

TRAUMATIC DIAPHRAGMATIC HERNIA

Arcot Rekha^a, Ananthakrishnan Vikram^a

ABSTRACT

Traumatic diaphragmatic hernias are uncommon, yet associated with high mortality. The colon very rarely herniates through the diaphragmatic defect. This case is submitted as the diagnosis was delayed due to an initial

asymptomatic state. Patients are often seen initially by the physician for respiratory symptoms.

Key words : trauma, diaphragm, hernia

SRJM 2010;3:23-25

INTRODUCTION

Diaphragmatic rupture occurs due to blunt or penetrating injury, either as an acute presentation or delayed as respiratory distress or obstruction^[1], can be managed through a laparotomy or a thoracotomy^[2] and in the present day with minimal access surgery. Given the number of variables a review of this condition is interesting and thought provoking.

HISTORICAL VIGNETTE

Traumatic diaphragmatic hernia apparently was described by Sennertus, who in 1541 reported an instance of delayed herniation of viscera through an injured diaphragm^[3]. Ambroise Paré, in 1579, described the first case of diaphragmatic rupture diagnosed at autopsy. The patient was a French artillery captain who initially survived a gunshot wound of the abdomen, but died 8 months later of a strangulated gangrenous colon, herniating through a small diaphragmatic defect that would admit only the tip of the small finger. It was not until 1853 that ante mortem diagnosis of traumatic rupture of diaphragm was made by Bowditch. The first successful diaphragmatic repair was reported by Riolfi in 1886 in a patient with omental prolapse, and Naumann in 1888 repaired the defect with herniated stomach. The largest and the most comprehensive collective review was published by Hood in 1971, whereas the earliest review on this subject was by Carter and associates in 1951.^[4]

CASE REPORT

A 65 year old lady presented to the emergency room(ER) with complaints of dyspnea at rest and orthopnoea. She had been referred to our tertiary care centre as a case of bronchopneumonia. The lady also complained of abdominal distension and of having difficulty in defaecation over the last one week. Examination showed decreased breath sounds on the left hemithorax and the presence of bowel sounds over the left thorax and normal bowel sounds in the abdomen. She had severe respiratory acidosis on analysis of the blood gas.

CORRESPONDING AUTHOR :

Dr. Arcot Rekha

Associate Professor

Department of General Surgery

Sri Ramachandra Medical College & Research Institute

Sri Ramachandra University, Porur, Chennai - 600 116.

Email : rekha_a@yahoo.com

^a Department of General Surgery



Fig 1 : Chest X-ray & CT showing the diaphragm hernia

A plain X Ray taken in the ER showed bowel loop shadows in the chest (Fig 1 left inset). She was stabilised in ER and then shifted for a CT thorax and abdomen which showed herniation of the bowel loops through the left hemidiaphragm. There was mediastinal shift to the right and there was little lung field visualized on the left chest (Fig 1-right inset).

A diagnosis of diaphragmatic hernia was made. On questioning there was a history of fall 10 days prior to the admission (apparently minor injury when patient slipped and fell while crossing the road). She had sustained no external injuries and had not been treated.



Fig 2 : Shows the rent in the diaphragm



Fig 3 : Shows the rent repaired with a prolene mesh

Patient was shifted for surgery after informed high risk consent.

A diagnostic laparoscope inserted showed a large defect on the left side and colonic loops herniating through this. Attempts to reduce this laparoscopically failed and laparotomy was done. At laparotomy dense adhesions were found between the loops of transverse colon. The incision was extended as a left thoracotomy and the contents were reduced. There was a large defect about 15 cm 13 cms in the left hemi diaphragm (Fig 2) which was repaired using a prolene mesh (Fig 3). There was compressed lung tissue that did not expand significantly even after reduction of the hernia. A left thoracic drain was placed and wounds (thoracic and abdominal) were closed.

DISCUSSION

Incidence

Diaphragmatic injury accounts for 0.8-1.6% of blunt trauma abdomen. Approximately 4-6% of patients who undergo surgery for trauma have a diaphragmatic injury.^[5]

Aetiology

Diaphragmatic injuries are caused either by penetrating or blunt injuries to the abdomen. They are diagnosed immediately as part of multi-organ injury, or present later either with respiratory distress or as intestinal obstruction^[4]. The mechanism in blunt injury is explained by shearing of a stretched membrane, avulsion at the point of diaphragmatic attachment, and the sudden force transmission through viscera acting as viscous fluid¹. Left sided injuries are more often seen. Left-sided rupture occurred in 68.5% of the patients, 24.2% had right-sided rupture⁵, 1.5% had bilateral rupture, 0.9% had pericardial rupture, and 4.9% were unclassified in the present collective review. Increased strength of the right hemi-diaphragm, hepatic protection of the right side, under diagnosis of right-sided ruptures, and weakness of the left hemi-diaphragm at points of embryonic fusion all have been proposed to explain the predominance of left sided diaphragmatic injuries.^[5] Autopsy studies reveals that the incidence of rupture is almost equal on both sides but the greater force needed for the right rupture is associated with more grave injuries that, these are seen more by the forensic examiner than the trauma surgeon! A positive pressure gradient of 7-20 cms of H₂O between the intra-peritoneal and the intra pleural cavities forces the contents into the thorax. With severe blunt trauma the pressures may rise to as high as 100cms of water.

