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Case Report

An interesting case of laparoscopic management of traumatic diaphragmatic rupture in an acute setting

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ABSTRACT

Traumatic rupture of the diaphragm is an uncommon injury, often diagnosed late as it is associated with concurrent abdominal and thoracic visceral injuries which are the main cause of morbidity and mortality. Diaphragmatic rupture has been reported in 1–7 % of the patients following major blunt thoracoabdominal trauma and 10–15 % of the patients following penetrating trauma. In an emergency scenario, open approach remains the mainstay of management; however the laparoscopic approach has been steadily gaining acceptance. We report the case of a 35 year old male who was diagnosed with diaphragmatic rupture following blunt trauma to the chest and abdomen. The patient underwent emergency laparoscopic reduction of contents with anatomical repair of the ruptured diaphragm.

Introduction

Post traumatic diaphragmatic rupture is a life-threatening condition requiring early surgical intervention so as to avert intestinal obstruction, strangulation and cardiorespiratory collapse. Its silent nature makes it one of the most commonly missed injuries in trauma cases and a prompt diagnosis requires a high index of suspicion in patients presenting with blunt or penetrating abdominal or thoracic traumas. Physical examination is usually unremarkable and while radiological imaging plays a crucial role in the timely diagnosis, CT scan may miss 30–50 % of the diaphragmatic rupture during the initial assessment. Laparoscopic approach has been found to have excellent diagnostic and promising therapeutic benefits in the hands of the experienced surgeon.

Case presentation

A 35 year old male presented to the emergency department of our tertiary hospital following blunt trauma to the chest and abdomen as a result of a road traffic accident. On arrival, the patient was alert but tachypneic with a respiratory rate of 30 breaths/min, heart rate of 130 beats/min, blood pressure of 170/110 mm of Hg and a saturation of 97 % maintained with 4 l of oxygen. No breath sounds were audible over the left chest. However, the breath sounds were well elicited over the right chest. The abdomen was distended with diffuse tenderness over all quadrants and guarding was noted in the epigastric and left hypochondriac regions. Positive thoracic compression test was elicited on both sides of the chest. Chest X-ray and CT scan of the chest and abdomen was undertaken and showed eventration of left lobe of the diaphragm with pylorus superior to gastric fundus, transverse colon and spleen with about

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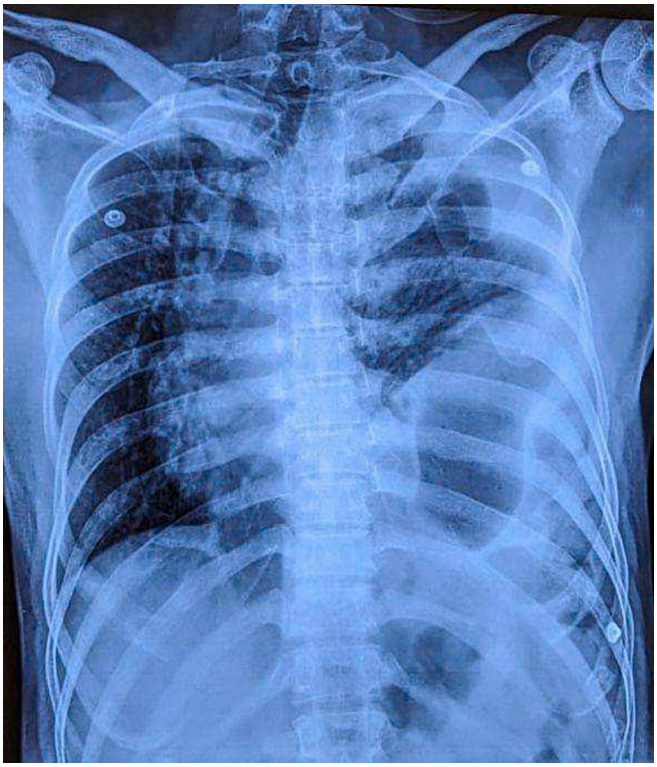

Fig. 1. Preoperative chest X-ray of the patient showing herniation of the abdominal contents into the thoracic cavity causing complete collapse of the left lung.

