

How to mend a broken heart: A case of right ventricular stab injury

Sir,

Stab wounds of the heart represent a significant surgical and anaesthetic challenge because of their unpredictable clinical course and the need for emergency clinical care often includes emergency room thoracotomy. Haemodynamically unstable patients with penetrating thoracic wounds would more likely be considered as being accompanied by a cardiac injury, especially when the wounds were located on the left or anterior chest wall. Individuals with prompt ongoing aggressive resuscitation and emergency thoracotomy might have a favourable prognosis.^[1]

A 28-year-old man with the American Society of Anesthesiologists (ASA) physical status ASA 2E, who was involved in an altercation received a stab wound to the chest, one on each side of left nipple [Figure 1]. When he was brought to the emergency department, he was semiconscious and haemodynamically unstable and oxygen saturation was around 95% with the oxygen mask. Following focused assessment with sonography in trauma (FAST) showing a huge pericardial and left pleural collection, an intercostal drain was inserted and the patient shifted to the cardiac catheterisation laboratory for pericardiocentesis. The patient suffered cardiac arrest on the table. Cardiopulmonary resuscitation (CPR) was started immediately and the trachea patient was intubated and pericardiocentesis started after inserting pericardial drain through the xiphisternum. After pericardiocentesis, the heart

started beating and blood pressure started picking up. The internal jugular vein was cannulated to start inotropic support and transfusion.

There was rapid re-accumulation of blood in the pericardium with unstable haemodynamics, in spite of pericardial drain being *in situ*. Due to unavailability of cross-matched blood as well as un-cross-matched O-negative blood, we decided to autotransfuse the pericardial blood under sterile aseptic conditions, till the patient was shifted to the operation theatre. Approximately 2–3 L of blood was autotransfused during this period.

After sternotomy, blood was seen popping out of the right ventricle [Online Video 1] with each heartbeat and clots all around [Figure 2]. Teflon pledgetted 3-0 polypropylene suture was used and the rent in the right ventricle was closed [Online Video 2] [Figure 3]. After transfusing 4 units of packed red blood cells (PRBC), 2 fresh frozen plasma (FFP) and 2 platelets, blood pressure stabilised. 100 mg hydrocortisone and 1 g of thiopentone sodium were given for prophylactic neuroprotection on cardiopulmonary bypass (CPB) and nasopharyngeal temperature was maintained just above 34°C on CPB. Intraoperative transoesophageal echocardiography was also done to rule out any structural injuries such as atrial or ventricular septal defects and aorto-right ventricular fistulas. The patient was shifted to ICU and was extubated the next day without any neurological sequelae. Cefoperazone was given till 5th postoperative days.

Most surgeons agree that patients with penetrating cardiac wounds need immediate intervention. Hypotension may be temporarily corrected by aggressive fluid resuscitation. Stable patients may indeed have a cardiac laceration that may remain undiagnosed – until

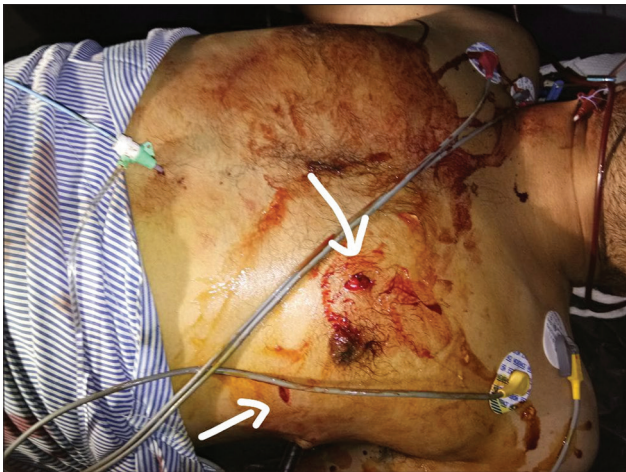


Figure 1: Stab wounds, one on the lateral aspect and one on the medial side of the left nipple

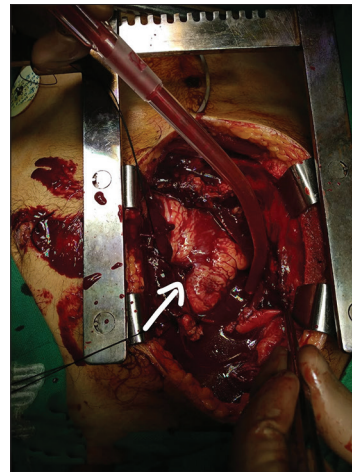


Figure 2: Clots are seen all around the heart with a pointer showing rent in the right ventricular outflow tract

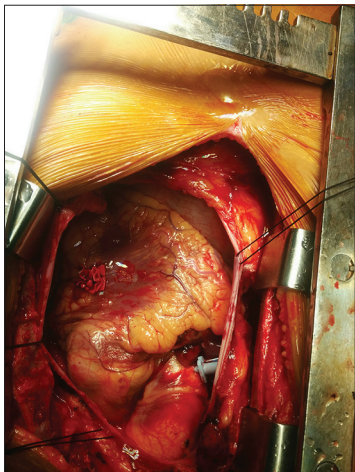


Figure 3: Right ventricular (RV) wound sutured with 3-0 Teflon pledgetted suture

the patient suddenly deteriorates.^[2] Investigations such as chest roentgenogram and pericardiocentesis are not always reliable. Echocardiography has been useful in stable patients with minimal clinical signs.^[3] The clinical presentation may be broadly classified into the following:

Group 1: Chest wound, little or no sign of shock, possible cardiac penetration.

Group 2: Chest wound, hypotension which often responds to transfusion, probable cardiac penetration, but not in acute haemodynamic difficulty.

Group 3: The ‘apparently dead’, chest wound, unconscious, absent pulses, dilated pupils and no recordable blood pressure.

If the chest wound overlies the cardiac silhouette, there is a 60% chance that the heart has been penetrated.

On the left side, wounds between sternum and nipple may injure the right ventricle. Further lateral to the nipple, the left ventricle is at risk. On the right side, the right atrium and great veins are at risk.

Infection is a potential risk factor after prolonged exposure following penetrating injuries. Attar *et al.*^[4] reported a 19.4% incidence of infection in patients who survived after penetrating cardiac injury. The patient, in this case, was protected from infection by persistent irrigation and debridement of the wound and perioperative administration of antibiotics and short exposure time.

Iatrogenic haemorrhagic pericardial effusion (IHPE) is one of the similar major complications encountered in daily percutaneous intracardiac interventions (percutaneous left atrial appendage closure) with the WATCHMAN device.^[5]

Our patient received his own blood, which is safer, easier and more cost-effective, and it contains adequate clotting factors and platelets than banked blood. On the basis of our experience, we recommend gently aspirating blood from the pericardium and directly reinjecting that blood through a large central venous line. We do not advise retransfusing collected blood from the drainage bag to avoid complications such as thrombosis, air embolism and haemolysis.

Venkatachalam *et al.*^[6] retrospectively analysed nine patients who had pericardial effusion requiring pericardial drainage after an ablation procedure for atrium fibrillation. They described the successful use of a Cell Saver device during emergency

pericardiocentesis. However, in the patient presented in this case report, there was an acute situation with no immediately available Cell Saver.

This present case illustrates well the optimal management of a cardiac stab wound and underlines the importance of autotransfusion where there was no time available for cross-matching or getting O-negative blood during emergency.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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