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Research Article

Outcomes of Gastric Transposition in Pure Esophageal Atresia

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Abstract

Introduction: Gastric transposition for esophageal atresia is a relatively new method of esophageal replacement. Earlier the most common organ used was colon, however major complications were seen following the procedure. And for these reasons colonic interposition was gradually replaced by gastric transposition. This study was conducted to study the outcomes and complications related to gastric transposition for pure esophageal atresia.

Aim and Objective: To study the outcomes of gastric transposition in pure esophageal atresia in children.

Materials and Methods: All the children undergoing gastric transposition for pure esophageal atresia in Paediatric Surgery Department of SMI Hospital, Dehradun were prospectively followed for a period of 2years post operatively. Complications following the procedure were recorded and patients were further evaluated with outpatient follow-ups.

Result: 5 children underwent gastric transposition during the study period. The procedure was performed in 2 stages. The most common complications following the procedure were anastomotic stricture at neck and gastro-esophageal reflux, which were managed accordingly. During the follow up period all 5 patients were alive and health.

Discussion: Gastric transposition for pure esophageal atresia is a relatively newer modality. It effectively re-establishes gastrointestinal continuity with fewer complications, and the follow up period showed appropriate weight gain and oral feeding.

Keywords: Anastomotic strictures; Esophageal atresia; Gastric transposition

Introduction

Esophageal Atresia (EA), with or without tracheoesophageal fistula, is a congenital malformation of the esophagus [1]. The incidence of EA is approximately 1 in 3000 live births [2]. The survival rate of newborns with EA has significantly increased during the last few decades [3]. However, it continues to be a challenging problem to identify an ideal management protocol for these infants because the clinical management may be fraught with postoperative complications, such as chronic recalcitrant strictures and anastomotic leaks. [4] Brown and Tam [5] proposed a classification based on the length of the gap between the esophageal segments (long-gap: >3 cm; intermediate-gap: >1 cm but </=3 cm: and short-gap: </=1 cm) to address the magnitude of the surgical problems in EA and tracheoesophageal fistula.

Ideal surgical treatment of EA includes division of the tracheoesophageal fistula as well as a primary end-to-end anastomosis of the upper and lower esophageal segments. Failure to achieve a satisfactory primary esophageal anastomosis will require esophageal replacement with the stomach, colon, or small intestine [6]. Gastric transposition is a relatively novel method of esophageal replacement [7]. We have favored gastric transposition as a procedure of choice for the treatment of LGEA in our institution. This study was conducted to review our surgical experience and assess the outcomes of gastric transposition in pure esophageal atresia.

Materials and Methods

Between March 2016 and May 2019, total 45 patients of Tracheoesophageal fistula presented in pediatric surgery department of our institute, out of these 12 newborns were diagnosed as case of pure esophageal atresia. 7 out of these 12 patients refused for further management due to various reasons and total 5 newborns (all male) with Pure EA were treated in our hospital. EA was diagnosed by plain radiographs with NG tube in situ. All patients were found to have gaps between the esophageal segments of over 3 cm at the time of the surgery and were

diagnosed with LGEA. Written informed consent was obtained from the parents of all the neonates. In all 5 neonate surgery was performed in two stages. Stage one was performed as soon as the newborn was diagnosed as having Pure Esophageal Atresia. In First stage Cervical Esophagostomy and Gastrostomy were done. Esophagostomy was done at the level of cervical esophagus and its purpose was to drain out excessive saliva. Gastrostomy was done for feeding purpose. The newborn was then followed up for a time period of 12 to 15 months after which second stage of surgery was performed. During this period patient was kept on liquid and semi-solid diet through the gastrostomy site and regular follow up was done on OPD basis. During second stage of surgery, the patients underwent general anesthesia and endotracheal intubation. A midline laparotomy incision was made and gastric transposition was done through posterior mediastinal route. The distal blind end of esophagus was excised at gastro-esophageal junction and was closed. An anastomosis was then carried out between the apex of the fundus and the distal end of cervical esophagus. The esophagostomy and gastrostomy sited were also closed simultaneously. Pyloroplasty was done to decrease gastric emptying time and a feeding jejunostomy was also made to start enteral feed in the post operative period.

A chest drainage tube was retained. A 6 French nasogastric tube was placed during anastomosis in order to provide postoperative gastric decompression. After the surgery, the patients were admitted to the intensive care unit (ICU), and were kept on elective ventilation for a time period of 24hrs. On day 1 and 2 postoperatively, they were provided with total parenteral nutrition. After POD3, glucose in water was administered through the feeding jejunostomy tube for 1 to 2 days and, subsequently oral feeding was started after POD7 and appropriate amounts of milk were administered. This was followed by liquid, semi-solid and solid diet subsequently. Initially multiple small feeds were given, which were well tolerated by the patients and the amount of feed was increased gradually. After initial recovery and discharge, the patients were followed up by outpatient consultation starting 1 month after surgery. The follow-ups were carried out at monthly intervals for the first 6 months. After 6 months, follow-up was carried out semiannually. Additionally, during follow-up, the infants were observed whether recurrent vomiting and regurgitation phenomenon occurred; if the infants had normal sucking without vomiting/regurgitation, they were determined to have no delayed gastric emptying or gastric retention.