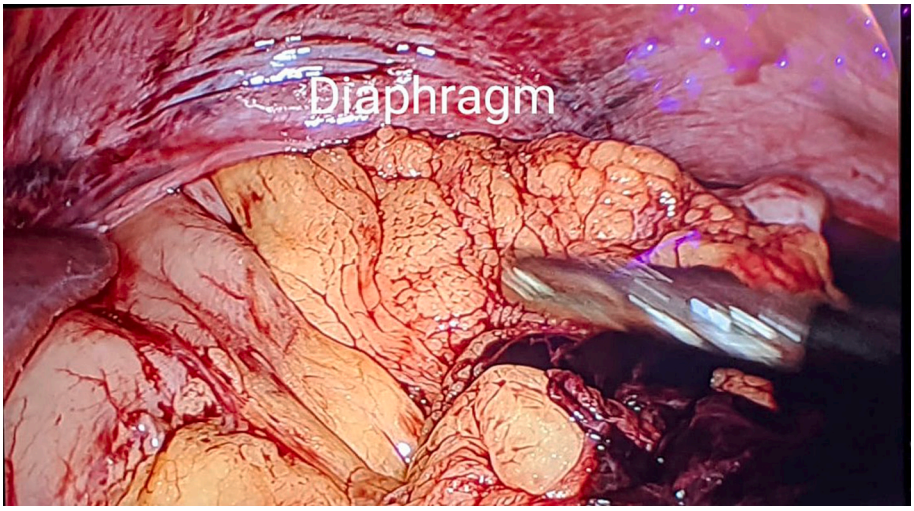

Fig. 2. Intraoperative image showing rupture of the left dome of the diaphragm with a defect of size 4 × 3 cm in the anterior left diaphragmatic space resulting in herniation of the stomach.

200 ml of hemoperitoneum. Patchy areas of consolidation with ground glass opacities in right upper and middle lobe were noted (Fig. 1). Following anaesthesia clearance, the patient underwent laparoscopy which revealed rupture of the left dome of the diaphragm with a defect of size 4 × 3 cm in the anterior left diaphragmatic space resulting in herniation of the stomach, transverse colon and spleen into the left side of the thorax causing complete collapse of the left lung (Figs. 2 and 3). Upon releasing the contents, Grade II splenic injury was noted, however the splenic hilum and vascular pedicles were intact. The rent in the left dome of the diaphragm was sutured intracorporally using 0-V LOC non-absorbable sutures after placing a 28 Fr Intercostal drainage tube under laparoscopic vision (Fig. 4). Another 28 Fr abdominal drain was placed in the abdominal cavity. The procedure was well tolerated by the patient.

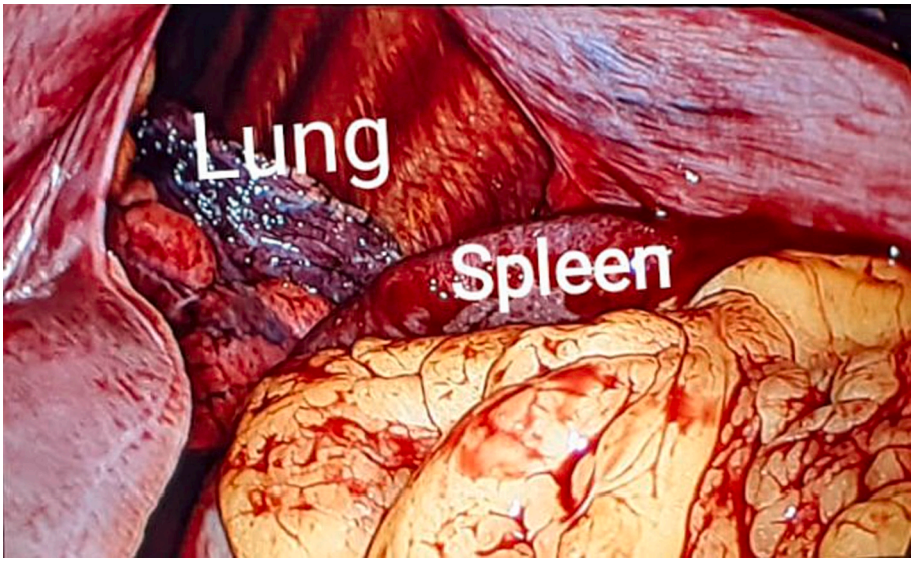

Fig. 3. Intraoperative image of the diaphragmatic defect revealing the lungs and herniated spleen.

