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Case Report

Traumatic diaphragmatic hernia: a case report

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ABSTRACT

Diaphragmatic injury is a rare entity and clinically difficult to be diagnosed as symptoms are often masked due to associated injury in a poly trauma case. There are no specific signs and symptoms for diagnosing diaphragmatic rupture. High degree of clinical suspicion is needed in all cases of thoraco-abdominal injury to diagnose a case of diaphragmatic rupture. Computed Tomography (CT) chest and abdomen is very useful in diagnosis. When in doubt a diagnostic laparoscopy should be undertaken to establish a diagnosis to reduce mortality and morbidity.

Keywords: Computed tomography, Diagnostic laparoscopy, Hernia, Laparotomy, Traumatic diaphragmatic injury

INTRODUCTION

Traumatic diaphragmatic hernia is uncommon injury and occurs as a result of high velocity blunt trauma to abdomen, penetrating injury to chest or abdomen.[1] The clinical presentation is also varied as it may be asymptomatic may have acute presentation as breathlessness or may manifest at a later stage after adhesions are formed as intestinal obstruction, strangulation or perforation.[2-5] High degree of clinical suspicion is important to diagnose a case of rupture diaphragm in a case of recent and old cases of Road traffic accident (RTA).

Computed Tomography (CT) chest and abdomen should always be obtained in all cases of thoraco -abdominal injuries as it is useful in ruling out rupture diaphragm in asymptomatic cases plus it has additional benefit in visualizing solid organs and hollow viscus especially in patients with multiple injuries.

Treatment of rupture diaphragm mainly consists of repair of diaphragm, can be performed through a thoracotomy or laparotomy. Laparotomy has additional benefits of directly inspecting all intra-abdominal organs during surgery.[6]

CASE REPORT

The 23 year old male presented to our emergency room with h/o Road traffic accident about 4 hrs. back. On presentation he was c/o pain in left side of chest and upper abdomen. He was also c/o difficulty in breathing. He was initially treated in a private nursing home where an x-ray chest (Figure 1a and 1b) was also obtained and then referred to our hospital. On clinical examination the vitals were stable, there was decreased breath sound noted in left side of chest and apical beat was also noted in the center of chest.

A plain x-ray which was taken outside (Figure 1a and 1b) showed multiple ribs fracture with pneumo-haemothroax with subcutaneous emphysema with collapse left lung with suspicious gastric shadow in left hemi-thorax with mediastinal shift towards right.

The patient was stabilized in emergency room. A left sided Inter -costal drain (I.C.D) placement was done as

an emergency procedure under local anesthesia. Ryle's tube was placed, patient was catheterized. All routine investigations were sent.

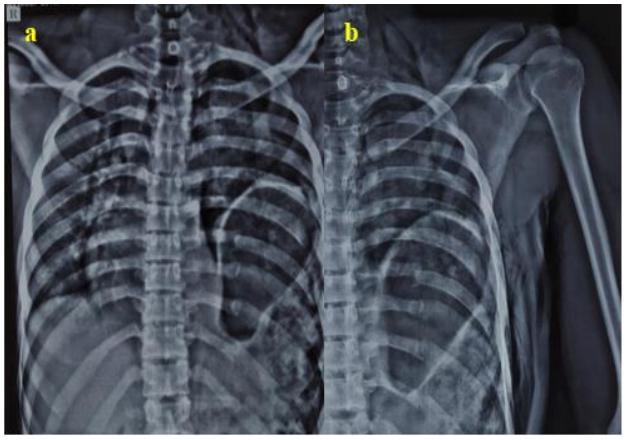

Figure 1: X-ray showing gastric shadow in left hemi-thorax.

Another chest x-ray was obtained in our hospital, after placing chest tube and Ryle's tube. The x-ray showed Ryle's tube with in the suspicious gastric shadow (Figure 2), hence authors arrived at a provisional diagnosis of traumatic rupture of diaphragm with herniation of stomach into left hemi-thorax.

