

## CLINICAL VIGNETTE

# Intermittent Colonic Obstruction: A Delayed Complication of Traumatic Diaphragmatic Hernia

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Traumatic diaphragmatic injuries are hard to diagnose and may be missed at the time of trauma. We present a case of recurrent abdominal pain and colonic obstruction due to undiagnosed traumatic diaphragmatic laceration at the time of trauma and will review causes, diagnosis and treatment of diaphragmatic injuries.

### Case

A 50-year-old male was admitted with an acute onset of severe epigastric pain. Two years earlier, while bicycling he was hit by a car resulting in multiple fractures: facial, scapular, lumbar and left ribs. Since the accident he had complained of persistent lower back pain despite chronic oxycodone. His past history also included Gilbert's disease, without other significant family or social history. He also reported recurrent mild to moderate and occasionally severe epigastric pain lasting several hours. An abdominal CT scan 2 months before admission was negative except for post-traumatic changes in the left lower chest. Recent endoscopy and colonoscopy were also normal. No obvious cause had been found for his recurrent abdominal pain, which was severe and resulted in ED visit. He was in severe pain with vitals: afebrile, BP 150/83, P 55/min and RR16/min. His exam was remarkable for moderate epigastric tenderness without other significant findings and he received intravenous hydro-morphone for analgesia. Initial labs included: WBC 7.1, Hgb 15 g, Hct 46.5%. Chemistries were normal except for bilirubin of 2.3 mg/dl consistent with his Gilbert's disease. Transaminases, lipase and amylase were normal.

Another CT scan of abdomen and pelvis with intravenous contrast only demonstrated an air filled dilated cecum, ascending and transverse colon up to the splenic flexure and post traumatic changes in the left lower chest. There was no dilation of the descending colon, sigmoid colon or rectum, which all appeared normal (Figure 1). The findings were suggestive of colonic obstruction near the splenic flexure and a gastrograffin enema was then obtained. It revealed splenic flexure colonic herniation through a diaphragmatic defect into left chest cavity (Figure 2). He underwent open exploratory laparotomy and was found to have a 3 cm posterior left traumatic diaphragmatic hernia, colon herniation and focal colon volvulus within the traumatic diaphragmatic hernia. The hernia was reduced and the diaphragmatic defect was repaired. His final discharge diagnosis was intermittent colonic herniation

causing intermittent obstruction due to traumatic diaphragmatic hernia. Since the surgery, the patient's pain has completely resolved.



Figure 1



Figure 2

### Discussion

Diaphragmatic rupture is uncommon. Less than 1% of all traumatic injuries result in diaphragmatic rupture.<sup>1</sup> Diaphragmatic rupture is usually associated with other thoracic or abdominal

injuries. Diaphragmatic rupture when associated with herniation of abdominal organs into the chest cavity is called traumatic diaphragmatic hernia. Diaphragmatic rupture can be caused by blunt abdominal or chest trauma, penetrating injury, or iatrogenic, associated with complications of medical procedures or abdominal or thoracic surgery. Penetrating injuries such as stabbing and gunshots accounts for almost 65% of all diaphragmatic rupture. Any penetrating injury from the level of T4 to T12 has potential to rupture the diaphragm. Abdominal contents may not herniate into the chest cavity at the time of injury but may do so at a later date. About 35% of diaphragmatic rupture is due to blunt trauma.<sup>2</sup> Motor vehicle collisions are responsible for 90% of blunt diaphragmatic rupture with the rest largely from falls or crush injuries.<sup>3</sup>

Normal intraperitoneal pressure ranges from +2 to +10 cm water. Normal intrapleural pressure is from -5 to -10 cm water. Thus the normal pleuroperitoneal gradient is +7 to +20 cm water. In blunt chest or abdominal trauma, this gradient can be as high as +150 to 200 cm water which is enough force to rupture the diaphragm.<sup>4</sup> The left diaphragm is 2-3 times more likely to rupture as compared to right side. The liver may provide cushioning for the right diaphragm.

