

CASE REPORT*Volume 9 Issue 4****Successful Surgical Outcome after Traumatic Diaphragmatic Intra-Pericardial Herniation from Blunt Abdominal Injury*****Tyler Bayliss, BS¹, Paul Bown, MD, FACS¹,
Mark Cooper, MD, FACS¹****ABSTRACT**

Intrapericardial diaphragmatic hernia (IPDH) is a rare manifestation of non-hiatal diaphragmatic hernias (NHDH). Intrapericardial diaphragmatic hernia is defined as the prolapse of the abdominal viscera into the pericardium through the diaphragm. Their incidence has increased over the last 50-60 years, secondary to high-speed transport, and constitutes 5% of major thoracic and abdominal trauma today. These injuries can present during the initial workup or months after the initiating injury. These hernias can be caused by both blunt and penetrating trauma with concomitant central tendon rupture and pericardial laceration. We report an interesting case of intrapericardial diaphragmatic hernia with delayed presentation that was successfully reduced via open surgical repair after a laparoscopic repair attempt failed. We present a 77-year-old female admitted to the hospital after a motor vehicle crash. On hospital day 9, the patient developed shortness of breath, which prompted a chest x-ray. The chest x-ray revealed bowel in the patient's chest. The patient was taken to the operating room, where they underwent an attempted laparoscopic diaphragmatic hernia repair and, ultimately, open repair of the diaphragmatic hernia. The patient did well after surgery and was discharged on post-injury day 22.

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KEYWORDS

Trauma, Diaphragmatic Hernia, Thoracic Surgery, Pericardium

INTRODUCTION

Nonhiatal diaphragmatic hernias (NHDH) are rare complications and manifestations of trauma. However, their incidence increased over the mid-century due to high-speed transport and is currently 3-7% in trauma cases.¹ An even rarer form of NHDH is an intrapericardial diaphragmatic hernia (IPDH), defined as the prolapse of the abdominal viscera from the peritoneal cavity into the pericardium. Most are believed to be caused by blunt or penetrating trauma associated with central tendon rupture and pericardial laceration, though they can also be caused iatrogenically.² The condition often presents with symptoms of bowel obstruction, such as abdominal discomfort, nausea, and/or vomiting. Presentation can be within hours to years post-traumatic event.^{3,4} Later presenting symptoms may be mistaken for

gallbladder diseases, peptic ulcer disease, or bowel obstruction.⁵

This case report depicts an abnormal presentation of IPDH as it was delayed with primary pulmonary symptoms that can be misleading in the clinical setting. Given the involved organs and surrounding structures, the primarily pulmonary manifestation of the hernia symptoms is not atypical. However, in a delayed context, the examiner may be led to think about more common etiologies, such as pulmonary embolisms or sudden cardiac injury.

CASE PRESENTATION

The patient was a 77-year-old female who presented to the emergency department after a motor vehicle



collision with a chief complaint of back pain, rib pain, and pain on palpation to the pelvis. No obvious injuries were noted on primary examination. Further workup was notable for abdominal wall hemorrhage, probable right adrenal hemorrhage, and extensive fracture burden of the sacrum, pubic rami, and ribs. The patient had a minute left pneumothorax. Notably, cardiac and mediastinal silhouettes were within normal limits. The patient was transferred to the ICU for observation.

Three days after presentation, there was interval development of small bilateral pleural effusions with associated bibasilar opacities. The patient's other injuries were unchanged or improved. The patient was deemed stable and sent to the floor from the ICU. Four days after presentation, moderate bilateral pleural effusions were seen, with atelectatic changes noted in the lower lobe. These were thought to be pneumonias in the lower lobes. The pleural effusions seen on previous imaging had increased in size. By hospital day 7, the patient continued to improve, though she displayed asymptomatic mild abdominal distention, and discharge to a rehab facility was planned.

