

Isolated right atrial tear following blunt trauma

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ABSTRACT

Cardiac chamber rupture in blunt trauma is uncommon and is associated with a high mortality rate. We report a patient involved in a motor vehicle collision with an isolated right atrial injury resulting in a pericardial effusion associated with hemodynamic compromise. A 20 year-old intoxicated female was transported after sustaining a collision in her vehicle. The patient remained mildly hypotensive and tachycardic despite volume resuscitation. FAST was negative showing good cardiac motion and no fluid in her abdomen. A CT scan revealed a mediastinal hematoma and free intra-abdominal fluid, and trans-thoracic echocardiogram (TTE) identified a mass within the right atrium associated with a pericardial effusion. In the operating room, clot was removed from within the pericardium. Hypothermic circulatory arrest and cardiopulmonary bypass were performed and a single laceration involving the right atrium was repaired after removing a large intra-atrial clot. A negative concurrent exploratory laparotomy was performed. The patient was discharged from the hospital postoperative day 6. This report presents an isolated right atrial tear associated with pericardial tamponade following blunt trauma and we discuss the role of early diagnosis and treatment.

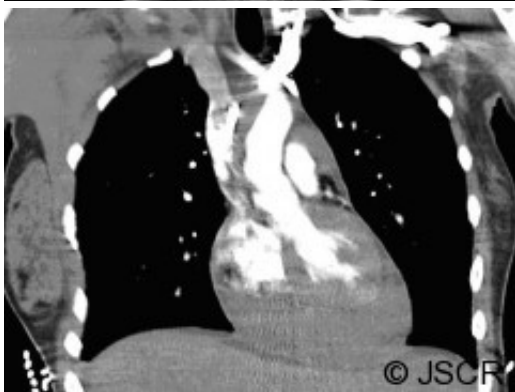
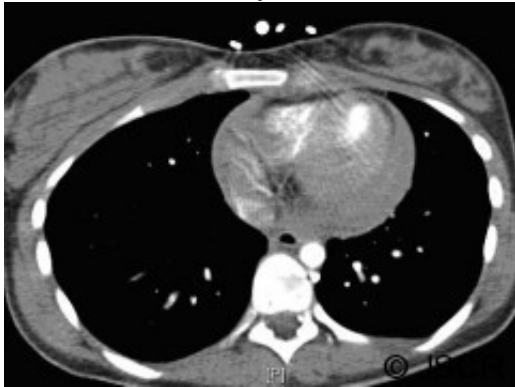
INTRODUCTION

Cardiac chamber rupture in blunt trauma is uncommon and is associated with a high mortality rate. We report the case of a female patient involved in a motor vehicle collision with an isolated right atrial injury resulting in a pericardial effusion associated with hemodynamic compromise.

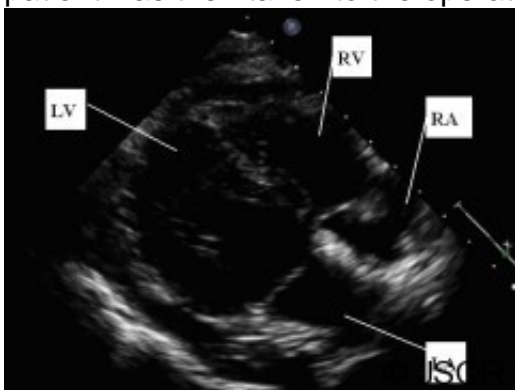
CASE REPORT

A 20 year-old female was transported after having had crashed her vehicle into a guard rail. She was inebriated with a blood alcohol level of 146. She was found by police outside of her car crying and unable to recall the events. It was unknown whether the airbag deployed or whether she was wearing a seat belt. She reported no apparent loss of consciousness, and her only complaint was mild abdominal pain. En route, she was tachycardic with a heart rate around the 130b/min, and hypotensive with a systolic pressure of about 80mmHg after having an initial systolic pressure of 110mmHg. Over the ensuing 5 hours, she received 5 liters of crystalloid and 1 unit of red blood cells, but remained mildly hypotensive. On physical exam, there was no jugular venous distention. Noted were minimal contusions on the anterior chest wall, mild right upper quadrant tenderness to palpation, and an enlarged liver, but the remaining portion of her abdominal exam was benign. Her Focused Assessment by Sonography in Trauma (FAST) exam was negative showing good cardiac motion and no fluid

