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SM Journal of Pediatric Surgery

Case Report

Self-Limiting Gastric Perforation after Diaphragmatic Hernia Repair: Iatrogenic or Pressure Necrosis?

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Article Information

Received date: Jan 23, 2019
Accepted date: Feb 06, 2019
Published date: Feb 08, 2019

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Keywords Congenital diaphragmatic hernia; Abdominal compartment syndrome; Gastro-cutaneous fistula; Wound closure

Abstract

Neonates with large diaphragmatic defects and small abdominal cavity may require an abdominal wall patch or open wound care or only skin closure to prevent abdominal compartment syndrome. Various problems described in literature due to abdominal wound closure under tension. We present a unique, self-limiting complication in a neonate after repair of congenital diaphragmatic hernia. Difficult abdominal wall closure resulted in part of anterior gastric wall necrosis and perforation. Other thoughts for this complication were iatrogenic injury or necrotizing enterocolitis; discussed here.

Introduction

In neonatal Congenital Diaphragmatic Hernia (CDH) repair; if abdominal wound is closed under tension, it may pose the problem of abdominal compartment syndrome (ACS) [1]. An abdominal wall patch or open wound care or only skin closure may be needed to prevent ACS in neonates with large diaphragmatic defects and a small abdominal cavity. A median laparotomy approach is usually preferred in severely affected children for this reason. Various problems described in literature due to abdominal wound closure under tension [1].

Here we present a rare complication of anterior gastric wall necrosis and perforation probably due to abdominal wound closure under tension in a neonate. Fortunately, it was self-limiting and healed by conservative management. Other thoughts of this complication were iatrogenic injury or necrotizing enterocolitis; discussed here.

Case Report

A 2 days old, male child weighing 2.25 Kg was presented with respiratory distress and peripheral cyanosis since birth. He was full term and delivered by Caesarian. General condition was low with respiratory rate of 68/min and peripheral cyanosis. He has acidosis on blood gas evaluation and oxygen saturation was <80%. There was no air-entry in left-side of chest and X-ray Chest showed bowel loops in thorax. He was intubated and resuscitated on ventilator. After initial stabilization, he was operated through left subcostal incision. There was large postero-lateral diaphragmatic defect and small bowel along with large bowel, spleen, left lobe of liver and stomach were lying in thorax. Contents were reduced into abdomen and malrotation was corrected. Diaphragmatic defect was closed without prosthesis under tension and intra-thoracic drain was placed. Subcostal incision closure was real challenge and it was closed under tension. Patient was electively ventilated for 96 hours and nasogastric feed was started after 4 days.

Wound collection was noticed on day 6th and a skin suture was removed. After a day, there was free leak of milk (feed) though wound without any sign of peritonitis or sepsis (Figure 1). Patient was kept nil per oral with nasogastric aspiration for next 5 days. During this period, total Parental nutrition was given. On day 12, dye study was performed which was normal without any evidence of leak (Figure 2). Oral feeding was re-started and patient was discharged on day 16th on full oral feed. Patient is on regular follow-up from last one year and gaining weight and height.

Discussion

Among the patients with left-sided CDH, more than 30% had the spleen herniated into the chest. Surgery can either be performed via an open abdominal (and possibly thoracic) approach or with minimally-invasive methods (laparoscopy, thoracoscopy) [1-3]. After initial stabilization, surgical repair is the only option. Abdominal closure in CDH patient is difficult in some cases. Too tight abdominal closure may result in Abdominal Compartment Syndrome (ACS) and may increase the duration of ventilatory support. The term "ACS" represents the pathophysiological consequences of a raised intra-abdominal pressure, including effects on lung compliance and ventilation, a critical

Figure 1: Post-operative pictures showing gastro-cutaneous fistula with seepage of milk (feed) through infected wound.

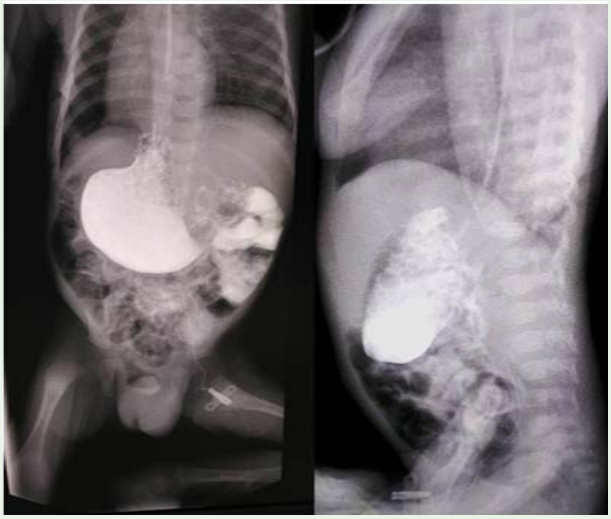

Figure 2: Upper GI-contrast study showing distended stomach without dye leak.

reduction in the perfusion of the intra-abdominal organs, leading to oliguria, renal impairment [4].

Temporary closure and use of prosthesis for abdominal wound closure are described in literature with emphasis on prevention of abdominal compartment syndrome [5] but inability to close abdominal fascia is associated with increased morbidity. While ACS in neonates after CDH repair is rare (<1%), delayed fascial closure is required relatively commonly (>10%) and is usually associated with right-sided diaphragmatic hernias [1,4]. In open surgery, there is a risk for intestinal obstruction due to adhesions and abdominal closure under tension may lead to ischemic necrosis of organs [1-5].

Our patient had difficult abdominal wound closure under tension because of less abdominal space. Probably, pressure over anterior gastric wall by parietal wall causes part of anterior gastric wall necrosis and perforation. Packed abdominal organs and in-between adhesions with high intra-abdominal pressure prevented the seepage of feed into abdominal cavity and saved the child to develop peritonitis. Skin and fascial incision over stomach made a low pressure zone leading to gastro-cutaneous fistula. Early detection and prompt conservative measure resulted in favorable outcome. It is a rare complication and could not found in literature.

In a study of 349 patients with CDH, only 0.8% patients were diagnosed to develop ACS, while 12% patients underwent for delayed fascial closure (DFC). Patients more often had right-sided defects (26% *vs* 13%, p=0.04) needed patch repair (41% *vs* 31.2%, p=0.23). Patients with ACS or DFC had increased length of stay (47.5 *vs* 33.9, p=0.01), and days on mechanical ventilation (16.3 *vs* 9.0, p=0.001) [1].

There were fair chances of iatrogenic injury to anterior gastric wall during closure of wound. But, iatrogenic injuries are usually present early in post operative period while in this case, gastrocutaneous fistula was observed after 24 hour of removal of sutures. Possibility of necrotizing enterocolitis induced perforation was excluded because isolated gastric perforation due to necrotizing colitis is quite rare and there were no signs of sepsis.

Conclusion

Abdominal wound closure under tension may raise abdominal pressure enough to cause vascular compromise and necrosis to abdominal organs after CDH repair. Prompt diagnosis and appropriate action needed for successful outcome.

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Citation: Kumar B, Upadhyaya VD, Singh A and Kirti MN. Self-Limiting Gastric Perforation after Diaphragmatic Hernia Repair: Iatrogenic or Pressure Necrosis? SM J Pediatr Surg. 2019; 5(1): 1077.