

Post-traumatic diaphragmatic hernia: Diagnostic dilemma in primary care

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ABSTRACT

Diaphragmatic hernia (DH) is a common condition following blunt trauma to upper abdomen and is also a commonly missed diagnosis. Its early anticipation in post-traumatic setting is very important to avoid any further life-threatening sequelae. X-ray chest with a nasogastric tube is a simpler way to diagnose this condition. CT scan is a gold standard tool to confirm diagnosis. Due to wide availability of ultrasound (US) in emergency room (ER), this tool will decide the correct way of further evaluation avoiding unnecessary delays in management. We present a case of a diaphragmatic hernia followed by blunt injury abdomen with multiple herniated abdominal contents successfully managed by early intervention.

Keywords: Blunt trauma abdomen, colon, diaphragmatic hernia, small bowel, stomach

Introduction

Diaphragmatic injury following blunt injury abdomen is a common missing event. This is mainly due to most of injuries will be minor that will not be having lethal presentation. But larger defects will lead to herniation of intra-abdominal contents causing mediastinal shift, respiratory compromise and shock. To prevent these lethal consequences timely diagnosis is very crucial in management. In this case report we are presenting a case of post traumatic diaphragmatic hernia and importance of timely diagnosis for primary care physicians.

Case Report

A 45-year-old male patient presented to the emergency room

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Received: 25-01-2020

Revised: 13-03-2020

Accepted: 15-03-2020

Published: 31-05-2020

with a history of blunt trauma to upper abdomen due to road traffic accident (RTA). On presentation, the patient complained of difficulty in breathing and pain in left upper quadrant of the abdomen and pelvis. Patient had hematuria and he complained not able to void. His pulse rate was 126/min, Spo2 90% on room air, respiratory rate 26/min, and blood pressure was 124/78 mmHg. Bilateral wide bore IV lines secured and blood samples were collected for surgical profile and cross-matching. He was conscious and obeying all verbal commands. Patient cervical spine was immobilized with Philadelphia rigid cervical collar. On examination, left chest air entry decreased and gurgling sounds were heard. Percussion over left chest revealed dullness. Mild tenderness noted in the left upper outer quadrant of abdomen and scaphoid abdomen present. There were no external injuries noted elsewhere. Chest compression was negative and pelvic compression positive so pelvic binder applied immediately. EFAST (Extended Focused Assessment Sonography in Trauma) performed shows absent lung sliding and peristaltic contents in the left thoracic cavity. There was no free fluid noted in abdomen. Clinically diaphragmatic injury

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How to cite this article: Vempalli N, Konda SR, Kaeley N, Bhardwaj BB, Kumar S. Post-traumatic diaphragmatic hernia: Diagnostic dilemma in primary care. J Family Med Prim Care 2020;9:2555-7.

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DOI:
10.4103/jfmpc.jfmpc_160_20

was suspected and immediately nasogastric tube inserted with oxygen support provided.

Chest X-ray revealed curled up nasogastric tube noted in left hemithorax with bowel loops entering into it [Figure 1]. X-ray pelvis revealed superior and inferior pubic rami fractures on left side [Figure 2]. Urinary diversion was performed with percutaneous suprapubic cystostomy. As the patient was hemodynamically stable, we proceeded with CT scan of thorax and abdomen which confirmed DH with stomach, colon, and small bowel herniating into left hemithorax with collapsed left lung and mediastinal shift [Figure 3]. There were no other intrathoracic and abdominal injuries identified.

The patient underwent emergency laparotomy which confirmed all imaging findings with 5 cm rent noted in left dome diaphragm on the posterior aspect. All herniated contents mentioned above were reduced back into abdomen and rent repaired with primary closure along with monofilament nonabsorbable mesh. There was no intra-abdominal visceral injury identified intraoperatively. The post-surgery period was uneventful; the patient recovered and discharged after 15 days. We reviewed patient after 2 months and confirmed he is doing well without any complications [Figure 4]. Patient advised for urethral repair after 4 weeks.

Discussion

Diaphragmatic injury is seen in 0.8%–1.6% of blunt injury abdomen and 4%–6% of patients are having a diaphragmatic injury on laparotomy in trauma patients.^[1] It is either a congenital variant or acquired. In acquired variety, trauma is the main cause. Trauma will be penetrating or blunt both will cause a rent in diaphragm leading to herniation of intra-abdominal contents such as stomach, colon, small intestine, large intestine, and omentum. The presentation may be delayed also then it can be challenging with manifestations of respiratory failure and intestinal obstruction. This delayed presentation is mainly due to initial minor injury will be increased because of negative pressure created during normal respiratory cycle and this further facilitates the herniation of intra-abdominal contents.^[2,3]

This herniation is mainly due to the pressure gradient present between thoracic and abdominal cavities. The pressure gradient in between these cavities is normally in the range of 7–20 cm of H₂O. But in BTA, it raises to around 100 cm of H₂O.^[4]

DH effects:^[4]

