MANAGEMENT OF TRAUMATIC DIAPHRAGMATIC HERNIAS

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ABSTRACT

Objective: *Experience with traumatic diaphragmatic hernias was reviewed to identify pitfalls in the diagnosis and treatment of this injury.*

Material and Methods: *A Computerized chart review of all patients admitted to the Thoracic Trauma unit with traumatic diaphragmatic hernias was undertaken for the period of January 2001 to December 2007.*

Results: *We retrospectively analyzed 18 patients who presented between January 2001 and December 2007 with traumatic diaphragmatic hernia, caused by blunt injuries in 15 (83.3%) and by penetrating injuries in 3 (16.7%). Average age of the patients was 30 years and the female to male ratio was 4:14. Traumatic diaphragmatic hernia was right-sided in 5 (27.8%) patients and left-sided in 13 (72.2%). The diagnosis was made by chest X-ray, thorax and upper abdominal computed tomography, and upper gastrointestinal contrast study. The most common herniated organs were omentum (n=11), stomach (n=10), spleen and colon (n=9), and liver (n=2). Sixteen diaphragmatic injuries were repaired primarily, and two were repaired using a prolene mesh graft. The mortality rate was 5.5% (n=1). Chest pain, abdominal pain, or dyspnea were the predominant symptoms.*

Conclusions: *Careful history, use of good diagnostic tool, best approach and meticulous repair are important because of the frequency and severity of associated injuries.*

Key words: *Diaphragmatic Hernia, Repair, Trauma.*

INTRODUCTION

The abdominal cavity is separated from the chest by the right and left diaphragm. These are muscles that not only segregate these areas, but allow change of the volume of the chest cavity. Injuries to the diaphragm can result in impaired breathing and circulation. It can lead to rupture of abdominal organs into the chest cavity. The first traumatic diaphragmatic hernia was reported by Sennertus in 1541.

Traumatic diaphragmatic hernia is an uncommon but important problem in the patient with multiple injuries. The first two deaths were described by Ambrose Paré in 1578, one from strangulated bowel[1]. In most reported cases diaphragmatic injuries are secondary to blunt, or more rarely penetrating, thoracic or abdominal major trauma, while isolated injuries of the diaphragm rarely occur in patients with blunt trauma.[2,3] It has been reported to occur in 3-8% of patients after major blunt trauma to the abdomen.[4,5]

Since no single investigation provides a reliable diagnosis of diaphragmatic rupture on arrival at hospital, the diagnosis is frequently missed or delayed unless co-existing associated injuries demand immediate intervention.[6] Approximately 69% of hernias are left-sided, 24% are right-sided, and 15% are bilateral. Left-sided rupture is more common owing to hepatic protection, increased strength of the right hemi diaphragm and weaknesses in points of diaphragmatic embryologic fusion. Children have equal rates of rupture per side, likely due to laxity of liver attachments.[7-9]

Motor vehicle accident is the leading cause of blunt diaphragmatic injury, whereas penetrating injuries result from gunshot or stab wounds. Other rare causes of traumatic rupture include labor in women with a history of congenital or repaired diaphragmatic hernias, [10] and barotraumas during underwater dives, in patients with history of Nissen fundoplications.[11]

Blunt trauma typically produces large radial tears usually at the posterolateral aspect of the diaphragm. In contrast, penetrating trauma can create small linear incisions or holes and may present late after years of gradual herniation and enlargement.

Clinical findings include (1) marked respiratory distress; (2) decreased breath sounds on the affected side, (3) palpation of abdominal contents upon insertion of a chest tube, (4) auscultation of bowel sounds in the chest, (5) paradoxical movement of the abdomen with breathing, and/or (6) diffuse abdominal pain.

The high incidence of concomitant intra-abdominal injuries dictates the need for emergency abdominal exploration in the acute trauma. Patients who present in the latent phase or long after the trauma require repair because the hernia contents may become strangulated, leading to dead gut, stomach, liver, spleen, or other organs.

This study was conducted to identify pitfalls in the diagnosis and treatment of traumatic diaphragmatic hernias by reviewing the experience of Thoracic department, Lady Reading Hospital, Peshawar.

MATERIAL AND METHODS

Computerized chart review of all 18 patients admitted to the Thoracic Trauma unit, Lady Reading Hospital, Peshawar with surgically proven traumatic diaphragmatic hernias was undertaken for the period of January 2001 to December 2007. All the patients were admitted through out-patient department or referred from other units. All were properly assessed before surgery. Right side hernias was approached by thoracotomy and left side hernias was approached by thoracolaprotomy Parameters examined included age, sex, injury pattern, injury severity, mortality and outcome. All patients with pediatric age and with multi organ injuries were excluded.

