

DELAYED PRESENTATION OF DIAPHRAGMATIC RUPTURE FOLLOWING BLUNT TRAUMA IN VIEW OF CRITICAL CIRCUMSTANCES AT ADMISSION

General Surgery

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ABSTRACT

In a polytrauma patient, diaphragmatic injury is associated with injury to local structures including ribs and abdominal solid organs like liver or spleen. It is usually linked to penetrating injury more commonly than a blunt traumatic injury. A high index of suspicion is the key to diagnosis of diaphragmatic injury in a patient with blunt traumatic injury. There is a high probability the injury goes unnoticed. Late presentation of an unnoticed diaphragmatic rupture with hernia is associated with increased morbidity. We report an interesting case of blunt traumatic diaphragmatic hernia in a 35 year old man presenting 7 days after blunt abdomino-thoracic injury. The injury went unnoticed for 7 days from admission pertaining to critical circumstances. He had herniation of bowel, stomach, colon and left lobe of liver through left sided ruptured diaphragm. Through a left subcostal incision, herniated organs were reduced and diaphragmatic defect closed with interrupted horizontal mattress polypropylene sutures.

KEYWORDS

Diaphragmatic rupture, Delayed presentation

INTRODUCTION

Traumatic diaphragmatic rupture in itself is a rare entity. However, incidence is rising because of the increasing number of road traffic accidents in the last few years, together with better pre-hospital and hospital resuscitation of severely injured patients and improved diagnostic facilities. Significant deceleration injury or truncal impact contributes to rapid and abrupt increase in intraabdominal pressure. Significant change in velocity during deceleration in a motor vehicle collision leads to rupture of hemidiaphragm. While considering blunt traumatic diaphragmatic injury, high level of suspicion is necessary to diagnose the injury owing to the very rare nature. Thorough assessment of severity and the exact mode of injury is a key indicator in diagnosing the condition.

AAST has classified diaphragmatic injury as-

Table 1: AAST classification of traumatic diaphragmatic injury

Diaphragm injury scale			
Grade*	Description of injury	ICD-9	AIS-90
I	Contusion	862.0	2
II	Laceration <2cm	862.1	3
III	Laceration 2-10cm	862.1	3
IV	Laceration >10 cm with tissue loss ≤ 25 cm ²	862.1	3
V	Laceration with tissue loss > 25 cm ²	862.1	3
*Advance one grade for bilateral injuries up to grade III.			

Larger injuries, usually longer than 5 cm lacerations with acute bowel herniation, are associated with blunt trauma compared to penetrating traumas. Such patients can present with shortness of breath, respiratory distress. If presented late, may show features of unexplained hypotension and shock. In the plethora of other injuries which require immediate attention in critically ill, diaphragmatic injuries are usually missed.¹

Management of this patient includes a chest X ray followed by CT scan. Surgical repair of diaphragm remains the mainstay of treatment.³ We came across a case of delayed presentation of post traumatic diaphragmatic hernia in an clinically normal chest at the time of admission. The chest X ray, also, did not show any herniated bowel loops. We reviewed the literature to highlight challenges in diagnosis and management of such cases.

CASE REPORT

A 35 year old male with a/h/o road traffic accident with exact mode and time of injury not known was found lying on the road in Valsad, Gujarat on 28 October 2020, was admitted in a local hospital in Valsad.

Patient was intubated due to low GCS (6/15). Investigations were done and patient was being managed conservatively. X-rays were done with patient in supine position as patient was unstable. X-ray chest of the patient had pneumo-mediastinum but no evidence of herniated viscera. Long bone x-rays were not done. NCCT brain did not show any brain parenchymal injury. On next day, patient was referred to New Civil Hospital, Surat for further management. Patient had left arm deformity, bony crepitus and abrasions over posterolateral aspect of left chest and left lower limb. He was unable to maintain saturation owing to poor respiratory drive following head injury and was put on ventilator. No palpable rib fracture was noted. Air entry was bilaterally equal. Blood investigation profile of the patient was normal. NCCT brain was repeated on the same day of admission which showed minimal Subarachnoid haemorrhage. Chest, pelvic, long bones x-rays were done. Displaced midshaft left humerus fracture was present. Repeat x-ray chest did not show any evidence of herniated bowel loops.

