

ESOPHAGOPLASTY IN CHILDREN - A 28 YEARS SINGLE CENTRE EXPERIENCE

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Abstract

The need for esophageal replacement in children has been dramatically reduced over the past 2 decades. Despite this fact, esophageal substitution is still required for resistant caustic or peptic esophageal stricture or long gap esophageal atresia. The purpose of this study is to present the authors experience in colon and gastric tube esophagoplasty in children. We retrospectively reviewed the records of 70 patients who underwent esophagoplasty for data regarding demographics, initial esophageal diseases, complications, and mortality. The follow-up period was 25-30 years. Twenty-two cases (31,4%) had proximal stricture. 14 patients required surgical revision of the anastomosis after failure to respond to dilatation. The global mortality rate was 7,14%. Despite the complications, the long-term outcome of the patients was considered good to excellent in terms of normal weight gain, absence of dysphagia, and other gastrointestinal symptoms.

Key words. Esophageal stenosis, gastric tube esophagoplasty, colic tube esophagoplasty.

Introduction

Various alternatives for esophageal substitution have been proposed and their respective drawbacks widely discussed. Every effort is made for the preservation of the patient’s native esophagus after caustic ingestion.

Satisfactory results have been reported for all forms of esophageal replacement, although the numbers reported are small.

Purpose

The aim of the study is to retrospectively evaluate authors experience regarding the indication, clinical presentation, technique, complication and results in esophagoplasty during the last 28 years.

Material and method

We retrospectively reviewed the records of 70 patients who underwent esophagoplasty for data regarding demographics, initial esophageal diseases, complications, and mortality. The operative technique was scrutinized for the presence or absence of esophagectomy, the choice of the intestinal segment, the type of pull-through. The intraoperative as well as the postoperative complications were recorded, and the mortalities reviewed. The period of follow-up and the presence of specific symptoms such as dysphagia, regurgitation, abdominal pain, and repeated chest infection were recorded.

Results

From 1975 to 2003 37 children underwent colonic interposition and 33 children underwent gastric tube esophagoplasty for esophageal replacement. The indications for surgery are presented in Table 1.

Table 1. Indication for surgery.

Diagnostic	Gastric tube
Esophageal atresia	2
Caustic strictures	67
Peptic strictures	1

Most patients (95,5%) had post caustic esophageal stenosis, who did not respond to conservative treatment (endoscopic dilatation).

All the children were fed exclusively through a Stamm gastrostomy before the definitive operation.

The patients’ age range was 2 months to 17 years (Table 2). There were 37 boys and 33 girls.

Table 2. Age at surgery.

Age	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-17
Number of cases	7	29	15	7	3	2	2	5
%	10	43	21	10	4	3	3	7

As clinical symptoms all the patients had various grades of dysphagia for solids, liquids, vomiting and weight loss.

All patients had barium enema, and 20% had endoscopic evaluation.

30% of the patients with strictures had their first dilatation at 6 to 8 weeks from the injury. Dilatation

was mainly antegrade dilatation using the Savary Gillard dilators over a guidewire (fig2). All patients undergo dilatation once every 2 weeks in the first 3 months, then once every month for the next 3 months, and once every 2 months for 6 months. Dilatations were conducted under general endotracheal anesthesia in all patients.



Fig. 1 Endoscopic dilatation.

Table 3. Endoscopic stenosis location.

Esophageal stenosis	1/3 inf.	1/3 middle	1/3 sup
Cases	15	25	30
%	21,5	35,5	43

The surgical techniques used were:

- Anisoperistaltic gastric tube replacement (Gavriliu technique).
- Isoperistaltic left colon tube esophagoplasty.
- Isoperistaltic transverse colon tube esophagoplasty (Waterstone technique).

Table. 4. Type of esophagoplasty.

Type of surgery	Placed	Nr. of cases	%
Gastric tube	Retrosternally	8	11,4
	Posterior mediastinum	25	35,7
Transverse colon tube	Retrosternally	27	38,5
	Posterior mediastinum	6	8,57
Left colon tube	Retrosternally	4	5,71
	Posterior mediastinum	0	0

The colon was placed either retrosternally or in the posterior mediastinum in the esophageal bed. When the esophageal bed was chosen, the old burned esophagus was extracted (fig. 2). Both thoracic

pathways were obtained by combined blunt finger dissection through abdominal and cervical incisions, without the need of thoracotomy.



