

A Rare Dual Atresia Case Report Introducing Gastric Distension-Assisted Esophageal Approximation (GDEA): A Hypothetical Novel Technique for Long-Gap Esophageal Atresia

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Abstract: The simultaneous occurrence of pure esophageal atresia (EA) and duodenal atresia (DA) is an exceptionally rare congenital anomaly, posing significant diagnostic and surgical challenges. While each condition alone is well-documented, their coexistence is reported in only a small fraction of EA cases, and often necessitates complex, staged interventions. We present a unique case of a neonate with Down Syndrome diagnosed with both pure EA and DA. Intraoperatively, the esophageal segments were found in unexpectedly close proximity, allowing for a tension-free primary anastomosis—an outcome less likely achievable in pure EA which typically has a long-gap. Postoperative imaging confirmed DA, which was subsequently repaired. Despite initial surgical success, the patient experienced a complicated postoperative course and ultimately succumbed to multi-organ failure. This case highlights the diagnostic complexity and high morbidity associated with dual gastrointestinal atresia. Notably, the gastric distension caused by DA appeared to facilitate esophageal approximation, prompting the hypothesis of a novel technique: Gastric Distension-Assisted Esophageal Approximation (GDEA). GDEA proposes pyloric occlusion with monitored physiologic or controlled gastric loading—as a means to approximate esophageal segments in long-gap EA. This approach may offer a new adjunct to existing surgical strategies. The hypothesized GDEA technique, inspired by this case, introduces a potentially transformative concept in the treatment of long-gap EA. We emphasize that GDEA is a speculative hypothesis derived from a single clinical observation and is not supported by experimental or clinical evidence.

Keywords: long-gap esophageal atresia, LGEA, duodenal atresia, dual gastrointestinal atresia, gastric distension-assisted esophageal approximation, GDEA, esophageal atresia type A

Introduction

Esophageal atresia (EA), a congenital interruption of the esophageal continuity, occurs in approximately 1 in 2500 live births, with the majority of cases (around 86%) associated with a distal tracheoesophageal fistula.¹ Pure EA (Type A), lacking any fistulous connection, presents a particular surgical challenge, especially when the gap between the esophageal ends is long—commonly referred to as long-gap esophageal atresia (LGEA). These cases often require complex, staged procedures or esophageal replacement techniques due to the difficulty in achieving primary anastomosis.

Duodenal atresia (DA), a leading cause of congenital intestinal obstruction, occurs in approximately 1 in 6000 to 10,000 live births.² The co-occurrence of EA and DA is rare, reported in only about 2% of EA cases, and presents a unique set of diagnostic and therapeutic challenges.^{3,4} Management strategies for this dual anomaly remain controversial, particularly regarding the timing and sequence of surgical interventions.

In this report, we present a rare case of combined pure EA and DA in a neonate with Down Syndrome. Remarkably, the gastric distension caused by the duodenal obstruction facilitated a tension-free primary esophageal anastomosis, despite the typically long-gap nature of pure EA. This unexpected anatomical advantage led us to hypothesize a novel

technique—Gastric Distension-Assisted Esophageal Approximation (GDEA)—as a potential adjunct in managing LGEA. The technique involves pyloric occlusion with monitored gastric loading to potentially aid esophageal alignment in long-gap EA. However, this concept remains theoretical, carries significant ethical and safety concerns—including the risk of gastric rupture—and should not be attempted clinically without rigorous validation in preclinical animal studies. This case not only underscores the complexity of dual atresia but also introduces a new perspective on leveraging anatomical conditions to improve surgical outcomes in LGEA.

Case Presentation

A newborn, for a 43-year-old woman, who was delivered via cesarean section at 35 weeks and 3 days due to prolonged premature rupture of membranes (72 hours). Her mother was gravida 2, para 1, and underwent routine prenatal ultrasonography at 20 weeks gestation, which revealed polyhydramnios. A subsequent four-dimensional (4D) ultrasound demonstrated a double-bubble sign and a retrocardiac mass, raising suspicion for duodenal atresia. At birth, the neonate weighed 2.5 kg and exhibited dysmorphic features consistent with Down Syndrome. APGAR scores were 8 and 9 at 1 and 5 minutes, respectively.

