

Stress Induced Takotsubo Cardiomyopathy Following Blunt Trauma: A Diagnostic Challenge in a Young Female

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Keywords: Takotsubo cardiomyopathy, Heart failure, Apical hypokinesia, Trauma.

INTRODUCTION

Takotsubo cardiomyopathy (TC), also known as stress-induced cardiomyopathy or “broken heart syndrome,” is a transient cardiac condition characterised by left ventricular apical ballooning¹⁻³. It clinically mimics acute coronary syndrome (ACS), presenting with similar symptoms and electrocardiographic changes, yet without significant obstructive coronary artery disease on angiography⁴. While emotional stress is the predominant trigger, physical stressors, including trauma, can also precipitate TC, albeit in a minuscule proportion of cases - approximately 0.001%⁵. The condition is most frequently observed in elderly females, particularly in the context of emotional or physical stress, though trauma-induced TC in males often presents with more severe manifestations requiring intensive care, including mechanical ventilation⁵.

Among trauma-induced cases, extremity injuries are the most common, followed by head injuries.¹ Blunt trauma is the predominant mechanism, with penetrating trauma being less frequent². The clinical overlap between TC and ACS extends to biochemical markers, with both conditions showing elevated cardiac enzymes and similar electrocardiographic changes, such as ST-segment elevation and T-wave inversions¹. This overlap poses significant diagnostic challenges in clinical practice. Therefore, a high degree of clinical suspicion, combined with the use of diagnostic adjuncts such as echocardiography, and criteria like the Mayo Clinic or International Takotsubo Diagnostic Criteria, is crucial for accurate diagnosis.

The pathophysiology of TC remains incompletely understood but is hypothesized to involve a combination of sympathetic overdrive, microvascular dysfunction, and trauma-induced metabolic disturbances affecting the myocardium and coronary microcirculation^{4,5}. Despite its acute and often dramatic presentation, TC is generally a reversible condition with a favourable prognosis, typically resolving spontaneously over days to weeks^{2,5,6}. However, the mortality risk associated with TC is comparable to that of ACS, making prompt recognition and supportive management essential.

CASE PRESENTATION

A 43-year-old previously healthy female presented to the emergency department following an assault involving multiple blunt injuries inflicted by a wooden pole, impacting her head, abdomen, and posterior aspect of the left elbow. She sustained active bleeding from the laceration on the posterior elbow. The patient was conscious, able to recall the incident, and denied any loss of consciousness, worsening headaches, shortness of breath, haematuria, or incontinence following the injury.

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Upon admission, the patient was hemodynamically stable, with an unremarkable primary survey including stable vital signs, a negative e-FAST scan, and normal X-rays of the cervical spine and pelvis. Secondary evaluation included a non-contrast CT of the head and cervical spine, which showed no acute injuries, and a normal X-ray of the left elbow joint. Physical examination revealed a stable patient with a Glasgow Coma Scale (GCS) score of 15/15. The only notable injury was a laceration on the posterior elbow; no other significant injuries were detected.

On the first day of hospitalization, the patient experienced sudden onset of severe bradycardia (32 beats per minute) and hypotension (80/40 mmHg). Initial management for

suspected hypovolemic shock included fluid resuscitation, which failed to improve her condition. Repeated e-FAST scan was unremarkable and failed to demonstrate any evidences of bleeding to support hypovolemic shock. Despite administration of atropine and adrenaline, followed by noradrenaline infusion for suspected neurogenic shock, the patient remained unresponsive to treatment.

Further evaluation with an electrocardiogram (ECG) revealed a first-degree heart block, and high-sensitivity Troponin I levels were elevated at 1767 ng/L. Given these findings, the patient was transferred to the intensive coronary care unit (ICCU) for specialized care after liaising with the cardiology team. A 2-D echocardiogram

