

The Role of Imaging in Diagnosis and Management of Diaphragmatic Hernia with Intestinal Occlusion: A Case Report

M. MAHIR¹, A. ZIDANI¹, B. SLIOUT¹, S. BELASRI¹, N. HAMMOUNE¹ & MOUHSINE¹

¹ Radiology Department, Avicenne Hospital, Faculty of Medicine of Marrakech, University Cadi Ayyad, Morocco

Correspondence: M. MAHIR, Radiology Department, Avicenne Hospital, Faculty of Medicine of Marrakech, University Cadi Ayyad, Morocco.

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Abstract

A diaphragmatic hernia is a condition characterized by a communication between the abdominal and thoracic cavities, with or without abdominal contents in the thorax. Diaphragmatic hernia with intestinal occlusion is rare and presents a significant diagnostic challenge that requires accurate and timely diagnosis for effective management. This article discusses the importance of various imaging modalities in diagnosing diaphragmatic hernia, particularly in identifying intestinal occlusion. Early recognition of this condition is crucial to prevent complications and improve patient outcomes.

Keywords: diaphragmatic hernia, intestinal occlusion, CT scans

1. Case Report

A 76-year-old male patient presented to the surgical casualty department with severe abdominal pain, cessation of bowel movements and gas for the past six days and vomiting for the past three days. The patient had a history of chest trauma dating back thirty-five years, without any consultation or further complementary examination. On admission, the patient appeared restless and grossly dehydrated, with tachycardia and a weak pulse. Abdominal examination revealed distension, generalized tenderness, and increased bowel sounds. Chest and upper abdominal X-rays showed multiple air-fluid levels in the right hemithorax, non-delineation of the right hemidiaphragm, and haziness of the left lung base (Figure 1). A CT scan of the whole abdomen revealed a dilated loop of the intestine from the duodenojejunal flexure to the hepatic flexure. The omentum, terminal 30cm of the ileum, right half of the transverse colon with the hepatic flexure, had herniated into the right hemithorax through an 8.6cm posterolateral defect in the right dome of the diaphragm (Figure 2), suggestive of intestinal obstruction. After resuscitation, the patient underwent emergency explorative laparotomy through a midline incision. The hernia was reduced by gentle traction and sharp and blunt dissection. The entire length of the gut was congested, and a segment was found to be non-viable, requiring resection and anastomosis. A defect was observed in the posterolateral aspect of the right dome of the diaphragm, which was repaired using a non-absorbable polypropylene mesh. The patient had an uneventful recovery postoperatively.



Figure 1. Chest and upper abdominal X-ray showing multiple air-fluid levels in the right hemithorax and non-delineation of the right hemidiaphragm

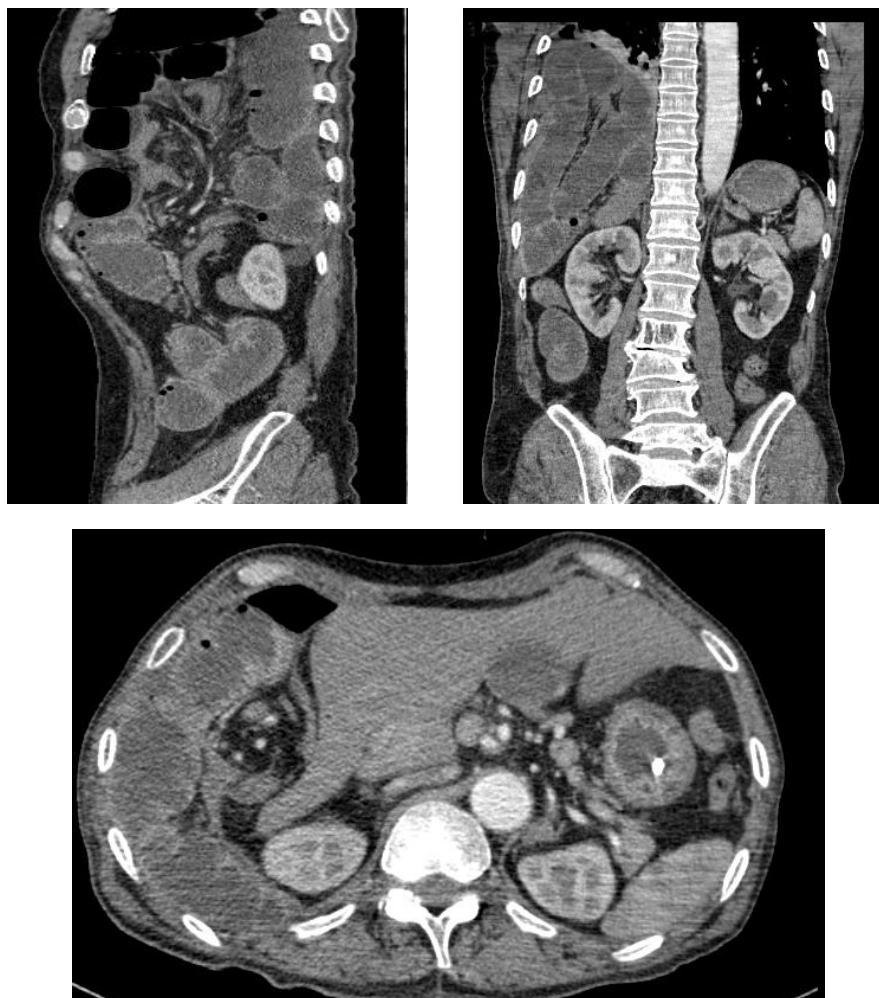


Figure 2. CT scan of the whole abdomen revealing a dilated gut loop from the duodenojejunal flexure to the hepatic flexure, suggestive of intestinal obstruction. The omentum, terminal 30cm of the ileum, right half of the transverse colon with the hepatic flexure, had herniated into the right hemithorax through an 8.6cm posterolateral defect in the right dome of the diaphragm

2. Introduction

Diaphragmatic hernia occurs when abdominal organs protrude into the thoracic cavity through an anatomical

defect in the diaphragm. It can be congenital or acquired, with or without abdominal contents in the thorax, and may lead to complications such as intestinal occlusion, posing a significant medical emergency. This article presents a case of obstructed diaphragmatic hernia complicated by acute intestinal obstruction and highlights the crucial role of imaging techniques in accurately diagnosing diaphragmatic hernia with intestinal occlusion.

