Case Report

MANAGEMENT OF CARDIAC PENETRATING INJURIES: A PROPOS OF A CASE

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ABSTRACT

A 24 year old policeman presented with massive subcutaneous emphysema on the left side of the thorax with severe dyspnea after a motor vehicle accident. There were no clinical and radiographic signs of cardiac injury before the operation except the pneumediastinum. An incomplete laceration of the left ventricle and combined lung injury due to broken ribs were succesfully repaired. The rib fractures and pneumomediastinum may be considered as an alert sign for the possibility of concomitant cardiac injury after blunt thoracic trauma.

INTRODUCTION

Blunt thoracic trauma can result in various types of lung injury with or without cardiac problems. Thoracic trauma patients need careful investigation and management because of the unexpected features of the cardiac injuries. Blunt thoracic trauma has been observed in different clinical entities from cardiac concussion / contusion, to the laceration and rupture of intracardiac structures. Mostly, penetrating traumas to the heart may be eithher gunshot wounds. However, bone fragments and rib fractures usually result in other visceral injuries including laceration of the heart (1 - 3). The most affected parts of the heart after penetrating injuries, are the right ventricle followed by the left ventricle, right atrium and the left atrium (4). Herein we report an incomplete laceration of the left ventricle and concomitant lung injuries as a result of direct puncture from the broken ribs after blunt thoracic trauma.

CASE REPORT

A 24 year old policeman was brought to the Emergency Department after being struck by a car while riding his motorcycle. On arrival at the Emergency Department he had a blood pressure of 100 / 70 mmHg, a heart beat of 120 per minute with normal electrocardiogram and a respiratory rate of 30 breaths per minute. He was very agitated and mentally confused. His physical examination revealed massive subcutaneous emphysema on the left side of the thorax and superficial abrasions on the left arm without any sign of pericardial tamponade.

Plain chest roentgenogram showed pulmonary contusion and hemothorax on the left hemithorax with two broken ribs, without any sign of

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pericardial tamponade. A chest tube was immediately inserted. Two hundred ml of blood was evacuated. The patient was intubated because of gradually worsening dyspnea. A computed tomography (CT) was performed and it showed pneumomediastinum and upper lobe contusion. The neurologic and abdomen examinations revealed nothing remarkable. The patient was taken directly to the operating room for emergency thoracotomy after a sudden chest tube drainage exceeding 2000 ml in half an hour. Fiberoptic bronchoscopy before the operation revealed no damage of the bronchial tree. On the operating scene it was found that broken ribs had lacerated the upper lobe and the lingula of the lung. Five-hundred ml of hemothorax was evacuated. Careful examination of the mediastinum revealed a tear in the pericardium and a hematoma on the left ventricle. There was an incomplete laceration on the lateral wall of the left ventricle including bleeding from the first branch of the obtuse margin artery and venous bleeding due to tear effect of the neighboring broken 6th rib. The bleeding artery and the vein were ligated and surrounding venous bleedings ceased after additional teflon supported sutures. The laceration of the left ventricle was incomplete and relatively superficial on the 4 x 4 cm^2 part of the ventricle. A 5 cm^2 Gore-tex (Gore & Associates, Flugstaff, Arizona, US) patch was sewn over the lacerated region. Lingulectomy was performed with staplers for the concomitant lacerations of the upper lobe. The pericardium was left open. Another chest tube was inserted after diagnosis of the pneumothorax on the right hemithorax in the Intensive Care Unit. The patient was extubated on the third postoperative day. The rest of the postoperative recovery was uneventful and the patient was discharged on the 8th postoperative day. The control echocardiogram showed no sign of wall abnormality of the left ventricle on the lateral wall.

