PENETRATING CARDIAC INJURIES: ROLE OF EMERGENCY THORACOTOMY IN IRAQI PATIENTS

Ihssan Ali Hais Elamery¹ and Maysa Edan²

¹Specialist in Thoracic and Cardiovascular Surgery (M.B.Ch.B.F.I.C.M.S), Imam Hussein Medical City, Kerbala Health Directorate / Holy Kerbala - Iraq.
²Practitioner Thoracic and Vascular Surgery, Imam Hussein Medical City, Kerbala Health Directorate / Holy Kerbala – Iraq.

*Corresponding Author: Ihssan Ali Hais Elamery
Specialist in Thoracic and Cardiovascular Surgery (M.B.Ch.B.F.I.C.M.S), Imam Hussein Medical City, Kerbala Health Directorate / Holy Kerbala - Iraq.

ABSTRACT

Background: Penetrating cardiac injuries continue to increase in proportion to the steady rise in violence in our society. Aim: The aim of study was to express the importance of emergency diagnosis and surgical approach in penetrating cardiac trauma patients. Method: Between January 2016 to January 2017, a five penetrating cardiac trauma were admitted to the emergency unit in imam Hussein medical city in kerbala, three of them stab wound and two cases is shell injury, all of them males in age range from 14-44 years old, the five patients were operated without using cardiopulmonary bypass machine and all of them pass without any complications. Results: The study consisted of five patients sustaining penetrating cardiac injuries, the five gunshot patients divided into two shell wound (40%) and three stab wounds (60%). An emergency department thoracotomy was performed in all patients and the wounded was sutured with 4/0 prolene after good resuscitation in ER. Conclusion: Penetrating wounds of the heart are one of the major cause of mortality and morbidity in our society due to violence, rapid action and good resuscitation with right decision of good skill hand cardiac surgeon will improve the outcome of the results.

INTRODUCTION

Penetrating cardiac injuries continue to increase in proportion to the steady rise in violence in our society. The method of assault has changed from knives and icepicks to more lethal low-velocity hand guns.¹ With aggressive resuscitative therapy and emergency room thoracotomy, the salvage rate of these patients can reach up to 35%. This study reviews our experience with penetrating cardiac injuries over the past 15 years.² ³

Cardiac traumas may be blunt or penetrating. Increasing violence also leads to a progressive increase in penetrating traumas. These injuries account for the most important causes of death in the young population. The young average age of our patients is also consistent with this current knowledge. Most of the patients were male, as also found in most other series of the penetrating traumas,⁴ ⁵ ⁶, the most frequent causes are stab wounds or gunshot wounds (GSWs). In the United States, 35-96% of penetrating cardiac traumas are due to GSWs. In developing countries, however, stab wounds are more frequent.⁷ ⁸

Except for a two cases gunshot victim, all other cases in our study suffered from stab wound.⁹ ¹⁰ ¹¹

Rapid transfer to the emergency department, accurate and quick diagnosis and aggressive surgical approach will increase survival in penetrating cardiac trauma.¹² ¹³ ¹⁴

PATIENT AND METHOD

Five consecutive patients with penetrating wounds to the heart underwent operation at Imam Hussein medical city Hospital during the period January, 2016, to January, 2017. Most patients were taken to the hospital by ambulance, a large majority reaching the emergency area within thirty minutes from the time of injury. The patients ranged in age from 14to 44 years. All of them were male. Two had gunshot wounds and the three other had stab wounds. Resuscitative measures including endotracheal intubation, volume replacement, and placement of chest tubes were carried out soon after admission to the emergency room. If the condition of the patient stabilized, then he would be moved to the operating room for further repair of the heart wound, and control of other thoracic and abdominal injuries.

