

## Delayed left traumatic diaphragmatic hernia mimicking acute coronary syndrome

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### ABSTRACT

Traumatic diaphragmatic hernias (DH) represent only a small percentage of all DH. Injury is mostly caused by severe blunt or penetrating trauma. DH may be recognized during the period of hospitalization immediately following trauma. Here, we present the case of DH in a 33-year-old male who presented with typical acute coronary syndrome-related symptoms with significant electrocardiography changes. The case is unique due to the occurrence of the DH with trauma and its delayed presentation with acute coronary symptoms. A high index of suspicion should be raised if the patient had a previous history of trauma and chest X-ray findings.

**Key words:** Acute coronary syndrome, Delayed traumatic diaphragmatic hernia, Exploratory laparotomy, Thoracotomy

Traumatic diaphragmatic hernias (DH), an uncommon entity, represent only a small percentage of all DH. Injury is mostly caused by severe blunt or penetrating trauma. DH may be recognized during the period of hospitalization immediately following trauma [1]. If the diaphragmatic injury (DI) is not recognized during the immediate post-traumatic period, the patient may recover and remain symptom-free or present either with chronic thoracoabdominal symptoms or with acute emergency due to intestinal strangulation [2]. During the delayed presentation with chronic thoracoabdominal symptoms, the trauma responsible for the injury is often forgotten and the diagnosis is not suspected. A careful history, physical examination, and awareness of the possibility are the prerequisite for timely diagnosis.

Here, we present the case of DH in a 33-year-old male. The case is unique due to the occurrence of the DH with trauma and its delayed presentation with acute coronary symptoms. Literature review shows that coronary events are common in the acute setting of blunt chest trauma precipitated by cardiac contusion or cardiac tamponade. The reported cases of coronary events in delayed DH are very rare. For young adults, blunt chest trauma is one of the non-atherosclerotic mechanisms leading to acute myocardial infarction (AMI) [3]. Not only a severe trauma but also a mild trauma such as sports trauma can cause AMI. However, acute coronary occlusion following a blunt injury to the chest in the presence of coronary atherosclerosis may induce progressive angina pectoris.

### CASE REPORT


A 33-year-old Malay gentleman presented to the emergency department (ED) with a complaint of left-sided chest pain associated with discomfort and palpitation for 2 days. He denies any fever, cough, or intestinal obstruction symptoms. He had a history of motor vehicle accident 3 months ago and sustained a traumatic thoracic injury (left fourth rib fracture with the left lung contusion). On that admission to the ED, the patient was hemodynamically stable and not in respiratory distress. A primary survey was done and the chest X-ray was noted to have a simple left fourth rib fracture with the left lung contusion and no evidence of hemothorax or pneumothorax. Electrocardiography (ECG) was done and sinus rhythm was noted. Cardiac contusion was ruled out after the focused assessment with sonography for trauma scan and ECG results. He was admitted for traumatic rib fracture and was treated conservatively with analgesics and discharged well after 2 days period of observation.

After 3 months of trauma, he again presented to the ED. Upon presentation, he was hemodynamically stable and not in distress. Clinically, the patient was pink and able to converse in full sentences. Lung examination noted markedly reduced air entry on the left side. The abdominal examination was unremarkable. ECG done noted significant changes with ST-elevation lead 1, 2, AVF lead, V3-V6. The patient was initially treated for inferior myocardial infarct with posterior involvement and was started on antiplatelet with an anticoagulant.

However, the routine chest X-ray done on this admission noted left lung collapse with tracheal and mediastinal shift to the

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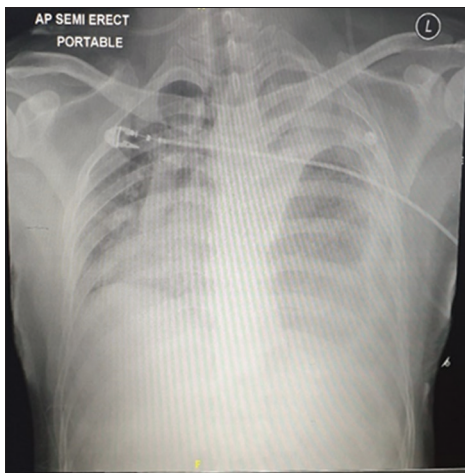
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right (Fig. 1). Computed tomography (CT) thorax abdomen was done and noted DI with herniation of distal transverse colon and splenic flexure into the left hemithorax (Fig. 2).

Based on the CT thorax abdomen, the patient was diagnosed with a delayed traumatic left DI with bowel herniation. After consulting with a cardiologist in view of ECG changes, the patient underwent emergency exploratory laparotomy, reduction of herniated bowel, primary repair of DI, and segmental transverse colon resection with functional end to end anastomosis under high cardiac risk. Intraoperatively, the patient had a 2.5 cm defect at the left hemidiaphragm with transverse colon herniated into the left hemithorax (Fig. 3a). The herniated part of the bowel appeared unhealthy (Fig. 3b). No fecal contamination was noted in the left hemithorax. Left chest tube inserted.

