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## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

# Complete gastroesophageal junction avulsion after near drowning: A case report and review of literature

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## ARTICLE INFO

### Article history:

Received 27 August 2020

Accepted 22 September 2020

Available online 25 September 2020

### Keywords:

Pediatric

Near-drowning

Cardiopulmonary resuscitation

Gastroesophageal junction

Transection

Avulsion

## ABSTRACT

**INTRODUCTION:** Gastroesophageal (GE) junction injuries are rare in the pediatric population. A complete GE junction separation in a child secondary to trauma has not reported in the literature yet.

**PRESENTATION OF CASE:** A 14-year-old boy presented with a complete GE junction avulsion after a near-drowning experience. He underwent immediate damage control surgery and delayed gastric pull-up esophageal reconstruction in 3-months. At the most recent clinic visit 5 months from the reconstruction, he can tolerate a regular diet without difficulty and is gaining weight and recovering well.

**CONCLUSION:** Complete GE junction injuries and avulsions are rare with limited data to guide management. These injuries are associated with mortality rates from 25% to 33%, therefore, high index of suspicion, prompt recognition and careful surgical planning is needed for favorable outcomes.

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## 1. Introduction

Gastroesophageal (GE) junction injuries are rare and constitute approximately 10% of traumatic esophageal or gastric injuries [1]. In children, these injuries are exceedingly rare and can be a challenge to manage. Complete GE junction avulsion is an infrequently encountered entity in the pediatric population with only three cases reported in the literature previously [2–4]. Herein, we report the case of a 14-year-old boy who presented with a complete GE junction separation after a near-drowning experience and cardiopulmonary resuscitation (CPR). We have reviewed previous literature on GE junction injuries and discuss the unique mechanism and surgical approach for this interesting case. The work of this case report has been in line with the SCARE 2018 criteria [5].

## 2. Presentation of case

A 14-year-old boy was brought to the emergency department after a near-drowning incident. He was playing in a “lazy river” at a water amusement park and became trapped against a large suction intake drain with subsequent loss of consciousness. He was rescued and brief bystander CPR was performed. On arrival, he was hemodynamically stable, fully conscious and complained of abdominal pain. On exam, he had diffuse abrasions on his torso in the configuration of a square (Fig. 1). His abdomen was otherwise soft and

without any peritoneal signs. A chest x-ray was performed which showed pneumoperitoneum (Fig. 2a). CT scan revealed pneumomediastinum, pneumoperitoneum, and intraabdominal free fluid, particularly in the region of the esophageal hiatus (Fig. 2b and c).

Due to concern for hollow viscus perforation, he was taken emergently to the operating room. Initial inspection during the laparotomy revealed gross contamination with food debris and a total gastroesophageal junction (GEJ) disruption (Fig. 3). At this time, patient started become hemodynamically labile, so a decision was made to perform a damage control procedure. The distal esophagus and the proximal stomach were stapled closed, leaving the patient in discontinuity. Four drains including a mediastinal drain and a gastrostomy (G) tube was placed. No surgical proximal esophageal diversion was performed. Instead, a large bore nasogastric (NG) tube was placed in the esophagus above the staple line to manage secretions. Intraabdominal and mediastinal drains were placed. Fascia was closed and the patient was transferred to the Pediatric Intensive Care Unit (ICU).

His ICU stay was complicated by septic shock, respiratory failure leading to prolonged intubation, deep venous thrombosis with pulmonary embolism, bilateral pleural effusions and general deconditioning. Parenteral nutrition was started in the immediate postoperative period. He was extubated on postoperative day 18 and fluoroscopic evaluation demonstrated a leak in the esophagus which was controlled by the mediastinal drain. The stomach was negative for leak and therefore enteral nutrition was initiated via the G tube. After extensive rehabilitation, he was discharged on day 50 with the nasogastric tube and the mediastinal drain.