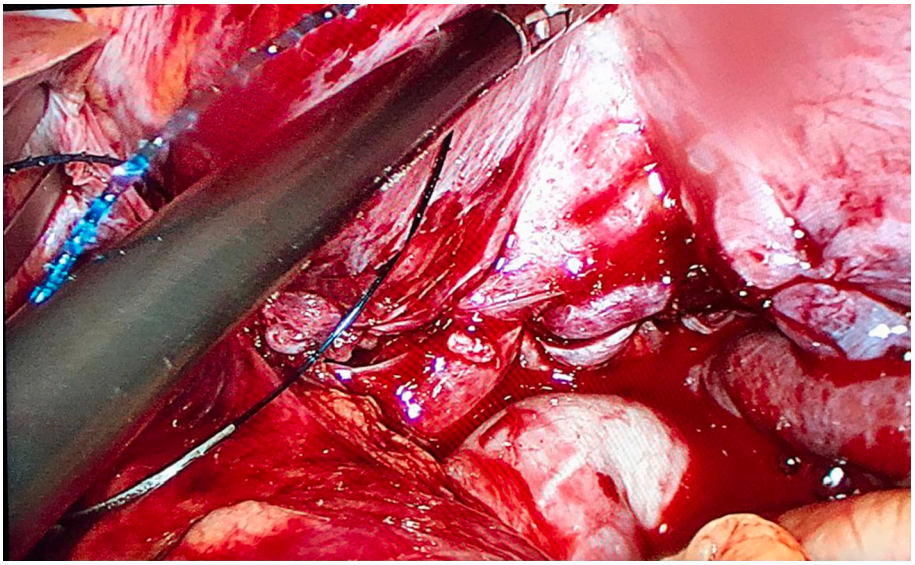

Fig. 4. Intraoperative image of the rent in the left dome of the diaphragm sutured intracorporally using 0-V LOC non-absorbable sutures.

Immediate post operative X-Ray showed complete expansion of the left lung with intercostal drainage tube insitu (Fig. 5). The post operative period was uneventful, abdominal drain and chest drain was removed on the third and fourth postoperative days respectively. The patient improved dramatically and was discharged on the sixth postoperative day. The patient was followed up over a year with period clinical examination and imaging and he remained asymptomatic.

Discussion

The major cause of acquired diaphragmatic hernias is trauma. Approximately 5.8 %–8 % of the patients undergoing laparotomy for abdominal trauma will have a diaphragmatic injury [1]. The large force required to rupture the diaphragm can result in an array of multi-system injuries as a consequence of which the diaphragmatic rupture is often overlooked. The occult diaphragmatic injury may present as a hernia later with potentially life-threatening complications. The clinical manifestations are frequently nonspecific and radiological imaging often underestimates the severity and extent of the injury. Computed Tomography scan may miss 30–50 % of the diaphragmatic rupture during the initial assessment [2]. Mihos et al. reported that 74 % of traumatic diaphragmatic injuries in their study were diagnosed intraoperatively after being missed on non-invasive imaging [3]. To counter the dreaded consequences of a

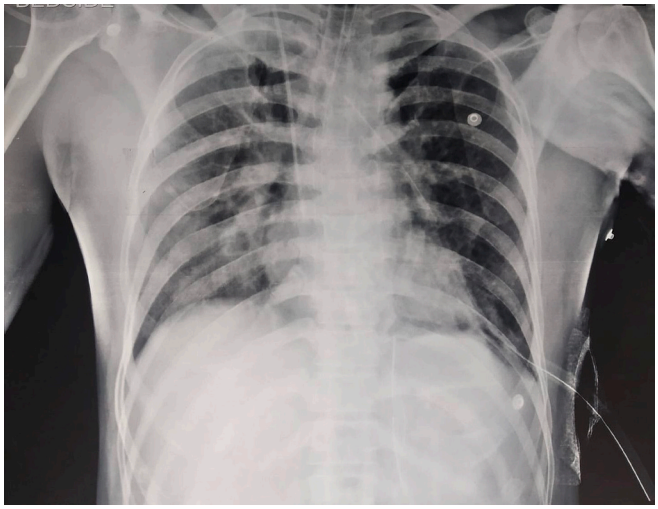

Fig. 5. Immediate post operative chest X-ray showing complete expansion of the left lung with intercostal drainage tube insitu.

missed diaphragmatic rupture, several authors have advocated routine laparotomies in patients following blunt or penetrating trauma to the chest or abdomen. However, this protocol has diagnosed all but 1 out of 18 traumatic hernias resulting in an unnecessary laparotomy rate of 31 % [4]. In the wake of advances in minimally invasive surgery, laparoscopy is rapidly emerging as the modality of choice to diagnose diaphragmatic rupture owing to its high degree of sensitivity and specificity as well its ability to provide simultaneous therapeutic intervention [5]. Friese et al. [6] confirmed laparoscopy to be both specific and sensitive (100 % and 87.5 % respectively) for the diagnosis of traumatic diaphragmatic rupture in a series of 34 penetrating thoracoabdominal injury patients by performing mandatory laparotomy following diagnostic laparoscopy. Laparoscopy can illuminate both hemidiaphragms to rule out diaphragmatic rupture and can also identify other injuries in the abdominal cavity. Open surgical approaches in contrary to laparoscopic repair is associated with increased postoperative pain, increased duration of hospital stay and development of long term complications like incisional hernia [7,8]. Most surgeons concur that diaphragmatic injuries are amenable to laparoscopic repair in carefully selected patients under the stipulation that the operating surgeon has a high degree of expertise and skill.

Conclusion

Laparoscopic management of diaphragmatic rupture following trauma is safe in selected patients and avoids the complications and morbidity related to laparotomy.

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