Fig. 2. Burned esophagus with stenosis.

The colon was always interposed as an isoperistaltic segment. The esophagocolic anastomosis was performed in the neck in 2 layers, in all cases end-to-end anastomosis.

In all patients, the gastrostomy was maintained in the postoperative period to provide gastric decompression for 30 to 90 days. Also all patients had cervical, mediastinal and cervical drains left in place.

The oral intake was permitted around 10-19 days after surgery.

All patients received intravenous antibiotherapy.

There were 5 deaths in the series, with a mortality rate of 7,14%. 3 died in the early postoperative period from either respiratory or cardiac failure, and 1 died more than a year postoperatively. One child in the esophagocoloplasty group developed graft necrosis and was treated by urgent surgical revision in the second postoperative day to remove the necrotic colon. Unfortunately she developed severe mediastinitis and

died. All of these children had had complex courses after the esophagoplasty with severe complications (sepsis, esotraheal fistulae, mediastinitis, and neoesophagus necrosis).

Anastomotic leakage at the esophagogastric connection occurred in 10 patients (14,2%), all except four of which closed spontaneously. There were 2 cases of gastric tube esophagoplasty and 8 cases of colic tube esophagoplasty.

Anastomotic strictures developed in 22 patients (31,4%), 7 patients with gastric tube esophagoplasty and 15 from colic tube esophagoplasty. In all patients except 3 gastric tube and 11 colic tube the cervical stenosis was successfully treated by endoscopic dilatations

In the 14 patients requiring stricture resection, the procedure was completed successfully via a cervical approach.

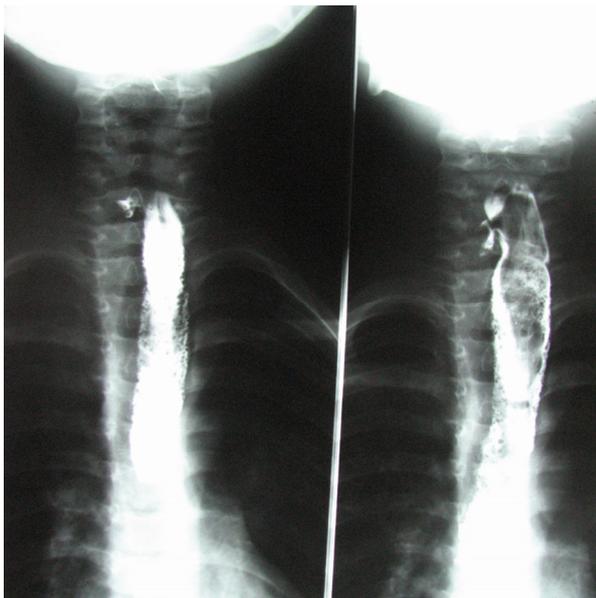


Fig. 3. Suprastenotic diverticula.



Fig. 4. Suprastenotic dilatation.

There was one late complication, an occlusive syndrome that needed reintervention.

Despite the complications, the long-term outcome of the patients was considered good to excellent in terms of normal weight gain, absence of dysphagia, and other gastrointestinal symptoms.

The follow-up period was 25-30 years.

30 patients had swallowing problems (minor), associated in 10 cases with weight lost.

Oral radiographic contrast studies have been performed at 6 month, 1 year, and 20 of follow-up; neither anastomotic stricture nor redundancy of the neoesophagus was observed (fig. 5).

All gastric tube patients were investigated regarding the presence of gastro-esophageal reflux, 28 of the with positive results, were medically treated. 20 patients from the gastric tube group also had endoscopy with mucosal biopsies. None of the had any signs of metaplasia.

