

Transanastomotic Feeding Tubes in Repair of Esophageal Atresia

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● To avoid the need for a gastrostomy and parenteral nutrition during the 7- to 10-day healing period after esophageal anastomosis, the authors modified their technique for esophageal atresia repair to include placement of a transanastomotic feeding tube. A SILASTIC® transanastomotic feeding tube and early enteral nutrition was used for 19 of 23 consecutively treated patients after repair of esophageal atresia and tracheoesophageal fistula. One of the 19 patients had recurrent fistula and another had an anastomotic leak. Five patients had significant gastroesophageal reflux (noted on barium esophagram), and four had strictures that required dilatation. Parenteral nutrition was necessary for only two patients. The authors conclude that transanastomotic feeding tubes and early enteral nutrition are safe and effective, reduce costs, and do not appear to increase the incidence of anastomotic leaks, strictures, or gastroesophageal reflux.
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INDEX WORDS: Esophageal atresia, transanastomotic feeding tube.

SINCE THE FIRST successful repair of esophageal atresia (in 1939), surgical management has evolved from preliminary gastrostomy and staged repair to primary repair without gastrostomy.¹⁻³ To avoid the need for gastrostomy and parenteral nutrition during the initial healing period after esophagoesophagostomy, we further modified our technique to include placement of a transanastomotic feeding tube.

MATERIALS AND METHODS

This report concerns our inpatient and outpatient results for 23 consecutive cases of esophageal atresia with tracheoesophageal fistula (EA-TEF) treated between July 1988 and June 1994. Transanastomotic feeding tubes were used in 19 of the 23.

Technique

After induction of anesthesia, a soft, red rubber catheter was introduced through the nares into the proximal esophagus. When the back row of the anastomosis was completed, the proximal (unfenestrated) end of a 2.3-mm SILASTIC® (Dow Corning, Midland, MI) ventriculo-peritoneal shunt catheter was sutured in the operative field to the tip of the red rubber catheter. The red rubber catheter was removed retrograde through the nares, leading the SILASTIC® catheter through the same path; at the conclusion of this maneuver, the multifenestrated end of the SILASTIC® catheter was in the operative field, and the proximal end of the catheter exited at the nostril. The multifenestrated end of the SILASTIC® catheter was then drawn across the anastomosis into the distal esophagus and advanced into the stomach. The anterior row of the anastomosis was completed (Fig 1). Small-volume continuous feedings were begun on the first postoperative day.

All patients received H₂ receptor antagonists. Between the 7th and 10th postoperative days, a barium swallow was performed to

evaluate the anastomosis. If there was no leak, the feeding tube was removed and the baby was fed.

RESULTS

The patients have had follow-up for a mean of 33 months (range, 4 to 75 months). There have been no deaths.

Two of the 19 patients treated with transanastomotic feeding tubes had major complications that could have been catheter-related. The first required division of a recurrent tracheoesophageal fistula at 1 year of age, and the second (a 1,400-g boy) had a clinically significant anastomotic leak on the 7th postoperative day, after an emergency inadvertent esophageal intubation. He required gastrostomy and subsequent Nissen fundoplication despite maximal medical therapy. Parenteral nutrition was necessary only for the patient with the anastomotic leak and one other who pulled out his feeding tube.

Five of the 19 patients (26%) had significant gastroesophageal reflux (GER) (noted on barium esophagram, detected at 1 to 4 months of age) including two who were asymptomatic. In four patients, two of whom had GER, a stricture developed that required dilatation.

The four patients whose treatment did not include a transanastomotic feeding tube were considered special cases. One had a staged repair because of congenital heart disease, and two others had gastrostomy tubes because of simultaneous repair of duodenal obstruction. The fourth patient did not receive a transanastomotic feeding tube because of the attending physician's preference.

DISCUSSION

In the absence of a gastrostomy, parenteral nutrition is almost obligatory for the critical first week after repair of esophageal atresia.⁴ The concept of transanastomotic feeding is elimination of this wait-

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Presented at the 26th Annual Meeting of the American Pediatric Surgical Association, Boca Raton, Florida, May 20-23, 1995.

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0022-3468/96/3101-0008\$03.00/0*

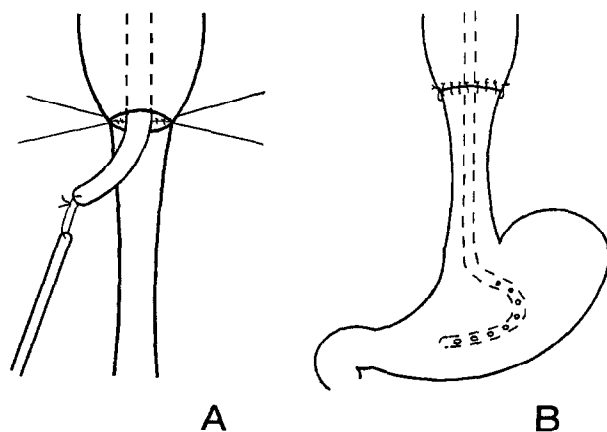


Fig 1. (A) The nonfenestrated end of the SILASTIC® catheter is sutured to the tip of the red rubber catheter, which is removed retrograde through the nares. After the SILASTIC® catheter is in place, the rubber catheter is discarded. (B) The SILASTIC® catheter in place.

ing period while avoiding the complications of central venous catheters and parenteral nutrition. This technique has been described by Sweed et al⁵ and others,^{6,7} but no follow-up studies were available.

