

## case report

# Tension viscerothorax due to traumatic diaphragmatic rupture

Hasan Ekim,<sup>a</sup> Mustafa Tuncer,<sup>b</sup> Bulent Özbay<sup>c</sup>

From the Departments of <sup>a</sup>Cardiovascular Surgery, <sup>b</sup>Cardiology and <sup>c</sup>Pulmonary Diseases, Yüzüncü Yıl University, Van, Turkey

Correspondence and reprints: Dr. Hasan Ekim · Cardiothoracic Surgery, Yüzüncü Yıl Üniversitesi, Tıp Fakültesi Hastanesi · Mara\_ Caddesi 65200 Van, Turkey · T: +90-432-210-0811 F: +90-432-749-9525 · drhasanekim@yahoo.com · Accepted for publication August 2007

Ann Saudi Med 2008; 28(3): 207-208

The diaphragm separates the thorax from the abdominal cavity, and trauma to either region may cause hernia of the diaphragm. The sequelae of the diaphragmatic injury may manifest as an acute or chronic presentation. The acute manifestation may be bleeding and herniation of viscera into the thoracic cavity causing hemodynamic compromise.<sup>1</sup> We present a case of an acute tension viscerothorax that occurred immediately after blunt trauma leading to cardiac and pulmonary compromise.

### CASE

A 31-year old man was admitted to the Emergency Department of Yuzuncu Yil University Hospital. He was the victim of a traffic accident and sustained injuries to the right lower limb. On admission, the patient had severe respiratory distress (respiratory rate, 43/min), hypotension (85/59 mm Hg), and tachycardia (heart rate, 142 beats per minute). He was cyanotic, and auscultation revealed decreased breath sounds in the left hemithorax. Heart sounds were heard to the right of the sternum. The peripheral pulses were all present and the neurological examination was normal.

Initially, the clinical presentation and chest radiograph were misinterpreted as tension pneumothorax in the emergency room. A chest tube was inserted, resulting in no improvement of cardiopulmonary function. The patient was transferred to our department for further evaluation and management. A repeated chest radiograph revealed a large mass in the left hemithorax displacing the heart and mediastinum to the right side (Figure 1). A CT scan confirmed the tension viscerothorax. Repeated attempts to insert a nasogastric tube were unsuccessful. The hematology and emergency routine biochemistry results were within normal limits.

He was taken to the operating room immediately. A left thoracotomy was performed through the seventh intercostal space. At exploration, the stomach and omentum were found in the left thoracic cavity herniated through a diaphragmatic rupture, compressing both

the heart and lung (Figure 2). The stomach had dilated inside to the left hemithorax. An attempt to insert a nasogastric tube was successful while repositioning the stomach. The stomach was decompressed with the aid of nasogastric tube aspiration. The decompression resulted in immediate improvement in ventilation and oxygenation. The decompressed stomach and omentum were easily reduced following gastric aspiration. A 14-centimeter linear tear in the left hemidiaphragm was oversewn with interrupted non-absorbable sutures (0-polypropylene). Other intraabdominal and intrathoracic organs were uninjured and there was no evidence of hemothorax or pneumothorax. A chest tube was placed in the left thoracic cavity. The incision of the thoracotomy was closed in the standard manner. The hospital course of the patient was somewhat prolonged due to a right femur fracture. At the ninth month of follow-up, he was asymptomatic and had an unremarkable physical examination.

### DISCUSSION

Forceful impact to the upper abdomen due to blunt abdominal trauma creates a sudden increase in intraabdominal pressure that transmits a burst of kinetic energy through the domes of the diaphragm, which can result in a linear tear.<sup>2</sup> Most ruptures are longer than 10 centimeters and occur at the posterolateral aspect of the hemidiaphragm between the lumbar and intercostal attachments, and then spread in a radial direction. Indeed, this is the weakest point of the diaphragm, where the pleuroperitoneal membrane finally closes at embryogenesis.<sup>3</sup>

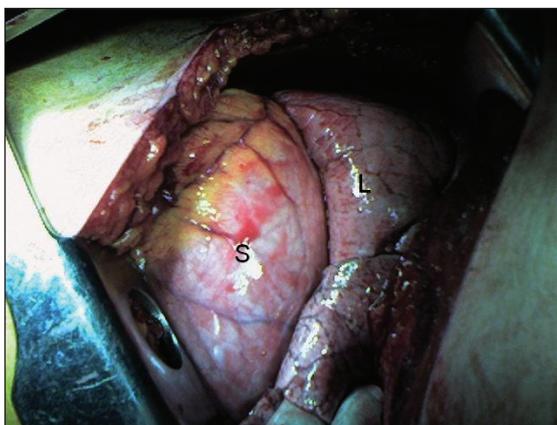
Herniation of an intraabdominal viscus into the chest cavity with a resultant tension viscerothorax is an exceedingly rare complication. Tension viscerothorax can imitate acute tension pneumothorax. Pathophysiologically, tension viscerothorax reduces venous return to the heart much like tension pneumothorax.<sup>4</sup> Clinically, it may be difficult to differentiate the two conditions.<sup>5</sup>

## case report

TENSION VISCEROTHORAX



**Figure 1.** Chest radiograph showing a large mass in the left hemithorax displacing the heart and other mediastinal structures to the right side.