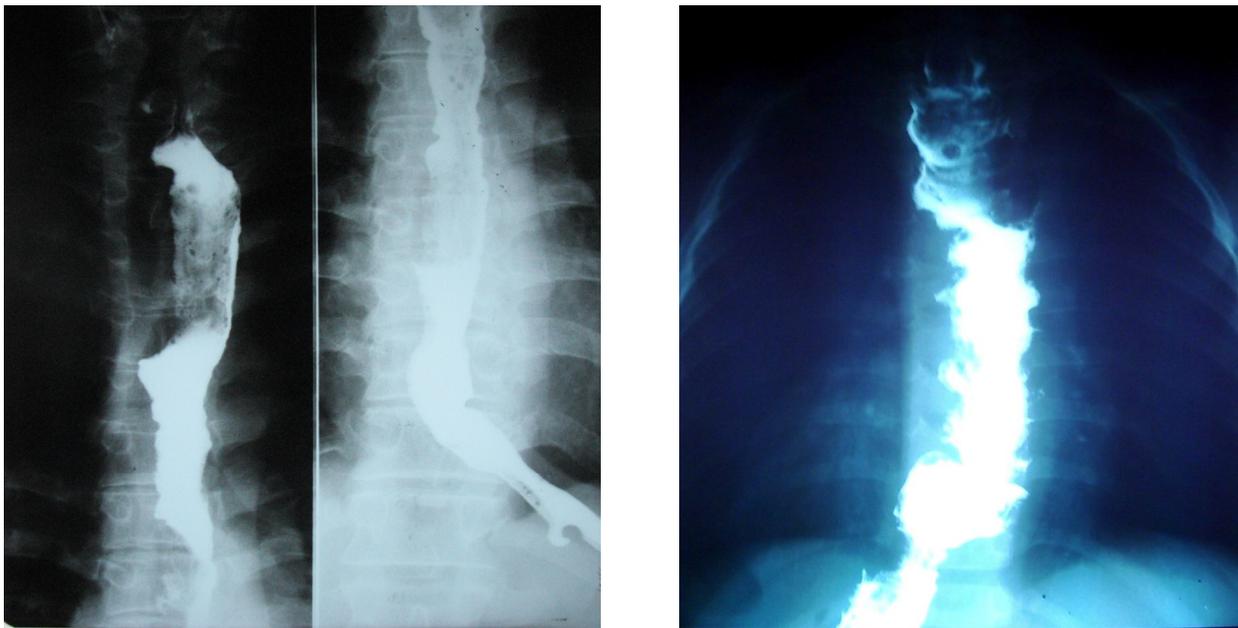


Fig. 5. Gastric tube and colic tube esophagoplasty.

Discussions

Various alternatives for esophageal substitution for intractable caustic stricture are reported in the literature, including gastric tube interposition in an isoperistaltic or antiperistaltic fashion or colonic interposition, gastric transposition, or jejunal interposition graft. Each technique has advantages and disadvantages.

The ideal esophageal substitute should conform in function as far as possible to the original structure. The patient should be able to swallow normally and experience no reflux symptoms. An additional requisition in children is that the substitute should continue functioning for many decades without deterioration.

Although no substitute functions as well as a normal esophagus, children who require this operation do not have a normal esophagus. In many cases the substitute is clearly inferior to the native esophagus.

Comparative results between colon transplant and gastric tube esophagoplasty may conclude that they are both acceptable procedures of esophageal substitution. Colon interposition is the most commonly used operation in children.

The major early complication of the esophagocoloplasty remains graft necrosis with an incidence between 0% and 20%. Gradual infarction of the colonic interposition secondary to venous obstruction may occur weeks or months after surgery. This complication will require another esophageal

substitute. In our series only one child had this major complication.

Removal of the strictured native esophagus is required because of an increased risk of malignant changes and chronic inflammation in the burned esophagus left in place on long-term follow-up. In the same way, removal of a failed graft is better than its withdrawal, but it is not always possible.

Late complications of esophageal substitution occur with varying frequency and can affect the ultimate function of the transplant. Stricture of the cervical anastomosis after leakage can lead to varying degrees of dysphagia. Twenty-two cases (31,4%) had proximal stricture. 14 patients required surgical revision of the anastomosis after failure to respond to dilatation. Redundancy of the interposed colonic graft in the chest may lead to stasis and dysphagia because of kinking of the transplant. Careful removal of the excess colonic segment from its proximal end before esophagocolic anastomosis and suture of the transplant to the margins of esophageal hiatus may decrease the incidence of this complication.

Postoperative bowel obstruction is always a potential problem after abdominal surgery. This complication occurred in one patient.

In reports of children who underwent esophagocoloplasty or gastric tube esophagoplasty, there is always a great concern for postoperative life-threatening complications and mortality rates. An important result of the present series of patients is the

global mortality rate (7,14%), the same as the mortality rate of 6% to 9% observed in other reported series of esophageal substitution.

The overall quality of life was considered good for most of the patients.

In conclusion, our experience demonstrates that esophagocoloplasty and gastric tube esophagoplasty are satisfactory surgical methods for esophageal replacement in children.

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