A nasogastric tube could not be advanced into the stomach, and radiographic imaging revealed a coiled tube in the upper esophageal pouch and a distended, gasless abdomen (**Figure 1A**), strongly suggestive of pure esophageal atresia (Type A). While bronchoscopy is considered the gold standard for confirming the absence of a tracheoesophageal fistula, it was not performed preoperatively due to the neonate's clinical condition. Instead, a meticulous intraoperative inspection was conducted to exclude any fistulous connection.

Echocardiography identified multiple cardiac anomalies: a moderate to large patent ductus arteriosus, a moderate patent foramen ovale, and a 4 mm perimembranous ventricular septal defect with left-to-right shunting. The aortic arch was normal, and no other VACTERL-associated anomalies were detected.

On postnatal day one, the neonate underwent a right lateral thoracotomy via an axillary approach. This decision is based on our standard practice in cases where long-gap esophageal atresia is anticipated, where we typically begin with thoracotomy with the intent of applying internal traction and creating a gastrostomy tube as part of a staged approach,

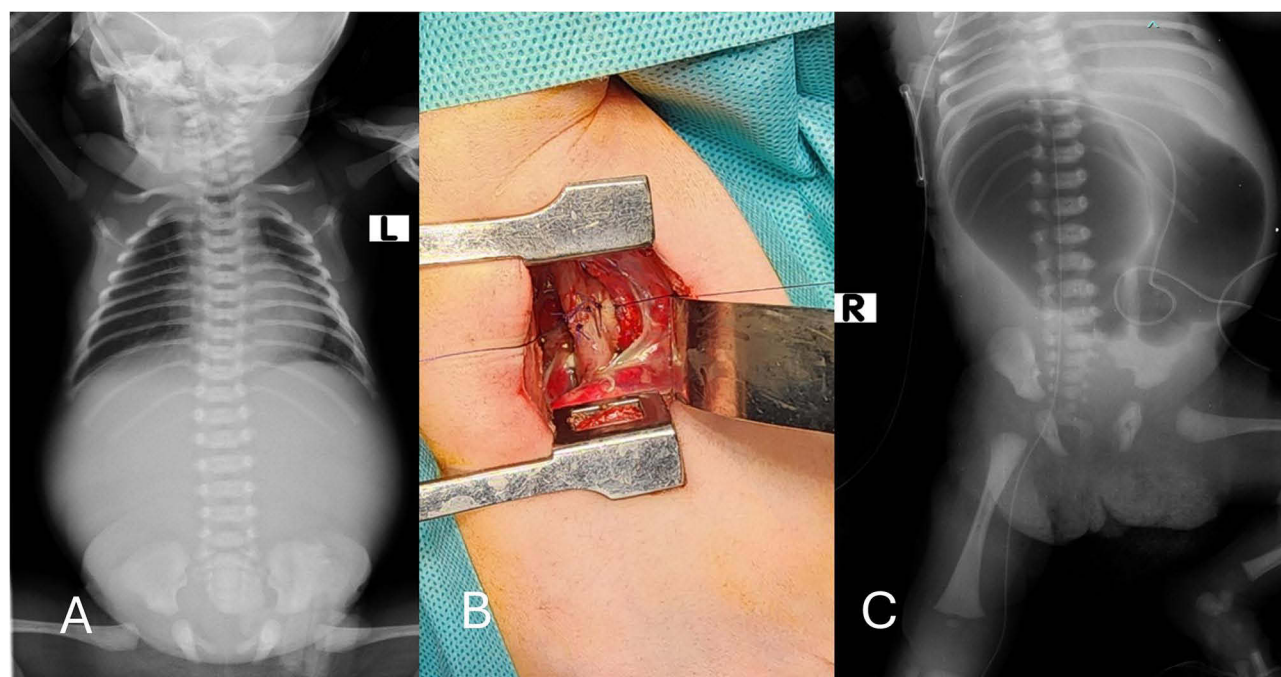


Figure 1 (A) Anteroposterior chest and abdominal radiograph of the newborn girl on day 0, showing a nasogastric tube coiled in the upper esophageal pouch, consistent with esophageal atresia (EA). The abdomen appears distended and gasless, further supporting the diagnosis of Pure EA. (B) Intraoperative photograph demonstrating a tension-free primary esophageal anastomosis—an uncommon finding in cases of pure esophageal atresia, where a significant gap between esophageal segments is typically expected. (C) Anteroposterior abdominal radiograph of at 3 days of age demonstrating the classic double-bubble sign, indicative of duodenal atresia.

