

Transdiaphragmatic Intercostal Hernia: A Case Report

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Abstract

Background: Transdiaphragmatic Intercostal Hernia (TDIH) is an uncommon hernia occurring through a defect in the diaphragm and intercostal space. The etiology of both diaphragmatic and intercostal hernias can be traumatic, acquired, or congenital. Diaphragmatic hernias may be repaired from an abdominal or thoracic approach while intercostal hernias are generally repaired through a thoracotomy.

Case presentation: A 63-year-old male with a background of Chronic Obstructive Pulmonary Disease (COPD), Myocardial Infarction (MI), heart failure, and Pulmonary Embolism (PE) presented with right-sided abdominal pain and dyspnea for one week. The patient was found to have a transdiaphragmatic intercostal hernia. The patient underwent laparoscopic transdiaphragmatic intercostal hernia reduction and repair of the diaphragmatic defect. A right anterolateral thoracotomy was performed to repair the intercostal hernia. The patient has been seen in follow-up with no evidence of recurrence.

Conclusions: This patient presented with a unique pathology requiring a thoracoabdominal approach to repair his transdiaphragmatic intercostal hernia. Clinicians should maintain a high level of suspicion when evaluating patients with abdominal pain, dyspnea, and chest wall bulge to avoid delay in diagnosis and treatment of a transdiaphragmatic intercostal hernia.

Keywords: Transdiaphragmatic intercostal hernia • Diaphragmatic hernia • Intercostal hernia • Thoracotomy • Laparoscopic diaphragmatic hernia repair

Introduction

Transdiaphragmatic Intercostal Hernia (TDIH) is an uncommon hernia occurring through a defect in the diaphragm and intercostal space [1,2]. Most recent comprehensive reviews of the literature have identified up to 42 cases of TDIH [3-6]. The etiology of diaphragmatic and intercostal hernias can be traumatic or congenital [7-12]. Diaphragmatic hernias may present from penetrating or blunt trauma acutely, months, or years after the injury. Half may remain asymptomatic with complications several years later [13-15]. Diaphragmatic rupture from blunt trauma may occur in 0.8%-1.6% of those admitted to the hospital [16].

Case Presentation

A 63-year-old male with a background of Chronic Obstructive Pulmonary Disease (COPD), Myocardial Infarction (MI), heart failure, and Pulmonary Embolism (PE) presented with right-sided abdominal pain and dyspnea for one week. The patient was a daily smoker of Prednisone, Aspirin, and Rivaroxaban with no history of trauma. Initial examination revealed right-sided abdominal and chest wall tenderness with a reducible soft mass over the right lower ribs. This presentation prompted further imaging workup including a Chest X-Ray (CXR) shown in Figure 1.

Computerized Tomography Chest-Abdomen-Pelvis (CT CAP) was then performed which revealed a diaphragmatic defect with a large amount of intraperitoneal fat herniating through the right hemithorax and into the 8th intercostal space as seen in Figure 2.

Given the patient's history of cardiopulmonary disease pre-operative optimization was performed.

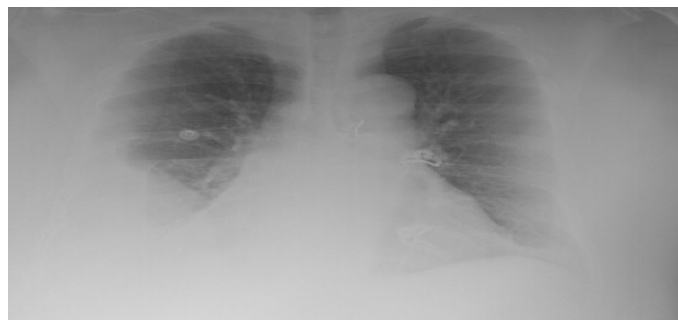


Figure 1. Chest x-ray showing opacification of the right lower lung and blunting of the right costophrenic angle.

