

CASE REPORT

Repair of a giant diaphragmatic hernia using the dual approach

Salman Al Sabah^{1,*}, Eliana Al Haddad², and Jonathon D. Vaz¹¹Kuwait University, Faculty of Medicine, Kuwait City, Kuwait and ²Al Amiri Hospital, Department of Surgery, Kuwait City, Kuwait

*Correspondence address. Kuwait University, Kuwait City, Kuwait. Tel: +965 66666911; Fax: +965-2246-4727; E-mail: salman.k.alsabah@gmail.com

Abstract

Bochdalek hernias are diaphragmatic defects seen in pediatrics. About 5–25% of the cases are diagnosed in adulthood, and present with symptoms of chest and abdominal problems. This is a case of an 18-year-old male who presented to the emergency department with epigastric pain, vomiting and dyspnea. Most of the left-sided organs had herniated to the left chest cavity. Immediate surgery was performed. The stomach, spleen and colon were reduced into the abdominal cavity. The diaphragm defect was repaired laparoscopically, but there were limitations due to inadequate space, leading to difficult visualization of the posterior diaphragmatic leaflet. A thoracoscopic approach was taken where we saw the left kidney herniated through the repair site posteriorly. It was reduced and the defect was closed. The early diagnosis of Bochdalek hernias is important to prevent stomach/intestinal strangulation. Laparoscopic surgeons need to be prepared for a thoracic approach in giant congenital diaphragmatic hernias.

INTRODUCTION

Bochdalek hernias are congenital defects that occur in the diaphragm due to the failure of the posterolateral diaphragmatic foramina to fuse in utero, resulting in the displacement of abdominal organs into the thoracic cavity [1]. This phenomenon was first described in 1848 by Bochdalek [2], and is usually exclusively seen in the pediatric population presenting with pulmonary symptoms between the neonatal and preschool period [1–3]. This condition occurs in approximately 0.04% of all births, and left congenital diaphragmatic hernias are more common than right ones (85% vs 12%) [4].

Even though these hernias are of the congenital nature, 5–25% of the cases are diagnosed later in adulthood, presenting with symptoms of chest and abdominal problems, such as complications of herniated viscera and gastric volvulus [4], with these symptoms usually appearing after trauma or pregnancy. Bochdalek hernia in adults is extremely rare; with less

than 100 published cases in the literature. Here we present our case of Bochdalek hernia in an 18-year-old male.

MATERIALS AND METHODS

This is a case of an 18-year-old male who presented to the emergency department with symptoms of epigastric pain, vomiting and dyspnea. He reported similar symptoms 5-years prior to this admission and left the hospital against medical advice.

He reported no history of trauma, and on physical exam we noted decreased breath sounds over the left lobe.

A computed tomography (CT) scan was performed of the chest+abdomen that revealed a defect in the left diaphragm, with the trachea and heart shifted to the right. On sagittal and coronal view, we observed that most of the left sided organs had herniated to the left chest cavity. The patient was then immediately taken to the operating room.

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Appropriate IRB approval and informed consent were obtained for this patient.

RESULTS

Surgery

Four ports were inserted in the upper abdomen and the liver was retracted as seen in the video. The procedure was video-recorded (Video 1).

The diaphragmatic defect was first visualized, showing an organo-axial gastric volvulus which was due to long gastrocolic mesentery. The mesentery was displaced to locate the stomach, which was restored and a nasogastric (NG) tube was placed down into the stomach to attempt to reduce it into the abdomen. The NG was unable to pass and therefore we mechanically reduced the entire stomach into the abdominal cavity. The NG tube was then used to decompress the stomach in the aim to facilitate further work in the upper abdomen.

Next, we visualized the hernia and were able to see the spleen, pancreas and small bowel in the chest cavity. The spleen was then reduced back into the abdomen, followed by the colon, greater omentum and small bowel.

We then entered the chest cavity through the hernia and visualized the collapsed lung, heart and rest of the small bowel.