preceding definitive delayed primary repair. Intraoperatively, during thoracotomy the proximal and distal esophageal segments were found to be in unexpectedly close approximation, allowing for a tension-free primary end-to-end esophageal anastomosis (Figure 1B). The anastomosis was even technically less demanding than typically encountered in cases of Gross Type C esophageal atresia. The distal esophageal pouch appeared markedly dilated, and upon incision, there was an abrupt evacuation of accumulated intraluminal fluid—an atypical intraoperative finding that retrospectively suggested a contributory role of gastric distension in facilitating esophageal approximation. At the time of the procedure, the etiology of this distension remained unidentified; the diagnosis of duodenal atresia was established only in the postoperative period.

On the third day of life, abdominal radiography demonstrated the classic “double-bubble” sign (Figure 1C), confirming the diagnosis of duodenal obstruction. A duodeno-duodenostomy was subsequently performed utilizing the standard diamond-shaped anastomotic technique. Intraoperative assessment revealed a Type I duodenal atresia, with no evidence of additional atretic segments throughout the small intestine.

The postoperative course was complicated. Fever developed on the first postoperative day and persisted intermittently. Meconium passage was delayed until day eight, and C-reactive protein levels were elevated by day five. An upper gastrointestinal contrast study performed on postnatal day seven demonstrated intact anastomoses without evidence of leakage, confirming the patency of both the esophageal and duodenal repairs. These findings supported the initiation of cautious oral feeding. However, the patient exhibited poor sucking and bilious vomiting (Figure 2A). A contrast enema revealed a microcolon (Figure 2B), suggesting distal bowel hypoplasia.

Further complications included pancytopenia requiring multiple transfusions, respiratory distress necessitating intubation and mechanical ventilation, and hemodynamic instability. Blood cultures grew *Staphylococcus hominis* and *Staphylococcus warneri*, prompting broad-spectrum antibiotic therapy. Supportive measures included intravenous fluids, hydrocortisone, inotropes, hypertonic saline for hyponatremia, and sodium bicarbonate for metabolic acidosis. Despite aggressive management, the patient developed persistent bradycardia and ultimately succumbed following unsuccessful resuscitation.

