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Blunt Coronary Injury Presenting as Massive Left-Sided Hemothorax

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ABSTRACT
Hemothorax after blunt trauma results from injury to intrathoracic structures or the chest wall. Tube thoracostomy is the most common mode of treatment; depending on the type of injury, it is frequently the only intervention required. Rarely, blunt cardiac injury can produce hemothorax if a communication exists between the pericardium and pleural space. We describe such a case that highlights the importance of a broad differential diagnosis when treating acutely injured patients.

KEYWORDS: Hemothorax, Thoracic Cavity, Wounds and Injuries

INTRODUCTION
Hemothorax is frequently present in patients who have sustained blunt thoracic trauma. Typically, this results from a vascular injury within the pleural cavity and can be treated with tube thoracostomy. Rarely does blunt cardiac injury cause hemothorax unless the pericardium has been violated. Blunt cardiac injury can result in myocardial contusion, ventricular laceration, or overt chamber rupture leading to immediate death. Those surviving to hospital presentation require prompt diagnosis, but concomitant injuries may impede this. We describe a case of blunt cardiac injury resulting in coronary vessel injury, which presented as massive left-sided hemothorax.

CASE REPORT
A 69-year-old restrained male driver involved in a motor vehicle crash arrived at the emergency department intubated and hemodynamically stable 2 h after the injury. Breath sounds were decreased on the left. There was no jugular venous distention or pulsus paradoxus. Chest radiography demonstrated a left hemothorax and widened mediastinum (Figure 1). Tube thoracostomy returned 1,200 mL of blood initially, with no significant ongoing output. Computed tomography revealed minimal pericardial fluid, anterior 2nd–7th rib fractures, and no aortic injury (Figure 2). Chest tube drainage increased by another 800 mL. A left anterior thoracotomy was performed and >1 L of clotted blood was removed. A left pericardial laceration was noted, allowing blood to drain into the left thorax. An epicardial laceration and a lacerated posterior cardiac vein and small obtuse marginal artery branch were also observed. These vessels were ligated to control hemorrhage. Cardiopulmonary bypass was not used. Intraoperative transesophageal echocardiography demonstrated decreased left ventricular lateral wall motion with an ejection fraction of 40%. Postoperatively, electrocardiography revealed a new inferolateral infarct. Nevertheless, the patient was weaned from inotropic and ventilator support within 48 h. A follow-up echocardiogram was unchanged. The remainder of his stay was notable for atrial fibrillation and a subclavian vein thrombus, for which he was anticoagulated. He was discharged home 3 weeks later, and continues to do well.

DISCUSSION
Several million people are discharged from hospitals in the United States each year after treatment of traumatic injuries, but only 30,000 are discharged after a diagnosis of blunt cardiac injury; most die before
reaching hospital. Survival is only 50% among patients who survive to hospitalization and require surgery. In light of these highly acute injuries, quick diagnosis and treatment is paramount prior to the onset of significant physiologic derangement. History and physical examination, chest radiography, echocardiography, electrocardiography, computed tomography, and cardiac enzymes may aid in diagnosis. Some reports have described diagnostic and treatment algorithms based on these modalities. If a patient with blunt cardiac injury survives surgical treatment, mortality depends on the severity of concomitant injuries and effectiveness of resuscitation. Our case supports these tenants of survival; the patient had relatively minor concomitant injuries limited to left rib fractures and pulmonary contusion.

Although a median sternotomy is favored for blunt cardiac injury, a left thoracotomy was chosen because of high suspicion of pleural space injury. This approach gave adequate exposure to repair the cardiac injury and allowed examination of the lung, hilum, and diaphragm. The pericardial and coronary artery/vein injury were most likely due to laceration caused by adjacent rib fractures, as documented by Patetsios and colleagues. Various techniques for repairing lacerated coronary vessels include primary repair, vein patch repair, distal bypass with ligation, and simple ligation. In this case, because the injury was so distal, simple ligation was deemed adequate. More commonly in blunt trauma, coronary vessel injury results in dissections that limit blood flow. Rarely does blunt cardiac injury cause coronary vessel disruption.

Hemothorax is prevalent in patients who have sustained blunt thoracic trauma. Frequently, this can be treated with tube thoracostomy because most of the bleeding is self-limiting. Nevertheless, the continued presence of hemothorax should prompt further diagnostic studies. In this case, a definitive preoperative diagnosis of blunt cardiac injury was never established because of concomitant unsuspected and undiagnosed injuries.

**Figure 1.** Initial portable chest radiograph after placement of left-sided chest tube. Residual hemothorax, pulmonary contusion, and widened mediastinum were identified.

**Figure 2.** Computed tomogram revealing residual left-sided hemothorax, no aortic injury, and minimal pericardial fluid.
The presence of massive hemothorax was confirmed and appropriately treated, but the cause was not discovered until surgical intervention. The lack of significant pericardial effusion or cardiac herniation on computed tomography confounded the diagnosis. Electrocardiography revealed no evidence of acute ischemia suggesting coronary injury. Had the patient remained stable, perhaps focused abdominal sonography for trauma could have assisted in establishing the diagnosis. Unfortunately, the patient’s clinical change hastened surgery before a definitive work-up could be completed. Although rare, significant blunt cardiac injury should be considered in the differential diagnosis of trauma patients presenting with massive left hemothorax. These injuries may be survivable with continual vigilance, early surgery, and aggressive resuscitation.

REFERENCES
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