International Surgery Journal
Hotiatun et al. Int Surg J. 2024 Jun;11(6):985-988
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20241400

Case Report

Operative management of traumatic rupture of diaphragma in elderly with Bochdalek hernia: a rare case report

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Received: 13 March 2024
Revised: 03 April 2024
Accepted: 03 May 2024

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ABSTRACT

Diaphragmatic hernia is a displacement of the abdominal viscera organs into the thoracic cavity due to a defect in the diaphragm. The most common type is failure fusion of the Bochdalek's foramen. We report the case of a 76-year-old woman with discomfort in the right chest area since 1.5 months ago. Shortness of breath and nausea accompanied the complaints. The patient admitted that eight months before hospital admission, she was hit by a motorbike, fell towards the back, and hit her back. After the incident, the patient reported one episode of hematemesis and melena. On physical examination, the conjunctiva was pale. The anterior and posterior thoracic regions appeared asymmetrical, the fremitus was asymmetrical, and there was increased diaphragmatic excursion with bowel sounds on the right thorax. An image that leads to a right Bochdalek hernia was obtained on thoracic multi slice computed tomography (MSCT) with contrast. The patient underwent thoracotomy and diaphragm repair using mesh. The thoracic approach aims to reduce visceral-pleural adhesions and visceral intrathoracic perforation. Right-sided Bochdalek hernia in the elderly is rare, but trauma is very likely to occur and worsen the patient's condition. Late diagnosis and inadequate management are associated with incarceration and strangulation with high mortality rates. In this case, thoracotomy approach proved to be a useful method for hernias due to chronic defects in the diaphragm.

Keywords: Case report, Bochdalek hernia, Thoracic trauma, Thoracotomy

INTRODUCTION

Diaphragmatic hernia is a displacement of the abdominal viscera organs into the thoracic cavity due to a defect in the diaphragm, it can occur due to congenital or acquired abnormalities.[1] Thoracoabdominal trauma is one of the causes in cases of acquired diaphragmatic defects.[2] Acquired diaphragmatic hernias occur due to sharp trauma such as gunshot wounds and stab wounds or from blunt abdominal trauma such as traffic accidents and falls.[3] Approximately 2.7-50% of diaphragmatic rupture in adults are not diagnosed and treated early, because they are generally asymptomatic or have minimal typical symptoms.[4] Diaphragmatic hernia is a serious delayed complication that must be treated immediately.[5]

The development of the diaphragm begins in the fetus. There can be abnormalities in this developmental process, with the exact etiology unknown, but genetic mutations are involved.[6] The occurrence of this developmental abnormalities process can lead to congenital defects, the most common type is failure fusion of the Bochdalek's foramen.[4,7] This condition can be diagnosed after birth, but 10% of cases can occur in adulthood.[6] A study of an elderly population in Japan showed the median age at diagnosis of Bochdalek's hernia was 58 years.[8] Absence of symptoms until adulthood or the presence of a co-occurring event, such as trauma, can cause rupture of the fragile area due to a congenital abnormality of the diaphragm.[9,10] The occurrence of trauma in individuals with congenital hernia increases the risk of rupture of the diaphragm.[10]

Increased pressure on the intraabdomen plays a role in the occurrence of organ herniation. The history of vaginal birth is one of the elements involved.[10] In addition, blunt trauma can increase intrabdominal pressure rapidly, which will lead to defects in the diaphragm.[11] In the elderly population there are changes in the diaphragm. Old age is related to sarcopenia which can cause impaired coordination in the muscles, such as decreased muscle strength and muscle contraction.[12]

In diaphragmatic hernias due to trauma, dyspnea, abdominal pain, respiratory failure, and cardiac tamponade may occur.[13] Diagnostic modalities via computed tomography (CT) scan are reported to have a sensitivity of 71-100% in diagnosing diaphragmatic rupture.[14] The principle of diaphragmatic hernia management is to reduce the herniated organ to return to the abdominal cavity and correct the diaphragm defect. Surgery can be performed with laparoscopic, thoracoscopic, transthoracic, and transabdominal approaches.[15] The thoracic approach is more recommended for reducing viscera-pleural adhesion and intrathorax visceral perforation.[5]

We report the case od a 76-year-old woman with right sided diaphragmatic hernia with a history of trauma.

CASE REPORT

A 76-year-old woman came to Dr. Moewardi Hospital with a complaint of discomfort in the right chest area. This complaint was first experienced 1.5 months before hospital admission, especially during activities. Complaints were accompanied by shortness of breath and nausea. Complaints of fever, vomiting and abdominal pain were denied. Defecation and micturition are still within normal limits. The patient claimed that eight months previously, she was hit by a motorcycle, fell towards the back, and hit her back. After the incident, the patient reported one episode of 600 ml emesis containing blood clots and melena. The patient claimed to have had five childbirth histories. There was no history of diaphragmatic hernia in the family.