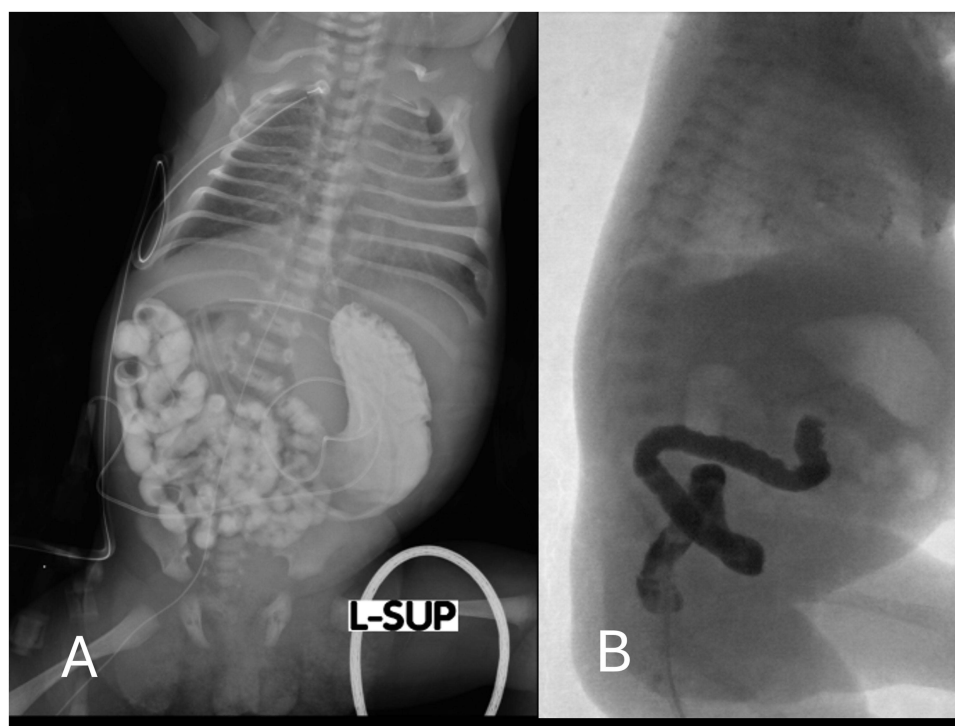


Figure 2 (A) Abdominal radiograph showing an upper gastrointestinal contrast study, visualizing the esophagus, stomach, and proximal small intestine (L-SUP: left side – supine position). (B) Lateral abdominal radiograph at 25 days of age following a contrast enema, demonstrating findings consistent with microcolon.

Discussion

This case presents a rare and complex association of pure EA and DA, which poses significant diagnostic and surgical challenges. While prenatal detection rates for EA and DA individually exceed 70%, their concurrent diagnosis remains rare due to overlapping and sometimes contradictory imaging findings.^{5,6} DA is typically identified by the “double-bubble” sign on prenatal ultrasound, while EA is suspected with polyhydramnios and a small or absent gastric bubble—though the sensitivity for EA detection remains low at 42%.^{1,7} When both anomalies coexist, a closed loop may form between the distal esophageal pouch, stomach, and proximal duodenum, complicating diagnosis and management.⁸

Fetal MRI has been shown to improve diagnostic accuracy, with a positive predictive value of 78% for EA, particularly when DA is also present. It can reveal dilation of the esophageal pouch, stomach, and proximal duodenum, providing critical information for prenatal counseling and surgical planning.⁹

Pure EA (Type A) is frequently associated with other congenital anomalies, particularly in the absence of a tracheoesophageal fistula. These associations significantly influence treatment strategies and outcomes.¹⁰ DA is strongly linked to trisomy 21, with reported associations ranging from 30% to 46%.^{7,11} EA is also associated with chromosomal anomalies in 6–10% of cases, with an additional 1–2% involving copy number variants.¹²

Historically, survival rates for combined EA and DA were poor, ranging from 6% to 33% before 1980.^{13,14} However, advances in neonatal surgery, anesthesia, intensive care, and nutrition have significantly improved outcomes. More recent studies report survival rates of 75–100%,^{15,16} with Doval et al noting a post-2001 survival rate of 86.4%.¹⁷ Delayed diagnosis of DA has been associated with increased mortality, emphasizing the importance of early postoperative imaging in cases of persistent feeding difficulties following EA repair.¹⁷

Only six cases of “short-gap” EA with DA have been reported, with varied approaches including delayed EA repair after DA correction or simultaneous primary anastomosis.¹⁷ In contrast, 43 cases of long-gap EA with DA have been documented, often managed with staged procedures such as cervical esophagostomy and feeding gastrostomy followed by delayed esophageal replacement.¹⁷

While single-stage repairs may appear advantageous, evidence does not conclusively support their superiority over staged approaches.^{14,15,18} Ein et al reported better survival with staged procedures (83%) compared to non-staged repairs (57%).^{14,15,18} Factors such as respiratory distress and delayed DA diagnosis likely contribute to these outcomes. Prolonged anesthesia and operative time in neonates also pose significant risks, reinforcing the need for individualized, flexible management strategies.⁴

In cases of LGEA, primary anastomosis is typically not feasible due to the considerable distance between the esophageal ends. Several well-established surgical strategies have been developed for the management of LGEA, each with distinct advantages and limitations. The Foker technique, which involves the application of external traction sutures to stimulate esophageal growth, has gained popularity for preserving native esophageal tissue, though it requires prolonged intensive care and multiple procedures.¹⁹ Alternatively, delayed primary anastomosis without traction may be attempted after a period of spontaneous esophageal growth, particularly in cases with moderate gap lengths.¹⁹ When primary repair is not feasible, esophageal replacement techniques such as gastric transposition, colonic interposition, or jejunal grafts are employed, though these carry risks of graft necrosis, dysmotility, and long-term nutritional complications.²⁰ A notable recent advancement is the intrathoracic thoracoscopic internal traction technique described by Dariusz Patkowski, in which traction sutures are placed thoracoscopically between the esophageal pouches to gradually approximate them over a few days. This method avoids gastrostomy in most cases and facilitates early anastomosis while preserving the native esophagus.²¹ Despite the variety of techniques, no single approach has emerged as universally superior, and management remains highly individualized based on gap length, associated anomalies, and institutional expertise.¹⁹

