

Sudden Death in Adolescent: A Case of Acute Myocardial Infarction in Late Second Decade

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Abstract

Blunt trauma is a rare cause of Myocardial Infarction (MI) in an individual with a pre-existing coronary heart disease leading to death. Histopathological examination becomes invaluable in identifying the cause of death in such cases. Post-mortem gross examination might be normal or shows minor insignificant findings to ascertain the cause of death.

We report a case of a 62-year-old male, with a history of physical assault, who came with multiple injuries over the body including lacerations, abrasions, and contusions. On internal examination brain was congested and multiple old infarcts over the heart were noted. We could not attribute the cause of death to any of the autopsy findings making it difficult to ascertain the cause of death. Hence the cause of death was reserved pending awaiting histopathology and RFSL reports. Later, the RFSL report was negative for all the poisons. However, the histopathology report revealed acute myocardial infarction of the right ventricle (Estimated time 4-12 hours) confirming the cause of death. This case highlights trauma as the cause of Myocardial Infarction and one should keep in mind, MI as a cause while ascertaining the cause of death in cases following physical or emotional assaults or accidents.

Keywords: Myocardial Infarction; Trauma; Physical assault, psychological effects

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Introduction:

Blunt force trauma is a common health problem. Cardiac injury is a common complication after a blunt force trauma to the chest. However, myocardial infarction (MI) secondary to blunt force trauma is extremely rare yet has catastrophic effects. However, MI following blunt force impact to the head is rarest. Here, we report a case of acute myocardial infarction, following blunt force trauma to the head associated with emotional stress.

Case report

A 62-year-old male was brought dead to the mortuary with a history of physical assault.

The case was registered under section 302 of IPC. He was last seen at 07: 00 am by the family members and was found dead in a restraint position at 11:40 pm on the same day (Fig 1).

On post-mortem examination, he was moderately built and nourished, wheatish to dark in complexion. The body was cold and stiff all over. Post-mortem lividity was fixed. Conjunctivae of both the eyes were congested. There were trivial injuries over the head like split lacerations four in number, varying in depth from subcutaneous tissue deep to bone deep. On internal examination, the brain was congested and oedematous and all the internal organs were congested. No past history of cardiac complications. There was 10% luminal narrowing of the left circumflex and left anterior descending arteries and all the coronaries were gritty on the cut section. Multiple atheromatous

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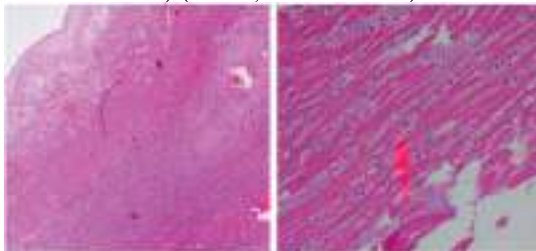
plaques were present over the aortic intima at several places. There were no gross findings at the autopsy suggestive of the cause of death.

Fig 1. Showing the restraint position of the victim.



Lung, liver, kidney, and entire heart were sent for histopathological examination to ascertain the possible cause of death. The histopathological examination revealed a zone of infarction of cardiac fibers with neutrophilic infiltrates of the right ventricular muscle suggestive of acute MI with an estimated time of 4-12 hours duration as shown in Figure 2.

Fig 2. A zone of infarction of cardiac fibers with neutrophilic infiltration; Acute myocardial infarction of right ventricle (Est time 4-12 hrs) (H&E, 10X & 40X)



Discussion

In forensic casework, physical/ emotional stress provoked by the criminal activity of another person is sometimes referred to as "Homicide by heart attack".¹ Experiencing trauma causes the body to produce adrenaline and cortisol, activating normal protective processes of the *fight*,

flight, or *freeze*. Unresolved traumatic experiences can stimulate these responses even in non-threatening situations. Severe stress activates the sympathetic nervous system causing tachycardia and increased workload on the heart that may already be having a compromised blood supply due to atherosclerotic plaques. A myocardial infarction occurs when there is a blockage in one of the arteries that supply oxygenated blood to the heart muscle. It is well recognized that in certain cases, emotionally stressful events, and more specifically, episodes of anger, immediately precede and appear to trigger the onset of acute myocardial infarction. Albeit rarer, there are cases of MI causing death after a blunt force trauma to the chest.^{2,3} In addition, mental trauma can lead to the paradoxical vasoconstriction of already diseased coronary arteries by further damaging the endothelium of the artery and increasing myocardial ischemia.⁴ However, to our knowledge, there has been not a single case report of a head injury causing an acute MI leading to death. The possible mechanisms of a head injury causing MI could be severe internal or external bleeding leading to hypoperfusion, extreme pain due to the injuries causing sympathetic activation, or emotional trauma due to the incident.

In our case, the probable reason for MI would be due to emotional trauma as there was no significant internal or external bleeding and the head injury was caused by a physical assault after tying him up. The case also highlights the importance of histopathology in identifying the cause of death, especially when the dead body is brought for autopsy early. The gross examination of the heart shows evidence of infarction only after approximately 4 hours, which leads to an obscure autopsy. Hence one needs to be careful and look out for causes such as MI in appropriate clinical contexts and send for histopathology examination in all autopsies wherever necessary if sufficient time has passed after the incident.

This case report describes a rare, yet catastrophic, a complication of blunt force trauma and distress. In such cases, the entity trauma leading to disease (Myocardial infarction) can be considered. Hence, a cardiac examination is vital even in absence of morphological findings as seen in our case. Awareness of this complication in cases of physical or emotional assault is essential for proper monitoring and treatment for clinicians and also important for forensic pathologists for ascertaining the cause of death. In criminal cases, medical conclusions are based on a reasonable degree of certainty- A doctor as an expert witness in a court of law is expected to deliver an opinion beyond any reasonable doubt. An autopsy surgeon's opinion is based on the highest level of probability. A medical opinion is based on the facts and findings, as they are available at the time of making a medico-legal opinion.⁵

Conclusion

Myocardial infarction is a rare cause of death due to physical and emotional trauma and histopathology examination is crucial in identifying the cause of death in certain circumstances. In presence of trivial

injuries, the assertion regarding the cause of death poses a difficulty to forensic pathologists. In such cases, the entity trauma leading to death must be considered.

References

1. Turner SA, Barnard JJ, Spotswood SD, Prahlow JA. "Homicide by heart attack" revisited. *J Forensic Sci.* 2004 May;49(3):598–600.
2. *Medicine (Baltimore)*. 2019 Jan; 98(4): e14103. Published online 2019 Jan 25. doi: 10.1097/MD.00000000000014103.
3. Kumar S, Bansal YS, Mehta N, Nada R, Girdhar P, Vishwajeet V. Blunt-chest-trauma-induced acute myocardial infarction. *Autopsy Case Rep.* 2021;11:e2021263.
4. Nedić D, Pilija V. Cardiac death after extreme physical and mental trauma—case report. *Egypt J Forensic Sci.* 2019 May 28;9(1):27.
5. Guharaj P, K Gupta S. *Forensic Medicine, and Toxicology*. 3rd ed. Hyderabad: Universities Press (India) Private Limited; 2019.