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Research Article

An Approximation Technique for Primary Anastomosis (Gazi Method) In Selected Cases of Long Gap Esophageal Atresia

Ramazan Karabulut*, Zafer Turkyilmaz, Kaan Sonmez, Asli Ozbayoglu and A. Can Basaklar

Gazi University Medical Faculty Department of Pediatric Surgery, 06500, Besevler, Ankara, Turkey

*Corresponding author: Ramazan Karabulut, MD, Gezegen Sokak No:1/10, 06670 GOP Çankaya, Ankara, Turkey, Tel: +90 312 2026210; Fax: +90 312 2026212; E-mail: karabulutr@yahoo.com

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Abstract

Background: The authors describe a technique of approximation and primary repair (Gazi method) for selected long gap esophageal atresia (LEA).

Methods: Five infants underwent repair for LEA. The distal fistula was divided and oversewn. The upper and lower ends of the esophagus were dissected and excessively mobilized. Both of the esophageal ends were grabbed approximately 1 cm away from the anastomotic line with gentle tissue forceps to reduce the tension. By using these forceps the assistant approximates both ends at the anastomotic site in such a manner that they contact each other (Gazi Method). After placement of esophageal sutures circumferentially, all sutures are tied up one by one. Following the completion of anastomosis asistant releases the esophageal ends by loosening the forceps, thus distributing the tension of the anastomosis evenly to suture sites.

Results: Early complications occurred in 3 of 5 patients (60%); these consisted of minor anastomotic leak and in one patient sepsis. Gastroesophageal reflux occurred in 2 patients and they were treated medically. Strictures occurred in 1 case and 6 esophageal dilatations were required.

Conclusion: Gazi method for selected LEA is an applicable procedure that allows the use of patients' own esophagi.

Key words:

Long gap esophageal atresia; New method, Newborn

Introduction

Treatment of long gap esophageal atresia (LEA) is still a major challenge. Although it is generally accepted that the best results are obtained if native esophagus is preserved, this may be difficult to achieve technical refinements have been advised to mobilize and lengthen both esophageal pouches, including circular myotomies, esophageal flap, continuous suture traction with reoperation, and multi staged extra thoracic elongation of the proximal esophagus [1,2]. Gastric transposition procedure and use of the colon interposition, are two popular choices for esophageal replacement. Unfortunately, early complications are frequent, and only approximately 60% to 80% of these interpositions are satisfactory on follow-up [2-10]. More important, most substitutions have severe, late problems associated with them and the results will become even less favorable. We are reporting on this small number of patients with long gap atresia in which approximation and primary repair (Gazi method) was applied.

Materials and methods

The diagnosis of EA was suspected after choking with feeding and usually confirmed by the inability to pass a tube into the stomach. Written consents from the patients' parents were obtained. Before surgery, the patients were kept in a semi upright position with intermittent suction of the proximal pouch to prevent aspiration. Fluid resuscitation and antibiotics were administered as indicated. From 2008 to 2010, 5 infants underwent primary repair of LEA at our clinic (Table 1). All of the five esophageal atresia patients were with a distal fistula. Gap lengths were estimated with preoperative x-ray study and at the time of repair. In these patients, the upper esophageal pouches ended at the level of or before the second thoracic vertebrate with the esophageal tube in place in preoperative graphies. At operation, the gaps were between 3 and 5 cm. Thus, this report focuses on patients with gap distances more than 3 cm, which is considered as a long gap in textbooks, but less than 5 cm [1].

Patient/ gender	**F**	**M**	**F**	**M**	**F**
Birth weight	3100	2450	2020	1660	2260
Antenatal	UN	UN	PH	PH Renal agenesia	Renal agenesia
Gap length(cm)	4	3	5	4	4
Asosiaceted anomaly	-	VACTERL association	-	Cardiac Renal agenisia Hypothyroidism	Hypospadias Renal agenesis Polydactyly – syndactylia
Early complications	Leak	-	Leak tube drainage	Leak tube drainage	-
Late complications	GER	-	-		GER
Death	-	Cardiac 6.month	-	-	-

UN: unkwonn, PH: Polyhydramnios, F: female, M: male, GER: Gastroesophageal reflux

Table 1: Patient characteristics and associated anomalies

Using an extrapleural right thoracotomy, the dissection and anastomotic technique was carried out. The upper esophageal pouch was dissected up 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 along 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 (Figure 1 and 2).

Figure 1: Intraoperative appearance of lengthening technique and primary anastomosis (Gazi Method) for long gap esophageal atresia.

