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Traumatic abdominal wall hernia: A case report and literature review

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ABSTRACT

INTRODUCTION: Traumatic abdominal wall hernia is a rare but serious diagnosis resulting from blunt abdominal trauma. The clinical diagnosis is not usually straightforward and the hernia is often discovered at the time of the surgical exploration for intra-abdominal injuries or by imaging studies.
PRESENTATION OF CASE: A 25-year-old obese, restraint, male patient was the victim of a high-speed road traffic accident. Among other injuries, he showed extensive skin maceration and bruising over the lower abdomen and flanks upon presentation, however he did not need any surgical intervention. Contrast-enhanced computed tomography scan of the abdomen and pelvis demonstrated extensive abdominal wall muscular disruption over both flanks with herniation of the right colon. Counselled to follow up in 4–6 weeks to have the hernia surgically repaired, he showed up after 8 months with a large muscular defect resulting in a large hernia containing small and large bowel loops.
DISCUSSION: The timing and type of the surgical repair of traumatic abdominal wall hernia depends upon the size of the hernia defect and the presence of associated intra-abdominal injuries. Delayed repair; however, may result in a large defect making primary, non-prosthetic repair impossible and increases the risk of abdominal compartment syndrome after surgical correction.
CONCLUSION: Traumatic abdominal wall hernia presents a diagnostic as well as a therapeutic challenge. The therapeutic approach is governed by a multitude of factors emphasizing the need of a patient-tailored, case by case management plan.

1. Introduction

The case of a 25-year-old gentleman, who sustained a road traffic accident resulting in multiple injuries, including an extensive traumatic abdominal wall hernia is presented. The patient lost to follow up and presented back 8 months after his accident with a large right flank hernia. A review of the literature of this unusual complication of blunt abdominal trauma follows, going through the diagnostic tools and the therapeutic options available to address this entity, which is easily missed upon the primary clinical assessment of trauma patients. The challenges facing the surgeon in treating this type of hernia are discussed in relation to the timing and type of surgical repair.

2. Report of a case (Reported in line with the CARE criteria)

A 25-year-old, Saudi Arabian, male driver, with no significant past medical history, was involved in a high-speed, road traffic accident, resulting in rolling over of the vehicle, while being seat-belted. He arrived to the emergency department at our hospital, with the paramedics, in a stable condition. He was assessed along the lines of the Advanced Trauma Life Support (ATLS) protocol.

The patient sustained multiple injuries. The Glasgow Coma Scale (GCS) was 15 at presentation and the vital signs were within normal limits. He showed upon assessment the following positive signs: bilateral conjunctival haemorrhage, tenderness over the left side of the chest, back of the neck and the left shoulder with overlying bruises and inability to fully move his left upper limb (that showed to be related to a brachial plexus injury). This morbidly obese gentleman (a body mass index of 37) presented, upon examining his abdomen, a large pannus with seat belt marks, extensive ecchymoses, bruises and skin maceration over the lower abdomen and pelvis. The examination, otherwise, showed a soft abdomen with moderate lower abdominal tenderness and bilateral, mildly tender, flank swellings, being more prominent on the right side.

Paraclinical investigations were positive for left-sided haemothorax with multiple overlying rib fractures, this was addressed urgently by the insertion of a chest tube. A contrast-enhanced computed tomography (CECT) scan of the abdomen and pelvis revealed 2 large muscular defects involving the anterior abdominal wall bilaterally, being more marked on the right side associated with subcutaneous visceral herniation with the right colon being present lateral to the right anterior superior iliac spine. Subcutaneous fat stranding and bleeding could be identified over both flanks (Fig. 1). The liver and spleen were unremarkable. No free peritoneal air

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Fig. 1. An axial view of a CT image showing herniation of the colon through the right-sided muscular defect. Haematoma and muscular disruption can be demonstrated bilaterally.

could be found. The pelvic imaging was significant only for a small amount of blood and fat stranding.

