



BIMODAL APPROACH OF MESH PLACEMENT: A CASE REPORT OF DIAPHRAGMATIC HERNIA REPAIR BY COMBINED THORACO-LAPAROSCOPIC APPROACH

General Surgery

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ABSTRACT

Diaphragmatic hernia (DH) is most common in children, mainly due to an embryological defect in diaphragm, but a rare occurrence in adults. Spontaneous DH is rare, and trauma is thought to be the most common cause of DH in adults. The diagnostic issue can make management challenging, needing a comprehensive history and physical examination and necessary studies. For the repair, various techniques have been used, but the minimally invasive approach has proven to be the most effective, resulting in less postoperative morbidity, faster recovery, and a shorter hospital stay. Primary repair and strengthening by installing a synthetic mesh (Composite mesh) are usually performed laparoscopically, however, a thoracoscopic approach can also be performed. In this case report, we used a bimodal approach for diaphragmatic hernia repair, which reduced the risk of intraperitoneal adhesions and recurrence of the hernia, as well as the risk of postoperative respiratory problems.

KEYWORDS

Diaphragmatic hernia, Dual approach for diaphragmatic hernia repair,

INTRODUCTION

Diaphragmatic hernia is a herniation of abdominal viscera into the pleural space caused by a diaphragmatic abnormality/defect, which can be acquired or congenital. Traumatic hernias are usually the most prevalent cause of acquired hernias, which can be caused by penetrating or blunt thoracoabdominal trauma.[1] Spontaneous diaphragmatic hernia is a rare but life-threatening illness that should be suspected in patients who have abdominal pain and dyspnea.[2] It accounts for just 1% of all diaphragmatic hernia ruptures.[3] The importance of early detection cannot be overstated. All patients who have been diagnosed with this illness should undergo surgery. The patient's condition determines the timing of the operation. The clinical aspects of a hernia are determined by the location of the hernia, the organ that has been herniated through it, and the time of presentation. A diagnostic dilemma that requires a sceptical attitude, as well as a detailed history, physical examination, and accurate chest x-ray interpretation. A CT scan of the chest and abdomen can be very helpful in circumstances when the diagnosis is unclear. The patient's symptoms typically dictate the scheduling of the procedure. An elective repair might be performed on people who have a hernia that is discovered by chance. Among the numerous surgical procedures, the minimally invasive technique (laparoscopic and thoracoscopic approach) provides a safe, practical, and successful option, as well as all of the benefits of minimally invasive surgery. Usually reduction of the contents followed by primary repair of diaphragm and placement of synthetic mesh, if needed

Case presentation

A 32-year-old female presented to the surgical emergency with complaints of pain abdomen and dyspnea for the past 1 month. The pain was in the upper left quadrant of the abdomen for 3 months insidious in onset with aggravated after taking food, dull aching type, relieved on taking over the counter analgesics, the patient also complained of dyspnea since past 1 month, whereby she would feel difficulty in breathing, gradually progressive. There was no history of trauma. Physical examination revealed decreased breath sounds on the left side. At a local hospital, she underwent a chest x-ray which revealed an air-fluid level in the left lung along with shifting of lung parenchyma towards the opposite side, thus they placed intercostal tube drainage. There was no improvement even after it and the patient was referred to us where she was advised of subsequent investigations. The CT scan of the thorax and abdomen revealed a diaphragmatic hernia (Left Posterolateral or Bochdalek type) She was planned for laparoscopic repair and intraabdominal contents like stomach, omentum, transverse colon and spleen were seen in the left thoracic cavity. The contents of the hernia were reduced after adhesiolysis with the help of placing a thoracoscope in the left 5th intercostal space. The diaphragm was closed by primary repair by 3-0 Monofilament Polypropylene suture via abdominal approach and a 15x7.5 cm

Monofilament polypropylene mesh were placed via thoracic approach.

DISCUSSION

Diaphragmatic hernia in adults can be congenital or acquired type (traumatic). Congenital diaphragmatic hernia is uncommon in adults, it occurs from incomplete fusion of the posterolateral foramina of the diaphragm leading to Bochdalek hernia or at anterior midline through the sternocostal region of diaphragm leading to Morgagni hernia.