**Figure 2.** Operative photograph shows the distended intrathoracic stomach compressing both the heart and lung (S; stomach, L; lung).

Chest radiography remains valuable in the acute phase for the detection of diaphragmatic rupture.

Because of the high frequency of associated injuries with blunt diaphragmatic tears, most hemodynamically stable patients with suspected diaphragmatic injuries require an admission CT examination to evaluate the extent and anatomic sites of coexisting thoracoabdominal injuries.<sup>6</sup> In cases where doubt remains, MRI is the gold standard.<sup>7</sup> MRI with breath-hold acquisition permits good visualization of diaphragmatic abnormalities, but the urgency of the condition does not allow time for this imaging study in emergency situations.<sup>6</sup>

Penetrating diaphragmatic injuries are frequently overlooked initially if there is no herniation of viscera and no other significant injuries. In such cases, presentation is usually delayed until the defect gets larger in size with visceral herniation.<sup>8</sup> Early diagnosis and repair of diaphragmatic tears is desirable. Indeed, a decrease in the amount of fibrosis and avoidance of future visceral compromise due to the thoracic herniation are indications for early repair.<sup>6</sup> Emergency relief of tension gastrothorax by needle aspiration, or erroneous treatment by tube thoracostomy, is fraught with complications such as bowel perforation, sepsis, fecothorax, empyema, acute lung injury and respiratory failure.<sup>9</sup>

Tension viscerothorax is a rare but life threatening complication of blunt traumatic diaphragmatic ruptures. Its treatment with nasogastric decompression may be unsuccessful due to the anatomical changes with the intrathoracic position of the stomach and the trapped air, as seen in our case. Additionally, the diaphragm is in a constant state of movement; therefore, stab or gunshot wounds and blunt ruptures almost never heal without surgical repair.<sup>10</sup> Therefore, surgical repair is the treatment of choice. The choice of surgical approach (thoracotomy, laparotomy, or both) depends greatly on associated injuries and trauma-related syndromes.<sup>10</sup> In our case, CT revealed no associated intraabdominal injury. Therefore, we preferred thoracotomy. In conclusion, acute tension viscerothorax should be kept in mind in the differential diagnosis of tension pneumothorax and intrapericardial hernia following blunt thoracoabdominal trauma and should be operated on immediately.

## REFERENCES

1. Rathinam S, Margabanthu G, Jothivel G, et al. Tension gastrothorax causing cardiac arrest in a child. *Interact CardioVasc Thorac Surg* 2002;1:99-101.
2. Sharma Om P. Pericardio-diaphragmatic rupture: five new cases and literature review. *J Emerg Med* 1999;17:963-968.
3. Kuhlman JE, Pozniak MA, Collins J, et al. Radiographic and CT findings of blunt chest trauma: aortic injuries and looking beyond them. *RadioGraphics* 1998;18:1085-1106.
4. Shah R, Sabanathan S, Mearns AJ, et al. Traumatic rupture of the diaphragm. *Ann Thorac Surg* 1995;60:1444-1449.
5. McCann B, O'Gara A. Tension viscerothorax: an important differential for tension pneumothorax. *Emerg Med J* 2005;22:220-221.
6. lochum S, Ludig T, Walter F, et al. Imaging of diaphragmatic injury: a diagnostic challenge? *RadioGraphics*. 2002;22:S103-S118.
7. Shanmuganathan K, Mirvis SE, White CS, et al. MR imaging of hemidiaphragms in acute blunt trauma: experience with 16 patients. *AJR Am R Roentgenol*. 1996;167:397-402.
8. Al-Naami MY. Gastric volvulus associated with traumatic diaphragmatic hernia: a delayed presentation. *Ann Saudi Med* 1999;19:137-138.
9. Bamgbade O. Management of tension gastrothorax (editorial). *Resuscitation* 2006;70:293-294.
10. Rubikas R. Diaphragmatic injuries. *Eur J Cardiothorac Surg* 2001;20:53-57.