Successful conservative management of blunt right ventricular rupture in a patient with prior cardiac surgery

Takeyoshi Ota, Aditya Bansal, Yoshiya Toyoda*

Division of Cardiac Surgery, Department of Cardiothoracic Surgery, University of Pittsburgh, Pittsburgh, PA, USA

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Abstract

Blunt cardiac trauma is one of the leading causes of death on site in motor vehicle accidents and frequently requires an emergent surgical intervention if the patient reaches the hospital. We experienced a rare case of blunt right ventricular disruption that was successfully managed by conservative therapy without surgery.

Keywords: Blunt; Cardiac injury; Trauma

1. Introduction

Blunt cardiac trauma is a common cause of death on site in motor vehicle accidents (MVAs). A limited number of the victims are able to reach the hospital, and most of these require emergent surgical interventions. We present a case of blunt cardiac rupture that was successfully managed by conservative therapy without surgery.

2. Case report

A 49-year-old male, who had had a defibrillator implanted 2 years previously and had a history of coronary artery bypass grafting (CABG), was transported to the emergency department after an MVA. Upon presentation, he complained of left chest and shoulder pain.

Physical examination showed no penetrating wounds on the chest. His blood pressure was 126/70 mmHg, with a pulse of 60 beats/min (paced rhythm). A chest computed tomography (CT) scan showed disruption of the wall of the right ventricle (RV), with extravasation confined by the pericardium (Fig. 1a). Transesophageal echocardiography confirmed the disruption of the RV wall (a 20 mm defect), with extravasation extending 18 mm into a localized laminated hematoma (Fig. 2).

Given the patient's hemodynamic stability, we decided to manage the RV wall disruption medically. Serial follow-up chest CT-scans were performed, which showed a decrease in size of the pseudoaneurysm at day 3 and subsequent thrombosis of the pseudoaneurysm by day 6 (Fig. 1b,c). The patient was discharged 13 days after the MVA after an uneventful hospital stay.

Three months later, the RV disruption was no longer visible on a follow-up chest CT (Fig. 1d). Twenty-six months after the MVA, the patient had no complaints and was well.

3. Discussion

Blunt cardiac trauma is one of the leading causes of death on site in MVAs [1, 2]. More than 60% of patients with blunt cardiac injury die within a few minutes [3], and only 5% of patients with blunt cardiac injury from an MVA survive long enough to be admitted to hospital [4].

In clinical series, the incidence of cardiac rupture after blunt cardiac injury is as high as 30%, and in an autopsy series, cardiac rupture after blunt cardiac injury was detected in up to 65% of cases [5]. In a landmark series of 546 autopsies after blunt cardiac injury, 65% of the cases had rupture of at least one chamber, 24% had a myocardial contusion, 7% had pericardial laceration, 4% had papillary muscle rupture, 2% had a valvular rupture, and 1% showed coronary laceration [6]. The right atrium is the most commonly injured chamber among survivors of blunt cardiac injury, followed by the left atrium, RV and left ventricle [7].

Hypothesized mechanisms of blunt cardiac injury include direct force transmission, compression of the heart between the sternum and the spine, acceleration/deceleration forces, direct injury from fractured bones, and the hydraulic ram effect, in which sudden compression of the abdomen produces extremely high transient pressure in the cardiac chambers, resulting in a bursting injury [6]. The heart is most susceptible to compression injury during...
maximal filling of the chambers. In an animal study, impact velocity and degree of chest compression were the most important factors affecting severity of injury [8].

In the present case, the patient likely remained hemodynamically stable because the adhesions from his previous CABG prevented tamponade by confining blood in a localized cavity. To our knowledge, this is the first reported case of RV rupture successfully managed without surgery. Conservative management can be an option to treat certain blunt cardiac disruptions when the hemodynamics are not significantly compromised.

References