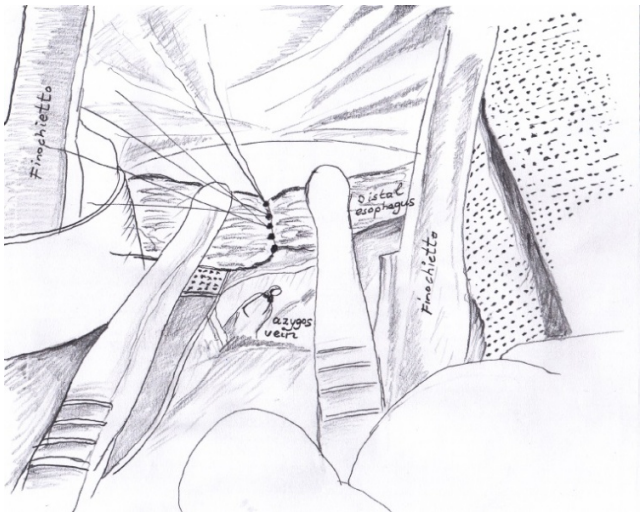

Figure 2: Chematic drawings of the mobilization of the esophageal ends and of the anastomosis

After placing a chest tube, toracotomy was closed with usual manner. To minimize disruptive anastomotic forces, all infants with esophageal atresia were postoperatively kept paralyzed, sedated and mechanically ventilated for 2 to 5 days. The chest tube was left on site until the esophagogram was performed. No deep suctioning was performed. Total parenteral nutrition was provided for the first 7 to 12 days until oral feeding was begun. A postoperative esophagram was done on approximately day 8 for most infants to rule out a leak or anastomotic problem.

Results

Early complications occurred in 3 of 5 patients (60%); these consisted of anastomotic leak in two and sepsis in one patient. Patients with anastomotic leaks were waited with additional chest tube systems till the leakage improved and they recovered without a need for reoperation. Ph study confirmed reflux at age one year occurred in 2 of 5 cases (40%), fundoplication was required in none of the 5 infants. They were treated only medically. None of the patients reported swallowing difficulties or persistent dysphagia except for one patient with stricture. This was detected with esophagogram upon swallowing complaints. Esophagogram revealed an anastomotic diameter less than 5mm. Six dilations done in an antegrade manner, under general anesthesia were required. One patient with VACTERL syndrome died of cardiac failure at the 6th month. In this follow up period of 4 to 6 years, all surviving patients are eating a diet that is normal for age. As an indicator of well feeding, 100% of patients were above the 25th percentile.

Discussion

LEA is considered the pinnacle of challenge for any neonatal surgeon. Although a primary repair might be attempted, the severe anastomotic tension would impose a significant risk of leakage or disruption and later stricture formation. This maneuver, however, may lead to severe continuing reflux, so that some surgeons would choose to replace the missing esophagus with a gastric or colon interposition [7]. On the contrary, Boyle and colleagues reported primary esophageal anastomosis in 8 patients with ultralong-gap EA (gap length, 3.5 cm) without a lengthening procedure. They noted significant anastomotic tension in most cases -with associated early complications-, but overall eventual good outcome. The intramural blood supply was excellent and allowed further mobilization of the esophageal ends [11]. Our intraoperative observations are also consistent with theirs which permitted dissection of the esophageal ends considerably.

A report of a patient with EA and a gap of 9 vertebral bodies provide additional confirmation of the growth stimulation produced by continuous longitudinal traction. In this case, because the upper pouch would not tolerate traction without possible disruption, it was pulled into the thoracic inlet using internal traction. The lower pouch was also mobilized and pulled upward using internal traction leaving a gap of 4 vertebral bodies (3.5 cm). At reoperation 4 weeks later, it was obvious that both pouches, and especially the lower, had grown substantially in width as well as in length [7].

Foker et al first proposed, in 1997, esophageal elongation by traction sutures for the treatment of difficult cases of esophageal atresia. They reported this approach as being a successful preliminary method, which was used in 4 infants, to bridge gaps measuring 5.3 to 6.8 cm in length [4]. Al-Qahtani et al. modified this technique by

applying 4-0 silk sutures for extra thoracic traction and placing metallic clips on the sutures close to the esophageal ends to serve as radiopaque markers postoperatively. Daily traction of 1 to 2 mm on both esophageal ends was started on day 2 postoperatively [10]. Hadidi et al describe a modification of a lengthening technique based on tissue expansion to avoid sutures cutting through the esophagus. Foker technique was modified by fixing 2 small silastic tubes (3 cm) to each end of the esophagus using 4 fine 4/0 proline sutures. Traction threads through the chest wall are passed through the silastic tubes. External traction is transmitted to the esophageal ends through the silastic tubes allowing a wider distribution of traction on the esophagus [8]. Contrary to the above stated methods, the present method is a modification which does not require extrathoracic elongations and most importantly allows using the patients native esophagus with eliminating the requirement of additional thoracotomy in selected cases. In comparison to this technique with the others that mentioned above, no difference was determined. In Hadidi's series GER was seen in 4 cases and in one Thal procedure was performed. Chest x-ray on day 8 showed that the silastic tubes are at the chest wall (i.e, the tubes were detached from the esophagus) in a patient and required additional thoracotomy [8]. In Al- Qahanti et al. series two patients had anastomotic leak which were treated conservatively. In two patients GER were detected and one of them required fundoplication [10]. In Focker's original series, in 10 of the 70 patients lengthening technique were performed subsequent to the placement of traction sutures for long gap EA. Fundoplication was required for all of this ten patients for GER as well as more dilatations were needed compared to normal EA patients [4]. In our series 60% of our patients developed minor anastomotic leak and only 2 patients were given medical treatment for GER. One patient required dilatation for anastomotic stricture.

In developing countries like ours; procedures which requires long term treatment and hospitalization are expensive as well as causes development of complications in patients.

Our lengthening and approximation technique is appropriate for cases with esophageal gap distances between 3-5 cm. Its theoretical basis depends on observations that intramural blood circulation in both the upper and lower ends is excellent that 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.

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