DISCUSSION

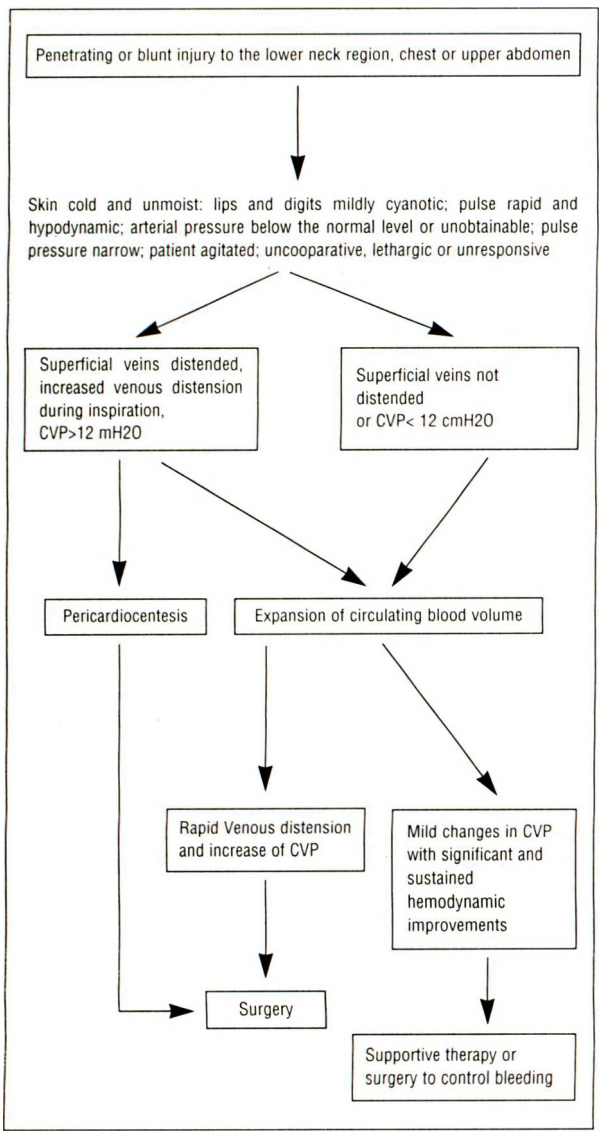
Penetrating cardiac injuries are the most fatal events among trauma patients. The majority of these patients (50 – 80 %) die before arrival at the Emergency Ward. Most authors reported a significant mortality rate (18 – 37%) after cardiac injury with hemodynamic unstability (4 - 6) . After rapid emergency room evaluation and resuscitation, patients in whom tamponade is suspected should undergo urgent exploratory surgery. Pericardial tamponade sings and the physical condition of the patient would create sufficient evidence to diagnose serious injury to the heart. Common life-threating conditions after penetrating cardiac injury are listed in Table I. During the initial evaluation and resuscitation, survival of the patient depends on immediate detection of those conditions. Rib fractures are found in 52 % of the patients with documented blunt cardiac injury versus 27 % without cardiac injury. The presence of rib fracture (s) should be evaluated carefully for concomitant cardiac injury. An algorhythm for emergency room evaluation is shown in figure 1. In hemodynamically stable patients, CT has been shown to be useful for the evaluation of pulmonary, airway, skeletal and diaphragmatic injuries (7, 8). However, CT is not always accurate for detecting pericardial and concomitant cardiac injury. Pneumomediastinum reported as a sign of bronchial airway damage is not always due to a serious problem (9). Diagnostic pericardiocentesis can also be performed with a certain rate of misleading results (25 %) (10). Decision on whether emergency room or operating room thoracotomy should depend on the patient's medical status and the technical facilities of the hospital. The initial surgical step could be either diagnostic subxiphoid window opening or direct thoracotomy. Left anterior thoracotomy is one of the most suitable incisions for both resuscitative

Table I: Life-threating penetrating cardiac injury

a. Immediate threat to life
Open Pneumothorax
Airway Obstruction
Flail Chest
Tension Pneumothorax
Massive Hemothorax
Pericardial Tamponade
b. Relative threat to life
Aortic Rupture
Rupture / Tear of Tracheabronchial Tree
Rupture of Diaphram
Rupture of Esophagus
Pulmonary Contusion
Myocardial Contusion

and therapeutic procedures. The key issue regarding mortality is diagnosis of the cardiac injury before going into the operating theatre. Additional supportive measures before surgery should be taken, especially for unexpected life-threatening cardiac injuries. We repaired the incomplete laceration by using gore-tex patch. We did not attempt to perform primary repair as we thought the lacerated part was too large for simple suturing.

Fig.1: An algorhythm for the management of patients with blunt or penetrating lower neck, chest or upper abdominal trauma. (Culliford AT. Penetrating cardiac injuries. In: Hood, Boyd, Culliford, eds. Thoracic Trauma Textbook, 9. edition. WB Saunders Company, 1989:184.)



Implication of this case;

(1) Blunt thoracic traumas may lead to unexpected cardiac injury, especially in the presence of concomitant rib fractures.

(2) The diagnosis of cardiac injury is not as accurate with CT, but the pneumomediastinum may arouse a suspicion of cardiac injury. Further evaluation including echocardiography is needed, in contrast to the previous report (11).

(3) The clinical condition of the patient might be urgent, needing emergency surgery. Every precaution must be taken for unexpected cardiac injury.

(4) There is no definitive rule to manage polytrauma patients because every patient has his/her own algorhythm.

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