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A case of faecopneumothorax resulting from a delayed diagnosis of traumatic diaphragmatic injury

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Abstract: Diaphragmatic hernia is a rare condition that can result from blunt or penetrating trauma. It is often asymptomatic for years, making diagnosis challenging. In fact, up to 66% of diaphragmatic ruptures can go unnoticed at the time of trauma. Delayed diagnosis can lead to complications, including faecopneumothorax. Faecopneumothorax caused by strangulated diaphragmatic hernia is an extremely rare clinical condition.

We report the case of a 15-year-old Iranian female who had a history of a motor vehicle accident 1 year prior to being referred to our center. She presented with tension faecopneumothorax, which occurred due to the incarceration and strangulation of the large bowel in the thoracic cavity. the patient was urgently transferred to the operating room for exploratory surgery.

In patients presenting with symptoms of pulmonary or intestinal obstruction and a history of thoracoabdominal injury, the clinician should consider diaphragmatic hernia as a potential diagnosis. Prompt recognition of this condition is crucial as complications can significantly increase morbidity and mortality rates.

Keywords: Blunt Injuries; Diaphragmatic Hernia; Traumatic

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1. Introduction

Diaphragmatic hernia is a rare condition that can result from blunt or penetrating trauma. It occurs in approximately 0.8%-6% of cases of blunt trauma and over 17% of thoracoabdominal-penetrating trauma. Diaphragmatic rupture occurs in about 5% of severe thoracoabdominal trauma (1). The condition can be categorized based on its duration, ranging from acute to chronic, and it is often asymptomatic for years.

Diagnosis can be challenging, and at the time of trauma, up to 66% of diaphragmatic ruptures can go unnoticed (2). Delayed diagnosis may lead to complications such as faecopneumothorax. Faecopneumothorax caused by strangulated diaphragmatic hernia is an extremely rare clinical condition (3). In this case, we present a patient with faecopneumothorax resulting from a delayed diagnosis of traumatic diaphragmatic injury (TDI).

2. Case presentation

A 15-year-old Iranian female was admitted to the emergency department with intermittent abdominal pain, nausea, and vomiting that had been occurring for the past 7 days. she had not had a bowel movement in several days and was experiencing constipation. She had a history of a motor vehicle accident 1 year prior to being referred to our center. She had undergone multiple outpatient visits for her symptoms, which were temporarily relieved with painkillers and laxatives.

She exhibited generalized abdominal tension, particularly in the umbilical region, and her abdomen appeared distended. Additionally, the patient was also febrile and hemodynamically unstable.

Based on the history of the accident, the presenting symptoms, and the findings from the physical examination, a diaphragmatic hernia was considered as a possible diagnosis. A thoracoabdominal computed tomography (CT) scan was performed and documented in the patient's medical records. The results of the scan revealed a diaphragmatic hernia, total obstruction of the colon, and faecopneumothorax (Figure 1). There was also suspicion of abdominal compartment syndrome due to the patient's septic state, as evidenced by a pulse rate of 160 and a blood pressure of 80/60, that made the patient's condition critical. Because it was hard to make definitive diagnosis, it was necessary to transfer patient to operating room for further assessment (Table 1).

As a result, the patient was urgently transferred to the operating room for exploratory surgery. During the surgery, a perforated diaphragm, strangulation of the perforated colon ascending to splenic flexure in the thorax, and compartment syndrome were observed.

The colon and small bowel were severely distended, and two 2-cm defects were observed in the diaphragm, through which the colon, mesocolon, and omentum had herniated. A

Figure 1 This axial view clearly displays the left diaphragm collapse caused by a diaphragmatic hernia, resulting in faecopneumothorax. Contralateral mediastinal shift due to hernia is obvious.

red-brownish fluid and fecal fluid were leaking from the diaphragmatic defects, prompting the performance of an anterolateral thoracotomy in the left seventh intercostal space, with 2 ribs being cut. Subsequently, the perforated colon and gangrenous meso- and omentum were removed from the thorax. The small bowel had a healthy color.