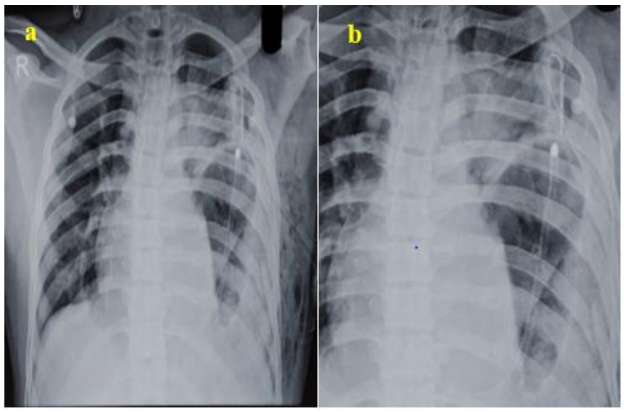

Figure 2 (a and b): After Ryle's tube insertion and I.C.D placement, Ryle's tube with in stomach is seen in left hemi-thorax.

Patient was shifted for computed tomography of chest and abdomen for confirmation of diagnosis.

CT chest and abdomen was suggestive of multiple ribs fracture, pnemo-haemothorax, subcutaneous emphysema, chest tube in situ, and defect in left diaphragm about 13 x 15 cm, herniation of stomach, small bowel, omentum, transverse colon through the defect into left hemi-thorax pushing mediastinum towards right (Figure 3a, b and 4a, b).

Hence authors arrived at a confirmatory diagnosis of traumatic diaphragmatic rupture with herniation of intra-abdominal parts into left hemi-thorax.

Figure 3: CT section showing defect in left diaphragm.

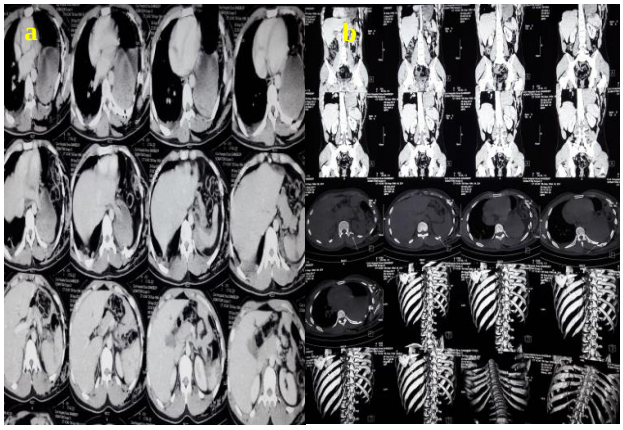

Figure 4: CT section showing herniation of bowel in left hemi-thorax and multiple ribs fracture on left side.

Patient was taken for emergency laparotomy. Through midline abdomen opened and stomach, small bowel, colon and omentum was reduced back into abdomen (Figure 5a and 5b), blood in hemi thorax was evacuated and chest tube repositioned and diaphragmatic defect was closed with 1-0 proline suture.

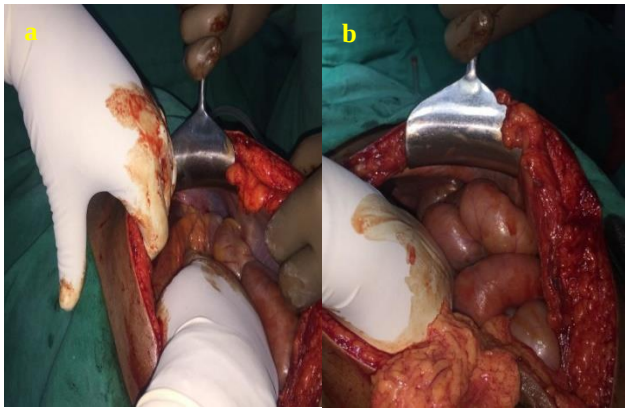

Figure 5: Intra-operative picture showing rent left diaphragm.

