

A Postmortem Study of Blunt Cardiac Injuries

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ABSTRACT

Introduction: Blunt cardiac injury (BCI) refers to injury sustained due to blunt trauma to the heart. The manifestations of such range from clinically silent, transient arrhythmias to deadly cardiac wall rupture.

Objectives: To study the blunt cardiac trauma following vehicular accidents brought for autopsy to the morgue of Osmania Medical College, Hyderabad have been studied.

Method: 55 cases of blunt cardiac trauma following vehicular accidents brought for autopsy to the Department of Forensic Medicine, Osmania Medical College, Hyderabad have been studied to find out types of cardiac injuries, their association with sternal and rib fractures, mechanism of causation, risk factors, etc.

Results: It was observed that 60 % of the cases with blunt cardiac trauma had associated sternal and rib fractures. Maximum number (58%) of the cardiac rupture was seen in run-over cases. The right ventricle of the heart was involved in 23 (41%) cases. All the injuries were located on the anterior surface of the heart.

Conclusion: In assessing blunt cardiac trauma victims in vehicular accidents, knowledge about the commonest sites, types and degrees of injuries have been highlighted in the present study, which will help in a timely intervention.

Keywords: *Vehicular accident, rib fracture, sternal fracture, blunt cardiac trauma.*

INTRODUCTION

Nonpenetrating chest trauma with injury to the heart and aorta has become increasingly common, particularly as a result of rapid deceleration in high-speed vehicular accidents, over the past 2–3 decades. Airplane crashes, falls from height, and other severe crushing injuries of the thorax and the lower body may also lead to the nonpenetrating cardiac injuries¹⁻⁷. Because blunt cardiac injury is the most clinically underdiagnosed traumatic injury in the adult and pediatric population⁸, these kind of injuries significantly increase morbidity in polytrauma patients, and in many cases lead to death⁹. The incidence of cardiac injury is presented 20% after blunt chest trauma in postmortem studies¹⁰. In the pediatric age group, the

incidence is slightly lower and previous studies suggested that cardiac injury was found in 15–20% of the pediatric patients examined⁷⁻¹¹. The incidence might be as low as 0.5–0.8% in clinical for all age groups. Therefore, there is always a possibility of fatal cardiac injuries to be unnoticed leading to a fatal outcome.

METHOD

55 cases of blunt cardiac trauma following vehicular accidents brought for autopsy to the morgue of the Department of Forensic Medicine, Osmania Medical College, Hyderabad have been considered for this study. The cases were studied to analyze the types of cardiac injuries, their association with sternal and rib fractures, mechanism of causation, risk factors, etc.

RESULTS

All the victims were males within the range age of 21–40 years, and all of them were involved in vehicular accidents. Out of these 55 cases of blunt cardiac trauma, 33 cases (60%) had associated sternal and rib fractures.

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27% of the cases had only associated rib injuries. Only five cases (10%) had no associated sternal or rib fractures (Table-1).

Table 1: Incidence of Cardiac Injuries and Association with sternal and rib fractures

	Cardiac injuries	Number	Percentage
1.	With sternal fracture	2	3%
2.	With rib fracture	15	27%
3.	With both sternal and rib fractures	33	60%
4.	Without sternal or rib fractures	5	10%

The right ventricle of the heart was involved in 23 (41%) cases. It was lacerated in 20 (86.5%) of these 23 cases, while the remaining three (13.2%) had contusion. The right atrium was lacerated in five (9.09%) cases. Both atria were lacerated in four (7.2%) cases, while both the ventricles were lacerated in five (9.09%) cases. The right ventricle and right atrium combined were lacerated in 10 (18.14%) cases. Extensive lacerations of the heart involving both the ventricles and both the atria were seen in five (9.07%) of the cases. The left ventricle and the left ventricle and left atrium combined were contused in two (3.6%) case each. In one (1.8%) case, laceration of the right atrium without any external injury of the chest region was seen and it was observed in a motorcyclist knocked down by a truck.

DISCUSSION

Waele J.J.D. et al.,¹² noticed that blunt cardiac injury was common after sternal trauma and the severity of the fracture was an indicator of possible myo or pericardial damage. This holds true in the present study as cardiac injuries were associated with sternal and rib fractures in 48.57% of the cases. In the run-over cases, the mechanism of injury could be attributed to compression of the heart between the sternum and vertebral bodies or penetration by a fractured rib or sternum. A direct blow to the anterior chest or penetration by a fractured rib or sternum could be the cause in the remaining cases. Bright E.F and Beck C.S.,¹³ and Parmley L.F. et al¹⁴, observed that while all the four chambers of the heart are susceptible to rupture in non-penetrating trauma, ventricular ruptures are preponderant. This is

in concurrence with the present study. The findings of the present study were also comparable to the findings observed by Brathwaite C.E. et al¹⁵ except for the fact that they observed a higher right atrial involvement (40.6%). The common sites of traumatic cardiac rupture in order of diminishing frequency are: right auricle, right ventricle, left ventricle, left auricle, ventricular septum and valves¹³. The preponderance of right ventricular injury over the left in blunt trauma can be explained by the fact that the sternocostal surface of the heart is mainly formed by the right ventricle, so the major brunt of the trauma is borne by the right ventricle ultimately leading its rupture. In one (2.86%) case, laceration of the right atrium without any external injury of the chest region was seen in the present study. The laceration of the right atrium without any external injuries of the chest region signifies that serious cardiac injuries may be present in absence of any visible external injuries.

CONCLUSION

In assessing blunt cardiac trauma victims in vehicular accidents, knowledge about the commonest sites, types and degrees of injuries sustained by them is often required. Patients with cardiac rupture who reach the hospital alive can often be saved by prompt diagnosis and immediate surgical treatment. Interestingly, survival is more common with right-sided injuries, especially right atrial lacerations^{16,17}. Moreover, as most of the cardiac injuries have associated rib and sternal fractures, proper monitoring of the victims with rib and sternal fractures is desired in blunt thoracic trauma cases. The presence of fatal cardiac trauma in head on collision cases emphasizes the utility of safety belts while driving.

Ethical Clearance: Taken from the Institutional Ethical committee

Source of Funding: Self

Conflict of Interest: NIL

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