The transverse colon was taken into the abdomen. Due to deserosalization, the ascending colon, a portion of the transverse colon, and the cecum were resected (right hemicolectomy). Ileostomy and colostomy procedures were performed. The abdominal fasciae were left open due to compartment syndrome. Simultaneously, the diaphragmatic defects were sutured.

The patient was then transferred to the intensive care unit (ICU) for close monitoring and further follow-up. Antibiotic therapy and supportive care were initiated in the ICU. Following the surgery, the patient was intubated and conscious, with no signs of respiratory distress. Despite vasopressors and fluid therapy, her blood pressure remained low. Unfortunately, the symptoms of septic shock did not improve. On the third day after the operation, cardiopulmonary resuscitation (CPR) was administered for 30 minutes, but it was unsuccessful, and the patient ultimately passed away.

3. Discussion

We describe a case of faecopneumothorax resulting from a delayed diagnosis of traumatic diaphragmatic injury which passed away due to septic shock and we couldn't assess the therapeutic intervention for a long time after the intervention.

Blunt or penetrating injuries can lead to TDIs (4). Delayed diagnosis is common due to misleading clinical and radiographic findings, resulting in many cases going undiagnosed upon admission (5). Although diaphragmatic injury is rare, it can occur in both penetrating and blunt trauma. Penetrating trauma, such as stab wounds or firearm injuries, is more likely to cause TDI, but it can also occur rarely with blunt trauma. In this particular case, the patient had a history of blunt trauma 1 year ago (6). The mortality rate after TDI ranges from 30% to 41% (7). If it progresses to diaphragmatic hernia or strangulated hernia, the mortality rate can increase to 66% and may manifest up to 3 years after the injury (8).

Diaphragmatic herniation occurs when abdominal organs pass through a defect in the diaphragm caused by trauma. Blunt thoracoabdominal trauma, such as vehicle accidents and falls, is the most common cause. The right hemidiaphragm is less likely to be affected due to the protective role of the liver on the right side. Increased abdominal pressure after trauma can result in diaphragm tears and subsequent herniation, which is more commonly seen in the chronic phase and can lead to mortality (9-11). Symptoms of diaphragmatic herniation include dyspnea, chest pain, abdominal distention, and decreased breath sounds, and they can have a significant impact on the respiratory system (1, 12). Ischemia, necrosis, and organ perforation can lead to septic shock and faecopneumothorax due to hypoxia (11). Thoracoabdominal CT is considered the gold standard for diagnosing post-traumatic diaphragmatic hernia, as it provides detailed information about the hernia's size, shape, and contents, with high sensitivity (71%) and specificity (87%). In cases where surgeons suspect a hernia but cannot make a definitive diagnosis, laparoscopy or thoracoscopy should be used to directly visualize and confirm or exclude the diagnosis (13,14).

Surgery is necessary for the management of post-trauma diaphragmatic hernia (PTDH). If left untreated, mortality rates can reach up to 100%. The most common surgical approaches for PTDH include thoracotomy, laparotomy, and laparoscopy. Laparotomy is recommended for patients with a high suspicion of digestive system obstruction or incarceration, while thoracotomy is necessary when multiple adhesions are present. Laparoscopy is preferred due to shorter hospitalization, reduced bleeding, smaller surgical incisions, and faster recovery time (15). The use of mesh is recommended for hernia rings with a diameter of ≥5 cm (16).

4. Conclusion

In patients with symptoms of pulmonary or intestinal obstruction and a history of thoracoabdominal injury, the clinician should consider the possibility of a diaphragmatic hernia. Prompt recognition and management of this condition are crucial as complications can significantly increase morbidity and mortality rates, necessitating emergency surgery.

5. Declarations

5.1. Acknowledgement

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Table 1 Timeline of diagnosis and treatment process

History of a motor vehicle accident 1 year prior to being referred to our center	2022
admitted to the emergency department with intermittent abdominal pain, nausea, and vomiting that had been occurring for the past 7 days	2023
Diagnosis: A diaphragmatic hernia, total obstruction of the colon, and faecopneumothorax Identyfied in computed tomography and during operation	2023
Treatment: Transferred to the operating room for exploratory surgery	2023

°C: degree Celsius; mmHg: Mill meter of mercury

5.2. Authors' Contribution

The study was designed by A.Y., and the main manuscript was written by S.A., and R.M. and K.A. collected the data and prepared the figures. The final manuscript was read and approved by all authors.