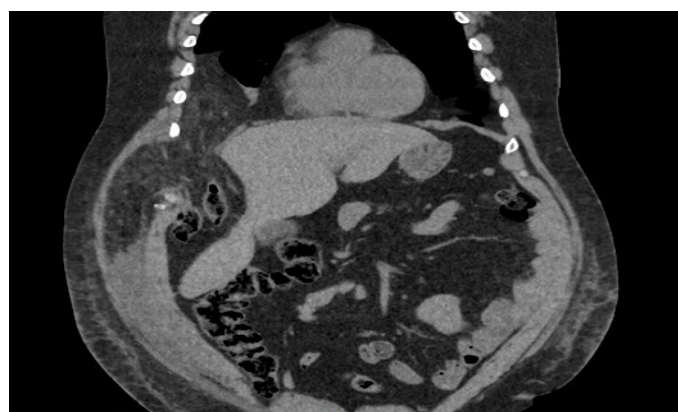


Figure 2. Coronal CT CAP. Presence of greater omentum herniating through a right-sided transdiaphragmatic defect and ascending cephalad into the 8th intercostal space.

The patient underwent laparoscopic TDIH repair. The greater omentum was reduced into the abdominal cavity and the diaphragmatic defect was closed with interrupted 0-Ethibond sutures. A right anterolateral thoracotomy was performed over the intercostal hernia which was closed with multiple interrupted number 1-PDS figure of 8 sutures. A 20 Fr thoracostomy tube was placed in the 4th-5th intercostal space. The patient's postoperative course was complicated by hypoxia requiring intermittent Bilevel Positive Airway Pressure (BiPAP) therapy. The patient has been seen in follow-up with no evidence of recurrence.

Discussion

Diaphragmatic hernias may be repaired from an abdominal or thoracic approach. Prior studies have shown no difference in hospital Length of Stay (LOS), mortality, ventilator days, and postoperative complications based on the operative approach for a diaphragmatic hernia repair [17]. Furthermore, a review paper by the Eastern Association for the Surgery of Trauma concluded that no recommendation could be made regarding the best approach for the repair of delayed diaphragmatic hernias [18]. Given the small size of the diaphragmatic defect in this patient, a mesh was not used.

When evaluating a patient with a palpable chest wall bulge surgeons must consider a wide differential diagnosis including chest wall hematoma, soft tissue mass, displaced rib fracture, or intercostal muscle rupture [19]. Given the patient's equivocal CXR findings a CT CAP was performed which was diagnostic for a TDIH. CT CAP is the test of choice for TDIH given its overall sensitivity and specificity of 70%-100% [20,21].

The etiology of this patient's intercostal hernia is secondary to excessive coughing from his chronic lung disease and use of corticosteroids [22-24]. It has been shown that the cough mechanism involves opposing muscle forces acting on the ribs and chest wall which can lead to muscle tears [12,25]. Intercostal hernias resulting from violent coughing episodes

can occur although this is infrequent [4,23]. These hernias can also occur secondary to penetrating or blunt trauma. Furthermore, they may be iatrogenic after thoracotomy or tube thoracostomy [26]. Given the overall paucity of information regarding the optimal treatment of TDIH classification systems have been proposed including the creation of the "Sheffield Classification" to guide appropriate surgical repair [27].

Complications of diaphragmatic hernia can include gastrointestinal and respiratory symptoms. This patient's TDIH contained omentum therefore he did not present with symptoms of bowel obstruction, liver necrosis, gastric volvulus, or other gastrointestinal findings. He did have shortness of breath secondary to the space-occupying effect of the omentum in his pleural space.

Conclusion

This patient presented with a unique pathology requiring a thoracoabdominal approach to repair his TDIH. Clinicians must maintain a high level of suspicion when evaluating patients with abdominal pain, dyspnea, and chest wall bulge to avoid delay in diagnosis and treatment of a TDIH.

Declaration

Not applicable

List of Abbreviations

Transdiaphragmatic Intercostal Hernia (TDIH), Computerized Tomography Chest-Abdomen-Pelvis (CT CAP), Chest X-Ray (CXR), Chronic Obstructive Pulmonary Disease (COPD), Myocardial Infarction (MI), Pulmonary Embolism (PE).

Ethics approval and consent to participate

Franciscan Research Administration (FRA)/IRB approval granted.

Consent for publication

Informed consent was obtained from the patient for the publication of this case report and accompanying images.

Availability of data and material

Not applicable.

Conflicts of interests/competing interests

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Author's contributions

All authors contributed equally to the planning and creation of this work.

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