



Case report

Blunt trauma to the chest- A case of delayed cardiac rupture

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ABSTRACT

Blunt traumatic cardiac rupture is a relatively uncommon diagnosis and is usually associated with a high mortality rate. A case of delayed cardiac rupture is described in an elderly person who sustained blunt chest trauma following a fall into a roadside ditch. In the case reported herein, the preliminary investigations at the time of admission did not show any evidence of haemopericardium. The patient deteriorated suddenly, possibly due to a delayed rupture of the right ventricle that was diagnosed postmortem. Acute cardiac tamponade resulting from rupture of the right ventricle is a serious and life threatening state. A high index of suspicion about the possibility of delayed cardiac rupture is required during the management of a case of polytrauma where significant cardiac findings can be masked by the presence of other injuries.

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1. Introduction

Blunt traumatic cardiac rupture is a relatively uncommon diagnosis and is usually associated with a high mortality rate. The rate of cardiac injury following blunt trauma to the chest varies widely and is estimated to be around 15%.¹ Blunt traumatic cardiac rupture is usually associated with vehicular accidents, fall from height and crush injuries.^{2–4} Injury to the heart in blunt chest trauma depends on the magnitude of the force applied to the chest, the area over which it is applied, the compliance of the chest wall and the time of application of force during the cardiac cycle.⁵

A wide variety of injuries sustained to the heart following blunt trauma include myocardial contusion, myocardial rupture, valvular disruptions, and injury to the coronaries, great vessels, and pericardium. Cardiac contusion remains the most common, while cardiac rupture the most uncommon injury sustained.⁴ A case of polytrauma is presented where the preliminary investigations at the time of admission did not show any evidence of haemopericardium. Eight hours after admission the patient deteriorated suddenly, possibly due to a delayed rupture of the right ventricle that was diagnosed postmortem.

2. Case report

A 71-year-old man, while jogging in the early morning hours, fell into a roadside ditch and sustained multiple injuries. After first aid the patient was brought to the emergency department of a tertiary care hospital. On arrival the patient was unconscious, gasping for breath and not responding to any stimuli. His pulse and blood pressure were not recordable. Subcutaneous surgical emphysema was present in the lower chest region. Radiographs of the chest showed multiple fractures of the ribs, evidence of pneumothorax and left sternoclavicular joint dislocation. Fluid therapy and blood transfusion were started, and the patient was shifted to the intensive care unit. Intubation was done and the patient was put on a ventilator. His pulse returned to 80/minute and was regular. The systolic blood pressure recorded in the right upper arm was 80 mmHg. ECG revealed ST depression and evidence of ventricular tachycardia. On ultrasonography no free fluid was seen in the abdomen. Ultrasound scan of the thoracic region showed a gas shadow in the left hemithorax (left pneumothorax). There was no evidence of pericardial effusion. Chest tube was inserted in the left 6th intercostal space along the mid axillary line and 50 ml of frothy blood was drained. At around 12 noon, the patient's condition started deteriorating. Pulse rate was 64/minute and systolic blood pressure was 80 mmHg. ECG revealed sinus rhythm, 1° heart block, left bundle branch block and intermittent 2° heart block of

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varying pattern. Peripheral pulses were not palpable. Resuscitation efforts were unsuccessful and the patient was declared dead. Patient was critical throughout the hospital stay and had survived for about 8 h following the traumatic incident.

Medicolegal autopsy was performed on the next day. The following external injuries were present on the body:

- Grazed abrasion measuring 14 × 12 cm over the left fronto-parietal region of the head.
- Multiple linear abrasions over an area measuring 22 × 8 cm on the central region of the front of the chest extending up to the upper abdomen on the left side.
- Contusion with overlying abrasion measuring 9 × 7 cm on the outer aspect of the upper region of the left buttock.
- Besides, multiple abrasions and lacerations were present on the upper and lower limbs.

Internal examination revealed a scalp contusion over the left frontal region. Brain weighed 1250 g, and did not show any evidence of injury. The body of the 5th cervical and 2nd lumbar vertebra was fractured. Spinal cord was unremarkable. Multiple contusions were present on the anterior chest wall with fracture of the body of the sternum at the level of the 2nd and 3rd ribs. 400 ml of blood mixed fluid was present in the left and 150 ml in the right pleural cavity. Fractures of the 4th to 6th ribs along the mid-clavicular line, 3rd to 7th ribs along the mid axillary line, and 3rd to 9th ribs in the paravertebral region were present on the left side. On the right side, fractures of the 1st to 10th ribs were present in the paravertebral region. Both the lungs were collapsed and pale.

Pericardium was intact and contained clotted blood occupying the pericardial cavity. Heart weighed 400 g. A laceration measuring 3 × 1 cm × ventricular cavity deep was present on the right ventricle with a surrounding contusion. Subendocardial haemorrhages were present on the left ventricular wall. The left ventricular wall thickness was 2.2 cm. The coronaries were patent. Diaphragmatic, para-oesophageal and perinephric contusions were present. All other organs were intact and pale on cut section. Death was attributed to haemopericardium secondary to cardiac ventricular rupture following blunt chest trauma.