Three months after his initial injury, he underwent Ivor-Lewis distal esophagectomy with gastric pull-up for esophagoesophageal

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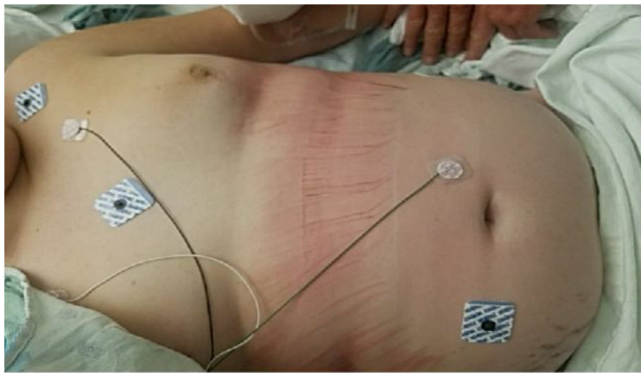


Fig. 1. Abrasions noted on initial physical examination.

anastomosis. For the surgery, he was positioned into a partial left lateral decubitus position for simultaneous access to the abdomen and the chest. A midline abdominal incision was made using his previous incision site. A gastric conduit was then made along the lesser curvature using a surgical GIA stapler. A right thoracotomy was performed and the distal esophagus was identified. The tubularized portion of the stomach was then advanced into the chest without difficulty and a 29 mm end-to-end anastomosis (EEA) stapler was used to complete the esophagogastric anastomosis. A leak test was performed via upper endoscopy which was negative. Finally, a jejunostomy tube was placed to allow for enteral access post-operatively.

He was extubated on postoperative day 3 and nutritionally supported with jejunostomy enteral feeds. On day 7, an esophagram showed no leak at the anastomosis and immediate stomach emptying (Fig. 4). He was initiated on a liquid diet and discharged on day 10. At the most recent clinic visit 5 months from the reconstruction, he can tolerate a regular diet without difficulty and is gaining weight and recovering well.

### 3. Discussion

Proximal enteric perforations are rare in children and present considerable challenges in diagnosis and management. Frequent causes in the pediatric population include blunt trauma, foreign body ingestion, caustic ingestion and endoscopy-related procedures [6]. Very infrequently, these injuries can be attributed secondary to rare etiologies such as drowning and CPR. The proposed mechanism of drowning-related perforation is insufficient airway control, which causes swallowing of large amounts of water. This leads to a rapid increase in gastroesophageal volume caus-

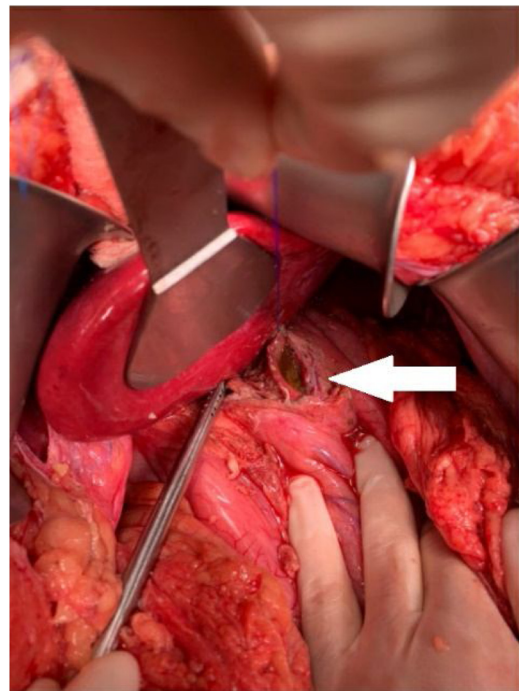


Fig. 3. Intraoperative picture showing complete GEJ separation (white arrow).

ing the diaphragm and the abdominal musculature to produce significant ejection forces, which may cause tears [7–9]. Similarly, during CPR, the forces applied during external compressions, the additional introduction of air via resuscitative ventilation and esophageal intubation increases the risk of perforation. While CPR related gastric perforations are well described in the literature [10], gastric perforations secondary to drowning are rare, with only one case reported previously [11].

Even rarer are injuries of the GE junction. Schellenberg et al. contributed the largest series of 28 patients with GE junction injuries [1]. The mean age in their series was 26 years. Mechanism of injury was penetrating in 27 (96%) patients, of which the majority were gunshot wounds (n = 22, 81%), followed by stab wounds (n = 5, 19%). Twenty-six patients (93%) had other associated injuries including liver (57%), diaphragm (43%) and splenic injuries (32%). All patients were taken to the OR. Twenty-two (79%) underwent primary repair, four underwent damage control surgery with delayed reconstruction and two patients underwent partial gastrectomy only. A mortality rate of 25% was observed. All injuries were full