A chest drainage tube was retained. A 6 French nasogastric tube was placed during anastomosis in order to provide postoperative enteral nutrition. After the surgery, the patients were admitted to the intensive care unit (ICU), and were kept on elective ventilation for a time period of 24-48 hrs. On day 1 postoperatively, they were provided with total parenteral nutrition. After POD2, glucose in water was administered through the nasogastric tube with micro pump for 1 to 2 days and, subsequently, appropriate amounts of milk were administered. This was followed by liquid, semi-solid and solid diet subsequently. Initially multiple small feeds were given, which were well tolerated by the patients and the amount of feed was increased gradually. After initial recovery and discharge, the patients were followed up by outpatient consultation starting 1 month after surgery. The follow-ups were carried out at monthly intervals for the first 6 months. After 6 months, follow-up was carried out semiannually. Additionally, during follow-up, the infants were observed whether recurrent vomiting and regurgitation phenomenon occurred; if the infants had normal sucking without vomiting/regurgitation, they were determined to have no delayed gastric emptying or gastric retention.

Fig 1.a- Gastric transposition

Fig 1.b- Gastric transposition

Results

The mean age of the 5 newborns at the time of first stage of surgery was 48 hours (range, 24–96 h) and at second stage of surgery was 12 to 15 months. There was no mortality or loss of patient during follow up period. Mild leak of saliva from cervical esophagostomy site was seen in first case, which was managed conservatively, in this case feeding jejunostomy was kept for longer time in post operative period and orad feed was also started late. However the patient gradually improved conservatively. Anastomotic stricture at neck occurred in 2 cases, which was managed by endoscopic esophageal dilatation, and patient improved symptomatically. Gastroesophageal Reflux (GER) occurred in 2 case, which was also managed conservatively. Feeding multiple small meals and postural support for positioning and feeding was performed for these cases. The symptoms alleviated and there was no need for additional medical or surgical therapy. All the infants had no delayed gastric emptying or gastric retention. Body weight and height of all 5 cases were normal and comparable to that of the children of the same age. No dyspnea, chest discomfort, and labored breathing were identified in the post operative period. (Figure 1).

Postoperative complications and the therapeutic outcome of the included children.

Case	Complications	Outcome
Case 1	Mild leak from esophagostomy site	Cured and left the hospital
Case 2	Anastomotic stricture at neck	Cured and left the hospital
Case 3	Gastroesophageal reflux	Cured and left the hospital
Case 4	Anastomotic stricture at neck	Cured and left the hospital
Case 5	Gastroesophageal reflux	Cured and left the hospital

Discussion

The surgical management of patients with LGEA remains controversial. Methods employed for esophageal replacement consist of esophago-coloplasty, gastric tube interposition, small intestine interposition, and gastric transposition [8-10] Esophageal replacement techniques have been found to have a number of associated complications such as anastomotic stricture, anastomotic leak, and reflux [11]. Recently, Tannuri et al. [12] showed that gastric transposition was preferable to gastric tube reconstruction. Additionally, Macksood et al. [13] identified that the use of gastric transposition for management of LEGA in children had fewer complications and was relatively safer in comparison with another procedure. Gupta et al [14] performed gastric transposition for 27 neonates with EA and demonstrated that gastric transposition could be a lifesaving alternative even in the critically ill neonates with tracheoesophageal fistulae and leaks.

These studies may provide clinical basis for the use of gastric transposition in LGEA treatment in neonates. Anastomotic leak can be devastating; it may lead to mortality as a result of irreversible sepsis and mediastinitis. A possible contributing factor to a leak is tension on the suture lines [15]. Besides, anastomotic stricture is the most common cause of revision surgery in these patients [15]. The advantages of gastric transposition are the requirement of a single anastomosis, excellent blood supply of the stomach, technical ease of the procedure, and the fact that adequate length is available for anastomosis,[16] leading to the lower incidence of anastomotic leak and stricture in gastric transposition compared with other procedures.[17] In this study, mild leak occurred in 1 case which was managed conservatively, anastomotic strictures occurred in 2 cases which was managed by endoscopic dilatation. GER is a common problem after gastric transposition.[18] In this study, GER occurred in 2 cases. Conservative treatment, including multiple small meals and postural support for positioning and feeding, was performed. GER symptoms alleviated with age and they had no additional need for medical or surgical therapy. Gastric transposition used in this study may have improved the survival of infants with LGEA to a certain extent by reducing the incidence of postoperative complications. However, more studies are required before gastric transposition may be recommended. Our report has some limitations, the number of cases was small, Nevertheless, we have referred to the relevant literature in the use of gastric transposition for the treatment of LGEA. The outcomes indicated that gastric transposition could provide a means of treatment to improve the cure rate of LGEA

Benefits of Gastric transposition:

- Less chances of stricture formation (as compared to gastric tube interposition).
- Less chances of delayed gastric emptying (as compared to esophago-coloplasty).
- Less chances of anastomosis failure due to rich vascular supply of stomach.
- As the surgery (gastric tranposition) is performed through posterior mediastinal route (in our study), there are less chances of pulmonary and cardiac complications in post operative period.
- More anatomical position of gastric transposition when performed through posterior mediastinal route.

Conclusion

In conclusion, the gastric transposition establishes effective gastrointestinal continuity with few long-term complications. Gastric transposition shortens the period of clinical treatment, reduces the economic and psychological burden on the parents of the children, thus improving the cure rate of LGEA to a certain extent. Oral feedings and appropriate weight gain are achieved in most children. Thus, gastric transposition may be a rewarding reconstructive surgical option in the treatment of LGEA. However, there is a clear need for high quality randomized and comparative studies to establish recommendations and guidelines.

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