Pathophysiology:

The pathophysiologic effects of ruptured diaphragm are on circulation and respiration. This is due to the impaired function of the diaphragm, compression of the lungs, and displacement of the mediastinum with impairment of the venous return to the heart. In cases of pericardial tear, the heart is compressed by the herniating viscera, and a clinical picture of cardiac tamponade may follow. Diaphragmatic action accounts for two thirds of the tidal volume when supine. Functional loss of one hemi-diaphragm results in 25% to 50% decrease in pulmonary function.

Clinical features and grading

The patient with a diaphragmatic rupture often presents with breathlessness and is mistaken for bronchopneumonia, especially when a history of injury is not forthcoming. Abdominal signs due to obstruction may be another mode of presentation.

The grading of severity has been proposed by Grimes.^[6] who discussed diaphragmatic rupture in phases- acute, latent and the obstructive phase. The acute presentation is in the patient with poly trauma associated with multiple intra abdominal and chest injuries. The latent phase is when herniation occurs through undetected diaphragmatic ruptures and rents. The obstructive phase is when the loop herniating obstructs and the patient develops distension and strangulation.

Investigations : An X-ray is diagnostic when the nasogastric tube is seen in the chest. The collar sign is seen when abdominal contents are seen in the thorax with/without focal constriction. Elevation and distortion of the hemi diaphragm are corroborative signs.^[7,8]

A CT thorax has a sensitivity of 14-82% and a specificity of 87% and permits direct visualization of the contents and the rupture. Focussed abdominal sonography for trauma (FAST) is now a good aid in diagnosing diaphragmatic hernia.^[9]

MANAGEMENT

When a diagnosis of diaphragmatic rupture is suspected in a patient with poly trauma, military anti shock trousers are contra-indicated as it could cause severe cardio-pulmonary deterioration. The patient is stabilized and taken up for emergent surgery. While controversies exist between laparotomy and thoracotomy-laparotomy is preferred as this is often associated with other abdominal injuries.^[10] In a series of 15 patients who underwent initial thoracotomy, 7 required laparotomy for associated injuries as against 1 in 65 that required thoracotomy after laparotomy. Minimally invasive procedures (abdominal and thoracic) are now a days preferred in small defects detected early. Laparotomy remains the gold standard in large defects. While simple suture is sufficient in the former, larger defects need a synthetic mesh.^[10]

CONCLUSION

A knowledge of diaphragmatic hernia is essential for both the physician and the surgeon in atypical abdominal and respiratory discomfort, especially when there is history of trauma. This hernia is amenable to correction by minimal access surgery and requires a prompt diagnosis aided by a high index of suspicion.

ACKNOWLEDGEMENT

The authors wish to acknowledge the cardiothoracic team, Dr. Sivamuthukumar and Dr. Naveen Alexander for their assistance.

REFERENCES

1. Cameron JL. Diaphragmatic injury. In: Current Surgical Therapy. 7th ed. Mosby-Year Book: St Louis, MO; 2001:1095-100.
2. Simpson J, Lobo DN, Shah AB, Rowlands BJ. Traumatic diaphragmatic rupture : Associated injuries and outcome. *Ann R Coll Surg Engl* 2000; 82 : 97-100.
3. Shah R, Sabanathan S, Mearns AJ, Choudhury AK. Traumatic rupture of diaphragm *Ann Thorac Surg* 1995;60:1444
4. Carter BN, Giuseffi J, Felson B. Traumatic diaphragmatic hernia. *Am J Roentgenol Radium Ther Nucl Med* 1951;65:56-72.
5. Ala Kulju K, Verkkala K, Ketonen P, Harjola PT. Traumatic rupture of right diaphragm. *Scand J Thorac Cardiovasc Surg* 1986;20:109–14
6. Grimes OF. Traumatic injuries of the diaphragm. Diaphragmatic hernia. *Am J Surg.* 1974; 128:175-81.
7. Shackleton KL, Stewart ET, Taylor AJ. Traumatic diaphragmatic injuries: spectrum of radiographic findings. *Radiographics* 1998; 18:49-59.
8. Sliker CW. Imaging of diaphragm injuries. *Radiol Clin North Am* 2006;44:199-211.
9. Blaivas M, Brannam L, Hawkins M, Lyon M, Sriram K. Bedside emergency ultrasonographic diagnosis of diaphragmatic rupture in blunt abdominal trauma. *Am J Emerg Med* 2004;22:601-4.
10. Hanna WC, Ferri LE, Fata P, Razek T, Mulder DS. The current status of traumatic diaphragmatic injury: lessons learned from 105 patients over 13 years *Ann Thorac Surg* 2008;85:1044-8.