3. Discussion

Spectrum of cardiac injury after blunt chest trauma varies from clinically insignificant contusion to full thickness cardiac rupture.⁶ Arrhythmias and conduction defects are the most common complications of cardiac contusions. Myocardial contusions are usually associated with a transient right bundle branch block. Left bundle branch block, however, is rarely reported in literature.^{5,7,8} Cardiac lacerations from blunt trauma are usually lethal injuries that are frequently diagnosed postmortem. The rupture of a cardiac cavity is usually instantly fatal because of acute cardiac tamponade. The right atrium and right ventricle are most frequently ruptured due to their anterior positioning in the mediastinum.

Myocardial contusion is characterized by patchy areas of muscle necrosis and haemorrhagic infiltrate that can be recognized at surgery or autopsy but not with conventional imaging studies. The clinical diagnosis of cardiac contusion is thus an extremely vague and subjective one and often made only in patients with a history of chest trauma. Cardiac injury must be suspected in a patient with angina-like chest pain or with progressive dyspnoea after trauma. Physical examination suggests cardiac injury if complex arrhythmias, a precordial thrill, or a murmur is present. Many patients with

cardiac injury, however, do not present with these characteristic symptoms. In some patients, cardiac injury is reflected only by the haemodynamic status. Systemic hypotension and elevated venous pressure are important signs of cardiogenic shock. The jugular veins, however, may not appear distended in patients who have bled from other injuries, and severe or refractory hypotension may be the sole sign of a cardiac injury.¹

In the described case of polytrauma, the victim was critical throughout the stay in the hospital. Investigations at the time of admission did not show any evidence of haemopericardium. The victim deteriorated suddenly 8 h following admission, possibly due to a delayed rupture of the right ventricle that was diagnosed postmortem. Acute cardiac tamponade is a serious and life threatening state. A high index of suspicion about the possibility of a cardiac injury is required during the management of a case of polytrauma where significant cardiac findings can be masked by the presence of other injuries.

Owing to its possible delayed occurrence, certain medicolegal issues associated with bleeding into the pericardial sac from delayed cardiac rupture in cases of blunt chest trauma must be considered. Although cardiac rupture due to blunt chest trauma is usually fatal, the two consequential events do not always occur simultaneously. The latent interval prior to the delayed cardiac rupture may lead to civil suits for negligence where a doctor in a hospital emergency care department usually discharges an apparently well patient who later dies at home or is re-admitted in a calamitous state. Although radiology of the chest is not mandatory if the clinical indications are not present, failure to radiologically investigate the patient can be a legal hindrance for the defence. Repeat imaging should be further considered following the initial evaluation, given the potential for delayed cardiac rupture in patients with blunt chest trauma.

In autopsy cases, the dating of cardiac contusions surrounding the ruptures may be crucial in both criminal and civil cases when it is being either upheld or refuted that a particular incident of blunt chest trauma caused the cardiac injury. Although rigid adherence to any research oriented histological dating regimen is unjustified, broad distinctions in terms of days or weeks may be reasonable.

Conflict of interest

None declared.

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Ethical approval

None.

References

1. Pretre R, Chilcott M. Blunt trauma to the heart and great vessels. *N Eng J Med* 1997;**336**:626–32.
2. Fuld G, Brathwaite CE, Rodrigues A, Turney SZ, Dunham CM, Cowley RA. Blunt traumatic rupture of the heart and pericardium: a ten year experience (1979 – 1989). *J Trauma* 1991;**31**:167–72.
3. Kato K, Jushmato S, Mashiko K, Henmi H, Yamamoto Y, Otsuka T. Blunt traumatic rupture of the heart: an experience in Tokyo. *J Trauma* 1994;**36**:859–63.
4. Brathwaite CE, Rodriguez A, Turney SZ, Dunham CM, Cowley RA. Blunt traumatic cardiac rupture: a 5 year experience. *Ann Surg* 1990;**212**:701–4.
5. Pizzo VR, Beer I, Cleva R, Zilberstein B. Intermittent left bundle branch block (LBBB) as a clinical manifestation of myocardial contusion after blunt chest trauma. *Emerg Med J* 2005;**22**:300–1.
6. Liedtke AJ, De Mmuh Jr WE. Non penetrating cardiac injuries: a collective review. *Amer Heart J* 1973;**86**:687–97.
7. Torres-Mirasal P, Gruenberg JC, Brown RS, Obeid FN. Spectrum of myocardial contusion. *Am Surg* 1982;**48**:383–92.
8. Cachecho R. The clinical significance of myocardial contusion. *J Trauma* 1992;**33**:68–73.