

Traumatic Diaphragmatic Hernia in a 40-Year-Old Lady after 34 Years of Trauma

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Abstract

The diaphragm is a sheath made of muscle and tendon that separates the thoracic cavity from the abdominal cavity. A diaphragmatic hernia is the protrusion of intra-abdominal contents through an abnormal opening in the diaphragm. Acquired diaphragmatic tears are rare and occur mainly due to direct penetrating injury to the diaphragm or, less commonly, secondary to blunt abdominal trauma, causing herniation of the abdominal contents into the thorax resulting in a condition known as post-traumatic diaphragmatic hernia. Signs and symptoms include orthopnea, dyspnea, diminished breath sounds on the side of the rupture and audible gut sounds in the chest. We report a case of a 40-year-old woman with a 34-year-old history of an unmanaged road traffic accident who presented with a complain of gradual in onset shortness of breath, which when approached surgically, revealed to be due to an absent left sided diaphragm. Upon diagnosis, successful primary hernia mesh repair was performed.

Keywords: Diaphragmatic hernia, X-ray computed tomography, laparotomy, thoracotomy, surgical mesh.

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Introduction

The diaphragm is a muscle across the bottom of the ribcage that plays a crucial role in respiration¹. Diaphragmatic rupture is a tear of the diaphragm which may be congenital or acquired. Acquired diaphragmatic tears result from physical trauma causing herniation of the abdominal contents in to the thorax resulting in a condition known as post-traumatic diaphragmatic hernia. Signs and symptoms may include orthopnea and dyspnea on lying flat, dysphagia and retrosternal discomfort especially after taking meals, diminished

breath sounds on the side of the rupture and audible gut sounds in the chest².

Complications can result in intestinal obstruction, if herniated contents are part of gut, or sepsis in herniated abdominal organs. Usually patients present immediately after trauma or within days or weeks of trauma. It can be detected by radiological imaging of the chest and can be diagnosed by high resolution computed tomography (HRCT) scans.

Treatment is always surgery. However, the choice of approach depends upon the time of injury and when it was diagnosed i.e. at an acute stage or a chronic. If the tear is small then it can be repaired very easily but if it is a large defect then the choice of repair is difficult. Although the spontaneous recurrence rate for repaired diaphragmatic hernias is low, small defects in the repair site have been reported; therefore, periodic assessments and surveillance is crucial².

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This case report describes a 40-year-old patient who developed diaphragmatic hernia secondary to trauma caused by road traffic accident 34 years ago, which was treated conservatively at the age of 6 years, and now she presented with the signs and symptoms of respiratory and upper gastro-intestinal problems. She was treated successfully by surgical intervention and mesh repair. Informed consent of the patient was taken, for publication of this case report.

Case Report

A 40-year-old female presented to the outpatient department of surgery at Abbasi Shaheed Hospital on 16th October 2017, with presenting complaints of shortness of the breath, pain on the left side of the chest and left hypochondrium for 2-3 months. Shortness of breath was gradual in onset and progressively increasing, present even at rest. Pain was continuous and dull, aching in nature, aggravated on eating and on exertion and had no relieving factor. According to the patient she had a history of road traffic accident at the age of 6 years which was managed conservatively at home. There were no known comorbidities. Past medical history was unremarkable. Past surgical history included 2 caesarean sections, 19 years and 18 years back, respectively. She belonged to the low socioeconomic class.

On general physical examination, she was a thin, lean, average-heighted, pale-looking, middle-aged female, sitting comfortably on the bench. She was alert, conscious, well-oriented to time, place and person. She was co-operative. Her vitals were within normal range. Chest examination revealed a slightly deviated trachea towards the right side with reduced chest expansion and absent apex beat on the left side of the chest. Apex beat was palpable centrally and on the right. Breath sounds were reduced and vocal fremitus was dull on the left side. However, gut sounds were audible in the middle and lower zones of the left side of chest. On abdominal examination, abdomen was scaphoid in shape, it was soft, non-tender and no visceromegaly was appreciated. On cardiovascular examination

apex beat was not palpable in the 5th intercostal space, instead it was palpable centrally and on the right. Rest of the systemic examination was unremarkable. After history-taking and clinical examination of the patient our provisional diagnosis was of Hiatus hernia.