Critically unstable patients show signs of life but are profoundly hypotensive, and cardiac arrest appears to be imminent. At the time of the study, in our hospital, the distance between the resuscitation room and the operating room (OR) was less than 20 m. We never
practice needle pericardiocentesis in patients with suspected penetrating cardiac trauma in our hospital, as we believe false negative results are relatively common. Occasionally computed tomography (CT) can be very helpful in detecting a transthoracic missile.

The study include 5 cases of cardiac injuries were presented. 3 of them had stab wound in the heart, one of them 14 years old patient with stab wound to LV near the apex of the heart and the 2nd case was 32 years old with stab to RV near the origin of Pulmonary. A, 3rd one was 20 years old with stab to epi-gastric region with injury to internal mammary artery and pericardium, the 2 other cases with shell injuries one is 17 years old with shell penetrating the heart (Lt. side of the heart) from apex to base, was stalled in mediastinum, and the other case was 23 years old with shell to the pericardium and stalled in RV wall, all patients entre the theatre room immediately after insertion of chest tube and good resuscitation and left anterior thoracotomy done with direct suturing of pericardium with 4/0prolene and repair the associated injury in the lung or abdomen if present then the patients transfer to ICU and after stabilization of their general condition they discharge to the word and then discharge to home.

**RESULTS**

The survival rate of penetrating cardiac injuries was related to the time between the injury and initiation of resuscitation, in current study the 5 cases of cardiac injuries were males presented to our department in Imam Hussein medical city (Fig 1).

The age in current study were divided into three groups as shown in (table 1): The first group (10 – 19) years the N. of patients in these group was (1) patient (20%), The second group (20 – 29) years the N. of patient was (3) (60%) and the last group (30 – 39) years the n. of patient (1) (20%).

**Table 1: Number of patients according to age.**

<table>
<thead>
<tr>
<th>Age</th>
<th>N. of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 – 19</td>
<td>1</td>
<td>20 %</td>
</tr>
<tr>
<td>20 – 29</td>
<td>3</td>
<td>60 %</td>
</tr>
<tr>
<td>30 – 39</td>
<td>1</td>
<td>20 %</td>
</tr>
</tbody>
</table>

**Figure 2** In present study were shown site of injury, the n. of patients that shown in right atrium (RA) was (0), but the n. of patients were shown in left atrium (LA) was (4), the right ventricle (RV) the n. of patients were shown (0) and in left ventricle (LV) the n. of patients (1).
Type of surgery were shown in (table 2) that revealed the n. of patients in left anterior thoracotomy was (4) (80%), while the n. of patients in right anterior thoracotomy was (1) (20%) and the n. of patients in median sternotomy was (0) (0%).

**Table 2: Number of patients according to type of surgery.**

<table>
<thead>
<tr>
<th>Type of surgery</th>
<th>N. of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left anterior thoracotomy</td>
<td>4</td>
<td>80%</td>
</tr>
<tr>
<td>Right anterior thoracotomy</td>
<td>1</td>
<td>20%</td>
</tr>
<tr>
<td>Median sternotomy</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Type of injury in current study were shown in (table 3) that revealed the n. of patients had stab wounds was (3) (60%) and n. of patients had shells wounds was (2) (40%).

**Table 3: Number of patients according to type of injury.**

<table>
<thead>
<tr>
<th>Type of injury</th>
<th>N. of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stab wounds</td>
<td>3</td>
<td>60%</td>
</tr>
<tr>
<td>Shells wounds</td>
<td>2</td>
<td>40%</td>
</tr>
</tbody>
</table>

**DISCUSSION**

In a review in 1968, found that less than 20% of patients with penetrating wounds of the heart reached the hospital alive. With improved emergency transport systems increase the numbers of patients who reach to emergency room alive.[15, 16] Penetrating cardiac injuries have shown a progressive increase over the past two decades, due to increase the violence in our society after the war on Iraq and increase the use of weapons and harmful sharp objects like knives, needles and gunshots, the gunshots and knives are the most penetrating cardiac injuries in our study.[17-19] The gunshot wounds carry a worse prognosis because they associated with larger defects in the pericardium, more destruction of myocardial tissue than the stab wounds, which produce a small injury in the pericardium that seals off and produces cardiac tamponed.[20, 21] Eighty to ninety percent of stab wounds demonstrate pericardial tamponed, but only 20% of gunshot wounds of the heart have cardiac tamponed when first seen.[16, 22]