in her abdomen. Her initial EKG revealed sinus tachycardia. Her hemoglobin and hematocrit were 12.2 gm/dl and 36.2 percent, respectively. Serum lactate was 6.4 mmol/L, and troponin levels had risen from 1.9 initially to 8.0 ng/ml within 7 hrs. Her chest x-ray was unimpressive. Computed tomography (CT) of her chest revealed a moderately-sized mediastinal hematoma with no filling defects of the great vessels and no extravasation. Her abdominal CT revealed a small amount of fluid in the abdomen and hepatic venous congestion with no evident intra-abdominal injuries.



© JSCR A trans-thoracic echocardiogram (TTE) was performed revealing an ejection fraction of 60% and a poorly defined mobile mass within the right atrium with a moderately large pericardial effusion circumferentially with a large thrombus within the effusion. The right ventricle was hypokinetic. Cardiovascular surgery was consulted and the patient was then taken to the operating room for exploration.



Evacuation of a large 10x15cm clot from the pericardium was first performed by means of a median sternotomy with immediate rise of her systolic pressures. No active bleeding was noted anywhere. Prior to further evaluation of the heart, a limited upper exploratory laparotomy was performed to assess for any abdominal injuries given the free fluid seen on previous imaging. 1.5 liters of clear serous ascites was noted. No apparent intra-abdominal injuries were identified. Further cardiac evaluation revealed a subtle

2.5cm area of ecchymosis in the intra-atrial groove near the course of the right coronary artery. An intra-operative transesophageal echo was performed which continued to show the intra-atrial mass. The patient was placed on cardiac bypass and care was taken to not disrupt the intra-atrial clot. During brief hypothermic circulatory arrest lasting 7 minutes, an incision was made on the wall of the right atrium. The clot was removed, and a 2cm full thickness laceration was identified in the intra-atrial groove and closed using 4-0 prolene. The right coronary artery was not involved. She was extubated postoperative day 1, and transferred to the surgical floor postoperative day 2. A follow-up echocardiogram was performed which showed no abnormalities. She was discharged home uneventfully on postoperative day 6.

DISCUSSION

Cardiac chamber rupture in blunt trauma is uncommon occurring in less than 0.5% of all blunt trauma (1), and is associated with a mortality rate nearing 80% (2). It is thought that the right atrium is more susceptible to rupture due to its thin wall and anterior location when compared to other chambers of the heart. The mechanisms associated with these injuries usually consists of rapid deceleration with subsequent impact of the steering wheel to the thorax (3-5), bidirectional forces against the thorax, blast forces, or increases in thoracic pressure resulting from sudden compression of the abdomen or lower limbs (6). Median sternotomy is the approach most commonly utilized as it allows for adequate exposure of the heart and great vessels and can be extended easily for a laparotomy if active bleeding is encountered. A foley catheter may be placed temporarily through the wound and the balloon inflated and pulled back carefully until resistance is met in order to stop the bleeding until definitive repair is performed. Small tears can be repaired primarily by simple suture with or without the use of pledgets under direct compression or with application of a vascular clamp thus avoiding the need for potential cardiopulmonary bypass. Care must be taken to avoid injury to coronary vessels during the repair. Early use of echocardiography to detect the presence of hemopericardium and cardiac tamponade in patients with suspected atrial rupture following blunt chest trauma is advocated (7). ECG and cardiac enzymes are used only as screening tests for myocardial injury, and poorly correlate with findings on echocardiography (8,9). In experienced hands, transesophageal echocardiography is the diagnostic technique of choice for assessing traumatic myocardial or valvular injury (10) and should be utilized early if clinical suspicion of cardiac injury exists.

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