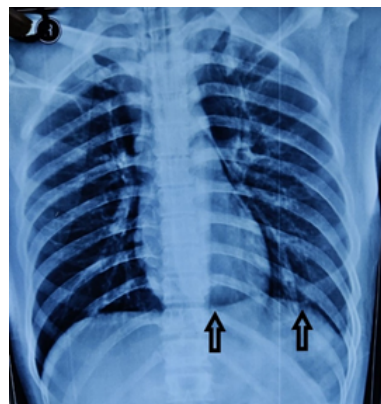


Figure 1 (X-ray chest on day of accident showing pneumomediastinum and no evidence of herniated bowel loops)

Patient's GCS improved after antibiotics, analgesics, anticonvulsant treatment. Patient was put in 30° inclination and eventually, patient was extubated on day 6 of admission. Patient's GCS was 15/15 with all higher functions intact.

After 7 days of sustaining the trauma, patient complained of breathlessness. Patient had difficulty in breathing especially in supine posture wherein, his spO₂ dropped to 85% on room air compared to 94% in erect posture. Air entry was evidently reduced, on left side compared to right. Trachea was found deviated to right side.

X-ray chest was repeated which showed presence of gaseous shadows of hollow viscera in left hemithorax with collapsed left lung with obliterated costo-phrenic angle and mediastinal shifting.

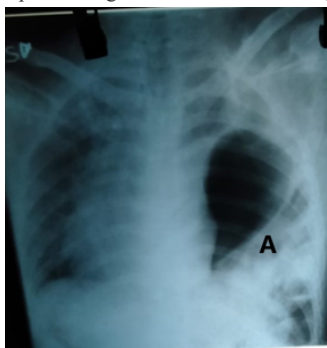


Figure 2 (Repeat chest Xray on admission day 7 showing gaseous shadows of hollow viscera in left hemithorax with collapsed left lung with obliterated costo-phrenic angle and mediastinal shifting)

CT Thorax was carried out for detailed evaluation of injuries and it showed the presence of anterior part of stomach, jejunum, ileum, left lobe of liver and part of transverse and descending colon in the left thoracic cavity confirming diagnosis of post-traumatic diaphragmatic hernia.

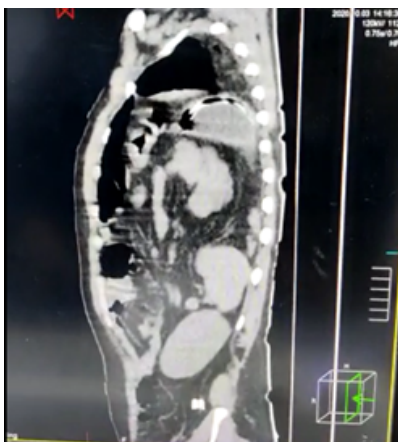


Figure 3(CT thorax sagittal view showing herniated abdominal viscera)

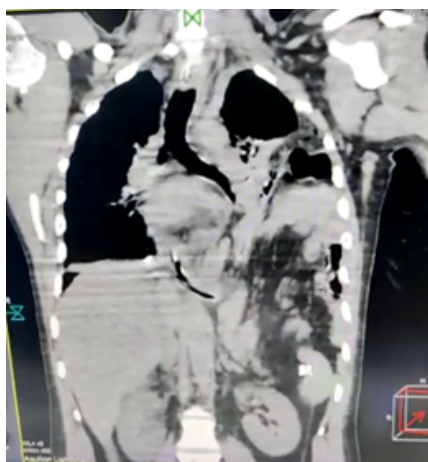


Figure 4 (CT thorax coronal view showing herniated abdominal viscera)

Patient and relatives were counselled and taken for emergency surgery was planned. Left subcostal incision was kept. A large defect of approximate size 10 X 7 cm² was found in left hemidiaphragm with herniated stomach, jejunum, ileum, left lobe of liver, part of transverse colon and part of descending colon. All herniated contents were reduced. All organs were viable.

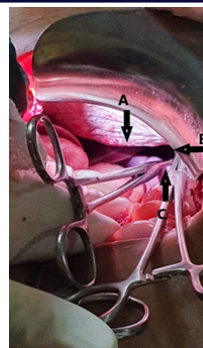


Figure 5 (Intraop picture showing Upper leaflet of ruptured diaphragm [A], Diaphragm defect [B] and Lower leaflet held with a forceps [C])



Figure 6 (IntraOp picture of diaphragmatic laceration which is being repaired with interrupted horizontal mattress sutures)

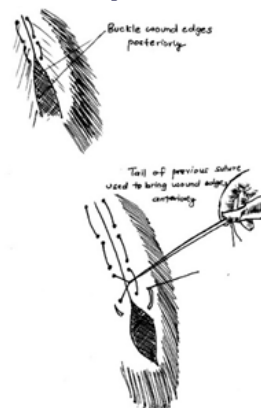


Figure 7 (Surgical technique of repair of diaphragmatic laceration)

An intercostal tube of size 28 Fr was placed in left thoracic cavity. Diaphragmatic tear was repaired using polypropylene suture number 1 on round body in interrupted horizontal mattress technique.