In our case, the presence of DA led to significant gastric distension, which appeared to facilitate a tension-free esophageal anastomosis (Figure 3A and B). This unexpected intraoperative finding prompted the development of a novel hypothesis—Gastric Distension-Assisted Esophageal Approximation (GDEA)—as a potential adjunctive strategy in the management of LGEA. To our knowledge, this technique has not been previously described or established in current surgical literature.

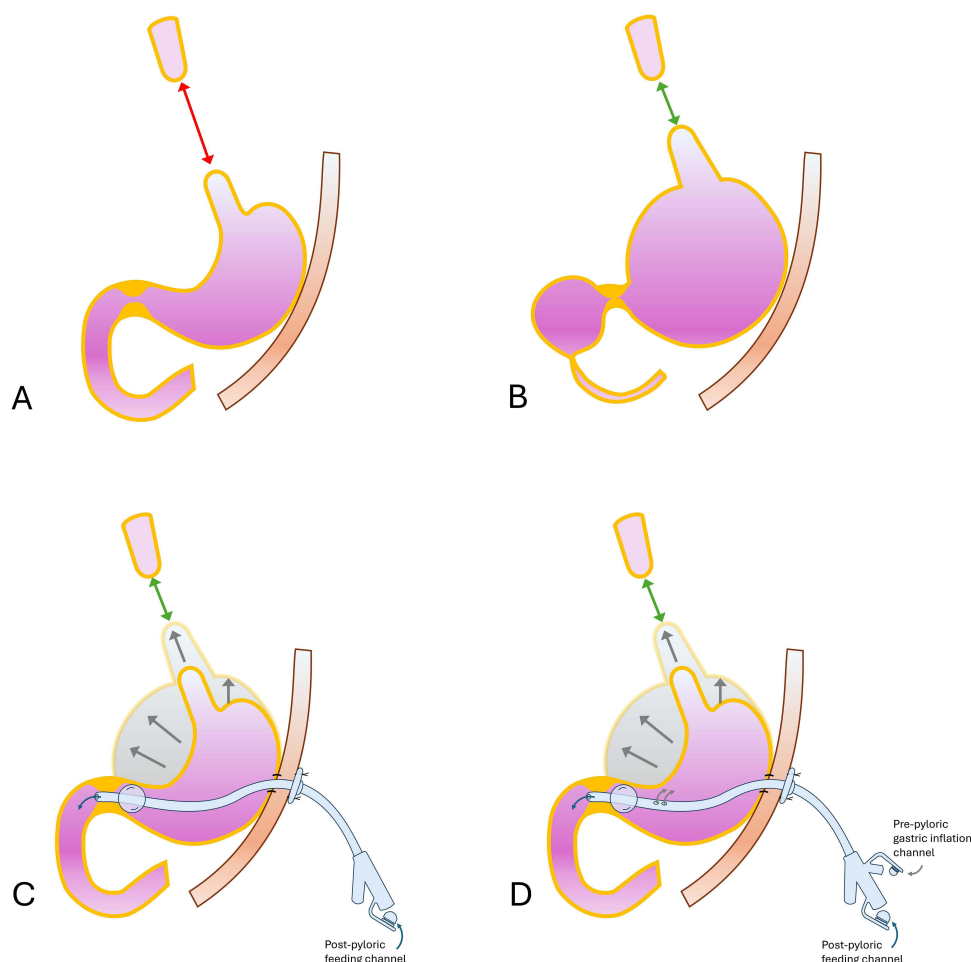


Figure 3 Schematic Representation of the Gastric Distension-Assisted Esophageal Approximation (GDEA) Technique. **(A)** Depicts the upper gastrointestinal anatomy of a neonate with isolated long-gap esophageal atresia (red arrow represents the long-gap). **(B)** Shows our specific case involving dual upper GI atresias—esophageal atresia (EA) and duodenal atresia (DA) (green arrow represents a short-gap). **(C)** GDEA via Pyloric Occlusion with Physiologic Gastric Loading, where a dual-lumen gastrostomy tube is advanced into the pyloric lumen, with the balloon inflated just before the pylorus. This occlusion prevents gastric emptying, allowing gastric secretions to gradually accumulate and distend the stomach (grey arrows represent the act of gastric distension resulting in a short gap represented by green arrow), and facilitates potential post-pyloric enteral feeding. **(D)** GDEA via Pyloric Occlusion with Controlled Gastric Inflation, where a specially-designed triple-lumen gastrostomy tube is utilized to deliver controlled inflation—using air or saline—through the pre-pyloric channel, generating upward pressure on the distended stomach and the distal esophageal pouch, promoting a more rapid esophageal approximation (grey arrows represent the act of gastric distension resulting in a short gap represented by green arrow). Post-pyloric feeding remains feasible in this approach as well. Schematic illustration conceptualized and designed by the first author (Raed Al-Taher).

While the intraoperative finding in our case suggested that gastric distension might have contributed to esophageal approximation, this observation cannot be generalized. Previous reports of EA with DA have not documented similar outcomes, and there is no evidence that postnatal gastric distension can reliably elongate the distal esophagus to enable primary anastomosis. The notion that pyloric occlusion or gastric inflation could facilitate esophageal approximation is entirely hypothetical and lacks any experimental validation. Furthermore, the potential for catastrophic complications—such as gastric perforation, ischemia, or respiratory compromise—renders this approach ethically unacceptable for clinical use at present.

Hypothetical Technique: Gastric Distension-Assisted Esophageal Approximation (GDEA)