From the physical examination, we found pale conjunctiva, asymmetrical anterior and posterior thoracic wall and expansion between the right and left, and asymmetrical tactile fremitus. There was increased diaphragmatic excursion, 8.5 cm in the anterior part and 9 cm in the posterior part, with dull percussion in ICS 6-11 (anterior) and ICS 7-10 (posterior) and positive peristaltic sounds in the right thoracic.

Laboratory examination showed a decrease in haemoglobin (Hb) and haematocrit (HCT), with a Hb level of 8.4 g/dl and a HCT level of 27%. The patient underwent a thoracic multi slice computed tomography (MSCT) with contrast examination and showed an image leading to a right Bochdalek hernia, with multiple bowel loops and stomach in the posterior aspect of the right thoracic cavity.

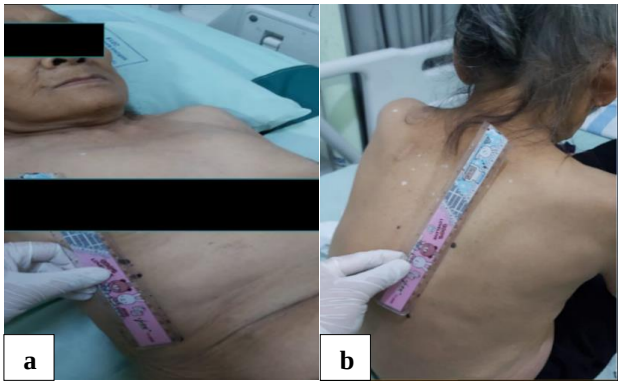

Figure 1 (a and b): Increased diaphragmatic excursion, anterior (8.5 cm) and posterior (9 cm).

Figure 2: Thoracic MSCT with contrast showed right Bochdalek hernia.

Surgical treatment was performed to treat the patient's complaints. The patient underwent an exploratory thoracotomy with a right lateral incision, then opened the pleura and identified the contents of the posterior diaphragmatic hernia. We found the stomach as the content of the hernia which was then returned to the abdominal cavity. There was also an attachment of the hernia sac to the lung and it was released. The diaphragm defect was repaired with a mesh (Figure 3). Then the wound was sutured layer by layer.

Postoperatively, monitoring and evaluation of the patient were done. Patient’s condition was evaluated through radiological examination with posteroanterior and lateral chest radiographs. The results are shown in Figure 4. The radiological picture shows a herniation of the right diaphragm with right pleural effusion. There were multiple lucencies on the right hemidiaphragm that extended to the posterior mediastinum, high right hemidiaphragm, and thickening of the right pleural cavity. The patient's condition improved and the patient was discharged after undergoing surgery and postoperative care.

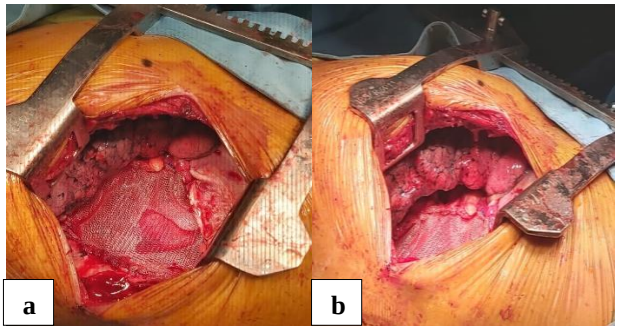

Figure 3 (a and b): Post hernia repair, closure of the diaphragm defect with mesh installation.

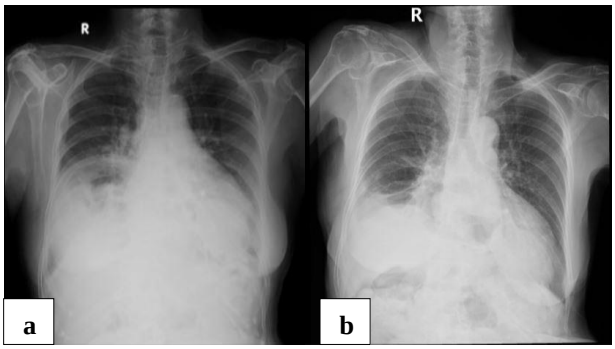

Figure 4: Posteroanterior and lateral chest X-ray images in a patient (a) preoperative and (b) postoperative.

