (9). A total of 81% of the patients were referred from other hospitals (50% from other countries). Age at operation ranged from 7 days to 17 years. The gastric transposition was performed by using blunt mediastinal dissection in 98 patients, with an additional 90 patients undergoing lateral thoracotomy. The retrosternal position was used in 4 patients.

**RESULTS:** There were no graft failures, including those who had previously had failed gastric tube or Scharli operations. Anastomotic leaks occurred in 12% (all but one resolved spontaneously). Anastomotic stricture, requiring dilation developed in 20%. Half of these patients had previously sustained caustic esophageal injury. There were 9 deaths in the group (4.6%). One death occurred intraoperatively, 5 in the early postoperative period, and there were 3 late deaths. In over 90% of our patients, the outcome was considered good to excellent in terms of absence of swallowing difficulties or other gastrointestinal symptoms. Many children preferred to eat small frequent meals. Poor outcome was particularly associated with multiple previous attempts at esophageal salvage. There was no deterioration in the function of the gastric transposition in those patients followed for more than 10 years.

**CONCLUSIONS:** Gastric transposition for esophageal substitution is an acceptable procedure. It is attended by 4.6% mortality and a 12% leak rate. A total of 20% of the patients needed anastomotic dilation for stricture. In the long term, good function has been maintained. Gastric transposition compares favorably with other methods of esophageal replacement.

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The ideal esophageal substitute should function as closely as possible to the original structure. The patient should be able to swallow normally, consume normal amounts, and should not experience any reflux symptoms. An additional requisite in children is that the substitute should continue functioning for many years without deterioration.

Satisfactory results have been reported for all forms of esophageal replacement,<sup>1</sup> although the numbers reported are mostly small and long-term data are scanty.

In the past 25 years, we have used gastric transposition almost exclusively for esophageal substitution. The present report describes the outcome in the largest number of children undergoing this procedure to date.

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## Materials and methods

In the 25-year period, 1981 to 2005, 192 infants and children underwent gastric transposition for esophageal substi-

**Table 1** Indication for esophageal replacement

Esophageal atresia	138
With distal tracheoesophageal fistula	76
Isolated atresia	48
With proximal fistula	12
H-fistula	2
Caustic stricture	29
Peptic stricture	9
Other	16
Achalasia	2
Laryngeal cleft	2
Congenital amotile esophagus	2
Congenital stenosis	3
Congenital short esophagus	1
Prolonged foreign body impaction	2
Diffuse leiomyoma	2
Inflammatory pseudo-tumour	1
Teratoma	1

tution. There were 116 male and 76 female patients undergoing the procedure at a median age of 2 years (range 7 days to 17 years).

The indications for esophageal replacement are shown in Table 1. Ninety-four patients were referred from centers abroad (49%), 62 from centers within the United Kingdom (32%), and the remaining 36 (19%) received all their treatment at Great Ormond Street Hospital.

A prior colonic interposition had been unsuccessful in 17 patients, a partial gastric transposition in 6, 3 each had had a Scharli-type procedure<sup>2</sup> or a reversed gastric tube esophagoplasty, and 1 child had a failed jejunal interposition. Previous extensive surgical attempts to retain the original esophagus had been performed in a total of 69 (36%) patients.

The method of replacement was via the posterior mediastinum using blunt dissection in 98 patients, whereas 90 patients required an additional lateral thoracotomy due to extensive mediastinal fibrosis secondary to the original injury (caustic, perforation) or to previous attempts at esophageal reconstruction. The stomach was placed in the retrosternal position in 4 patients, who previously had a failed colonic interposition placed in that site. The surgical technique has been fully described previously.<sup>3,4</sup> A jejunal feeding tube was routinely inserted in patients who had not previously fed orally. A transanastomotic nasogastric tube was left in the intrathoracic stomach to provide postoperative gastric decompression. All patients with the exception of the first 9 in the series were electively paralyzed and mechanically ventilated for varying periods postoperatively.

Ethical committee approval was obtained for this study as was approval from the Hospital Research & Development Committee.

## Results

There were nine deaths in the series, for a mortality rate of 4.6%. One child died intraoperatively from uncontrollable

hemorrhage, five died in the early postoperative period from either respiratory (4) or cardiac (1), failure and three died over a year postoperatively. Eight of these children had had complex courses before the transposition (Table 2).

The median time on mechanical ventilation postoperatively was 4 days (range 0-120 days). The patient requiring 120 days of mechanical ventilation had a complete laryngotracheal cleft repaired 6 months before the gastric transposition.

Anastomotic leakage at the esophagogastric connection occurred in 23 patients (12%), all except 1 of which closed spontaneously. The 1 child with a major disruption had a cervical esophagostomy reestablished. Secondary anastomosis was performed 6 months later. Four of these patients had undergone previous unsuccessful esophageal replacement procedures (2 colonic and 2 partial gastric transposition), and 9 had had multiple procedures performed previously in an attempt to preserve their original esophagus.

Anastomotic strictures developed in 40 patients (20%), with all but 3 responding to endoscopic dilatations. In the 3 requiring stricture resection, the procedure was successfully completed via a cervical approach. In 17 cases the original pathology was caustic esophageal injury. Five children had previously undergone a colonic interposition.

Significant swallowing problems were encountered postoperatively in 55 patients (29%), half of whom had prolonged difficulties. Eighteen of these children had had major swallowing problems before the gastric transposition.

Severe delay in gastric emptying occurred as a late complication in 16 (8.3%) patients. Included among this group were 3 infants in whom an original pyloromyotomy was converted to a pyloroplasty and 2 who required a Roux-en-Y gastrojejunostomy.

Seven patients experienced problems with the jejunal feeding tube comprising leakage into the peritoneal cavity following traumatic reintubation, volvulus, intussusception, internal fistula, and adhesion obstruction.

Other complications included three infants with severe tracheomalacia, two of whom required aortopexy, two vocal cord paresis requiring temporary tracheostomy, two chylous effusions, two transient Horner's syndrome, and one postoperative hemorrhage requiring rethoracotomy.

The long-term outcome was considered excellent if the child had normal eating habits with an absence of symp-

**Table 2** Postoperative complications following gastric transposition

Mortality	9	(4.6%)
Anastomotic leak	21	(12%)
Anastomotic stricture	34	(19.6%)
Significant swallowing problems	53	(30.6%)*
Delayed gastric emptying	15	(8.7%)
Jejunal tube complication	7	(4%)
Dumping syndrome	5	(2.9%)
Others	13	(7.5%)

\*All except 8 improved in the long-term follow-up.

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