The pressure gradient between the thoracic and abdominal cavities, which may reach up to 100 mmHg during respiration, is the most effective factor contributing to the herniation of abdominal contents to the thoracic cavity.[4]

They are most commonly found at the oesophageal hiatus or the points of failure of embryonic fusion of the diaphragm. The latter are usually subcostal (foramen of Morgagni, Larrey's spaces) or posterior (pleuroperitoneal or foramen of Bochdalek) in origin.[5] A 'spontaneous' rupture implies an absence of trauma, but there is always the possibility that a diaphragmatic defect arose from some forgotten trauma in the past or has a structural origin.[6]

Diaphragmatic hernia is often asymptomatic or produces only mild symptoms; however, it may lead to serious complications associated with considerable morbidity and possible fatalities, such as intestinal occlusion by incarceration and perforation of the bowel into the thorax, pancreatitis owing to the strangled pancreas, rupture of spleen owing to splenic commitment, pneumothorax, superior vena cava syndrome and cardiac arrest.[7] The characteristic clinical features of a diaphragmatic hernia are thoracic and abdominal pain, dyspnoea, nausea and vomiting.[8] In our case patients presented with pain abdomen and dyspnoea with respiratory distress. Clinically, diaphragmatic rupture has 3 phases according to the interval between injury and diagnosis: the initial or acute phase, the interval phase and the obstructive or late phase. In the acute phase, which continues for 2 weeks, clinical signs of diaphragmatic rupture may be obscured by the associated injuries.[9]

In a study by Losanoff et al, spontaneous rupture of the diaphragm was seen on the left more often (68%). In the same study, the most commonly herniated organs were the stomach (43%), colon (29%) and omentum (29%), whereas the most common symptoms were abdominal or thoracoabdominal pain, nausea, vomiting, and dyspnea. The most common reasons for diaphragmatic ruptures were coughing (32%), physical exercise (21%), and vaginal childbirth (14%).[10] In this case, there was herniation of the stomach, splenic flexure and spleen. Differential diagnosis includes giant hiatal hernias, congenital diaphragmatic hernias, pulmonary sequestration, neoplasia, phrenic nerve palsy, atelectasis, sub-pulmonic effusion, sub-pulmonic abscess

and eventration of the diaphragm.[11]

Single or serial plain chest radiographs with a high index of suspicion are diagnostic in most cases of diaphragmatic rupture.[12] On the chest x-ray radiography, degradation of the integrity of the diaphragm, visualization of bowel haustras and gas shadows which may occur within the thorax, visualization of the diaphragm above the normal anatomical position, mediastinal shift, atelectasis, pulmonary mass appearance, pleural effusion, pneumothorax, and hydropneumothorax can be observed. The computed tomography of the thorax is the second imaging modality of choice in these patients and the sensitivity varies between 71% and 90%.[12,13] In this case chest x-ray and CT scan chest and abdomen were done.

The diaphragm is in a constant state of movement during respiration. Surgery is indicated for symptomatic as well as asymptomatic patients who are fit for surgery. It can be done by laparotomy, thoracotomy, thoracoscopy, or laparoscopy.[14] In patients with a diaphragmatic hernia, surgical repair should not be delayed as any delay might cause complications such as volvulus formation, incarceration, strangulation, haemorrhage, and even perforation of a hollow visceral organ. The management of diaphragmatic hernia consists of reducing the herniated organs to the abdominal cavity and repairing the diaphragmatic defect either by open surgical methods (thoracotomy, laparotomy, or both) or by minimal access surgery.[15] Laparoscopic repair helps in delineating clear anatomy, working space, early recovery, and return to home and work.[14] Laparoscopic diaphragmatic hernia repair is increasingly reported to be an acceptable and safe alternative to open surgical repair.[16]. In this case, the patient was operated on after optimizing the patient in an elective setting and a combined approach of minimal access surgery both laparoscopic and thoracoscopic approaches were used. Through the thoracoscopic approach, adhesions were removed and reduction of herniated structures was made easier and primary repair of the defect was done through a laparoscopic approach.

CONCLUSION

Early diagnosis and subsequent surgery according to the patient's condition is the key to management in a case of spontaneous diaphragmatic hernia. Primary tissue approximation with suture material, with or without a prosthetic mesh for reinforcement, can be used to repair the defect. We noticed that minimal access techniques can be safely used in diaphragmatic hernia; in situations where the herniated content is difficult to reduce laparoscopically alone, a simultaneous thoracoscopy has greatly aided in reducing the herniated content as thoracoscopic mesh placement is relatively easy (the herniated abdominal organs do not revert to the defect), with diaphragm supporting to stabilize the mesh by its downward movement. This provides all of the benefits of a minimally invasive approach, such as improved operative visualization, less postoperative pain, faster recovery, shorter hospital stay, low recurrence rate, and lower hospital costs, as long as tissue repair is done in a tension-free manner by a skilled laparoscopic surgeon.

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