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Auricular Rupture in a Fatal Fall – A Case Report

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Abstract: ***Deaths due to fall from height can be due to injury to head and spinal cord, thoracic injuries, abdominal injuries etc. Cardiac rupture following blunt trauma to the chest is a relatively uncommon diagnosis, however it is associated with a very high mortality rate. Successful management is based on a high index of suspicion, avoidance of unnecessary diagnostic studies and immediate surgical intervention once the diagnosis is made. Of all the injuries to the heart left auricular rupture is a rarity. Hence we present such a rare case.***

Keywords: Cardiac rupture, Cardiac tamponade, Diagnosis, Fall from height.

1. Introduction

An event in which a person comes to rest inadvertently on the ground or other lower level is termed as fall. It ranks 2nd among the unintentional deaths globally. According to the World Health Organization (WHO) it amounts to 424,000 deaths worldwide annually [(1)]. According to the national crime records bureau (NCRB) in the year 2013 the deaths due to fall from height in India was 11,292 [(2)]. Deaths due to fall from height can be due to injury to head and spinal cord, thoracic injuries, abdominal injuries etc. The incidence of blunt cardiac injuries following fall accounts to 5% to 50 %. Of all the injuries to the heart left auricular rupture is a rarity. Hence we present such a rare case. Cardiac rupture following blunt trauma to the chest is a relatively uncommon diagnosis, however it is associated with a very high mortality rate [(3)]. In 1955 DesForges reported the first successful repair of cardiac rupture after blunt trauma [(4)]. In cases of cardiac rupture the mortality rate is high, and the majority of patients die within the first 30 min after trauma [(5)]. As a result of the improvement in pre hospital care and rapid transport facilities, more patients are likely to reach the hospital alive. Successful management is based on a high index of suspicion, avoidance of unnecessary diagnostic studies and immediate surgical intervention once the diagnosis is made [(6)]. Although all four heart chambers are equally susceptible to rupture or laceration, a better survival rate is associated with right- sided and atrial injuries .The lower pressure in these chambers allows a longer interval before the complications of tamponade appear [(7)]. The mechanism of blunt thoracic trauma may be due to low velocity or high velocity blunt force injuries. The low velocity blunt injuries such as blow with a club or fist may lead to soft tissue contusions with or without any internal injuries, whereas high velocity blunt force as seen in vehicular accidents may produce a wide variety of external as well as internal injuries [(8)]. It has been reported that motor vehicle accidents are the primary causes for heart rupture however here we present a case of cardiac chamber rupture due to a fall from height.

2. Case History

A 51 year old adult male, with nil premorbidities and a coconut tree farmer by profession, while climbing a coconut tree, accidentally slipped and fell from a height of around 25 feet and sustained injuries to the chest and was subsequently brought to the hospital and was declared dead on arrival. The body was subjected to postmortem examination to ascertain cause of death and rule out any intoxication.

External Examination

On external examination, there was a swelling deformity over the right side of the face associated with fracture of the right maxilla, multiple contusions over the chest, abraded contusion over the inner aspect of the thigh and outer aspect of left leg.

Internal Examination

Internal examination revealed that there was fracture of left 3rd to 5th ribs along the anterior axillary line and left 12th rib fracture along the posterior axillary line with associated intercostal muscle contusion. Para-tracheal and para-oesophageal contusion were also present. The pericardium was intact and contained 160 ml of blood. The heart weighed 280 g; a tear measuring 0.7 cm x 0.3 cm x cavity deep was present over the left auricle. All other organs were unremarkable. Routine viscera were preserved for chemical analysis and the result was negative for any intoxicative substances that are in the screening panel of the regional forensic science laboratories.

Cause of Death

Cause of death was opined as death due to complications of cardiac rupture as a result of blunt force trauma to the chest.

3. Discussion

The common sites of traumatic cardiac rupture in order of diminishing frequency are: right auricle, right ventricle, left ventricle, left auricle, ventricular septum and valves [(5)]. The incidence of heart rupture thus is relatively rare in left auricle, and in fact for the entire left section of the part as 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 to its rupture [(8)]. During fall, at the moment of impact there will be deceleration of the falling body and some amount of

energy will be transferred to the ground which will react with an equal amount against the falling body. The falling body in the form of injuries reabsorbs the lost energy. The height of fall can be correlated to site of injuries sustained. If the fall is between 0 – 20 feet the common site of injury would be to head and spinal cord wherein if the fall is between 21 – 40 feet then the common site would be thorax and abdomen [(9)], in our case the height of fall was 25 feet. The probable mechanism that could have attributed to the death of this patient could be due to the mechanical force that lead to the rupture of left auricle which resulted in hemopericardium of about 160 ml (according to Di Maio even as low as 150 ml of hemopericardium can cause tamponade), which subsequently lead to cardiac tamponade and resulted in death. The incidence of cardiac injuries involving the right side was 8 – 65 % and of that left side was 0 – 31 % [(10)].

According to American association for the surgery of trauma (AAST) the spectrum of blunt cardiac injuries can be classified briefly in to five types they are as follows [(11)].

1) Pericardial injuries
2) Valvular injuries
3) Coronary artery injury
4) Cardiac chamber rupture
5) Myocardial contusion

However a point which is noteworthy is that it has been reported that there may in fact be a cardiac or any of its constituent chamber rupture even in the absence of any significant external injury [(12)].

4. Conclusion

Clinicians must be made aware of the fact that cardiac rupture is not as rare entity as has been advocated and all patients with history of any blunt trauma to the chest with or without significant injury must be assessed with the possibility of cardiac rupture in mind. In assessing blunt cardiac trauma victims in triage area, 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 [(13)]. Another aspect that should lead to suspicion is that individuals with rib or sternal fractures as was the scenario in our case should be monitored for cardiac ruptures as they are most prone to the injury. The survival rate can be increased only by a high index of suspicion, and prompt appropriate surgical management.

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