5.3. Conflict of Interest

None declared.

5.4. Funding

None declared.

5.5. Ethics approval and consent to participate

We received the following code of ethics from the research ethics committee of Hamedan University of Medical Sciences: IR.UMSHA.REC.1402.368. Written consent was obtained from the patient's relatives to publish the treatment process.

5.6. Consent for publication

The authors provide consent for publication.

References

1. Blitz M, Louie BE. Chronic traumatic diaphragmatic hernia. Thorac Surg Clin. 2009;19(4):491-500.
2. Sala C, Bonaldi M, Mariani P, Tagliabue F, Novellino L. Right post-traumatic diaphragmatic hernia with liver and intestinal dislocation. J Surg Case Rep. 2017;2017(3):rjw220.
3. Sran H, Shaikh I, Coxon J, Wegstapel H. Tension faecopneumothorax: a rare presentation of colonic diverticular perforation. J Surg Case Rep. 2011;2011(5):5.
4. Shackleton KL, Stewart ET, Taylor AJ. Traumatic diaphragmatic injuries: spectrum of radiographic findings. Radiographics. 1998;18(1):49-59.
5. Turmak M, Deniz MA, Özmen CA, Aslan A. Evaluation of the multi-slice computed tomography outcomes in diaphragmatic injuries related to penetrating and blunt trauma. Clin Imaging. 2018;47:65-73.
6. Reitano E, Cioffi SPB, Airoldi C, Chiara O, La Greca G, Cimbanassi S. Current trends in the diagnosis and management of traumatic diaphragmatic injuries: a systematic review and a diagnostic accuracy meta-analysis of blunt trauma. Injury. 2022;53(11):3586-95.
7. Mancini A, Duramé A, Barbois S, Abba J, Ageron F-X, Arvieux C. Relevance of early CT scan diagnosis of blunt diaphragmatic injury: a retrospective analysis from the Northern French Alps Emergency Network. Journal of visceral surgery. 2019;156 1:3-9.
8. Chen H-W, Wong Y-C, Wang L-J, Fu C-J, Fang J-F, Lin B-C. Computed tomography in left-sided and right-sided blunt diaphragmatic rupture: experience with 43 patients. Clinical radiology. 2010;65(3):206-12.
9. Eren S, Ciriş F. Diaphragmatic hernia: diagnostic approaches with review of the literature. Eur J Radiol. 2005;54(3):448-59.
10. Gu P, Lu Y, Li X, Lin X. Acute and chronic traumatic diaphragmatic hernia: 10 years' experience. PLoS One. 2019;14(12):e0226364.
11. Nusretoğlu R, Dönder Y. Faecopneumothorax due to missing diaphragmatic hernia: a case report. J Med Case Rep. 2021;15(1):19.
12. Shaban Y, Elkbuli A, McKenney M, Boneva D. Traumatic diaphragmatic rupture with transthoracic organ herniation: a case report and review of literature. Am J Case Rep. 2020;21:e919442.
13. Furák J, Athanassiadi K. Diaphragm and transdiaphragmatic injuries. J Thorac Dis. 2019;11(Suppl 2):S152-s7.
14. Testini M, Girardi A, Isernia RM, De Palma A, Catalano G, Pezzolla A, et al. Emergency surgery due to diaphragmatic hernia: case series and review. World J Emerg Surg. 2017;12:23.
15. Tessely H, Journé S, Therasse A, Hossey D, Lemaitre J. A case of colon necrosis resulting from a delayed traumatic diaphragmatic hernia. Journal of Surgical Case Reports. 2020;2020.
16. Liu Q, Luan L, Zhang G, Li B. Treatment of chronic traumatic diaphragmatic hernia based on laparoscopic repair: experiences from 23 cases. Front Surg. 2021;8:706824.