Figure 8 (X-ray chest on post-operative day 5)

Post operatively, patient was sedated-paralysed with midazolam and vacuronium and put on ventilator electively. Higher antibiotics, Analgesics given. Fluid and electrolyte management was done. On post operative day 4, check dressing was done. Appx 2 cc of serohemorrhagic fluid was drained. Lateral skin stitches removed and dressing done. Follow-up x-ray chest was taken on postoperative day 5 which was normal. Regular dressing was then done and sutures were removed on post operative day 10. Patient was then shifted to operating room for mid shaft humerus fracture plating. Post operatively on day 12, ICD was removed and patient discharged the next day. After 1 months of discharge, patient is vitally stable and had no complaints on follow-up.

DISCUSSION

Diaphragmatic injuries were described first by Sennertus in 1541. Riolfi performed the first successful repair in 1886.² Not until 1951, when Carter *et al.*, published the first case series, was this injury well understood and delineated. Approximately 0.8%-1.6% of patients with blunt trauma shows a rupture in the diaphragm. Approximately 69% of hernias are left-sided, 24% are right-sided, and 15% are bilateral. In our case, patient sustained a blunt thoraco-abdominal trauma following road traffic accident leading to left sided diaphragmatic rupture.⁴

Patients with delayed diaphragmatic herniation frequently present months to years after the initial injury with manifestations of visceral herniation, incarceration, obstruction, ischemia from strangulation, or perforation.⁵ In our case, diaphragmatic hernia was presented 7 days later. Symbas *et al.*, observed a delay in diagnosis in 8% of cases of diaphragmatic injury from 18 h to 15 years after injury. Chest radiography is the standard in the advanced trauma life support (ATLS) protocol for a trauma workup. Approximately 23-73% of traumatic diaphragmatic ruptures will be detected by initial chest radiograph, with an additional 25% found with subsequent films. Chest radiograph on admission in our case was not suggestive of evident bowel herniation. Bowel gas shadow was noticed on post admission day 7.

Barium meal usually confirms presence of cardia and fundus of stomach above the diaphragm. When Blunt traumatic diaphragmatic rupture occurs without herniation, diagnosis becomes even more difficult.⁷

Conventional CT scan has been reported to have a sensitivity of 14%-82%, with a specificity of 87%. Helical CT has increased sensitivity 71-100%, with higher sensitivity for left vs right. Considering higher sensitivity, CT was used in our case to confirm the diagnosis and further evaluate.

Ultrasonography (focused assessment with sonography for trauma [FAST] scan) has been reported to detect diaphragmatic hernias. However, bedside performed ultrasound FAST on day of admission, did not show any herniation owing to its delayed occurrence or lack of expertise.

Surgery is the mainstay in the treatment of diaphragmatic rupture. Approach can be open or laparoscopic. Operative repair is technically more difficult if the surgery is delayed. After reduction of the abdominal contents, the diaphragm is usually repaired simply with monofilament nonabsorbable suture. We chose the abdominal route with a left subcostal incision and defect was sutured with polypropylene sutures.

Delay in presentation of a diaphragmatic hernia in this case could be explained by various hypotheses. Delayed rupture of a devitalized diaphragmatic muscle may occur several days after the initial injury after a triggering event like excessive coughing or straining. However the more likely explanation is a possible delayed detection assuming that the diaphragmatic defect occurring with injury manifests only when herniation occurs. Importantly, early x-rays in our patient was done in supine position as patient was critical and put on ventilator. Supine position and ventilator must have prevented bowel loops from migrating to the thorax, leading to delay in presentation.

CONCLUSION

The history of trauma must be investigated thoroughly to diagnose patients with a delayed post traumatic diaphragmatic hernia. A high index of suspicion and the use of relevant radiological investigation is essential for early diagnosis. Close observation of patient's complains

and serial examination will help. Repeated x-rays will further aid in diagnosing. All cases whether diagnosed pre-operatively or intraoperatively must be repaired surgically either by laparotomy, thoracotomy, a thoraco-abdominal approach or by minimal access surgery. Laparotomy should be the preferred approach in unstable patients as it helps to rule out other organ injuries as well.

Delayed presentation of diaphragmatic rupture should always be kept in mind with unexplained respirator distress several days after abdomino-thoracic trauma.

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