Chest X-ray (Fig. 2) was done which demonstrated density on the left side as compared to the right along with a gas shadow which was seen on the left side suggestive of a bowel loop. High resolution computed tomography (Fig. 6) revealed a large diaphragmatic hernia on the left side which extended up to the level of T2 vertebral body upward, medially upto the mediastinum causing contralateral mediastinal shift, laterally to the left side of the chest wall. Herniation of stomach and large bowel loops was also visualised along with compression over the ipsilateral left lung with ground glass haze and sub-segmental atelectasis seen on the CT scan. All laboratory investigations were done including complete blood count, erythrocyte sedimentation rate, serum urea, creatinine and electrolytes, random blood sugar, viral markers and urine detailed report, all of them were within normal limits.

Plan of exploratory laparotomy with mesh repair of the hernia was made and patient was prepared for surgery. After all aseptic measures, an upper midline incision was given extending from epigastrium to below umbilicus. The left dome of the diaphragm was completely absent and only posterior crus was present (as shown in Fig. 1). Abdominal contents were adherent to the left thoracic cavity, adhesions were separated and contents were reduced back in the abdominal cavity. Organs found in the thoracic cavity were stomach, small intestine, spleen, descending colon with splenic flexure, transverse colon, left lobe of liver and omentum. A Prolene mesh (15 x 15 cm) was placed between the thoracic and abdominal cavity, fixed in interrupted fashion, anteriorly with periosteum of ribs and posteriorly with posterior crus of diaphragm. Drains were placed in right pelvis and left paracolic gutter. Mass closure of the wound was done. Skin was closed with staples and a chest

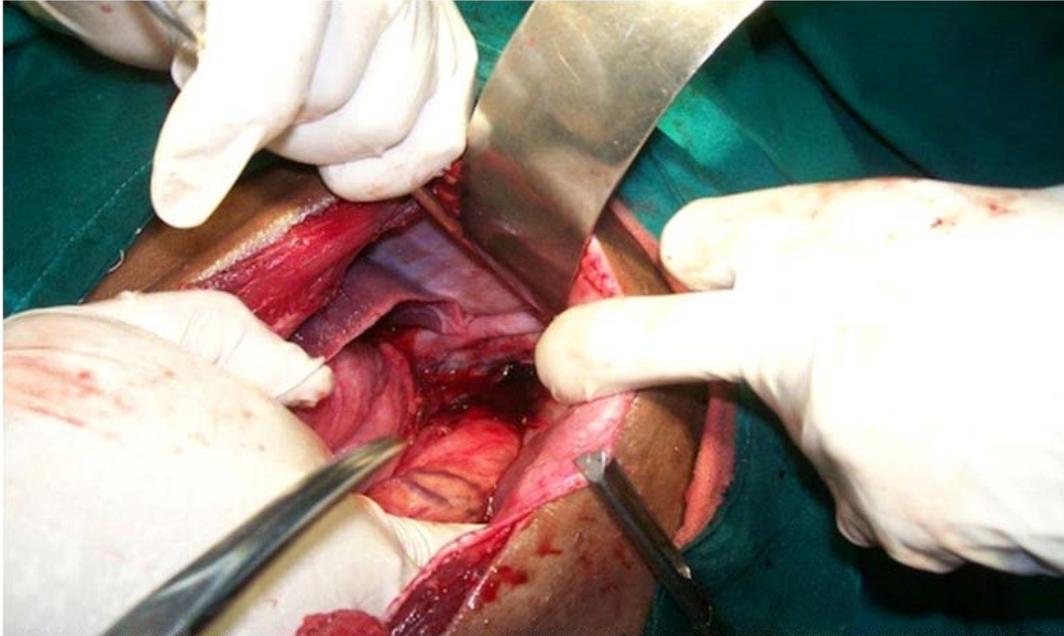


Fig. 1. Per-operative picture showing absence of diaphragm

drain was placed in left thoracic cavity as shown in Fig. 3.