We propose the concept of GDEA as a purely theoretical framework inspired by this single case observation. It is not intended for clinical application without prior validation in controlled experimental settings. The rationale is based on the assumption that controlled gastric distension might exert upward pressure on the distal esophageal pouch, potentially reducing the gap. However, this assumption is speculative, and there is no scientific evidence—clinical or experimental—to support its feasibility or safety. Any future exploration of this concept must begin with rigorous animal studies to

assess physiological responses, safe inflation thresholds, and risk mitigation strategies. This could be achieved through two potential strategies:

Pyloric Occlusion and Physiologic Gastric Loading

A proposed method for promoting gradual gastric distension involves temporary mechanical occlusion of the pylorus. This can be achieved by advancing the tip of the gastrostomy tube into the pyloric lumen and inflating the balloon just proximal to the pylorus. This maneuver effectively impedes gastric emptying, allowing for a slow and progressive accumulation of gastric secretions. During this period, the infant may continue to receive enteral nutrition through the gastrostomy tube (with the tip positioned intrapylorically) or be maintained on total parenteral nutrition if needed (Figure 3C).

We do not recommend pharmacologic pyloric inhibition using agents such as anticholinergics, as their effects on gastric motility are non-specific and less predictable, making them unsuitable for controlled gastric loading in this context.

Pyloric Occlusion and Controlled Gastric Inflation

A more precise and manageable approach to promoting gastric distension involves the gradual inflation of the stomach using a gastrostomy tube with air, saline, or contrast. The estimated functional gastric capacity of a term neonate is 20–30 mL at birth, increasing to 60–90 mL by day 3–4 of life. Preterm infants have lower capacities and are more vulnerable to overdistension.²²

Based on these considerations, the proposed protocol includes the following steps:

- Verification of gastrostomy tube (GT) placement, with pyloric occlusion achieved using specially designed three-lumen GTs. These tubes are configured to allow: (1) pre-pyloric gastric inflation, (2) balloon-mediated occlusion of the pylorus, and (3) post-pyloric access for potential enteral feeding (Figure 3D).
- Baseline monitoring, including heart rate, respiratory rate, oxygen saturation, and abdominal girth measurements.
- Initiation of inflation with 5–10 mL of air or saline via the GT.
- Gradual volume escalation, increasing by 5–10 mL once or twice daily, reaching a total volume of 60–90 mL in term neonates. Additional volume may be introduced as tolerated, based on ongoing clinical evaluation.
- Continuous monitoring for signs of intolerance, including changes in vital signs, abdominal distension, or respiratory distress.
- Imaging surveillance using abdominal ultrasound or X-ray every 2–3 days to assess gastric wall integrity and monitor esophageal gap progression.
- Inflation should be paused immediately if any signs of intolerance arise, such as increased respiratory rate, bradycardia, or apnea.