With the findings noted above and a stable haemodynamic status, the patient was admitted to the hospital for observation and symptomatic treatment. His brachial plexus injury and left-sided haemothorax were managed appropriately.

Taking into consideration the chest and left arm injuries, along with the morbid obesity and the maceration of the skin in the flank area, the patient was counselled to follow up with our team in 4–6 weeks to have the abdominal wall hernia reassessed for a possible repair.

The patient failed to show up for 8 months. During this period, the abdominal wall defect increased in size (Fig. 2). He started to develop dragging pain in the right flank associated with a progressively enlarging hernia that would interfere with his ability to perform activities of daily living, mainly in the light of his brachial plexus injury. A CT scan was performed showing 2 progressively enlarging defects with herniation of small and large bowel loops (Fig. 3), a defect over the right flank with the neck of the hernia measuring 8 cm × 8 cm and a smaller one over the left flank measuring around 3 cm × 3 cm.

The outline of management was discussed with the patient that would include weight reduction and surgery in the form of a laparoscopic, prosthetic repair in a specialised centre.

3. Discussion

Traumatic abdominal wall hernia (TAWH) is a rarely described type of hernia, resulting from blunt trauma to the abdomen. It is defined as bowel or abdominal organ herniation through a disruption of the musculature and fascia following adequate trauma [1], with no evidence of skin penetration or pre-existing hernia [2].

This type of hernia is caused by blunt force associated with acute elevation of intra-abdominal pressure. This force is distributed over a surface area sufficiently large to prevent penetration but small enough to remain focal. Shearing forces distributed over the bony prominences of the pelvis or the lower thoracic cage may also be involved [1].

This type of abdominal wall hernia was first described by Shelby more than 100 years ago, with around 250 cases reported in medical literature [2].

The clinical diagnosis of a TAWH is often not straightforward. This hernia can be discovered at the time of a detailed physical examination [1]. However, due to its rare occurrence, the diagnosis of TAWH is often not considered [3], with the symptoms related to the hernia being usually attributed to intra-abdominal lesions.

Fig. 2. A photo of the patient showing the abdominal wall hernia, 8 months after the accident.

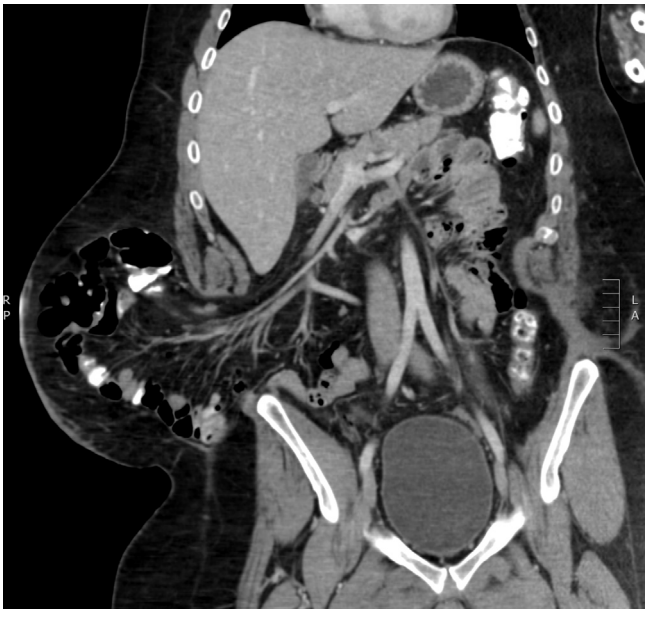

Fig. 3. A coronal view of a CT scan showing the defect 8 months after the accident.

Noting that the hernia is often discovered at laparotomy or with radiological studies.

Low-energy trauma (e.g. handlebar injury) can lead to smaller traumatic abdominal wall hernias, which can easily be missed on physical examination, and these may go undiagnosed for a long period of time after trauma [4]; whereas high-energy trauma can

Table 1
Abdominal wall disruption grade definitions.