DISCUSSION

The diaphragm is a dome-shaped musculotendinous structure located between the thorax and abdomen, which acts as a separator between the thoracic and abdominal cavities. Diaphragmatic hernia is a condition in which the abdominal viscera herniated into the thoracic cavity due to a defect in the diaphragm. Based on the etiology, a diaphragmatic hernia can occur due to congenital abnormalities, trauma, or iatrogenic.[6] Blunt trauma is the most common cause, about 75% of cases of acquired diaphragmatic hernia. Blunt trauma can occur due to motor vehicle accidents and falls from a height, resulting in a fairly large diaphragmatic defect.[2] Approximately 2.7-50% of cases of diaphragmatic rupture are not detected and treated early, especially in asymptomatic patients.[5]

One of the most typical forms of diaphragmatic hernia is the Bochdalek hernia, which is typically seen in newborns. Contrarily, a Bochdalek hernia diagnosis in an adult is uncommon and often seen on the left side of the diaphragm. The diagnosis of a right-sided Bochdalek hernia in elderly is much more uncommon. It is challenging to pinpoint the precise origin of an adult Bochdalek hernia because of the likelihood of a diaphragmatic hernia being acquired. The pathogenesis process that leads in a congenital abnormality of the diaphragm may be made worse by increases in intra-abdominal pressure, which then causes a hernia.[10] In this case, the patient has several factors that may be responsible for the occurrence of diaphragmatic hernia. The increase in intra-abdominal pressure may be due to five histories of childbirth and a history of blunt trauma from a motorcycle accident. In one similar case, a history of childbirth was found as one of the factors that could play a role in the occurrence of herniation of the abdominal organs.[10] Given that the patient is elderly, there may also be weakness of the diaphragm muscle.[12] The hernia experienced by this patient may be a chronic complication due to damage to the diaphragm due to trauma, diaphragm weakness, and increased intra-abdominal pressure.

A proper examination can prevent hernia to form as a chronic complication of diaphragmatic defects.[13] CT scan is considered to be the gold standard examination because it can determine the presence, size, and location of the diaphragmatic defect, as well as the contents of various types of diaphragmatic hernia.[16] CT scan sensitivity and specificity for diagnosing diaphragmatic hernia are 82% and 87%. Thoracic MSCT with contrast in this patient showed an image suggestive of a right Bochdalek hernia, with multiple bowel loops and stomach were in the posterior aspect of the right thoracic cavity. According to a study, diaphragmatic abnormality on the postero-lateral side causes Bochdalek hernia.[17]

The principle in the management of diaphragmatic hernia is to reduce herniated organs and repair the diaphragmatic defects. Surgery can be performed using a laparoscopic, thoracoscopic, transthoracic, and transabdominal approach.[15] The surgical method of diaphragmatic hernia is determined by age, location of the lesion or injury, and experience of the surgeon. In diaphragmatic hernias with an acute presentation, a laparotomy approach is recommended because it is easier to explore the presence of trauma-related abdominal organ injury. Laparotomy is the most common approach and is considered the gold standard management of diaphragmatic hernia.[18] The thoracoscopy approach is the preferred procedure because of its lower morbidity and complication rates.[7]

In patients with a diagnosis of chronic traumatic diaphragmatic hernia, thoracic surgery is recommended.[19] Chronic herniation of abdominal organs causes the attachment of organs to the walls or viscera of the thoracic cavity, so that through a thoracotomy approach it is easier to perform adhesiolysis and repair of the defect.[2,7] In this patient there was an adhesion of the hernia sac with the lung. The thoracotomy approach was chosen because it is easier and safer to reduce organ herniation and repair chronic diaphragmatic defects.[9]

Diaphragm defect in this patient was repaired using a mesh. According to Shabbay et al, the suture method determines recurrency. Defects in the diaphragm are most suitable fixed with figure-of-eight nonabsorbable suture. When the size of the defect is large, it is necessary to repair the defect with mesh.[2,7] In a similar case of traumatic diaphragmatic hernia, the size of the diaphragmatic lesion

in the patient was small and therefore repaired by direct closure and sutured with non-absorbable sutures.[20] According to a study, the maximum length for suture closure is five centimeters. It is crucial to choose a mesh repair when the hernia opening is wide or the tissues are extremely friable and difficult to close with sutures.[10] The patient follow up was good, there was no complications within recovery time.

CONCLUSION

Right-sided Bochdalek hernia in the elderly is rare, but trauma is very likely to occur and worsen the patient's condition. Late diagnosis and inadequate management are associated with incarceration and strangulation with high mortality rates. In this case, thoracotomy approach proved to be a useful method for hernias due to chronic defects in the diaphragm. The outcome also with good result.

ACKNOWLEDGEMENTS

The authors wish to thank Faculty of Medicine, Sebelas Maret University for the support.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Hotiatun, Sinuraya LW, Hayuningrat PK, Soebandrijo. Operative management of traumatic rupture of diaphragma in elderly with Bochdalek hernia: a rare case report. Int Surg J 2024;11:985-8.