Patient developed tachycardia and atrial fibrillation on her 1st postoperative day, being treated with beta blockers and loop diuretics, she was stabilised by 6th postoperative day. Chest drains were removed on 18th postoperative day and post-extubation X-ray chest were done which showed fully expanded lungs as shown in Fig. 4 and patient was discharged on 20th postoperative day. Patient was followed in outpatient department and X-ray was done which showed fully expanded lung as shown in Fig. 5.

Discussion

Diaphragmatic injuries were described first by Sennertus in 1541. Riolfi performed the first successful repair in 1886. Not until 1951, when Carter et al., published the first case series, was this injury well understood and delineated³.

Traumatic diaphragmatic hernias are uncommon, but life-threatening, and remain a diagnostic

and therapeutic challenge with an overall mortality rate of up to 31% in recent series². Diaphragmatic rupture following blunt or penetrating thoraco-abdominal trauma is frequently missed. It presents years later with herniation of abdominal viscera⁴. Maximum duration reported uptill now is 11 years², while our patient presented after 34 years of trauma. It is thought to be produced by a sudden increase in the pleuro-peritoneal pressure gradient, occurring at areas of potential weakness along embryological points of fusion, usually as a result of blunt or penetrating injuries or iatrogenic causes, and lead to entry of an abdominal hollow viscus or the omentum into the pleural cavity, which may lead to incarceration and even strangulation with a fatal outcome².

In the patients suffering from thoraco-abdominal trauma, incidence of diaphragmatic injuries is 1.1-3.9%. Diaphragmatic rupture may result in traumatic diaphragmatic hernia in less than 50% of diaphragmatic injuries. Incidence is more in males than in females⁵. Traumatic diaphragmatic rupture or hernia occurs in 5% with blunt abdominal trauma



Fig. 2. Pre-Op X-Ray on 28/10/17 showing density at the left side along with a gas shadow



Fig. 3. Immediate post-op x-ray 24/11/17 showing chest tube on the left side with partial expansion of left lung along with obliteration of the left costophrenic angle with some fluid

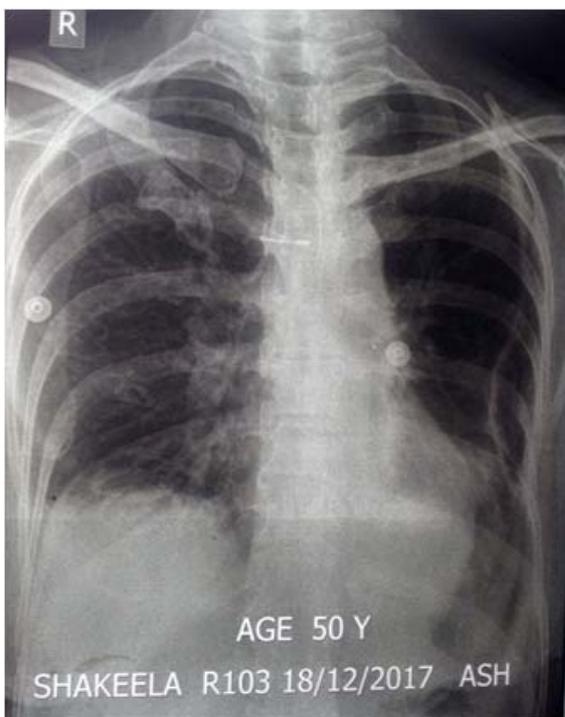


Fig. 4. X-Ray done at discharge 18/12/17 showing fully expanded lung on both sides with clear costophrenic angles



Fig. 5. X-Ray at follow up visit 07/02/18 showing fully expanded lungs on both sides