RESULTS

Records of 18 patients with traumatic diaphragmatic hernia were reviewed. Traumatic diaphragmatic hernia was caused by blunt injuries in 15 and by penetrating injuries in 3. Chest pain, abdominal pain, and dyspnea were the predominant symptoms (Table 1).

PRESENTATION OF DIAPHRAGMATIC HERNIA

Presentation	Frequency (n=18)	%age
Chest pain	18	100
Abdominal pain	15	83.3
Dyspnoea	11	61.1
Cough	8	44.4

Table 1

The diagnosis was made by chest X-ray, but confirmed by thorax and upper abdominal computed tomography, and upper gastrointestinal contrast study. The most common herniated organs were the omentum (n =11), stomach (n =10), spleen and colon (n =9), and liver (n = 2) {Table 2}. Right side hernias were approached by thoracotomy and left side hernias were approached by thoracolaprotomy. Sixteen diaphragmatic injuries were repaired primarily by non absorbable suture and two were repaired using a prolene mesh graft. All the patients were chest intubated which were removed when lung was fully inflated. All the patients were kept in thoracic intensive care unit for an average of two days. Chest physiotherapy was done for all the patients to promote lung expansion. The mortality rate was 5.5% (n=1). Patients were followed for six months none of the patients had recurrence or any other major complication after surgery.

DISCUSSION

Diaphragmatic rupture can present in the acute or chronic form. In the acute setting, immediate massive herniation of the intra-abdominal contents through the defect can cause marked respiratory distress and gastric outlet obstruction. Herniated abdominal viscera can be confirmed radio graphically by identifying loops of bowl in the thoracic cavity or finding the nasogastric tube coiled in the thorax on chest radiographs Delayed diagnosis of traumatic diaphragmatic hernia is not unusual, especially when there is no chest symptom at the time of the trauma and there is another injury, which distracts any attention to the diaphragmatic rupture.[12,13]

Diaphragmatic hernias are managed with operative repair. A patient's prognosis depends on the size of the hernia and extent of damage to the affected organs in chronic cases. These injuries can be repaired using a transthoracic or transabdominal approach. In cases of large defects, repair may require mesh, typically nonabsorbable polytetrafluoroethylene mesh.

Diaphragmatic injuries may be missed in the

COMMON HERNIATED ORGANS

HERNIATED ORGANS	Frequency (n=18)	%age
Omentum	11	61.1
Stomach	10	55.6
Spleen	9	50
Colon	9	50
Liver	2	11.1

Table 2

acute setting, particularly if the tears are right-sided or when a solid organ such as the spleen (as opposed to the small or large bowel) has herniated.[14] Chest radiographs may not detect diaphragmatic injuries, and diagnosis may hinge on the use of CT scanning, which is more sensitive in identifying these injuries.[15]

Treatment of choice is mainly based on the clinical situation therefore the timing of these procedures should be in accordance with the hemodynamic and respiratory status of the patient. Surgical repair is necessary, even for small tears, because the defect will not heal spontaneously. The parietoperitoneal pressure gradients favor enlargement of the defect with herniation of abdominal contents.

Early deaths usually are a result of associated injuries not the diaphragmatic tear. Mortality rate ranges from 5-30%. Serious morbidity usually is related to reexpansion pulmonary edema or to the thoracotomy or laparotomy.

Paralysis or incoordination of the diaphragm is common, but more than 50% of these conditions resolve. The late complications of an undiagnosed traumatic hernia include all of the following: bowel herniation, incarceration, and strangulation; tension hemothorax secondary to massive bowel herniation; pericardial tamponade from herniation into the pericardial sac; and diaphragmatic paralysis that may recover after repair. Death and significant morbidity rarely are related to delayed diagnosis. However, incarceration of herniated abdominal contents can lead to infarction or rupture with disastrous consequences.

The prognosis is generally good with immediate repair. Minimally invasive techniques for diaphragmatic repair are becoming more common than before. With advances in technology and surgical skills, repairing both acute and chronic diaphragmatic hernias is possible with laparoscopic, thoracoscopic, or combined approaches.[16]

CONCLUSION

Traumatic diaphragmatic hernia has always been a diagnostic challenge to both the radiologist and surgeon. The early recognition and the correct diagnosis of diaphragmatic rupture are not only important but a challenge! Careful history, use of good diagnostic tool, good surgical approach and meticulous repair are important because of the frequency and severity of associated injuries.

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