

Correspondence

An approximation technique for primary anastomosis (Gazi method) in selected cases of long gap esophageal atresia

We read with great interest the article by Reismann et al about "Partial gastric pull-up (PGP) in the treatment of patients with long-gap esophageal atresia (LGEA)." This article states that "The incidence of stenosis and gastro-esophageal reflux (GER) after PGP is considerably high, even compared with alternative surgical techniques for the treatment of LGEA and with their high complication rates. PGP cannot yet be generally recommended for the treatment of LGEA."^[1]

One of the challenges in evaluating the literature for the surgical treatment of long-gap esophageal atresia (LGEA) is the lack of a uniformly accepted definition for the entity. Some used a cutoff of a 2 cm gap to define a long gap,^[1] while others used 3 cm or more.^[2] Practically, LGEA is one in which the ends of the esophagus cannot be brought together for a primary anastomosis without employing alternative techniques. Staged elongation of the esophagus in cases of LGEA has been effective in achieving esophageal length and preserving the native esophagus.^[3] Internal (Foker) and external (Kimura) techniques have been described along with many modifications of each.^[2,4] In a Kimura series, esophageal gaps of 2 to 7 vertebral bodies were treated with 1 to 5 revisions of esophagostomy for anastomosis. All patients developed strictures requiring multiple dilations and 11 of 12 patients required fundoplication for gastroesophageal reflux. Seven of the 12 patients have been able to eat normally.^[5] In a Foker series, successful esophageal anastomosis required 2-15 thoracotomies in 52 patients.^[6] A review article reported a mean complication rate of 11%-60%, an anastomotic leakage rate of 80%-83%, and an esophageal stricture rate of 83%-100%.^[3] Reismann et al^[1] reported a series of 9 cases of LGEA (including 7 cases of pure atresia). These patients but 2 underwent initially gastrostomy and delayed PGP for LGEA. The median distance between the upper and lower esophageal segment under tension was 3 vertebral bodies (range: 1-6). Leakage as early complication occurred in 3 patients, stenosis in 7, and GER as a late complication in 5.^[1]

In our article "An approximation technique for primary anastomosis (Gazi Method) in selected cases of long gap esophageal atresia", we added five patients

with LGEA.^[7] The five patients were in type C and the gap length at the beginning of elongation varied from 3 to 5 cm. Dissection and anastomosis were carried out following an extrapleural right thoracotomy. The upper esophageal pouch was dissected up to the cervical inlet. The lower esophageal pouch was dissected as far down as the diaphragm. An eight French feeding tube was placed from the mouth and passed through the two pouches to the stomach. After this, both pouches were grabbed approximately 1 cm away from the cut ends, holding whole of the esophageal walls with tissue forceps and were approximated to each other under tension so that they contacted each other. The esophageal parts were held in this position until completion of the anastomosis using interrupted, 5-0 vicryl sutures (Gazi method). After all of the sutures were tied, the forceps were released so that the tension distributed evenly to all of the sutures and tissue holding the anastomosis. To minimize disruptive anastomotic forces, all infants with esophageal atresia were postoperatively kept paralyzed, sedated and mechanically ventilated for 2 to 5 days. In our series, 60% of our patients developed minor anastomotic leak and only 2 patients were given medication for GER. One patient required dilatation for anastomotic stricture. One patient with VACTERL syndrome died from cardiac failure at the 6th month. Its theoretical basis is that excellent intramural blood circulation in both upper and lower ends permits an excessive dissection, that esophageal lengthening could be achieved by intraoperative traction, and that an esophageal anastomosis could be constructed under considerable tension with associated minor complications if the tension is distributed evenly on the sutures. It is very important that the forceps holding and approximating the two esophageal ends to be released only after placing and tying the sutures. Advantages of our lengthening and approximation technique include no requirement of repeated thoracotomy, use of native esophagus, and short hospital stay. It is suitable for cases of esophageal gap between 3-5 cm.