Abdominal wall (AW) injury grade	Definition
I	Subcutaneous tissue contusion
II	AW muscle haematoma
III	Single AW muscle disruption
IV	Complete AW muscle disruption
V	Complete AW muscle disruption with herniation of abdominal contents
VI	Complete AW disruption with evisceration

give rise to large abdominal wall defects associated with intra-abdominal organ injury.

Several suggested definitions and diagnostic criteria have been proposed by different authors to characterize TAWH [5]. These differing criteria were either complex or non-conclusive. To this end, and with the widespread use of computed tomography (CT) in the initial assessment of trauma patients, a simpler, CT-based grading system has been developed to define different degrees of abdominal wall disruption (Table 1) [6].

According to this grading system, the patient's injury presented in this report would be classified as abdominal wall injury grade V.

If the TAWH is associated with intra-abdominal lesions needing exploratory laparotomy, the abdominal wall defect would most accurately be assessed intra-operatively. In cases with delayed presentation, CT and magnetic resonance imaging of the abdominal wall can accurately evaluate these defects [5].

As for the treatment of this hernia type, this could be emergent or elective. The therapeutic strategy is primarily governed by the patient's stability upon presentation in a trauma setting.

Factors affecting the timing (early or delayed) and the type (primary or prosthetic, open or laparoscopic) of the repair include the following:

1. the size of the abdominal wall defect,
2. the timing of its diagnosis,
3. the presence of associated intra- and extra-abdominal lesions,
4. and with the advent of minimal invasive procedures, the surgeon's expertise in laparoscopic surgery.

In case the trauma patient is stable and the size of the hernia is small, with the visceral organs protruding through the defect, exploratory laparotomy/laparoscopy should be performed on an urgent basis to prevent possible visceral incarceration [5].

In cases when the TAWH is discovered during abdominal exploration for visceral injury repair, the decision to repair the hernia may be more challenging and depends on multiple factors including the physiological stability of the trauma patient to withstand such a procedure in an emergency setting, the size of the orifice and the risk of incarceration, the presence of abdominal contamination from hollow viscus injury, the ability to perform a tension-free primary repair or alternatively the possible need of prosthetic material with the risk of surgical infection [2,5]. Noting that the use of biological mesh in the case of contamination may prove to be a good alternative, despite less favourable long-term durability [7].

In cases where the abdominal wall defect is large and urgent surgical exploration of the abdomen is not indicated, as in the present case, the repair can be delayed, giving appropriate time for the skin to heal and for any associated injuries to recover. However, this delay would be at the expense of the hernia itself which will enlarge due to muscle retraction and atrophy, resulting in a more challenging repair, making primary repair more difficult and increasing the chances of resultant abdominal compartment syndrome [8].

In conclusion, traumatic abdominal wall hernia presents a diagnostic as well as a therapeutic challenge. With its subtle presentation, a high index of clinical suspicion is needed to reach the diagnosis that is particularly facilitated by the routine use of CT scanning in the trauma setting. In spite of the fact that the present patient did not receive surgical treatment, the case report highlights the challenges facing the surgeon to treat such a clinical rarity. As outlined above, the therapeutic approach is governed by a multitude of factors emphasizing the need of a patient-tailored, case by case management plan.

Conflict of interest

None.

Funding

None.

Informed consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-chief of this journal on request.

Ethical approval

We, the authors, have obtained ethical approval from the Institutional Review Board (IRB) at Johns Hopkins Aramco Healthcare (JHAH) prior to submitting the manuscript for publication.

Author contribution

Osama S. Al Beteddini: Corresponding author. He has reviewed the literature and shared in writing the case report.

Osama Omari: Co-author. He has prepared the case report and reviewed the manuscript for style and content.

Samir Abdulla: Co-author. He has reviewed the manuscript for style and content.

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