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Evaluation of an antireflux procedure for colonic interposition in pediatric esophageal replacements

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Abstract

Background: In 1989, we introduced a 1-stage procedure with orthotopic colonic transplants for esophageal stenosis. A pitfall of this procedure is frequent reflux and/or stasis in the transplants from the cologastric anastomosis. Since 1993, we have used a new antireflux wrap (ARW) using an anterior wrap technique similar to the Dor procedure but fixed to the right crus of the diaphragm.

Purpose: The purpose of the study was to evaluate ARWs.

Method: From 1993 to 2008, the records of 67 patients with an ARW were compared with 27 without ARW (either operated on before 1993 or ARW was not appropriate) after colonic transplant for caustic esophageal stenosis. Both groups otherwise underwent the same surgical procedure. Postoperative esophagograms done on postoperative day 10 were reviewed for the presence of gastrocolonic reflux and stasis in the transplant.

Results: The reflux rate on the initial esophagogram was reduced from 48.1% to 7.5% using ARW. The incidence of reflux on later esophagograms was 40.0% with no ARW and 21.4% with ARW. The 25% long-term rate of stasis in the colonic transplant was not increased with ARW.

Conclusions: A loose ARW in patients with colonic esophageal replacements reduces gastrocolic reflux without increasing the rate of stasis. In the long term, children adapt better to stasis than to reflux and are thus protected from occult inflammation.

In 1907, Cesar Roux [1] performed the first successful esophageal replacement (so-called esophagoplasty) on a 12-year-old child in Lausanne, Switzerland. The child had caustic esophageal stenosis. Since then, many surgical procedures have been used to replace the esophagus. After having practiced for 24 years (1966-1989) performing a 2-stage esophagoplasty using a retrosternal colonic transplant, in 1989, we introduced the 1-stage procedure placing the colon transplant in the posterior mediastinum, following a closed-chest esophagectomy [2-4].This is now our preferred method of esophagoplasty, the gastric tube being used only when the colon is not available.

A pitfall of this procedure is resultant reflux and/or stasis in the transplanted colon above the cologastric anastomosis. Since 1993, we have used a new antireflux wrap (ARW) for patients with colonic transplants. We present the effect of this new ARW on reflux and stasis.

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1. Material and method

Between 1989 and 2007, 143 esophagoplasties with colonic transplant using a single-stage procedure were performed by our team. The esophagus was blindly removed without thoracotomy through a left cervical and a transhiatal approach. The interposed colonic transplant was placed in the mediastinum in an isoperistaltic position with the exception of 3 cases placed in an antiperistaltic position because of the vascular pedicle. Severe fibrosis owing to periesophagitis impeded mobilization of the esophagus from the trachea and the vessels in 24 cases (16.8%), which were excluded from the study because the retrosternal route was used for the transplant. Most esophageal replacements were done by the same senior surgeon (OR); therefore, we also excluded 12 cases done by other surgeons who had performed different techniques. Nine cases operated on abroad were also excluded because of a lack of follow-up data. We also excluded 1 case of achalasia and 3 cases using a new laparoscopic technique for dissection of the mediastinum.

Thus, this study concerns 94 esophageal replacements in children, all being performed by the same surgeon for irreversible extensive caustic esophageal burns under identical conditions and with the same surgical procedure, with or without an ARW.

A new ARW was developed in 1993 and first presented at the 1997 Second European Paediatric Surgeons' Association Congress in Madrid. Since then, it had been used in 67 cases. Even if our initial plan was to do an ARW as of 1997 in all cases, it was not possible in 9 (11.8%). The reasons were as follows: a stomach too small or scarred to build the wrap (4; 5.3%), extensive intraabdominal adhesions (2; 2.6%), and use of an antiperistaltic transplant owing to a difficult vascular pedicle (3; 3.9%). No ARWs were done in 18 mediastinal esophagoplasties included in the study between 1989 and 1993. This results in a total of 27 patients without an ARW. The patients of the series without ARW were treated with the same surgical technique, except for the lack of a wrap.

The average age at the time of surgery was 6.0 years (range, 1.5-15.5 years) (Table 1). The time span between injury and surgery was at least 6 months. A gastrostomy was in place before the esophageal replacement procedure in 72.3% of the children. If not, a Stamm gastrostomy was performed to improve nutritional status for a few weeks before the transplant surgery.

All patients had their first postoperative esophagogram approximately on day 10 (9.4 days; range, 5-18 days). Only the worst evaluation for gastroesophageal reflux (GER) or stasis was taken into account in this study. A second esophagogram is normally done at the end of the treatment, about 3 months postoperatively. If within a month of the procedure a child is fed per os with solid food and is without symptoms, in some cases, we try to avoid an additional radiation exposure and do not perform a second esophagogram. Sometimes, especially at the very beginning of our experience, esophagoscopy was done to check the antireflux valve, thus avoiding a second esophagogram. Thereafter, as it is a retrospective review, not all children had 2 esophagograms. It was performed in 71 patients (75.5%) (88 further esophagograms) 88.8 days (12.7 weeks) after surgery (range, 17-2391 days). For the patients with more than 2 esophagograms, the last study was taken into account. Gastrocolonic reflux and stasis in the transplant or in the stomach were described (Fig. 1). Because some minor clinically insignificant stagnation in colonic haustrations is common, it was not considered as stasis. Only a large amount of contrast fluid in the lumen of the esophagus was considered as stasis in the transplant. All the esophagograms were supervised by the same senior pediatric radiologist.

The 27 patients without ARW constitute the "no-ARW" group. They were compared with the "ARW" group in which all the children had the new ARW. Both groups are similar in age and sex ratio (Table 1).

1.1. Surgical technique

The transverse colon was prepared with its blood supply coming from the left or the middle colic vessels according to

Table 1 Patient demographics

	"No-ARW" group (27)	"ARW" group (67)	Total (94)
Male	16 (59.2%)	39 (58.2%)	55 (58.5%)
Age at the time of surgery	5.7	5.8	5.8
Antiperistaltic transplant	3 (11.1%)	0 (0%)	3 (3.2%)
Gastrostomy present at time of surgery	17 (63.0%)	51 (76.1%)	68 (72.3%)
1st esophagogram (d)	9.3	9.5	9.4
Patients with 2nd esophagogram done	15 (55.6%)	56 (83.6%)	71 (75.5%)
2nd esophagogram (d)	71.5	95.0	90.0
Cervical fistula	1 (3.7%)	3 (4.5%)	4 (4.3%)
Need of dilatation	13 (48.2%)	18 (26.9%)	31 (33.0%)
1 Dilatation	3 (11.1%)	9 (13.4%)	12 (12.8%)
2 Dilatations	6 (22.2%)	6 (9.0%)	12 (12.8%)
≥3 Dilatations	4 (14.8%)	3 (4.5%)	7 (7.4%)