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Case Report

Laparoscopic approach to the management of penetrating traumatic diaphragmatic injury

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ABSTRACT

Background: Traditionally, laparotomy/thoracotomy is the standard approach for thoracoabdominal injuries. However, it has a non-therapeutic rate of 12–40% and 40% morbidity. Laparoscopy, as a diagnostic and therapeutic modality, has evolved to be integral to general and subspecialty surgeons in the management of patients. However, its use in the field of trauma surgery has been limited. We present a case of traumatic diaphragmatic injury from a low velocity penetrating wound successfully repaired through laparoscopic approach.

Case presentation: A 20 year old male, presented with a traumatic diaphragmatic injury secondary to a low velocity penetrating injury. A computed tomographic scan revealed a tear on the left diaphragm with the superior pole of the spleen and omentum eviscerating through. He subsequently underwent diagnostic laparoscopy and primary repair of the diaphragmatic injury. His recovery was uneventful and he was discharged on the third postoperative day.

Conclusion: A review of current literature and our case suggest that the use of laparoscopy for the management of penetrating thoracoabdominal injuries is continually evolving and has shown to be a promising approach compared to traditional laparotomy in carefully selected patients. Laparoscopic repair of penetrating traumatic diaphragmatic injuries is a safe and expedient option for hemodynamically stable patients.

Introduction

Traumatic injuries to the diaphragm were previously diagnosed in autopsies, first of which was in 1541 by Sennertus, it was only in 1800s that diaphragmatic injuries were diagnosed antemortem [1]. Diaphragmatic injury as a result of penetrating trauma ranges from 0.8% to 15% [2]. This was traditionally managed by mandatory exploration on the premise that it was the only way to ensure that no associated intraabdominal injuries have been missed. However, studies have shown that 12–40% of these were nontherapeutic explorations, for which, prompted the need for alternative approach to the management of traumatic diaphragmatic injury (TDI).

The first reported laparoscopy for TDI was in 1984 by Adamthwaite, when he performed laparoscopy for 10 suspected TDI patients. Of the ten, 2 did not show any injury to the diaphragm, thus avoiding a non therapeutic laparotomy [3]. Ten years later the first therapeutic laparoscopy for TDI was done, saving the patient a laparotomy.

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We describe hereinto, the application of primary repair for a penetrating TDI successfully done through the laparoscopic approach. This is followed by a review of current existing literature on laparoscopic approaches to TDI.

Case

A 20 year old male, with unremarkable past medical history, presented to the emergency department(ED) with penetrating abdominal injuries. On primary survey, he was not in respiratory distress, not tachycardiac and normotensive. He sustained multiple stab wounds, 1 × 2 cm at level of T12, at the right flank, and a 1 × 2 cm at 7th intercostal space mid axillary line on the left. On auscultation there was decreased air entry in the left lung field with basal crackles. He was resuscitated according to ATLS protocols. Supine chest X-ray was negative for pneumothorax and hemothorax. (Fig. 1) Focused Abdominal Sonography for Trauma (FAST) showed no evidence of free fluid in all four compartments. He remained stable while in emergency department.

A computed tomography (CT) scan of abdomen with IV contrast was performed. It revealed two stab wounds. One over the right flank extending to subcutaneous layer at the inferior edge of right latissimus dorsi with hematoma, without peritoneal breach. (Fig. 2). The other was over the left posterolateral inferior chest wall. A small left pneumothorax with minimal atelectasis was noted. A focal defect of 1.5 cm was seen over the lateral aspect of the left diaphragm with protrusion of a small amount of peritoneal fat and a nub of the spleen through the defect. Minimal amount of hemoperitoneum was noted.

Surgical technique

A 32F chest tube was inserted on the left thoracic cavity prior to surgery. He subsequently counselled and consented for a diagnostic laparoscopy and, keep in view open, repair of the diaphragmatic injury. An indwelling Foley catheter and Nasogastric tube were inserted post induction.

A 10 mm infraumbilical laparoscopic port was inserted and the CO_2 pneumoperitoneum was created. Under direct visualization, three 5 mm ports were inserted, one in epigastrium and two in the left subcostal area. A diagnostic laparoscopic assessment of the intra-abdominal organs was performed. A 2 cm left diaphragmatic laceration with an omental plug was noted. Manual reduction was performed by gently pulling on the omentum. (Figs. 3 and 4). A grade 1 splenic laceration was also noted on the superior pole with no active bleeding. A minimal amount of blood was noted in the pelvis. The left thoracic cavity was noted to be clean with no contamination. Both the left subdiaphragmatic space and left thoracic cavity were irrigated copiously. The diaphragmatic laceration was repaired incontinuity using V-loc 3/0 suture, a hemolock clip was placed at end of suture. (Fig. 5) During the operation, the left chest tube was intermittently clamped and released as needed to prevent the loss of pneumoperitoneum and also to avoid a tension pneumothorax.

The patient was extubated prior to transfer to Post Anesthesia Care Unit (PACU), and was subsequently sent to high dependency unit with adequate pain control and respiratory support. A chest X ray on post-operative day 3 showed good re-expansion without residual hemothorax. The left chest tube was removed and he was discharged the next morning.

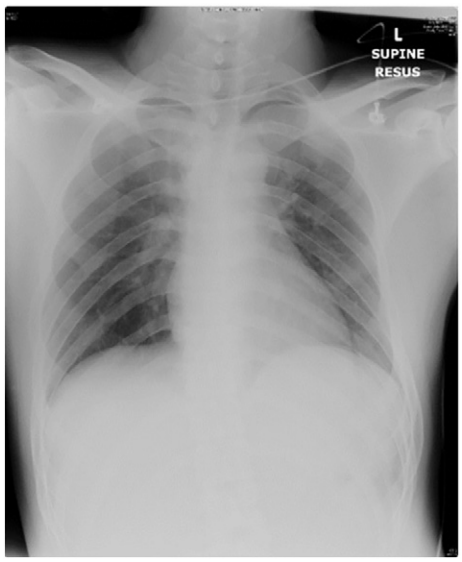

Fig. 1. Chest X ray on arrival.