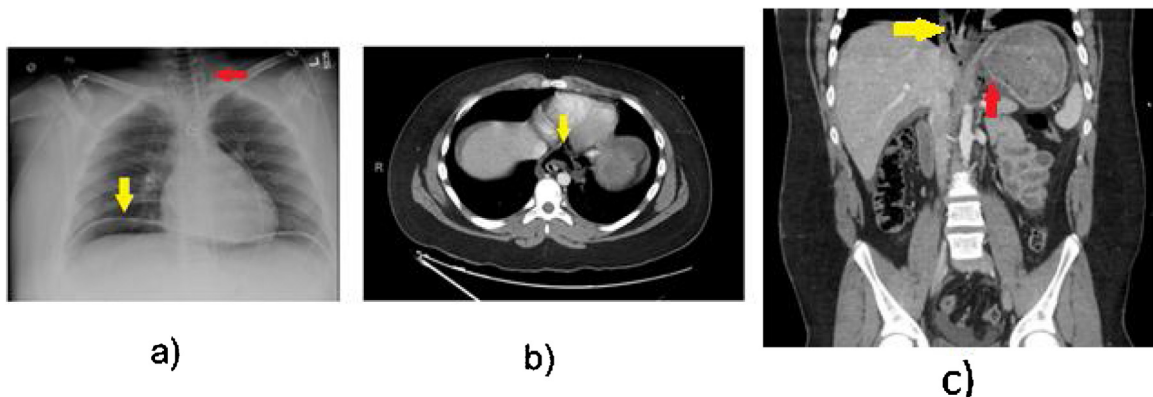
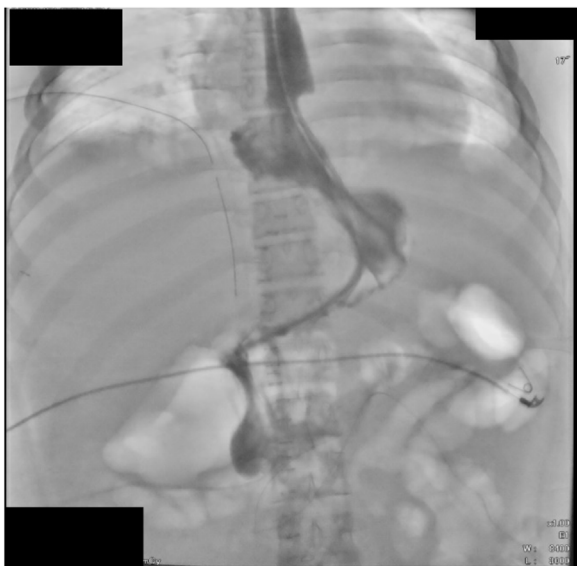


Fig. 2. a; Chest X ray showing pneumoperitoneum (yellow arrow) with air extending to the neck (red arrow), b; CT scan showing pneumomediastinum (yellow arrow), c; Pneumomediastinum (yellow arrow) and intraabdominal free fluid (asterisk).



**Fig. 4.** Final contrast study showing no contrast extravasation from the anastomosis and distal passage of contrast.

thickness with a mean length of 3 cm. It is not reported if any of those injuries were complete avulsions.

Compared to the adult population, only three cases of GE junction injuries are reported in children, to the best of our knowledge [2–4]. All of them were secondary to blunt trauma and had complete avulsion of the GE junction. In the first case, a primary reconstruction was performed and unfortunately the patient died on day four [2]. In the second and the third case, proximal diversion and delayed reconstruction were performed. Both patients had favorable outcomes [3,4].

Our case is novel due to its interesting mechanism of injury and management. What made this case more interesting was that a surgical proximal diversion such as an esophagostomy or spit fistula was not created, and he was managed with a nasogastric tube for 5 months for proximal diversion and venting. This saved the patient from the morbidity of a cervical esophagostomy.

#### 4. Conclusion

In conclusion, complete GE junction injuries and avulsions are rare with limited data to guide management. These injuries are associated with mortality rates from 25% to 33%, therefore, high index of suspicion, prompt recognition and careful surgical planning is needed for favorable outcomes. In cases where the esophagus and stomach are left in discontinuity, NG tube management of oral secretions may be considered.

#### Declaration of Competing Interest

The authors report no declarations of interest.

#### Funding

AA, BN, MA, KBJ and ST have no sources of funding for this research.

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#### Ethical approval

Being a case report, this study is exempt for any ethical approval.

#### Consent

Written informed consent was obtained from the patient's parents for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

#### Author's contribution

All authors meet criteria for authorship.  
 Study concept or design: AA, ST.  
 Data collection, analysis, interpretation: AA, MA, BN.  
 Writing: AA, BN, ST, KBJ.  
 Review and Revision: ST, KBJ, AA.

#### Registration of research studies

N/A.

#### Guarantor

Sifrance Tran.

#### Provenance and peer review

Not commissioned, externally peer-reviewed.

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