Nine days after admission to the hospital, the patient became tachycardic and reported increased difficulty breathing, prompting workup with a new chest x-ray, which showed a large diaphragmatic hernia, initially thought to be a poorly timed presentation of a Morgagni hernia due to its anterior position. An erect PA lateral chest x-ray was used to confirm the diaphragmatic hernia. Ten days after her injury, the patient developed shortness of breath and evidence of abdominal pain. A repeat chest x-ray showed bowel within the left chest consistent with an acute diaphragmatic hernia, and the patient was scheduled for surgery.

The following day, the patient underwent laparoscopic reduction of the hernia. The bowel was found to be herniated into the chest cavity, with the diaphragmatic defect encompassing one-half of the left side of the diaphragm. As the small bowel was manually reduced from the chest cavity, the bowel was seen entering the mediastinum, just left of the central tendon, and extended above the heart. The heart was then directly visualized through the defect, indicating that the hernia defect included

a portion of the pericardium. Multiple attempts at continued reduction of the herniated contents during repair of the diaphragm were unsuccessful due to the patient's significant obesity and dilation of the bowel. The surgery was then converted to an open procedure for better visualization. Median sternotomy was performed to visualize the defect better and improve access to the affected organs. The defect itself was not enlarged due to an increased risk of iatrogenic bowel perforation and a reduced need for defect enlargement, as the open technique provided ample visualization and access. The diaphragm was closed in the usual fashion, including running suture. The abdominal port sites and sternotomy were closed in the usual fashion. After closure, the patient remained intubated and was taken to the intensive care unit for further observation.

DISCUSSION

This case is interesting for the following reasons: delayed presentation, traumatic herniation into the pericardium, invasive procedure to gain better exposure, and successful recovery despite extensive trauma and critical condition. As a main takeaway, this case demonstrates that IPDH is associated with highly successful outcomes.^{3,6}

IPDH is not a variety of the congenital Morgagni's hernia but a sacless hernia directly through a tent in the pericardial portion of the diaphragm's central tendon. If not properly treated, life-threatening necrosis and/or perforation of the herniated contents may occur. Thus, it is important to secure the correct diagnosis. Imaging using chest x-ray or chest CT is preferred to avoid missing the diagnosis. Findings can vary and may present as extraneous gas bubbles or homogenous densities within the heart shadow on anteroposterior and lateral plain films, which may cause apparent pneumopericardium or variable cardiac silhouette. The tip of a nasogastric tube may rest within a supradiaphragmatic portion of the stomach, overlying the cardiac silhouette, and barium upper and lower gastrointestinal fluoroscopy may demonstrate opacification of intrapericardial organs. Due to the potentially life-threatening nature of IPDH, surgical repair via laparoscopy is desirable.⁷



Currently, the standard treatment for diaphragmatic hernias involves the reduction of the hernia back through the defect laparoscopically.¹ These repairs are typically done in similar fashions to any other diaphragmatic hernia, as reflected in our case. What makes our case different is that a similar reduction of the hernia was performed in the pericardial space, indicating it may be safe to do so when the situation arises. Nonetheless, there is some debate regarding the ideal approach for repairing these hernias if there is a degree of pleural involvement, with transabdominal being the most widely accepted. The transabdominal approach provides direct exposure to the abdominal viscera. Its only true disadvantage is that exposure of the right hemidiaphragm can be limited should it require repair. If the right hemidiaphragm needs repair, right-sided thoracotomy may be required. Repair is affected by closure of the defect with a nonabsorbable suture, but the pericardial diaphragm can be satisfactorily sutured.³

This case underwent successful hernia reduction and closure using the standard of care. The patient spent more time in the hospital for recovery after the hernia reduction and was discharged to an outpatient physical rehabilitation facility on post-op day 12 hospital day 22. Thankfully, the delayed presentation occurred while the patient was still admitted to the hospital, allowing the medical team to initiate care immediately.

CONCLUSION

Traumatic non-hiatal hernias and those into the pericardium are scary diagnoses but more treatable than one may initially think. Early recognition is essential to the medical outcomes of IPDH and is associated with highly successful and rapid recovery outcomes, as seen in our case.

AUTHOR AFFILIATIONS

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