Potential Risks and Considerations:

Although neonatal stomachs—particularly in term infants—can often tolerate considerable distension, there is no universally defined safe maximum volume. Overdistension carries several risks, especially in preterm or medically fragile neonates. These include gastric ischemia or perforation due to compromised mucosal perfusion, respiratory compromise from diaphragmatic elevation, and vagal stimulation that may result in bradycardia or apnea.

Ethical and Safety Considerations

The proposed GDEA technique carries substantial risks, including gastric rupture, ischemia, diaphragmatic elevation leading to respiratory compromise, and vagal-mediated bradycardia. These risks are particularly concerning in neonates with fragile gastric walls and comorbidities. Without robust preclinical data, any attempt to apply this method in humans would be ethically indefensible. We strongly advocate for a stepwise research approach, beginning with animal models, to evaluate the biomechanical and physiological implications of controlled gastric distension before considering any clinical translation.

Conclusion

The coexistence of pure EA without tracheoesophageal fistula and DA is a rare and complex congenital anomaly that presents unique diagnostic and surgical challenges. While various approaches have been described in the literature, there remains no consensus on the optimal timing or sequence of surgical repair, underscoring the importance of individualized, patient-centered management strategies.

In this case, the presence of duodenal obstruction appeared to facilitate a tension-free primary esophageal anastomosis by promoting gastric distension and distal esophageal approximation—an outcome rarely achievable in long-gap EA. This observation led us to hypothesize a novel technique, Gastric Distension-Assisted Esophageal Approximation (GDEA), which proposes the controlled use of gastric inflation to aid in esophageal alignment prior to repair.

Although promising in concept, GDEA remains a speculative hypothesis. It should not be interpreted as a clinical recommendation. Future research must prioritize animal experiments to determine feasibility, safety, and ethical acceptability. Only after such validation could this concept be considered for carefully monitored clinical trials.

Abbreviations

GDEA, Distension-Assisted Esophageal Approximation; EA, Esophageal Atresia; DA, Duodenal Atresia; LGEA, Long-Gap Esophageal Atresia; GT, Gastrostomy Tube.

Ethics

Our institution (Jordan University Hospital) does not ask for approvals to publish single anonymized case reports.

Consent to Publish

Written informed consent for publication of the details of this case was obtained from the parent.

Disclosure

The authors report no conflicts of interest in this work.

