

Massive Hemothorax Due to Splenic Injury and Splenectomy via Transthoracic Approach

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Citation

S Onat, E Gedik, A Avci, S Girgin. *Massive Hemothorax Due to Splenic Injury and Splenectomy via Transthoracic Approach*. The Internet Journal of Surgery. 2008 Volume 20 Number 1.

Abstract

An intrathoracic injured spleen is a rare cause of massive hemothorax. Splenectomy can be performed via transthoracic approach if there is no concomitant abdominal organ injury. We report a 35-year-old man with a stab wound who presented with hemopneumothorax. Left-sided urgent thoracotomy was performed because of the rate of chest tube drainage. An injured spleen was seen in the left thoracic cavity. Splenectomy was performed via thoracotomy because of the splenic injury.

INTRODUCTION

Stab wounds of the chest are a relatively common form of penetrating chest trauma. Chest tubes play a major therapeutic role in trauma by decompressing air or blood but also serve in diagnosis and management decisions concerning further options [1]. After insertion of a chest tube, the volume, rate and character of drainage should be noted. It is generally agreed that the indication for thoracotomy is an initial 1500 mL or more of blood, or if the rate of drainage is more than 250 mL/h [2]. Surgical treatment is needed in 15.8% as urgent procedure in the operating theatre of patients with stab wounds of the chest [3]. Trauma has been the most common indication for splenectomy for several decades [4]. Massive hemothorax caused by injured spleen with concomitant diaphragmatic rupture is rare. Splenectomy via transthoracic approach in trauma has been reported uniquely in the literature [5].

CASE REPORT

A 35-year-old man was stabbed with a knife creating a 3cm wide wound on the posterior axillary line of the left-lower side of the chest. He was admitted to the emergency room in the first hour after injury. A penetrating knife injury was seen in the 8th intercostal space of the left posterior axillary line. Auscultation revealed no audible breath sounds in the left-lower side of the chest. Physical examinations revealed that arterial blood pressure was 90/50mmHg and heart rate was 115/minute. Plain chest radiography showed left-sided hydropneumothorax and elevation of the left diaphragm (Figure 1). Hemopneumothorax was diagnosed after thoracocentesis. A left chest tube was inserted, and initial

blood drainage was 600 mL. Chest computed tomography was obtained, and it showed left-sided hemopneumothorax, left diaphragmatic rupture, and an intrathoracic spleen (Figures 2A and 2B). There was no additional pathology in the abdominal computed tomography. The rate of the chest tube drainage was 400 mL/hour, and arterial blood pressure became 70/40mmHg. Urgent left thoracotomy was planned because of the chest tube drainage rate and unstable hemodynamics of the patient. The patient was transferred to the operation room and left-sided posterolateral thoracotomy was performed. During the operation; a grade 3 injured spleen with bleeding in the left hemithorax (Figure 3) and a 6cm diaphragmatic defect were seen. There was no thoracic organ injury. The left upper side of the peritoneal cavity was controlled and there was no additional abdominal organ injury. Splenectomy was planned via thoracotomy. Splenocolic and splenorenal ligaments were ligated after dissection, gastricae breves vessels were ligated and splenectomy was performed after splenic hilus vessels were ligated. There was no technical difficulty for splenectomy. A drainage tube was placed subdiaphragmatically. Then, the diaphragmatic defect was repaired with non-absorbable sutures. Thoracotomy incision was closed after 2 chest tubes were placed into the left hemithorax. Two units of complete blood were given intravenously during operation. The postoperative course was uneventful and the patient was discharged home at the 8th day of his hospital stay. He was well during a follow-up of 6 weeks postoperatively.

Figure 1

Figure 1: Plain chest radiography on admission.



Figure 2

Figure 2A: Chest CT of the patient (parenchymal window).

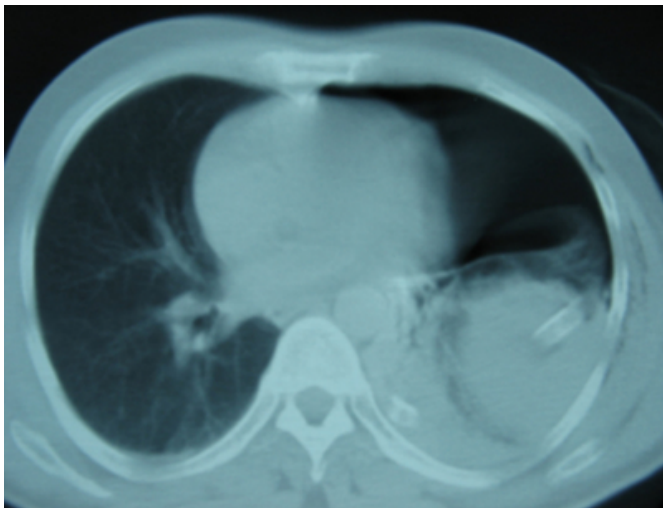


Figure 3

Figure 2B: Chest CT of the patient (mediastinal window)

