Traumatic thoracoabdominal hernia repair using a novel chest-wall reconstruction technique: a case report

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ABSTRACT

Thoracoabdominal hernia following blunt trauma is extremely rare. Abdominal viscera are more likely to herniate into the thorax if there is traumatic diaphragmatic rupture. We report the case of a patient presenting with a traumatic thoracoabdominal hernia containing part of the right lobe of the liver and the hepatic flexure of the colon. The hernia migrated cranially, to protrude through a seventh intercostal defect despite the diaphragm remaining fully intact. The need for early multispecialty (thoracic and hepatobiliary) surgical repair is highlighted, with improvements in surgical outcome for a complex trauma case by using a novel chest-wall reconstruction technique.

KEYWORDS

Hernia, thoracoabdominal – Trauma – Chest wall reconstruction

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Background

Thoracoabdominal hernia following blunt trauma is extremely rare. Abdominal viscera are more likely to herniate into the thorax if there is traumatic diaphragmatic rupture.

Case history

A 61-year-old male ex-smoker was admitted following blunt trauma to his right posterior chest after an accidental fall out of bed. At triage, he was haemodynamically stable but complained of a painful swelling on the right side of the chest and shortness of breath. He had a background history of hypertension. His body mass index was high, at 39 kg/m². Computed tomography (CT) three-dimensional reconstruction of the chest and upper abdomen demonstrated a displaced fracture of the posterior eighth rib and non-displaced fractures of the sixth, seventh and ninth ribs. He had a large hernia protruding through the seventh intercostal space, containing the non-obstructed hepatic flexure of the large bowel, accompanied by posterolateral abdominal wall, which contained abdominal fat. There was no diaphragmatic rupture.

Abdominal laparoscopic reduction was performed for the abdominal contents and the defect was repaired using

an intraperitoneal composite mesh (Symbotex™, Medtronic). Unfortunately, after two months, the patient re-presented with recurrence including herniation of segment eight of the liver on CT (Fig 1).

A multispecialty surgical approach was planned. Following a right posterolateral thoracoabdominal incision, an impressive seventh intercostal space defect was noted. The previous composite mesh was intact and left in place. An extraperitoneal approach facilitated reduction of the hernia contents and reinforcement with Gore® Bio-A® (WL Gore) mesh by the hepatobiliary surgeon (Fig 2a). This was applied as an onlay and fixed to the diaphragm using 2-0 polydioxanone. Size 0 Ethibond® (Ethicon, Inc) intercostal sutures were stitched within the shafts of the ribs (to avoid neuropathic pain) using a drill to align the ribs into a normal position and to eliminate the seventh intercostal space defect. Three MatrixRIB™ fixation system (DePuySynthes) sternal plates with an underlying Vicryl mesh closed the defect (Fig 2b). These plates were fixed using 14-millimetre screws. A 28 French drain was inserted.

The patient's postoperative course was uncomplicated. He spent his first night in intensive care, the Enhanced Recovery After Surgery protocol was applied and he was fit for discharge on the fifth postoperative day. At outpatient follow-up, his pain was well controlled, negating the need

for opioid analgesia. Follow up thoracoabdominal CT reconstruction reported a successful repair (Fig 3). There had been no recurrence at the six-month follow-up appointment.

Discussion

This is a rare case of thoracoabdominal hernia following blunt thoracic trauma and rib multiple fracture. The superior abdominal musculature, adjacent to the disrupted costal margin, became attenuated and stretched. This lead to

herniation of the abdominal contents with an intact diaphragm, presenting clinically as a large painful bulge causing the patient marked discomfort.^{2,4} In most cases, thoracoabdominal hernia is acquired following trauma or surgery. Predisposing risks for chest-wall hernia are previous thoracotomy, obesity, chronic obstructive pulmonary disease, oral steroid use and diabetes mellitus.² Rarely, hernias occur spontaneously or with congenital syndromes.⁵ It is important to have a high clinical suspicion for traumatic hernia based on the history and the risk factors.

Figure 1 Preoperative computed tomography (left) and three-dimensional reconstruction (right) of the intercostal defect, with liver (arrow) and hepatic flexure of colon (star) herniation.

Figure 2 Intraoperative image of (a) anterior abdominal Gore Bio-A mesh repair; (b) chest-wall reconstruction with sternal plates and Ethibond sutures.

Figure 3 Postoperative computed tomography (left) and three-dimensional reconstruction (right) showing sternal plates and chest-wall reconstruction.

The best diagnostic tool is CT, which offers a reliable means of establishing a preoperative plan to repair the defect. Three-dimensional chest wall and herniated contents reconstruction is recommended. Early surgical repair is important, as strangulation or incarceration complicates the outcome.^{2,4,5}

Techniques to repair the intercostal defect are variable and each case should be considered individually. In this case, a laparoscopic mesh repair proved unsuccessful, with symptomatic hernia recurrence two months postoperatively. This occurred as the abdominal viscera was able to re-herniate through the intercostal defect with all the fascial layers intact.⁴ Preoperative planning with a multidisciplinary approach involving thoracic and hepatobiliary surgeons, allowing for simultaneous repair of the abdominal and chest wall defect is best practice to decrease the risk of recurrence.

This case represents an innovative approach to the thoracoabdominal hernia repair using MatrixRIB fixation system sternal plates as intercostal bridges to avoid recurrence.

Conclusion

Thoracoabdominal hernia should always be suspected following blunt trauma in patients who present with palpable bulges over the chest wall. CT with three-dimensional reconstruction is the most appropriate initial imaging modality and should be promptly performed. Surgical repair should be pursued in symptomatic or at-risk patients. Chest-wall reconstruction by a thoracic surgeon is as important adjunct to abdominal wall repair to prevent recurrence and improve overall patient satisfaction.

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