Our report represents the retrospective study in 5 patients with penetrating cardiac injuries. These patients were all managed under the close supervision of the single cardiac surgeons in the Imam Hussein medical city in kIRbala, penetrating wound to the heart should be suspected in any patient with penetrating wounds to the chest, upper abdomen and neck, the diagnosis of patient with haemothorax after insertion of chest tube and drain more than 1500cc blood is exploratory thoracotomy.[23] Agitation, lack of coordination, cold extremity, distended neck veins, paradoxical pulses with muffled heart sounds in patients with penetrating wounds to the chest, upper abdomen and neck suggested a cardiac injury with tamponed, early transport of patient and good

Figure 2: Number of cases according to site of injury.
resuscitation play important role in the outcome of surgery.\(^{18}\) Immediate transport of patient to theatre room. The surgical team must concentrate on rapid resuscitation and insertion of an endotracheal tube, chest tubes, and intravenous lines as needed, with the use of immediate thoracotomy done. A left anterior thoracotomy in the fourth or fifth interspace provides good exposure to the heart and can be performed quickly.\(^{24-26}\) If additional exposure is needed, extension of the incision to the right chest with division of the sternum can be done which not used in our study. When the chest cavity has been opened, the pericardium should be extensively opened for treatment of tamponed, control of bleeding, and repair.\(^{27}\) Care must be taken to avoid injury to the phrenic nerve, underlying coronary arteries, and atrial appendages. If the heart is found arrested, direct cardiac massage is done with direct injection of cardiac drugs (epinephrine or calcium) into the heart can be performed.\(^{28}\) If ventricular fibrillation is encountered, direct cardioversion is carried out. In our study, all cases are managed without using cardiopulmonary bypass machine as in others, open and working on beating heart that lead to decrease the post-operative complications of using cardiopulmonary bypass machine like renal, pulmonary, neurological complications due to long time of clamping of aorta, so all patients pass smoothly without any complications after surgery, also we not use of pericardiocentesis in ER to prevent time lost in preparing the equipment for procedure and early transfer of patients to theatre room and manage the tamponed by open and evacuation, we see that the patients were more likely to survive if they presented with cardiac tamponed than without.\(^{29-31}\) Due to protective effect of tamponed. Chest X-R had no role in diagnosis of cardiac injuries so we never used it in our study, echo study and CT scan of the chest may help in diagnosis if the patient not in shocked and hemodynamically stable.\(^{32,33}\) The mortality among patients with penetrating injuries to the heart is related in part to the nature, size, and location of the cardiac wound, associated injuries, and the length of time from injuries to initiation of resuscitation and treatment.\(^{34,35}\) We firmly believe that rapid transfer of injured patient and early ER thoracotomy for decompensating patients, will help to reduce the mortality from penetrating cardiac injuries.\(^{36}\)

**CONCLUSION**

With the continuing rise of violence, surgeons are faced with an increasing number of patients with heart wounds. So it is mandatory for surgeons to be prepared to tackle penetrating injury to the heart immediately, as delay is likely to lead to adverse outcomes. The mortality among patients with penetrating injuries to the heart is related in part to the nature, size, and location of the cardiac wound, associated injuries, and the length of time from injuries to time of starting resuscitation and treatment. As the cardiac injury regarding the most common cause of mortality and morbidity among the body trauma and need rapid action and good management to preserve the life.

**REFERENCE**

1. Veit J. Aimed point shooting or P&S for self defense. 2015.
of Trauma and Acute Care Surgery. 2018; 85(1S): S4-S12.