Picture Story

Gastric volvulus in a child with diaphragmatic eventration presenting with respiratory distress

***Kaushalya Pussegoda[1], Nayana Liyanarachchi[1], Rajith Jayasanka[1], Imalke Kankananarchchi[1], Tikiri Gunawardena[1], Janath Liyanage[1]**

Sri Lanka Journal of Child Health, 2023; **52**(3):368-370
DOI: http://doi.org/10.4038/sljch.v52i3.10417
(Key words: Diaphragmatic eventration, Gastric volvulus, Respiratory distress)

Introduction

An abnormal elevation of the intact diaphragm due to a developmental abnormality of the diaphragmatic musculature leads to eventration of the diaphragm, which leads to the displacement of abdominal contents into the thoracic cavity[1]. We report a gastric volvulus in a 16-month-old child with diaphragmatic eventration presenting with acute respiratory distress.

Case report

A 16-month-old boy was transferred to the paediatric casualty ward with a suspicion of aspiration. He developed sudden cough and cyanosis after being fed a vegetable soup. There was no history of vomiting or apnoea. He was grunting, tachypnoeic and oxygen saturation was 88% at the local hospital. He was transferred to tertiary care for further management. He was thriving well and had no respiratory symptoms in the past.

On admission to the tertiary care centre, the child was stable but tachypnoeic. His trachea was deviated to the right side and chest expansion of the left side was noted to be reduced; the air entry was reduced in the middle and lower zones of the left lung with a dull percussion note. There were no added sounds. Chest x-ray revealed a large lung cyst on the left side with a mediastinal shift and there was no pneumothorax. (Figure1).

[1]*Teaching Hospital Karapitiya, Sri Lanka*
**Correspondence:* pcgkaushalya@gmail.com
https://orcid.org/0000-0001-8074-0452

(Received on 09 December 2022: Accepted after revision on 20 January 2023)

The authors declare that there are no conflicts of interest
Personal funding was used for the project.

Figure 1: ***Chest x-ray showing elevated left hemidiaphragm & mediastinal shift to right***

The child underwent an urgent contrast-enhanced computed tomography (CECT) of the chest, which revealed a 10.4×6.9cm abdominal cystic structure within the left hemithorax in the background of diaphragmatic eventration. (Figure 2).

Figure 2: ***Contrast enhanced computed tomography of chest (Arrows indicate eventration of diaphragm)***

An upper gastrointestinal (GI) contrast study revealed organo–axial gastric volvulus with diaphragmatic eventration. (Figure 3)

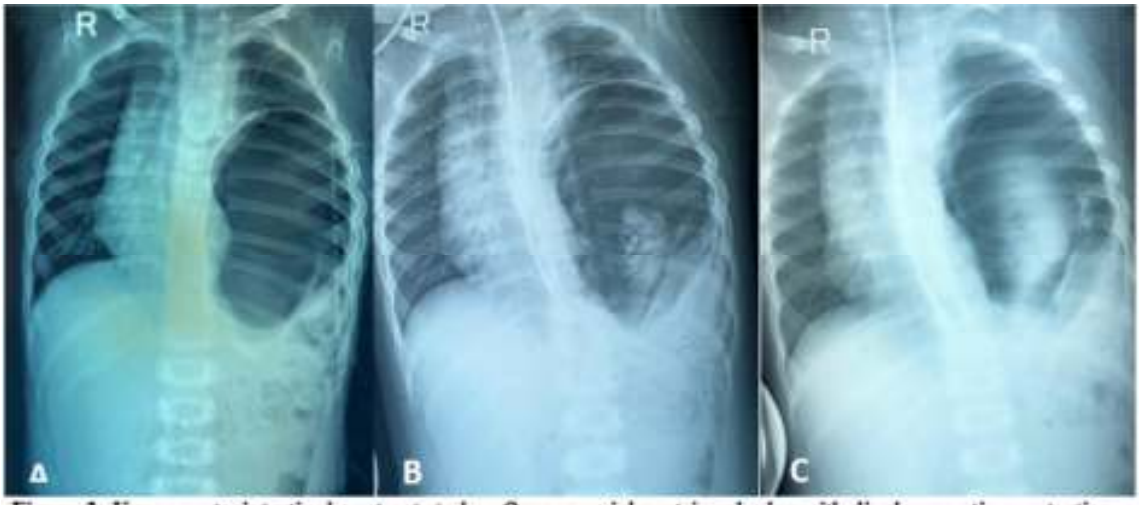

Figure 3: ***Upper gastrointestinal contrast study – Organo-axial gastric volvulus with diaphragmatic eventration***

A) Control film: There is left diaphragmatic eventration with a large thin-walled cystic lesion occupying left sub diaphragmatic region and upper abdomen with compression of left lung and mediastinal shift towards the right side. Gastroesophageal junction is lower than the expected position. The tip of the nasogastric tube is noted at the gastroesophageal junction.