1. Injury to diaphragm will affect its excursion during normal respiratory cycle leading to a reduction of tidal volume.
2. Decreased movements of the diaphragm will produce intrathoracic negative pressures causing reduction of venous

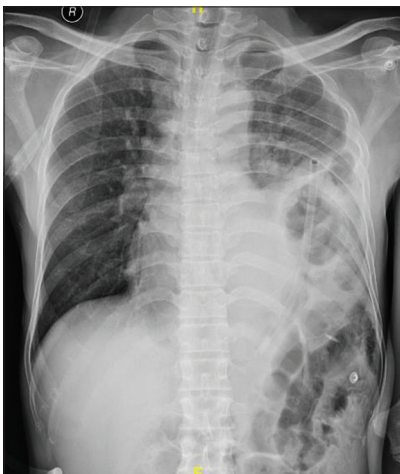


Figure 1: Preoperative chest X-ray showing nasogastric tube entering into right thorax and herniation



Figure 2: Pelvic X-ray showing superior and inferior pubic rami fractures (red arrow) with suprapubic catheter in-situ

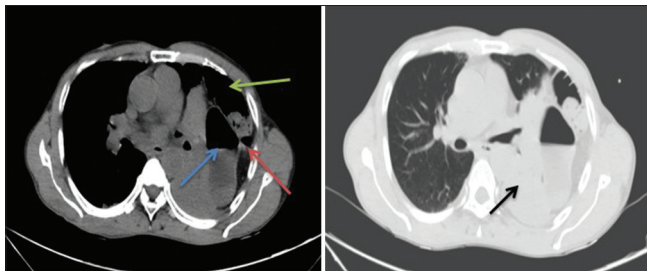


Figure 3: NCCT Thorax showing herniated stomach (blue arrow), colon (green arrow), small bowel (red arrow), and collapsed right lung (black arrow)

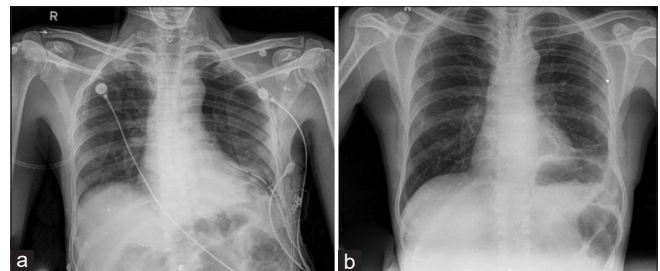


Figure 4: (a) Postoperative chest X-ray with fully expanded lungs (with ICD tube in-situ) and (b) 2-month follow-up X-ray

return finally leading to hypotension and shock.

3. Direct pressures of herniated contents on ipsilateral lung will produce decreased ventilation.
4. Herniated contents through small rent may develop strangulation and perforation.
5. Diaphragmatic rupture with associated pericardial injury may cause cardiac tamponade.

DH can happen on the left or right side but it is common on the left side. The reasons for this pattern are as described below.^[1,5]

1. Protected right dome diaphragm due to liver
2. Right dome diaphragm is more tough than left
3. The weakness of the left hemidiaphragm at embryonic points of fusion
4. Missed diagnosis of minor right diaphragmatic rupture

Diagnosis

Clinically cases can be suspected with an upper abdominal injury associated with reduced breath sounds on auscultation and gurgling sounds will be present. To confirm its presence, immediately nasogastric tube to be inserted and chest X-ray done. It is the simpler way to diagnose. Around 23%–73% of diaphragmatic ruptures can be noticed on initial films and further 23% with additional films. The following findings expected in a chest X-ray.^[6,7]

1. Focal constriction will develop while abdominal contents entering into the chest cavity (Collar sign)
2. Nasogastric tube curled up in the thoracic cavity
3. Elevated hemidiaphragm of >4 cm
4. Diaphragmatic contour distortion

Due to the wide availability of ultrasound in emergency room, point-of-care ultrasonography confirms the diagnosis by absent lung sliding and peristaltic movements noticed as done in our case. Even though it is not part of the extended FAST examination, it will be highly useful in detecting diaphragm injury.^[8] CT scan of thorax and abdomen is useful to diagnose the extent of bowel loops that entered into the thoracic cavity along with to rule out other intra-abdominal visceral injuries, the status of ipsilateral lung and mediastinal shift.

Conclusion

DH following blunt injury is the diagnosis made on a high index of suspicion which has to be confirmed with appropriate radiological imaging. Early diagnosis with early surgery is the cornerstone of its management. Awareness about post-traumatic diaphragmatic hernia and its initial management is required for

family physicians to avoid misdiagnosis and delay in surgery. Point-of-care ultrasonography rightly directs toward a diagnosis in these cases. But diagnosis will be done by simple chest X-ray with nasogastric tube in-situ. Early nasogastric decompression reduces complex physiology happening in the thorax and improves the postoperative outcome of the patient. This initial care will spare more time for emergency physicians and surgeons for better outcomes.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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