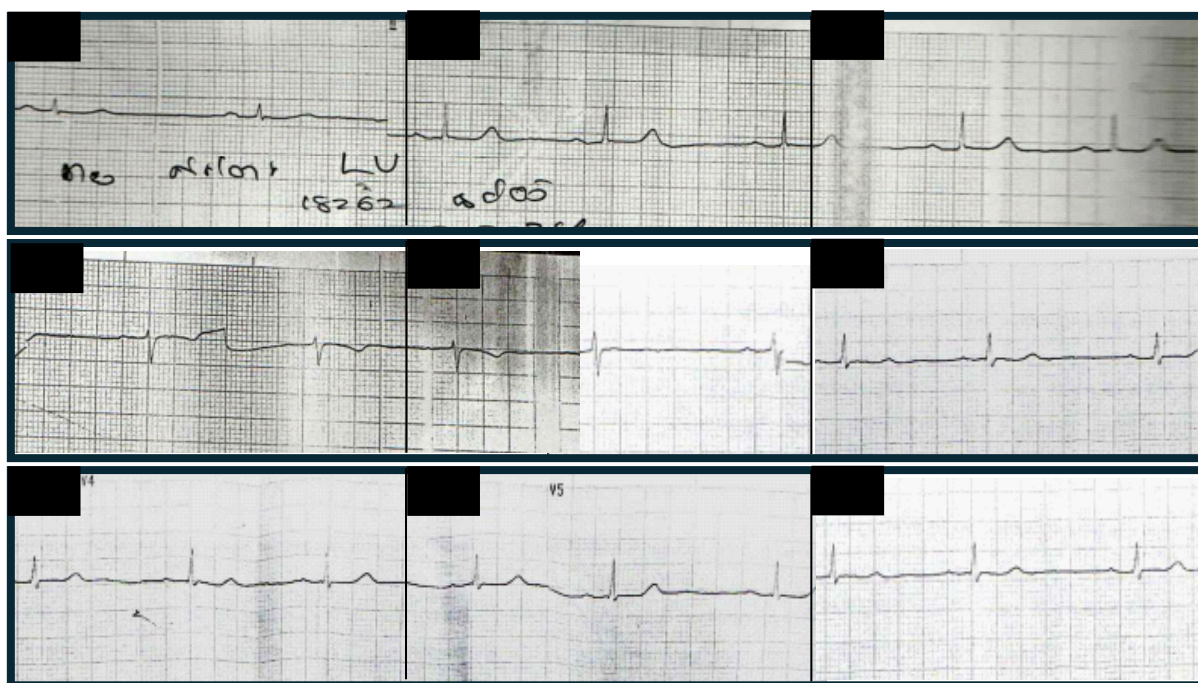


Figure 1. ECG Showing first degree heart block in 25mm/second ECG strip

performed in the ICCU demonstrated global hypokinesia of the apical region, with preserved basal contractility and an ejection fraction of 30-35%, leading to a diagnosis of TC. The patient was managed symptomatically for heart failure and discharged with a plan for follow-up echocardiography in two weeks to assess the resolution of the cardiomyopathy.

DISCUSSION

Takotsubo cardiomyopathy (TC) is traditionally associated with emotional stressors, but this case highlights the occurrence of TC following physical trauma, which is exceedingly rare. The patient's presentation of hypotension and bradycardia, unresponsive to standard resuscitation

and vasopressor therapy, underscores the importance of considering TC in the differential diagnosis, especially when initial workup does not reveal overt traumatic injuries that could explain the cardiovascular instability.

The diagnostic process in this case was particularly challenging due to the overlapping features of TC with other conditions commonly encountered in trauma patients, such as acute coronary syndrome (ACS) and neurogenic shock. The elevated troponin levels and first-degree heart block on ECG could have easily been attributed to ACS or direct cardiac trauma. However, the absence of significant coronary artery disease on further cardiac evaluation and the characteristic echocardiographic findings of apical

ballooning with basal sparing were key in establishing the diagnosis of TC.

This case also underscores the need for a multidisciplinary approach involving trauma surgeons, cardiologists, and critical care specialists to optimize the care of trauma patients with suspected TC. Early identification and differentiation of TC from other causes of shock in trauma are crucial for appropriate management. The typical treatment strategy for TC is largely supportive, focusing on stabilizing the patient while allowing for the spontaneous resolution of myocardial dysfunction.

Despite its reversible nature, TC carries a significant risk of complications, including cardiogenic shock, arrhythmias, and in rare cases, death. Therefore, prompt recognition and management are vital to improving patient outcomes. This case serves as a reminder to clinicians to maintain a high index of suspicion for TC in trauma patients presenting with atypical cardiovascular symptoms, ensuring timely diagnosis and intervention.

CONCLUSION

Takotsubo cardiomyopathy is a rare but potentially life-threatening complication of physical trauma that can mimic acute coronary syndrome or neurogenic shock, posing significant diagnostic challenges. This case illustrates the importance of meticulous clinical suspicion, particularly in trauma patients with unexplained cardiovascular instability. Early recognition and appropriate management of TC are essential, as the condition, though reversible, carries a significant mortality risk. Symptomatic

management, with careful monitoring and supportive care, remains the cornerstone of treatment until spontaneous recovery occurs.

Abbreviations

TC: Takotsubo cardiomyopathy; ICCU: Intensive coronary care unit, ECG; electrocardiogram, CT; computed tomography

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Cite this article: Jayasooriya HK, Abeysinghe AHMGB, Abeysinghe AHMCD, *et al.* Stress Induced Takotsubo Cardiomyopathy Following Blunt Trauma: A Diagnostic Challenge in a Young Female. *International Journal of Research in Medical and Clinical Sciences.* 2024;2(2): 43-45.

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