B, C) Contrast films: Upper oesophagus is filled with contrast. Decreased air is noted within the remaining gastrointestinal tract. No characteristic beak is observed in the stomach. Marked gastric dilatation and slow passage of contrast material past the site of twisting are noted. These features are suggestive of organo-axial gastric volvulus

The child was stabilised before surgery and vital parameters were maintained within normal limits. He was kept nil orally, and gastric content was drained through a nasogastric tube. The diaphragmatic eventration was repaired through thoracoscopy. The spleen, stomach with omentum, transverse colon and small intestine, which were found in the thoracic cavity were pushed back into the abdomen. The child recovered uneventfully and was discharged home on the third postoperative day. Figure 4 shows the post-operative chest x-ray

Figure 4: ***Post-operative chest x-ray***

Discussion

Gastric volvulus is defined as an abnormal rotation of the stomach of more than 180° [2]. This creates a closed-loop obstruction that can result in incarceration and strangulation[2]. This abnormal stomach rotation can be primarily due to gastric ligament abnormalities or secondary to other congenital malformations[2]. Secondary gastric volvulus is commoner than primary gastric volvulus[3]. Eventration of the diaphragm, hiatus hernia, congenital diaphragmatic hernia, malrotation of the gut and traumatic diaphragmatic rupture predispose to developing secondary gastric volvulus[2]. Diaphragmatic defect is the commonest cause of secondary gastric volvulus[2].

Gastric volvulus is of two types depending on the axis around which the stomach rotates[1]. In organo-axial volvulus, the stomach rotates around an axis that connects the gastro-oesophageal junction and the pylorus. The antrum and the fundus of the stomach rotate in opposite directions so that the antrum changes position from inferior to superior[1]. This is the most common type of gastric volvulus and is usually associated with diaphragmatic defects[3]. In mesenteric-axial volvulus, rotation occurs along a vertical axis extending from the liver to greater curvature[1]. It is usually incomplete, occurs intermittently and vascular compromise is uncommon[1]. The symptoms are usually chronic, and the patients usually present without diaphragmatic defects[1]. In line with the above, our patient also had an organo–axial gastric volvulus.

Eventration of the diaphragm is defined as an abnormal elevation of an intact diaphragm and, most often, is characterized by a developmental abnormality of the diaphragm musculature[1]. It usually remains asymptomatic in early life[1]. Later, it presents with respiratory and occasionally, gastrointestinal complications[1]. The abnormally wide sub-diaphragmatic space provides the potential for abnormal rotation of the stomach around itself, leading to gastric volvulus[1, 4].

Diaphragmatic eventration is usually asymptomatic[1]. Symptoms of diaphragmatic eventration include early satiety, nausea, post postprandial vomiting, constipation, and epigastric discomfort[4]. GI symptoms are related to volvulus of the stomach with intermittent or complete outlet obstruction. The symptoms depend on the degree of gastric outlet obstruction[1]. The classic triad of symptoms is called the 'triad of Borchardt' comprising violent unproductive retching, epigastric distension, and inability to pass the nasogastric tube[1]. The child presenting to us did not have any respiratory or gastrointestinal symptoms until the current admission. The chest radiograph's gas-filled viscus in the lower chest or upper abdomen is a recognized finding of a gastric volvulus[2] which was the only clue in our patient to suggest a gastric volvulus. Diagnosis of gastric volvulus with diaphragmatic eventration is always challenging in situations with no classic symptoms. A thorough history, clinical examination, and radiological evidence would help diagnosis. Computerized tomography (CT) scan and upper GI contrast studies confirm the diagnosis[4].

Management of diaphragmatic eventration varies greatly depending on the age of the patient[1]. Diaphragmatic eventration may not require surgery if it does not intrude significantly into the thoracic cavity or is not associated with adverse symptoms[4]. However, treatment by plication is indicated if there are respiratory or gastrointestinal symptoms such as dyspnoea, recurrent pneumonia, chronic bronchitis, chest pain, poor exercise tolerance or functional disorders of the stomach[4].

Symptomatic gastric volvulus secondary to diaphragmatic eventration is a surgical emergency and always requires surgical repair[1]. Surgical correction of predisposing factors alone is sufficient to manage secondary gastric volvulus in children[2]. Our patient had an uneventful recovery with the repair of the diaphragmatic eventration. A careful clinical examination will guide the aetiological clues, prompt diagnosis, and appropriate management.

References

1. Atulugama N, Samarajeewa U, Kollure S. Eventeration of the diaphragm with a gastric volvulus. *Sri Lanka Journal of Surgery* 2011; **28**(2): 22. https://doi.org/10.4038/sljs.v28i2.3203

2. Gastric volvulus: Practice essentials, pathophysiology, aetiology. [cited 2022 Aug 21]. Available from: https://emedicine.medscape.com/article/2054271-overview

3. Zain M, Abada M, Abouheba M, Elrouby A, Ibrahim A. Acute intrathoracic gastric volvulus: A rare delayed presentation of congenital diaphragmatic hernia: A case report. *International Journal of Surgery Case Reports* 2020; **70**: 123–5. https://doi.org/10.1016/j.ijscr.2020.04.066 PMid: 32416482 PMCid: PMC7229233

4. Agarwal AK, Lone NA. Diaphragm Eventration. StatPearls [Internet]. 2022 May 9 [cited 2022 Aug 21] Available from: https://www.ncbi.nlm.nih.gov/books/NBK560497/