Clinical presentation of the patient depends on the extent of diaphragm injury. Contusion of diaphragm may not cause any symptoms. A large laceration may result in herniation of abdominal contents into the chest cavity. Patients may have diminished breath sounds, respiratory distress, bowel sounds in the chest and herniation of abdominal organs into chest cavity resulting in intestinal obstruction or sepsis. Untreated diaphragmatic rupture tends to become larger with time. Delayed symptoms of diaphragmatic injury include abdominal pain and herniation of abdominal organs into chest cavity, especially on left side. Herniation of bowel into the chest cavity, may result in bowel obstruction symptoms.

Initial diagnosis of diaphragmatic injury can be difficult, especially when other severe injuries are present. Chest X-ray is unreliable and has low sensitivity and specificity. Use of ultrasound for diaphragmatic injury is not standardized and a negative study does not exclude diagnosis. CT scan of chest is more accurate than chest X-ray and may reveal abdominal contents in the chest cavity but no specific findings establish the diagnosis. Laparotomy may miss up to 15% of diaphragmatic ruptures. Thoracoscopy is more reliable than laparotomy, especially for traumatic diaphragmatic hernia.

Treatment of diaphragmatic rupture is surgery. Complications of diaphragmatic rupture include herniation of abdominal contents into chest cavity, diaphragm paralysis and pulmonary complications. Prognosis is generally good if rupture is surgically repaired. Mortality from diaphragmatic rupture due to blunt trauma ranges from 15-40% and from penetrating injury is 10-30%. Accompanying injuries from penetrating or blunt trauma play a major role in determining outcome.<sup>5</sup>

## Conclusion

Traumatic diaphragmatic injuries are hard to diagnose and may be missed at the time of trauma.<sup>6</sup> Patients presenting with unexplained abdominal pain, with a past history of blunt or penetrating abdominal or thoracic trauma, should be evaluated for possible missed rupture of diaphragm and traumatic diaphragmatic hernia. Intermittent herniation of abdominal contents into chest cavity causing intermittent intestinal obstruction should be considered in these patients.

## REFERENCES

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Delayed traumatic diaphragmatic hernias are not common, but can lead to serious consequences once occurred. Early detection of diaphragmatic injuries is crucial to prevent the occurrence of dTDHs. Surgeons should maintain a high suspicion for injuries of the diaphragm in patients who had suffered abdominal or lower chest traumas, especially during the initial surgical explorations. Bochdalek diaphragmatic hernia (DH) is an anatomic defect in the posterolateral aspect of the diaphragm that allows abdominal viscera to herniate into the thorax. Although this condition usually presents in the neonatal period with severe respiratory distress, late presenting DH has been described by a number of authors, mainly as case reports.<sup>1-9</sup> Incidence ranges from 5% to 25% of all DH.<sup>6,8</sup> Outcome is generally favourable, however previous reports from the 1970s and 1980s describe a high incidence of misdiagnosis associated with significant morbidity and mortality.<sup>1, 2, 5, 6</sup> The pathophysiology of this phenomenon is not clear. Intermittent diaphragmatic hernia of Bochdalek: report of a case and literature review. *Pediatrics* 1982;69:601-4. [OpenUrl Abstract/FREE Full Text](#). Keywords: Diaphragmatic hernia; Intrapericardial cavity; Complications; Bowel obstruction. Introduction. The diaphragmatic injury is uncommon and it could be the consequence of blunt or penetrating thoracoabdominal trauma. Traumatic hernia of the diaphragm is a rare but serious complications of blunt or penetrating thoraco-abdominal. Figure 1 Abdominal X-ray show, multiple distension of small intestine loop and cecum and ascending colon. Pelvic fixator. pain, intermittent vomiting with or without distension, gurgling in the chest, and weight loss [1,2,8,10]. The pathogenesis of traumatic diaphragmatic hernia-associated respiratory compromise is highly complex and depends on factors ancillary to the simple loss of diaphragmatic function; however, the results are dyspnea, hypoxemia, and acidosis. Diagnosis. Although respiratory dysfunction (i.e., dyspnea, tachypnea, cyanosis) is the most common presenting sign of traumatic diaphragmatic herniation, some animals may present with minimal respiratory compromise. In extreme situations, temporary mesh grafting may be considered to allow postoperative stretching and facilitate a delayed primary closure. Alternatively, splenectomy can liberate abdominal volume to facilitate primary closure. Reperfusion Injury and Reexpansion Pulmonary Edema.