Simple interrupted sutures were applied. After inspecting all intra-abdominal organs a peritoneal lavage was done and abdominal drains were kept. Abdomen was closed in layers. Repeat chest x-ray was done to see the position of chest tubes, Ryle's tube and position of mediastinum (Figure 6).

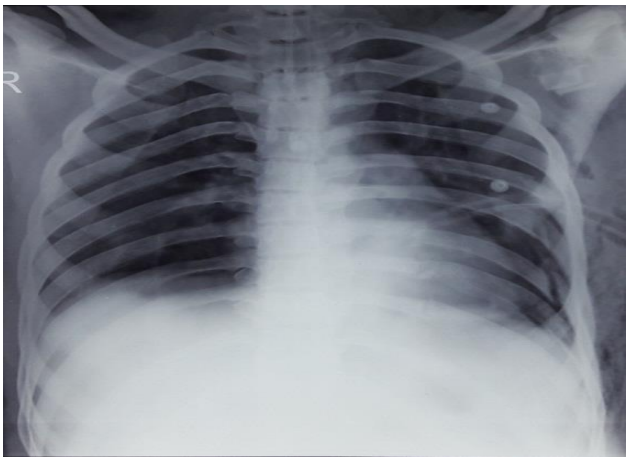

Figure 6: Immediate post-operative X-ray showing mediastinal shift to normal position.

Chest x-rays were repeated in post-operative period to see the lung expansion and mediastinum positioning (Figure 7). Patient showed a good recovery and discharged from hospital within a week time. However, I.C.D had to be kept for a period of 2 weeks.

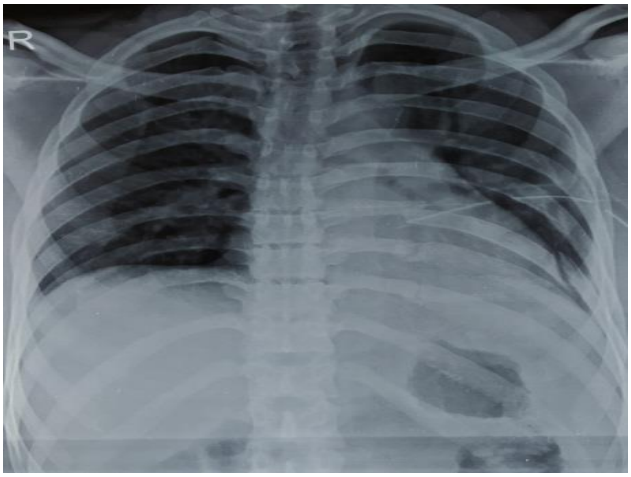

Figure 7: X-ray after 2 weeks, showing adequate lung expansion and gastric shadow in normal position.

DISCUSSION

Incidence

Traumatic diaphragmatic rupture though rarely seen occurs as a result of blunt or penetrating injury to abdomen. Diaphragmatic rupture mainly occurs after high velocity trauma to abdomen in road traffic accident. The incidence rate ranges between .8 to 5 percent.[7]

Etiology

Traumatic diaphragmatic rupture is mainly associated with multiple injuries.[8]it is mainly seen as a result of high velocity trauma in a road traffic accident.[9] Mechanism of injury mainly involves the shearing of stretched diaphragm at the point of diaphragmatic attachment due to due to sudden force transmission through viscera in abdomen. Most common site of rupture diaphragm is poster-lateral aspect of hemi-thorax because of its origin from pleura-peritoneal membrane which is structurally weak.[10] Left sided ruptures are more common as compared to right side because of the protective effect of liver.[11] Large right lobe of liver prevents herniation of abdominal contents into right hemi-thorax while smaller left lobe of liver is not able to provide a protective mechanism on left side so the left sided rupture is usually large and often associated with large hernias. A positive pressure gradient pushes the abdominal contents into thorax. with a high velocity abdominal injury the pressure gradient in abdomen may rise up to 100 cm of water.

