

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

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### Abstract

**Introduction:** Although myocardial infarction (MI) mainly occurs in patients older than 45, young men or women can suffer MI. Fortunately, its incidence is not common in patients younger than 45 years. However, the disease carries a significant morbidity, psychological effects, and financial constraints for the person and the family when it occurs at a young age. The causes of MI among patients aged less than 45 can be divided into four groups: (1) atheromatous coronary artery disease; (2) non-atheromatous coronary artery disease; (3) hyper-coagulable states; (4) MI related to substance misuse. There is a considerable overlap between all the groups.

**Case details:** An 18-year-old male was brought for the postmortem with no discrete signs of death. On further examination of cranium, spine and thorax, larynx, trachea, lungs, pericardium, heart, large vessels, abdomen and gastrointestinal tract examination, and genito-urinary examination and further histo-pathological studies revealed no relevant findings. The only relevant finding was the detection of acute myocardial infarction. The viscera were preserved to rule out associated poisoning.

**Discussion:** The occurrence of myocardial infarction in second decade of life is very uncommon adding to the fact of no prior addictions for tobacco, alcohol, or other abusive drugs and absence of any other risk factors. The onset was sudden and not expected which makes this case noticeable.

**Keywords:** Myocardial Infarction, young men, morbidity, psychological effects

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### Introduction:

Sudden deaths due to various causes are not uncommon in the world. As per WHO according to the International classification of diseases, version 10 (ICD-10) the sudden death is death, non-violent and not otherwise explained, occurring less than 24 hours from the onset of symptoms.<sup>1</sup> The cardiovascular causes amount to 45-50% for these sudden deaths<sup>5</sup>, and the mortality is roughly estimated to be about 7-lakh annually, in

India.<sup>6</sup> Though the old age is one of the risk factors for sudden cardiac deaths, these are rare but prevalent in any age group.<sup>7-12</sup>

ST-elevation myocardial infarction (STEMI) in very young patients is an uncommon entity but with significant clinical meaning for the patient.<sup>2</sup> The causes of MI among patients aged less than 45 can be divided into four groups: (A) atheromatous coronary artery disease; (B) non-atheromatous coronary artery disease; (C) hyper-coagulable states; (D) MI related to substance misuse.<sup>3</sup> There is a considerable overlap between all the groups. This article reviews the unexpected case of a patient with acute myocardial infarction in second decade of life.

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Received on 27.08.2021

Accepted on 12.10.2021

### Case details

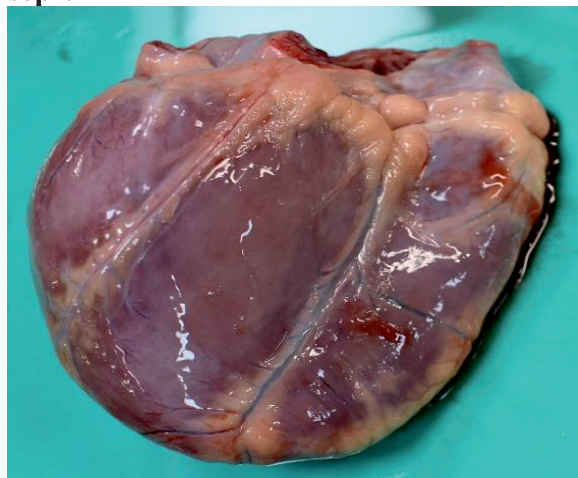
An 18-year-old male was brought to the post-mortem with no discrete signs of death. His history involved information of being collapsed following uneasiness. When brought to the hospital he was declared 'bought dead'. On further examination at autopsy it was found to be Acute Myocardial Infarction (AMI) with normal coronary arteries and time 12-24 hr. The viscera were preserved to rule out any history of poisoning.

External findings showed a whitish to dark complexed, cold and stiff male with non-fixed post mortem lividity over back and bilaterally congested conjunctiva and intact external orifices.

Thorax had all the structure including walls, ribs and cartilages, right and left pleura, larynx and trachea, inferior vena cava to be intact and unremarkable. Both the lungs were soft. The airways were intact. Trachea was congested. The remarkable findings include fatty streaks over aortic intima at places in aorta.

Findings in heart weighing 280 g with intact and competent valves included multiple white patches of varying sizes (from 2 X 1 cm to 1 X 0.5 cm) seen over the front right ventricle, interventricular septum and the front of left ventricle (fig.1)

**Figure 1: Multiple white patches seen over right ventricle and interventricular septum**



Investigations of lungs, liver, kidney, and pancreas were negative. Spleen had suggestive features of hypersplenism; heart revealed Acute Myocardial Infarction of 12-24 hr. Blood results showed increased cardiac markers - CK: 4235 U/L (normal: 20-200 U/L), CK-MB: >300 ng/ml (normal: 0.6-6.3 ng/ml), Troponin-T: 6.290 ng/ml (normal: up to 0.020 ng/ml), Serum amylase: 403 U/L (normal: 28-100 U/L) and Serum lipase: 40.5 U/L (13-60 U/L).

Viscera and body fluids which examined for poisoning included entire stomach and its contents, proximal 30 cm of small intestine with its contents, 500 g of liver with gall bladder, half of each kidney, 10ml of blood and sample preservative; all leading to case negative of poisoning.

The cause of death of the deceased was given as "Acute Myocardial Infarction".

### Discussion

Substance misuse, coronary artery anomalies, premature coronary artery disease, and hypercoagulable state have to be considered in all patients with suspected MI who are less than 45 years.<sup>4</sup> Smoking, hypertension, low HDL and high triglycerides are the major risk factors.<sup>3</sup> The occurrence of myocardial in second decade of life is very uncommon. Adding to the fact that there were no prior addictions for tobacco, alcohol, any other abusive drugs which are supposed to add up to the onset of cardiopathies like myocardial infarction. The onset was sudden and unexpected making this case noticeable. In a study done in the Nigeria, 22 year old male was reported to be died due to MI.<sup>13</sup>

In the absence of coronary artery obstruction, which is the most common cause of myocardial infarction, this case can be classified as Myocardial Infarction with Non-Obstructive Coronary Arteries (MINOCA). Various potential underlying mechanisms have been described including coronary artery spasm, spontaneous coronary thrombosis/emboli, coronary microvascular dysfunction, plaque disruption, and coronary

dissection; or other myocardial disorders such as myocarditis, takotsubo cardiomyopathy, and other cardiomyopathies; and non-cardiac causes, for example, pulmonary embolism<sup>14</sup>.

Incidence of MI are increasing in both men and women at young age. In a study done by Arora et al, showed that the incidence of MI has increased from the period between 1995 and 2014 in women aged 35–54 years old.<sup>15</sup> These young patients diagnosed with MI will not experience pain prior to the event as evident in a study by a study.<sup>16</sup>

### Conclusion

Cases of sudden death in adolescents and young adults are on the rise and myocardial infarction should be considered as a potential diagnosis when given the history of chest pain prior to death.<sup>17</sup> It is a challenge to diagnose AMI histo-pathologically if the time interval between the onset and death is narrow. Hence, forensic pathologists must keep in mind the various pathophysiological processes involved including non-atherosclerotic causes, before giving cause of death, as in young age it most frequently differs from routine conventional cases.

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