Laparoscopic repair of recurrent traumatic diaphragmatic hernia

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Abstract

Laparoscopic repair of recurrent diaphragmatic hernia is infrequently reported. We report successful laparoscopic management of such a case in a 23-year-old male who presented with recurrent vomiting and hiccoughs. He had suffered a gun-shot injury to the chest 2 years ago, following which a primary diaphragmatic repair was done by laparotomy and thoracotomy. The patient developed recurrent left diaphragmatic hernia, which was repaired using polypropylene mesh using a laparoscopic approach. At 6 months of follow-up, the patient is doing well, and his symptoms have resolved. Laparoscopic repair of recurrent diaphragmatic hernia is feasible.

Keywords: Diaphragmatic hernia, laparoscopy, recurrent, trauma

INTRODUCTION

Traumatic diaphragmatic rupture is seen in 0.8%–5.8% of blunt trauma cases, 2.5%–5% of blunt abdominal trauma and 1.5% blunt thoracic trauma.[1] Diagnosis is usually late because of nonspecific symptoms and lack of sensitive and specific imaging modalities. Surgery is the primary treatment modality. Recurrence of diaphragmatic hernia can occur especially after primary repair and can be managed with both open and laparoscopic approach. However, laparoscopic repair for recurrence has been infrequently described. There are only two case reports of laparoscopic repair of recurrent chronic traumatic diaphragmatic hernia (TDH), one with associated hialtal hernia[2] and other associated with trans-diaphragmatic intercostal hernia.[3] Here, we describe laparoscopic management of recurrent chronic TDH in a young male patient with a history of primary repair of diaphragmatic injury 2 years back.

CASE REPORT

A 23-year-old male patient presented with recurrent vomiting and hiccoughs for the past 1 year. The patient had a history of gun-shot injury 2 years back for which primary diaphragmatic rupture injury 2 years back for which primary diaphragmatic repair was done by laparotomy and thoracotomy. The patient had a history of gun-shot injury 2 years back for which primary diaphragmatic rupture repair was done by laparotomy and thoracotomy. The procedure was uneventful and the patient was discharged on the 8th post-operative day. On evaluation, chest X-ray [Figure 1a] revealed left lower lung collapse due to left diaphragmatic hernia. Contrast-enhanced computed tomography (CT) chest and abdomen [Figure 1b] revealed left diaphragmatic hernia with stomach and bowel loops herniating into thorax. Diagnosis of recurrent
diaphragmatic hernia was made, and the patient was planned for laparoscopic repair. The patient was placed supine with legs apart in reverse Trendelenburg position with the surgeon on the right side of the patient. Four ports were used: One 12 mm port at the umbilicus for the 30° telescope, one 12 mm and one 5 mm port at the right midclavicular and right anterior axillary line for working port and self-retaining liver retractor was placed through 5-mm incision in epigastrium. Intraoperatively, dense adhesions were present due to previous surgery. After adhesiolysis, the upper part of the stomach was seen to be herniating into the chest with defect size approximately 8 cm × 6 cm. Inferior lip of diaphragm was densely adhered with spleen. Contents were reduced, and the defect was defined by careful dissection to avoid injury to bowel and spleen. In view of a large defect [Figure 2a], closure was done with polypropylene mesh using continuous 2-0 polypropylene suture [Figure 2b].

Post-operative course was uneventful. Intensive spirometry and nebulisation were initiated. The patient was discharged on post-operative day 3. On follow-up at 6 months, the patient is doing well with complete resolution of his pre-operative symptoms. The chest X-ray revealed expanded lung fields.

DISCUSSION

Recurrence of TDH after successful repair has been uncommonly reported. Only two cases of recurrence have been reported out of 13 followed up cases after primary repair of 76 patients.[4] Attributable factors for recurrent TDH are increased body mass index, use of absorbable suture and repair under tension as might be in our case. Others include improper fixation of mesh with minimal overlap, post-operative prolonged ileus leading to increased intra-abdominal pressure and intra-abdominal sepsis which may disrupt the sutures and reopen the defect.[5] Any small defect during primary repair may lead to recurrence due to continual motion of the diaphragm which causes repetitive microtrauma to muscle fibres and eventual rupture over days to months.[6] Moreover, negative intra-thoracic pressure and positive intra-abdominal pressure further increase the risk of recurrence.

Diaphragmatic hernia can be missed due to non-specific symptoms and lack of any sensitive and specific imaging modality, so high index of suspicion is essential. The initial diagnostic tool is chest X-ray, but it is definitive only in 17%–40% of the cases.[7] Findings on chest X-ray include elevated diaphragm (left >4 cm higher than right), diaphragm margin distortion, collar sign (abdominal contents in hemithorax with or without focal constriction) and nasogastric tube in thorax. CT scan also has variable sensitivity of 14%–82%. Findings on CT scan which indicate diaphragmatic injury are direct visualisation of injury, segmental diaphragm not visualised and collar sign due to intrathoracic herniation of viscer.[8] Ultrasonography abdomen (focused assessment sonography for trauma) has also been known to help in the diagnosis of TDH by showing decreased diaphragmatic movement, discontinuity of diaphragm and bowel loops in thorax. Video-assisted thoracic surgery and diagnostic laparoscopy are useful diagnostic aids.

Approach of surgery should be individualised according to the patient’s presentation and surgeon experience. Laparoscopic approach is feasible if the patient is stable. Open approach is useful where concomitant injuries are present or if the contents of hernia are gangrenous. Laparoscopy is a good treatment option in experienced hands for chronic TDH. Defect can be repaired by either primary closure for small defects or mesh for large defects. Patients with recurrent chronic TDH after primary repair should be managed with mesh either by open or laparoscopic approach. Other modalities used are muscle flap fascia or a biomaterial patch. All post-operative patients need periodic reassessment for recurrence by chest X-ray.

A thorough literature search showed only two case reports of recurrent chronic TDH which were repaired laparoscopically. Frantzides et al.[2] reported the first such case in a 69-year-old male in whom the diaphragmatic defect involved the oesophageal hiatus. They performed a mesh repair as the defect was very large. The authors

![Figure 1: (a) Pre-operative chest X-ray showing left lower lung collapse due to the left diaphragmatic hernia. (b) Pre-operative computed tomography chest showing bowel loops in the left hemithorax](image1)

![Figure 2: (a) Intraoperative left diaphragmatic defect after reduction of its contents. (b) Intraoperative left diaphragmatic defect repaired with mesh using sutures](image2)
commented that laparoscopic repair of recurrent TDH poses a technical challenge due to the dense post-operative adhesions as well as the chances of injuries to the herniating viscus. We also encountered similar problems in our patient as the spleen was densely adherent with posterior lip of diaphragmatic defect. Yildar et al.\(^3\) described another such case in a 38-year-old male 6 years after a primary repair. The authors emphasised proper delineation of hernial defect and its relationship with oesophageal hiatus to avoid serious injuries to important structures. In both previous repairs, mesh was fixed using hernia stapler. However, in our case, the mesh was fixed using continuous intracorporeal suture (polypropylene), which is a better way of fixation as tackers may not hold due to mobility of diaphragm.

**CONCLUSION**

Repair of recurrent chronic TDH can be done by both open and laparoscopic approaches. Laparoscopic repair offers the advantages of less post-operative pain, faster recovery and decreased wound complications. Laparoscopic repair of chronic recurrent TDH is safe and feasible in experienced hands.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal.

The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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