After we reduced the hernia content, we started repairing the diaphragm defect laparoscopically with a GORE-TEX mesh. However, there were limitations due to the inadequate space we had to work, leading to difficult visualization of the posterior diaphragm leaflet. We then considered approaching it through the thoracoscopic approach.

Thoracoscopic approach

The camera was inserted through the chest, where we saw the left kidney herniating through the repair site posteriorly. We were unable to reduce the kidney by thoracoscopy, so converted to thoracotomy. The diaphragm was repaired primarily by non-absorbable pledgeted sutures.

The reason why thoracoscopy was done at first was just to check the integrity of the repair after its completion by laparoscopy due to the loss of domain experienced after the repair, which makes it difficult to see the last inch of the diaphragm. Once we saw the repair through thoracoscopy, we visualized the kidney inside, which most likely slipped through the defect under the diaphragm, after which we considered doing a thoracotomy due to the difficulty of repair by laparotomy because of the lack of ease of access and visualization to this space.

The post-operative chest X-ray demonstrated an intact repair of the diaphragm.

DISCUSSION

Bochdalek hernias occur in the diaphragm due to a congenital defects, most commonly through the posterolateral foremen on the left side, and involve the spleen, stomach, small intestine and colon [5]. When they involve the right side, the liver, gallbladder and intestine usually herniate through. Symptomatic Bochdalek hernias in adults are relatively rare, but the incidence of asymptomatic Bochdalek hernias found on autopsies in adult has been estimated to be in between 0.014-0.05% [2, 3], while reaching 6% in early CT findings [4].

When these hernias present with symptoms, they usually involve the gastrointestinal or pulmonary system. Symptomatic severe Bochdalek hernias in adults however, manifest as

gastrointestinal symptoms related to obstruction of the herniated organ [6]. A study conducted by Brown SR et al. [7] demonstrated that only 14% of these patients were symptomatic at presentation. These symptoms included pain/pressure in the chest or abdomen (69%), obstruction (39%), pulmonary symptoms (37%), strangulation (28%), dysphagia (3%), bleeding (4%), GERD (4%) and other 9%.

The diagnosis of this hernia in adults is however not easy and commonly misdiagnosed. Unlike infants who present with respiratory distress early, the most frequent symptom in adults is mild discomfort, and therefore consequently causing these patients to be merely treated according to their symptoms [8]. Contrast-enhanced CT is the most accurate imaging modality for its detection because it provides detailed information regarding the diaphragmatic defect and herniated viscera [9, 10].

The management of these hernias is surgical, involving the reduction of the herniated contents into the peritoneal cavity and repairing the diaphragmatic defect. Laparotomy was seen to be the most widely used approach (38%), however minimally invasive techniques have quickly gained popularity [7]. Regardless of the approach, the proper closure of the defect is critical. Many surgeons were seen to prefer a prosthetic graft because of the continuing stress on the diaphragm that results from respiratory movements and cardiac motions. Nevertheless, a tensionless type of repair has been validated as an option, which is similar to the type of repair used for all other hernias [10]. Polypropylene mesh can be used for this type of repair because it has the benefit of support and excellent tissue growth. However, it poses the theoretical risk of erosion of the mesh into the gastrointestinal organs [10]. The decreased tendency for adhesion formation of polytetrafluoroethylene and other dual prostheses makes them more desirable [10].

CONCLUSION

The early diagnosis of Bochdalek hernias is important to prevent stomach/intestinal strangulation. Laparoscopic surgeons need to be prepared for a thoracic approach in giant congenital diaphragmatic hernias. Laparoscopic repair is feasible but requires advanced skills and knowledge of the pathology of the disease.

SUPPLEMENTARY MATERIAL

Supplementary data are available at *Japanese Journal of Clinical Oncology* online.

CONFLICT OF INTEREST STATEMENT

Author 1, author 2 and author 3 have nothing to disclose.

ETHICAL APPROVAL STATEMENT

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

INFORMED CONSENT STATEMENT

Informed consent was obtained from all individual participants included in the study.

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