Clinical features

Traumatic diaphragmatic rupture has a varied presentation.[12] any patient of blunt trauma or penetrating thoraco-abdominal injury should arouse suspicion of traumatic diaphragmatic rupture.[13] On clinical presentation patient may totally asymptomatic or may have acute presentation like breathlessness due to compression of lung parenchyma in hemi-thorax. There may be symptoms relating to intestinal obstruction or strangulation or perforation due to herniation of bowel loops into thorax.[8,14] These symptoms may be masked in cases of large defect and may have a delayed presentation because in such cases strangulation does not occur. There may be symptoms of heaviness after meals in cases of herniation of stomach. In patients with poly trauma receiving (Intermittent Positive Pressure Ventilation) I.P.P.V, the diagnosis may be missed as the contents gets reduced into abdomen.[15,16]

Investigations

An x-ray may not be useful in most of the cases as signs are often masked by associated lung contusion, haemo-thorax, pneumothorax, plural effusion, atelectasis, emphysema and non-specific elevation of diaphragm.[16] X ray may be diagnostic at times in many cases as it was in our case. Especially it is sensitive in left sided rupture with herniation of stomach as we have seen in our case. chest x ray is abnormal in 85%, chest radiographs has low sensitivity for depicting rupture of diaphragm.it is only 46% sensitive for left and 17 % sensitive for right side.[17] The collar sign or hourglass sign is a useful sign for diagnosis of diaphragmatic hernia which is seen on

coronal section of CT/ MRI (Magnetic Resonance Imaging) and barium studies. It usually refers to a waist-like or collar-like appearance of herniated organs through a breach in diaphragm. CT chest and abdomen is very useful as it has very high sensitivity and specificity, Helical CT has 100% specificity.[18] It also helps to visualize the contents of hernia and measure the rent in diaphragm. CT abdomen has additional benefit in ruling out injury to solid organs and other hollow viscus. For diagnosing isolated cases of right sided rupture investigations like liver scintigraphy, intra-peritoneal instillation of technetium and celiac arteriography are of considerable value. Minimal invasive procedure like diagnostic laproscopy is very useful in making diagnosis of a rupture diaphragm when in doubt and when other diagnostic measures fail.[19] All efforts should be taken to establish a diagnosis of rupture diaphragm because a missing a diagnosis is associated with high mortality and morbidity because of delayed presentation like strangulation, obstruction and perforation.

Management

When a diagnosis of rupture diaphragm is established the patient should be stabilized and then taken for emergency laparotomy. Surgery may be performed through a laparotomy or thoracotomy. As rupture diaphragm is often associated with other abdominal injuries so a laparotomy is a preferred approach. Laparotomy has an additional benefit of visualizing the intra-abdominal organs directly. minimally invasive procedures through abdomen and thorax route are becoming popular as repair is technically easier in experienced hands. Repair of rupture diaphragm consist of approximation of rent by applying simple sutures, when rent is large a mesh placement is done. Now a day's laparoscopic repair is becoming popular.

CONCLUSION

from our case we can draw a conclusion that rupture diaphragm especially if left sided can be diagnosed easily even with a chest x-ray but that may not be true in all diaphragmatic rupture. Left sided rupture of diaphragm can be diagnosed easily. Clinical presentation may vary as asymptomatic, acute presentations and delayed presentation. Right sided rupture diaphragmatic ruptures are difficult to be diagnosed clinically and radiologically. A surgeon handling trauma should have High degree of clinical suspicion of rupture diaphragm in all cases of RTA with multiple injuries to arrive at a diagnosis. All cases of thoraco-abdominal injuries should be investigated with CT chest and abdomen. If other measures fail in establishing the diagnosis then lastly a diagnostic laproscopy should be undertaken.

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