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Cover Page Footnote

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Cardiac Tamponade and Laceration of Right Ventricle in Blunt Thoracic Injury: A Case Report

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Abstract

Cardiac tamponade caused by blunt thoracic injuries is a rare case with a high mortality rate. Usually patients not survived pre hospital. We present the case of a 50-year-old man admitted to our emergency department after a motorcycle accident, and he had cart handle injury to the chest. He presented with unstable hemodynamic with bruise on the precordial area, and fell into cardiac arrest. Standard CPR carried out continued with intubation and ROSC. FAST showed fluid in the pericardial sac. On pericardiocentesis, 40 mL blood aspirated. A median sternotomy performed, a lacerations found in the right ventricle and right ventricle pulmonary junction. Prompt diagnosis and definitive surgery save lives in traumatic acute cardiac tamponade caused by blunt chest trauma. FAST may be beneficial in diagnosing cardiac tamponade, and pericardiocentesis can be a temporary measure. A median sternotomy was a safe surgical approach in controlling the cardiac injury. The patient discharged on the fifth postoperative day.

Keywords: Blunt thoracic injury, traumatic cardiac tamponade, sternotomy

Introduction

Cardiac tamponade is an emergency condition that may be life-threatening and must properly manage. Cardiac tamponade is a very case in blunt thoracic injury.⁽¹⁾ Patients may present unclear clinical symptoms and signs, initially stable. However, they may worsen swiftly until cardiac failure occurs¹ as Beck's triad - a specific characteristic of cardiac tamponade - only seen in <10% of cases.² Therefore, high suspicion of cardiac tamponade in blunt thoracic injury must be considered in all patients presented in the Emergency Room (ER). Mortality rates, on patients experiencing blunt thoracic trauma, may reach 78%.³

The bleeding lead to cardiac tamponade should be managed sternotomy or left anterolateral thoracotomy. These surgeries may be performed in the operating theater or in the ER, based on the hemodynamic condition and facility available in the center.¹ Median sternotomy is a standard treatment for cardiac tamponade. The incision may be extended until the abdomen opens the peritoneum if needed. Meanwhile, in other center, lateral thoracotomy is chosen as fast and more comfortable for some.³

We reported cardiac tamponade with blunt thoracic injury managed in RSCM, which required proper management and discussed with evidence-based studies

Case Illustration

A male of 50-year old presented in the emergency room (ER) of dr. Cipto Mangunkusumo Hospital (RSCM), Jakarta. He had a history of a motorcycle accident forty minutes before admission. The crashed hit

him from the front side, and his chest hit by the metal handle. He had a temporary loss of consciousness. In the ER, the airway clear, respiratory rate of 12 times per minute, and oxygen saturation of 96%. Blood pressure 90/60 mmHg and pulse rate of 62 times per minute. A cardiac arrest found, and cardiopulmonary resuscitation carried out for two cycles, followed by intubation. The visible injury on left parasternal costal space IV. Following resuscitation, a return of spontaneous circulation (ROSC) occurred. Focused assessment with sonography for trauma (FAST) carried out and showing the fluid in the pericardium space. A pericardiocentesis proceeded, and a 40 mL blood aspirated. The blood pressure returned to 110/85 mmHg, with the heart rate 108 times per minute.



Figure 1 Clinical presentation showing a bruise on the pericardial zone



Figure 2 FAST showing the accumulation of blood on the pericardial sac.



Figure 3 The laceration on the right ventricle and right ventricle pulmonary junction.

Afterward, sternotomy performed in the operating theater. Following incision to the pericardium, a 200mL of blood and hematoma evacuated. A laceration on the right ventricle pulmonary junction measuring 2x3x2 cm identified and sutured. Another laceration was measuring 1x2x1 cm found on the right ventricle - involved the coronary vein, and sutured. As the left pleura opened, a hematoma on the left pleural fat identified. Fractures of the fourth and fifth ribs found and fixed with synthetic, monofilament, nonabsorbable polypropylene 1-0. Hemostasis carried out to treat left intercostal arteries of the fourth and fifth ribs. Three days of postoperative intensive care employed, and he discharged on the fifth postoperative days.

Discussion

Moore et al. classified all injury to the heart in the blunt trauma as blunt cardiac injury (BCI).⁴ In most cases, blunt cardiac injury often results from motorcycle accidents.⁵ A high-energy trauma leading to adjacent structures surround heart may lead to cardiac injury.³

Several mechanisms may involves in BCI: Cardiac compression due to direct impact on the precordial area, acceleration and deceleration force, high pressure on blunt trauma to the abdominal region, indirect where

the result of a fracture of the sternum or ribs that pierce the heart and finally due to blast injury.³ In our case, the patient had a high energy impact with a motorcycle from the opposite direction, which transmitted to the cart handle to the precordial area. In fig.1, we can see bruised around the precordial zone; this finding leads to high suspicion of cardiac injury. In addition, the patient presented with unstable hemodynamic.

Following this high impact injury, a cardiac tamponade, accumulation in the pericardial space, is a logical consequence. The most frequent part of subjected to injury is the right ventricle followed by the left ventricle, right atrium, intraventricular septum, left atrium, and finally, the interatrial septum.^{4,6} An acute fluid of 200 mL collection leads to an increase of pressure results in compression, let the heart chambers collapse, and when the cardiac volume falls dramatically, cardiac shock occurs.^{7,8,9,10}

Focused assessment with sonography for trauma (FAST) - first introduced in 1996, currently referred to as a critical examination as a standard tool in managing trauma cases in emergency departments.⁴ In the detection of cardiac tamponade, FAST may be employed bedside. Further, a pericardiocentesis or subxiphoid pericardial window may proceed as a temporary measure.^{6,12} Some centers with an adequate facility may go direct thoracotomy or sternotomy.¹⁰ Resuscitative thoracotomy may be done in patients with unstable hemodynamics. However, this procedure remains controversy as the mortality remains high, and depends on the hospital's resources.^{13,14,15}

In our case, FAST was done and shown the accumulation of fluid in the pericardial area. Swift decision has to be made; some centers have different approached. In the case report of Kim et al., although patients reported with unstable hemodynamics, definitive surgery was not performed immediately. The patient underwent a CT scan, but then the patient had a cardiac arrest and a pulmonary heart resuscitation was carried out, after ROSC, the patient connected to the VA ECMO.¹⁷

In Telich-Tarriba et al., patients present with stable hemodynamics. As the cardiac tamponade diagnosed, sternotomy immediately performed with no temporary decompression, namely pericardiocentesis or subxiphoid pericardial window.¹⁶ In our report, the pericardiocentesis carried out, followed by sternotomy as the hemodynamic stable.

In both reports, the operation employed was sternotomy, proceeded in the operating theatre the same as the case discussed in this study. Nonetheless, the patient in the study of Kim et al. died two days postoperatively; this indicates high mortality in cases of blunt thoracic injury accompanied by cardiac injury. In our report, the patient discharged on the fifth postoperative days.

Summary

The clinical presentation of cardiac tamponade in blunt thoracic injury may not be obvious, FAST may have benefit in diagnosis cardiac tamponade. Pericardiocentesis referred to a temporary measure followed by a definitive surgery.

Disclosure

The authors report no conflicts of interest.

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