Postoperatively, the patient was ventilated and was unable to wean off the ventilation and subsequently underwent CT thorax. Repeated CT thorax noted loculated left pleural effusion with left lung collapse. The patient underwent left thoracotomy and decortication on the 2<sup>nd</sup> week of admission. Post-operative repeated chest X-ray noted left lung expanded and the patient was able to wean off the ventilation support. The patient was subsequently discharged after 3 weeks



**Figure 1:** Chest X-ray showing gastric bubble with tracheal and mediastinal shift to the right



**Figure 2:** Computed tomography thorax abdomen on admission diaphragmatic injury with herniation of distal transverse colon and splenic flexure into the left hemithorax

of admission with no complications. He was given an outpatient appointment by a cardiologist to reevaluate the coronary symptoms and an outpatient coronary angiogram appointment.

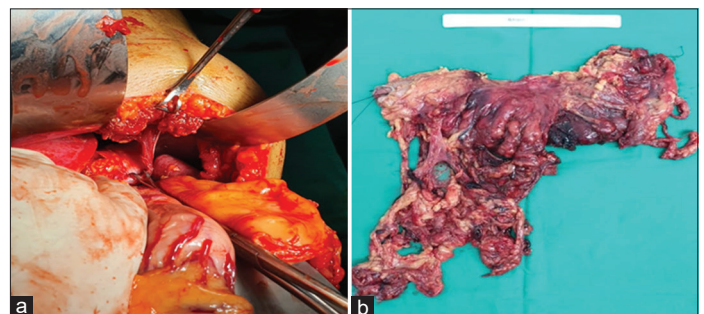
## DISCUSSION

Trauma especially thoracoabdominal trauma may induce diaphragmatic rupture with an incidence of 0.8–5% [4]. On average, up to 30% of blunt diaphragmatic ruptures may appear as late presentations, and <2.7% are detected during the first 4 months after injury [5]. Left-sided rupture occurs in 70–80% cases, a right-sided rupture in 15–24% cases, and bilateral in 5–8% cases [6]. The posterolateral aspect of the hemidiaphragm ruptures commonly because this area is embryologically weaker [7].

Presentation of traumatic DI is described into three phases – the acute phase, latent/delayed phase, and obstructive phase [8]. The acute phase is dominated in 95–100% cases by associated injuries such as rib fracture, pelvic fracture, splenic rupture, closed head injury, liver laceration, hemothorax, pneumothorax, and pulmonary contusion. The diagnosis is frequently missed in the acute phase because of the presence of other life-threatening conditions such as shock, respiratory failure, concomitant visceral injury, and coma, which dominate the clinical picture. Delayed presentation of the DH in the latent phase is with upper gastrointestinal symptoms, chest pain, and dyspnea or an abnormal chest radiograph without symptoms. Patients with obstructive phase often present months to years later with incarceration, obstruction, strangulation, or perforation.

The delayed phase of DH is precipitated by various hypotheses. The first explanation is that the diaphragmatic defect occurring with injury manifests only when herniation occurs [9]. Delayed rupture may occur several days after the initial injury as a process of inflammation and necrosis of a devitalized diaphragmatic muscle [10]. Small diaphragmatic tears may enlarge over time, allowing herniation of abdominal organs into the thoracic cavity, which may be another explanation for late diagnosis.

The above mention case was unusual entity. The presence of significant ECG changes during his presentation causing a diagnostic dilemma. A variety of cardiovascular pathologies have been associated with blunt trauma injury, including myocardial contusion, aortic transection or less often aortic dissection, trauma-induced ventricular arrhythmia or commotio cordis in young children, hemopericardium with tamponade, and aortic valve leaflet avulsion. AMI is a rare but well-described complication of



**Figure 3:** (a) Intraoperative defect at the left hemidiaphragm; (b) distal transverse colon and splenic flexure (herniated segment)

blunt trauma to the chest [11]. In the literature review, most of the cases of acute coronary artery occlusion are associated with a blunt chest injury and pre-existing atherosclerotic coronary artery disease have been described [12]. It is assumed that in such cases, pre-existing coronary atherosclerosis is always present and the blunt chest injury dislodges an atheromatous plaque, thus obstructing the vessel and causing acute coronary syndrome [12].

In the above mention case, the patient was presented with typical acute coronary syndrome-related symptoms with significant ECG changes. However, a high index of suspicion should be raised if the patient had a previous history of trauma and chest X-ray findings. The cardiac event could be an incidental event or perhaps associated with the delayed traumatic DI. However, the literature reviews show delayed DH could present with acute coronary symptoms.

## CONCLUSION

Delayed diaphragmatic hernia could present with acute coronary symptoms which may delay the initial treatment thus causing morbidity and possible mortality to the patient. Multidisciplinary team approach with the involvement of cardiologist and intensivist would aide the treatment algorithm

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