It is estimated that the direct cost of total parenteral nutrition was \$500 per day in 1990.⁸ This would

represent a cost reduction of at least \$3,500 per patient if enteral feeding (rather than parenteral nutrition) were used.

GER after repair of EA-TEF is a frequent, perhaps universal, occurrence. Jolley et al reported that 68% of patients had significant GER,⁹ and Parker et al noted an incidence of 82%.¹⁰ In our series, 26% of patients had significant GER, defined as grade III, IV, or V (noted on barium esophagram) according to the McCauley classification.¹¹ The incidence is less than those of other published studies and this could be related to the lower diagnostic sensitivity of the barium esophagram compared with other modalities.

The potential complications of transanastomotic feeding tubes are leaks, strictures, or recurrent tracheoesophageal fistula. Our anastomotic leak rate of 5%, recurrent tracheoesophageal fistula rate of 5%, and stricture rate of 21% compare favorably with those of other published studies^{12,13} (21%, 18%, and 37%, respectively).

We conclude that transanastomotic feeding tubes and early enteral nutrition after repair of EA-TEF are safe and effective, reduce cost, and are not a cause of anastomotic leaks, strictures, or GER.

REFERENCES

1. Leven NL: Congenital atresia of the esophagus with tracheoesophageal fistula. Report of successful extrapleural ligation of fistulous communication and cervical esophagostomy. *J Thorac Surg* 10:648-657, 1941
2. Ladd WE: The surgical treatment of esophageal atresia and tracheoesophageal fistulas. *N Engl J Med* 230:625-637, 1944
3. Tyson KRT: Primary repair of esophageal atresia without staging or preliminary gastrostomy. *Ann Thorac Surg* 21:378-381, 1976
4. Shaul DB, Schwartz MZ, Marr CC, et al: Primary repair without routine gastrostomy is the treatment of choice for neonates with esophageal atresia and tracheoesophageal fistula. *Arch Surg* 124:1188-1191, 1989
5. Sweed Y, Bar-Maor JA, Shoshany G: Insertion of a soft Silastic® nasogastric tube at operation for esophageal atresia: A new technical method. *J Pediatr Surg* 27:650-651, 1992
6. Shandling B: Letter to the editor. *J Pediatr Surg* 28:280, 1993
7. Roberts KD: Congenital oesophageal atresia and tracheoesophageal fistula, in Nixon HH, Spitz L (eds): *Rob and Smith Operative Surgery* (ed 3). London, England, Butterworth, 1978, pp 230-242
8. Rombeau JL, Rolandelli RH, Wilmore DW: Nutritional support, in Wilmore DW, Brennan MF, Harken AH, et al (eds): *American College of Surgeons, Scientific American Surgery*, vol 1, chap II, section 10. New York, NY, Scientific American, 1994, pp 3-40
9. Jolley SG, Johnson DG, Roberts CC, et al: Patterns of gastroesophageal reflux in children following repair of esophageal atresia and distal tracheoesophageal fistula. *J Pediatr Surg* 15:857-862, 1980
10. Parker AF, Christie DL, Cahill JL: Incidence and significance of gastroesophageal reflux following repair of esophageal atresia and tracheoesophageal fistula and the need for antireflux procedures. *J Pediatr Surg* 14:5-8, 1979
11. McCauley RGK, Darling DB, Leonidas JC, et al: Gastroesophageal reflux in infants and children: A useful classification and reliable physiologic technique for its demonstration. *AJR* 130:47-50, 1978
12. Spitz L, Kiely E, Brereton RJ: Esophageal atresia: Five-year experience with 148 cases. *J Pediatr Surg* 22:103-108, 1987
13. Chitmitrapap S, Spitz L, Kiely EM, et al: Anastomotic stricture following repair of esophageal atresia. *J Pediatr Surg* 25:508-511, 1990

Discussion

E. Dykes (London, England): This is another one of these fads that was generated from the United Kingdom. In the last 20 years this has been standard practice certainly in all of the four units I have ever

worked in and many of the others. It is very safe. You can start feeding on day 3 as long as the baby is propped head-up at 30° to prevent reflux.

K.P. Moriarty (response): Although the use of trans-

anastomotic feeding tubes after esophageal atresia repair may be standard practice in the United Kingdom, it is not in the United States. There have been references in the literature to the use of transanasto-

motric feeding tubes, but no followup studies are available that examine the efficacy and safety. We start tube feedings on the first postoperative day with chhalasia precautions.