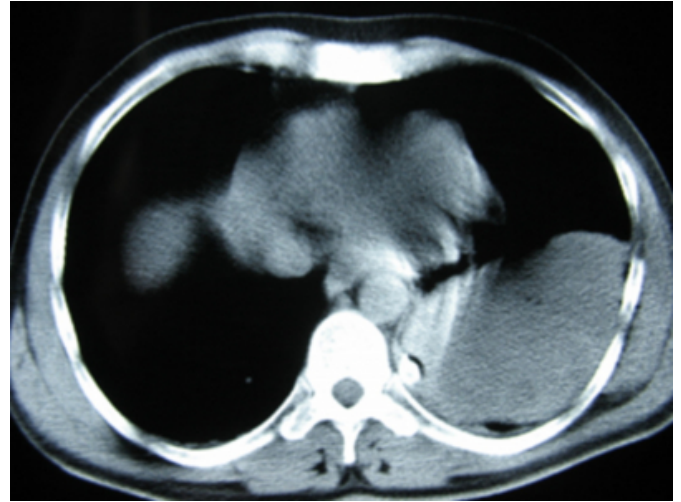
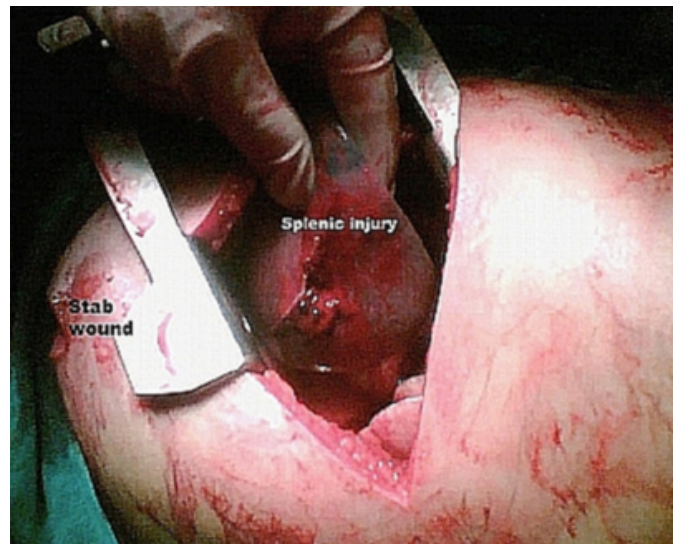


Figure 4

Figure 3: Intraoperative view. Injured spleen in the left hemithorax



DISCUSSION

Improvements in pre-hospital trauma management increased the number of patients arriving in the emergency rooms following severe trauma. Traumatic injuries still constitute one of the leading causes of death in all age groups, with penetrating and blunt thoracic trauma accounting for 25-50% of all injuries as well as being a contributing cause in 50% of fatal civilian trauma [6]. Understanding and treatment of penetrating thoracic trauma have advanced considerably in the last decades. The main consequences of chest trauma occur as a direct result of its combined effects on respiratory and haemodynamic functions.

A stab wound of the chest results in localised anatomical disruption, significantly to blood vessels, depending on the location and angle of entry. Pneumothorax and hemothorax are the major complications in stab-wounded patients. This case presented with hemopneumothorax. Variation of the injury depth and concomitant organ injury can be seen in stab wounds. The present case had splenic and diaphragmatic injury. Stab-wound injuries of the chest usually cause haemorrhage, and the only signs of severe intrathoracic haemorrhage may be the clinical features of shock. Each hemothorax can rapidly accommodate more than half of a patient's total blood volume before physical signs become obvious. It is difficult to know the volume of blood lost into the pleural cavity without drainage by tube thoracostomy. In the present case, chest tube drainage showed the cause of the hemodynamic instability. It is generally agreed that the indication for thoracotomy is an initial 1500mL or more of blood, or if the rate of drainage is more than 250mL/h [2,3,4,5,6]. Surgical treatment is needed in 15.8% as urgent procedure in the operating theatre for patients with stab wounds of the chest [3,6]. This case underwent left urgent thoracotomy because the rate of drainage was more than 250mL/h.

The left lower ribs provide the spleen with protection from traumatic injury. But in penetration trauma of the lower-left chest, spleen and left hemidiaphragm are under risk of injury. Translocation of the spleen into the left thoracic cavity after trauma is uncommon. We were surprised when we saw the injured spleen in the thorax causing the massive

hemothorax in the present case who underwent left-sided thoracotomy. Transthoracic approach is not the standard technique for splenectomy. But if there is no additional intra-abdominal injury it may be an acceptable technique in stab wounds. In the present case, the entrance of the knife and potentially injured organs were examined carefully by transdiaphragmatically.

In conclusion, splenic injury may be cause of hemothorax. Preoperative chest radiography can show the signs of diaphragmatic rupture. But radiologic signs of hemothorax usually lead to misdiagnosis. Stab wounds of the left-lower chest carry a risk of splenic injury with concomitant diaphragmatic rupture. An intrathoracic bleeding spleen can be the reason of emergency thoracotomy. Because of this, surgeons should be ready for splenectomy in such type of stab wounds.

References

1. Bastos R, Baisden CE, Harker L, et al. Penetrating thoracic trauma. *Semin Thorac Surg* 2008; 20: 19-25.
2. Wall MJ, Storey JH, Mattox KL, et al. Indications for thoracotomy. In: Ivatury RR, Cayten CG (eds): *The Textbook of Penetrating Trauma*, Baltimore, MD, Williams&Wilkins. 1996, p. 473.
3. Ashraf SS, Volans AP, Sharif H, et al. The management of stab wounds of the chest: sixteen years' experience. *J Royal Coll Surg Edinb* 1996; 41: 379-381.
4. Fraker DS. Spleen in Surgery: Scientific Principles and Practice. 3rd Ed. In: Greenfield LJ, Mulholland MW, Oldham KT, Zelenock GB, et al., eds. Philadelphia: Lippincott Williams & Wilkins, 2005: 1236-1259.
5. Yong WF, Hiratsuka M, Shinada Y, et al. Two cases of the traumatic rupture of the diaphragm (author's transl.). *Hokkaido Igaku Zasshi* 1975; 50: 485-488.
6. Hunt PA, Greaves I, Owens WA: Emergency thoracotomy in thoracic trauma - a review. *Injury* 2006; 37: 1-19

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