3. Discussion

The diaphragm, a musculotendinous partition between the thoracic and abdominal cavities, develops from four major structures during fetal life. Failure of closure of the pleuroperitoneal canal can result in a congenital diaphragmatic hernia, leading to the herniation of abdominal contents into the thorax. Late presentation of congenital diaphragmatic hernia can occur due to delayed rupture of the peritoneal sac or displacement of a solid organ that had initially plugged the hernial defect. Congenital diaphragmatic hernia is typically diagnosed in neonates presenting with severe respiratory distress and has an incidence of 1 in 4000 live births. It may also present with cough, dyspnea, recurrent chest infections, or chest or abdominal pain. Congenital diaphragmatic hernia presenting in adults is exceedingly rare, accounting for about 5-25% of cases. Late-presenting congenital diaphragmatic hernia poses a considerable diagnostic challenge, with a reported diagnostic failure rate of 38%. It can manifest as incidental findings on chest X-rays or present with vague non-specific symptoms. On the other end of the spectrum, acute abdominal symptoms may occur due to complications such as incarceration, strangulation, or visceral perforation in the chest cavity, resulting in severe respiratory distress. Detection of diaphragmatic hernia can be challenging if there is intermittent herniation of abdominal viscera into the thoracic cavity. However, diaphragmatic hernias in adults are typically traumatic in origin and can be diagnosed immediately or several months or even years after the trauma. Missed diaphragmatic injuries following trauma have been reported in 9.5% to 61% of cases. Missed injuries can lead to recurrent pulmonary dysfunction, abdominal pain, or acute intestinal obstruction. Delayed recognition of incarcerated diaphragmatic hernias following trauma can result in high morbidity and mortality rates. In the reported case, the trauma occurred over thirty years ago, without any further investigation, and there have been no similar late revelations reported in the literature. Therefore, the possibility of a strangulated congenital hernia being revealed in adulthood remains likely.

Conventional radiography, particularly chest X-rays, is the initial imaging modality for suspected diaphragmatic hernias. It can reveal the presence of bowel loops within the thoracic cavity or abnormal patterns suggestive of herniation. Abdominal X-rays can show signs of bowel obstruction, such as air-fluid levels and dilated bowel loops.

Ultrasonography, although operator-dependent, can be valuable in diagnosing diaphragmatic hernia. It provides real-time imaging, allowing visualization of herniated abdominal organs and assessment of associated complications, including intestinal occlusion. It is particularly useful in pediatric cases and for identifying hernias in pregnant patients.

Computed tomography (CT) is the most accurate modality for diagnosing and evaluating diaphragmatic hernia, especially smaller herniations. CT scans provide detailed cross-sectional images, making them highly effective in diagnosing diaphragmatic hernias. CT imaging can accurately locate the hernial orifice, determine the extent of bowel herniation, and evaluate the presence of intestinal occlusion. Multiplanar reconstructions and three-dimensional rendering enhance visualization and aid in preoperative planning.

Magnetic resonance imaging (MRI) is a non-ionizing radiation alternative to CT scans and is particularly useful in diagnosing diaphragmatic hernias, especially in pregnant individuals. MRI offers excellent soft-tissue contrast and multiplanar imaging capabilities, allowing visualization of herniated abdominal organs and assessment of bowel obstruction without exposing the fetus to ionizing radiation.

Fluoroscopy is essential for dynamic assessment of diaphragmatic hernias. It can visualize herniated bowel loops in real-time, aiding in the identification of obstructive features such as adhesions or volvulus. Fluoroscopic studies are particularly useful when the initial diagnosis is equivocal and further dynamic evaluation is required.

Surgical intervention is the treatment of choice for adult diaphragmatic hernias, even in asymptomatic patients, to prevent further herniation and associated complications. The surgical approach can be transabdominal or transthoracic, with the abdominal approach preferred in emergency situations and the thoracic approach typically reserved for elective surgery. If there are signs of intestinal obstruction, the transabdominal approach using an upper midline incision is a convenient option. After reducing the hernia contents, the viability of the herniated organs is examined, and any compromised segments are resected. The diaphragmatic defect is then repaired in a tension-free manner using non-absorbable sutures or mesh, depending on the defect size.

4. Conclusion

Imaging plays a crucial role in the diagnosis and management of diaphragmatic hernia with intestinal occlusion. The combination of various imaging modalities, including radiography, ultrasonography, CT, MRI, fluoroscopy,

and nuclear medicine, enables accurate and timely identification of this condition, facilitating prompt intervention and improved patient outcomes. Early recognition and intervention are essential to prevent potentially life-threatening complications, emphasizing the importance of a multidisciplinary approach in the diagnosis and management of diaphragmatic hernia with intestinal occlusion.

Conflict of Interest

The authors declare that there is no conflict of interest.

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