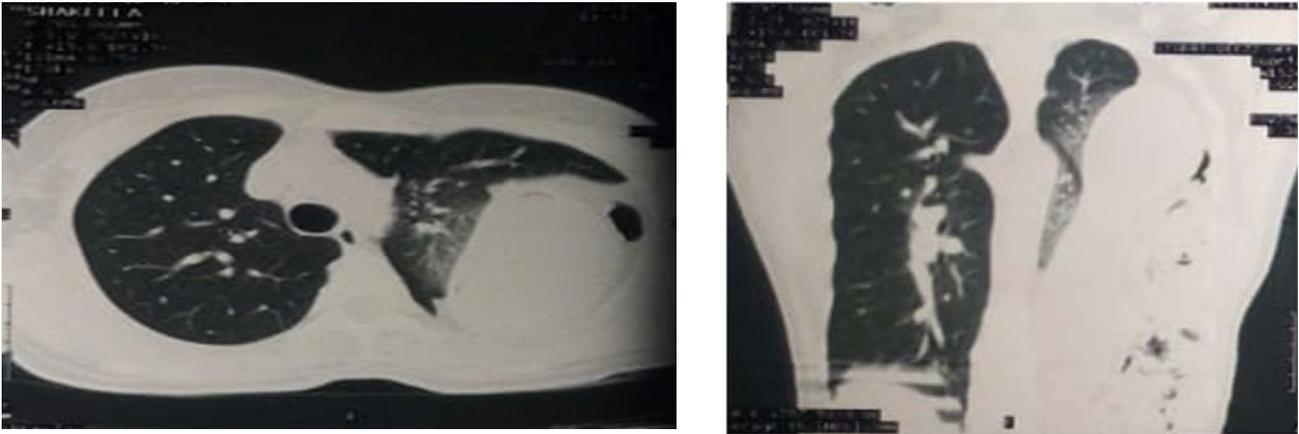


Fig. 6. CT scan (axial and coronal view)

due to motor vehicle accidents⁶. Our patient with a history of blunt trauma by road traffic accident that occurred 34 years ago developed into a left-sided herniation, as according to studies only around 13% of the hernias are found on the right side⁵. Diagnosis is difficult and often delayed causing increased morbidity and mortality⁷. The mortality percentage is 17%, with most deaths due to lung complications⁶. A high body mass index may be associated with a higher risk of diaphragmatic rupture in people involved in road traffic accidents. Most commonly found organs in the chest cavity herniated include stomach, spleen, colon, small bowel and liver as they have greater mobility and proximity to the diaphragm⁴.

Traumatic diaphragmatic injuries are difficult to diagnose in emergency settings unless it is already accompanied by herniation of intra-abdominal contents, compromising cardiorespiratory functions². Also, multiple associated injuries may complicate the patient's condition and delay the diagnosis. Clinical diagnostic methods are usually not conclusive. In 30-69% of patients, the diagnosis is made during surgery. In 4.5-15% of cases, the diagnosis remained undiscovered in the postoperative period⁸.

CT scan is the diagnostic radiological tool of choice. 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. CT

findings indicating rupture include direct visualization of injury, segmental diaphragm non-visualization, intra-thoracic herniation of viscera, "Collar sign", peri-diaphragmatic active contrast extravasation, elevated liver hilum, elevation of hemidiaphragm and dependent viscera sign^{3,4}.

Surgery is the treatment of choice for diaphragmatic rupture. The principles of surgery are to reduce the herniated organs (most commonly the transverse colon, omentum, and stomach), define the edges of the diaphragm, and close the diaphragmatic defect either primarily or with a patch. A variety of surgical approaches are described for repair, including thoracotomy with either primary or patch repair, laparotomy with primary or patch repair, and abdominal laparoscopy with patch repair⁹.

The use of relevant radiological investigation is essential for early diagnosis. All cases whether diagnosed pre-operatively or intraoperatively must be repaired surgically either by laparotomy, thoracotomy, thoraco-abdominal approach or by minimal access surgery. Laparotomy should be the preferred approach in unstable patients³.

Conclusion

Diagnosis of traumatic diaphragmatic hernia is difficult as these patients present many a times with non-specific symptoms, but failure to make this diagnosis carries a high mortality rate. A high

index of suspicion must be maintained and a history of trauma must be investigated to diagnose patients with a delayed post traumatic diaphragmatic hernia.

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