Ramazan Karabulut, Zafer Turkyilmaz, Kaan Sonmez
Department of Pediatric Surgery, Gazi University Medical Faculty,
06500, Ankara, Turkey
Email: karabulutr@yahoo.com

References

- 1 Reismann M, Granholm T, Ehrén H. Partial gastric pull-up

- in the treatment of patients with long-gap esophageal atresia. *World J Pediatr* 2015;11:267-271.
- 2 von Allmen D, Wijnen RM. Bridging the gap in the repair of long-gap esophageal atresia: still questions on diagnostics and treatment. *Eur J Pediatr Surg* 2015;25:312-317.
 - 3 Foker JE, Linden BC, Boyle EM Jr, Marquardt C. Development of a true primary repair for the full spectrum of esophageal atresia. *Ann Surg* 1997;226:533-541, discussion 541-543.
 - 4 Kimura K, Soper RT. Multistaged extrathoracic esophageal elongation for long gap esophageal atresia. *J Pediatr Surg* 1994;29:566-568.
 - 5 Kimura K, Nishijima E, Tsugawa C, Collins DL, Lazar EL, Stylianos S, et al. Multistaged extrathoracic esophageal elongation procedure for long gap esophageal atresia: Experience with 12 patients. *J Pediatr Surg* 2001;36:1725-1727.
 - 6 Bairdain S, Hamilton TE, Smithers CJ, Manfredi M, Ngo P, Gallagher D, et al. Foker process for the correction of long gap esophageal atresia: Primary treatment versus secondary treatment after prior esophageal surgery. *J Pediatr Surg* 2015;50:933-937.
 - 7 Karabulut R, Turkyilmaz Z, Sonmez K, Ozbayoglu A, Basaklar AC. An approximation technique for primary anastomosis (Gazi Method) in selected cases of long gap esophageal atresia. *Prensa Med Argent* 2014;100:1.

doi: 10.1007/s12519-016-0010-5

We are very grateful to Karabulut et al for their interest in our paper reporting the method of partial gastric pull-up (PGP) in the treatment of long-gap esophageal atresia (LGEA).

We agree to the view that the central problem in treatment of esophageal atresia is at present lack of generally accepted definitions, for instance, the definition of LGEA as mentioned in their letter. In our study, we used a practical approach to define this entity by incapability of conventional primary anastomosis due to insufficient length of esophageal segments.^[1] The measurement of the distances in vertebral bodies has a pure descriptive character. Karabulut et al acknowledged this type of definition.

Further, they demonstrated that all other techniques for treatment of LGEA are also associated with a significant number of complications like anastomotic leakage and esophageal stenosis/stricture. For postoperative stenosis, we used a generous definition that is essentially based on radiological, endoscopic but not on clinical findings.^[1] Another more practical and

frequently used definition is given by clinical symptoms revealing anastomotic stenosis, like swallowing difficulties, recurrent respiratory problems or foreign body obstruction.^[2] Our definition does not exclude the possibility that patients without severe clinical problems are treated for anastomotic stricture. Thus, the comparability of our results regarding this type of complication remains elusive.

In our study, we were not able to show convincingly better treatment results after PGP compared with other already established methods like jejunal interposition, colon interposition and gastric pull-up. Thus, we have been very reluctant with the conclusions drawn. However, our results do not exclude the possibility of comparable results regarding the outcome after PGP. There is a clear lack of comparative studies.

The published Gazi method for the treatment of LGEA can be seen as a modification of the method of PGP by further reducing the tension on the esophageal segments using forceps.^[3] It is well conceivable that this modification represents an effective extension of our approach, leading to a reduction of the complication rate. On the other hand, the tension within the partial pull-up presented by us has been considerably low in all the reported cases. A study comparing the Gazi method with pure limited dissection in the method presented by us could appropriately answer this question.

Marc Reismann

Department of Pediatric Surgery, Astrid Lindgren Children's Hospital, Karolinska Hospital, Stockholm, Sweden
Email: marc.reismann@charite.de

References

- 1 Reismann M, Granholm T, Ehrén H. Partial gastric pull-up in the treatment of patients with long-gap esophageal atresia. *World J Pediatr* 2015;11:267-271.
- 2 Lydia Serhal, Frédéric Gottrand, Rony Sfeir, Dominique Guimber, Patrick Devos, Michel Bonneville, et al. Anastomotic stricture after surgical repair of esophageal atresia: frequency, risk factors, and efficacy of esophageal bougie dilatations. *J Ped Surg* 2010;45:1459-1462.
- 3 Karabulut R, Turkyilmaz Z, Sonmez K, Ozbayoglu A, Basaklar AC. An approximation technique for primary anastomosis (Gazi Method) in selected cases of long gap esophageal atresia. *Prensa Med Argent* 2014;100:1.

doi: 10.1007/s12519-016-0011-4