References

- Spitz L. Oesophageal atresia. *Orphanet J Rare Dis.* 2007;2(1). doi:10.1186/1750-1172-2-24
- Abou Chaar MK, Meyers ML, Tucker BD, et al. Twin pregnancy complicated by esophageal atresia, duodenal atresia, gastric perforation, and hypoplastic left heart structures in one twin: a case report and review of the literature. *J Med Case Rep.* 2017;11(1). doi:10.1186/s13256-016-1195-x
- Cao ZP, Li QF, Liu SQ, et al. Surgical management of newborns with combined tracheoesophageal fistula, esophageal atresia, and duodenal obstruction. *Chin Med J.* 2019;132(6):726–730. doi:10.1097/CM9.000000000000102
- Jung E. Minimally invasive management of combined esophageal atresia with tracheoesophageal fistula and duodenal atresia: a comprehensive case report. *Front Pediatr.* 2023;11. doi:10.3389/fped.2023.1252660
- Saalabian K, Friedmacher F, Theilen TM, Keese D, Rolle U, Gfroerer S. Prenatal detection of congenital duodenal obstruction—impact on postnatal care. *Children.* 2022;9(2):160. doi:10.3390/children9020160
- Pardy C, D'Antonio F, Khalil A, Giuliani S. Prenatal detection of esophageal atresia: a systematic review and meta-analysis. *Acta Obstet Gynecol Scand.* 2019;98(6):689–699. doi:10.1111/aogs.13536
- Choudhry MS, Rahman N, Boyd P, Lakhoo K. Duodenal atresia: associated anomalies, prenatal diagnosis and outcome. *Pediatr Surg Int.* 2009;25(8):727–730. doi:10.1007/s00383-009-2406-y
- Estroff JA, Parad RB, Share JC, Benacerraf BR. Second trimester prenatal findings in duodenal and esophageal atresia without tracheoesophageal fistula. *J Ultrasound Med.* 1994;13(5):375–379. doi:10.7863/JUM.1994.13.5.375
- Ethun CG, Fallon SC, Cassady CI, et al. Fetal MRI improves diagnostic accuracy in patients referred to a fetal center for suspected esophageal atresia. *J Pediatr Surg.* 2014;49:712–715. doi:10.1016/j.jpedsurg.2014.02.053
- Holder TM, Cloud DT, Lewis JE, Pilling GP. Esophageal atresia and tracheoesophageal fistula a survey of its members by the surgical section of the American academy of pediatrics. *Pediatrics.* 1964;34(4):542–549. doi:10.1542/PEDS.34.4.542
- Cohen-Overbeek TE, Grijseels EWM, Niemeijer ND, Hop WCJ, Wladimiroff JW, Tibboel D. Isolated or non-isolated duodenal obstruction: perinatal outcome following prenatal or postnatal diagnosis. *Ultrasound Obstet Gynecol.* 2008;32(6):784–792. doi:10.1002/uog.6135
- Brosens E, Marsch F, De Jong EM, et al. Copy number variations in 375 patients with oesophageal atresia and/or tracheoesophageal fistula. *Eur J Hum Genet.* 2016;24(12):1715–1723. doi:10.1038/ejhg.2016.86
- Reid IS. The pattern of intrinsic duodenal obstructions. *ANZ J Surg.* 1973;42(4):349–352. doi:10.1111/J.1445-2197.1973.TB06816.X; REQUESTEDJOURNAL:JOURNAL:14452197A;PAGEGROUP:STRING:PUBLICATION
- Spitz L, Ali M, Brereton RJ. Combined esophageal and duodenal atresia: experience of 18 patients. *J Pediatr Surg.* 1981;16(1):4–7. doi:10.1016/S0022-3468(81)80105-4

15. Ein SH, Palder SB, Filler RM. Babies with esophageal and duodenal atresia: a 30-year review of a multifaceted problem. *J Pediatr Surg.* 2006;41(3):530–532. doi:10.1016/j.jpedsurg.2005.11.061
16. Dave S, Shi ECP. The management of combined oesophageal and duodenal atresia. *Pediatr Surg Int.* 2004;20(9):689–691. doi:10.1007/s00383-004-1274-8
17. Doval L, Rousseau V, Irtan S. Combined esophageal and duodenal atresia: a review of the literature from 1950 to 2020. *Archives de Pédiatrie.* 2023;30(6):420–426. doi:10.1016/J.ARCPED.2023.05.004
18. Nabzdyk CS, Chiu B, Jackson CC, Chwals WJ. Management of patients with combined tracheoesophageal fistula, esophageal atresia, and duodenal atresia. *Int J Surg Case Rep.* 2014;5(12):1288. doi:10.1016/J.IJSCR.2013.09.016
19. Sescleifer AM, Kunisaki SM. Management of long-gap esophageal atresia. 2025:257–277. doi:10.1007/978-3-031-80468-7_22
20. Bagolan P, Conforti A, Morini F. Long-gap esophageal atresia. In: *Fundamentals of Pediatric Surgery, second Edition*. Vol.2017. 2016:269–281. doi:10.1007/978-3-319-27443-0_31
21. Borselle D, Davidson J, Loukogeorgakis S, De Coppi P, Patkowski D. Thoracoscopic stage internal traction repair reduces time to achieve esophageal continuity in long gap esophageal atresia. *Eur J Pediatr Surg.* 2023;34(1):36–43. doi:10.1055/A-2235-8766
22. Pipes PL. Nutrition in infancy and childhood. 1989:425. Available from: https://books.google.com/books/about/Nutrition_in_Infancy_and_Childhood.html?id=CV4QAQAAMAAJ. Accessed July 18, 2025.

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