



Takotsubo Cardiomyopathy Following Physical Assault: A Medico-Legal Case Report

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(Received: 27 September 2025 Revised: 05 October 2025 Accepted: 01 November 2025)

KEYWORDS

Forensic medicine, Takotsubo syndrome, Forensic medical expertise, Medical causality, Permanent disability.

ABSTRACT:

Introduction:

Takotsubo syndrome accounts for 1 to 3% of acute coronary syndromes. It mainly affects women aged 67 to 70, who are ten times more likely to develop it than men. Diagnosis remains difficult due to its similarity to acute coronary syndrome. We report the case of a young man who presented with precordial trauma, followed by the subsequent development of Takotsubo syndrome.

Objectives:

The objective of this study is to highlight the challenge of establishing a causal link between the initial trauma and Takotsubo syndrome, particularly when several factors may contribute to this pathological condition. A forensic medical expertise was conducted to establish the causal link between the initial trauma and this syndrome and to determine whether the functional impact was temporary or permanent.

Case report:

This rare case reports a young man who was attacked with a screwdriver and admitted to the medical-surgical emergency department in Sidi Bel Abbès (Algeria) with a left anterior chest wound complicated by hemorrhagic shock. Thoracotomy revealed a left atrial wound and hemopericardium. Two weeks after admission, the patient presented with chest pain associated with electrocardiogram abnormalities suggestive of Takotsubo syndrome. A coronary CT scan was normal and confirmed this diagnosis.

Conclusions:

This case highlights the challenge of establishing causality, particularly when several factors may contribute to this pathological condition, as well as the difficulty of determining whether the functional impact is permanent or temporary.

1. Introduction

Tako-Tsubo syndrome, also known as stress cardiomyopathy, accounts for 1 to 3% of acute coronary events [1], with patients averaging between 67 and 70 years of age and a risk ratio greater than 10 compared to men [2]. This syndrome is often transient and is characterized by left ventricular dysfunction [3], but its diagnosis remains difficult due to its close resemblance to acute coronary syndrome, its main differential diagnosis [4].

We report a rare case of a young man who was physically assaulted with a sharp instrument (screwdriver). He was admitted to the medical-surgical emergency department of the public hospital in Sidi Bel Abbès (Algeria) for treatment of a wound to the precordial region resulting in cardiac injury with hemopericardium. Following surgical treatment, the patient presented symptoms suggestive of acute coronary syndrome. Takotsubo syndrome was confirmed by a normal coronary CT scan. The fact that Takotsubo syndrome mainly affects older women makes its occurrence in a young man particularly rare [2-5].



2. Objectives

The objective of this study is to highlight the challenge of establishing a causal link between the initial trauma and Takotsubo syndrome, particularly when several factors may contribute to this pathological condition [6-7]. It also highlights the difficulty of determining whether the functional impact observed is permanent or transient, while taking into account the medico-legal implications in this atypical case.

3. Case report

Mr. TA, a 28-year-old single man, delivery driver by profession, with no particular medical history. He was allegedly physically assaulted on September 2, 2023, at 7:00 a.m. while making a delivery, when he accidentally collided with a vehicle that was reversing. The driver of the vehicle that was hit allegedly got out and struck the victim in the chest, near the heart, with a screwdriver. The assailant allegedly behaved aggressively at the scene of the incident, making the situation more serious.

Following the attack, the victim reportedly went to the nearest police station, where emergency services were called. He was transported by firefighters to the public hospital in Sidi Bel Abbès (Algeria). He was hospitalized there for a period of fifteen days and underwent emergency surgery.

He was then transferred to the cardiology department at Sidi Bel Abbès University Hospital (Algeria) for persistent chest pain, where he was hospitalized for four more days for further investigation. The patient left the hospital with medical treatment and a follow-up appointment.

Diagnostic approach

Upon admission to the medical-surgical emergency department, the patient presented with a penetrating wound to the left anterior chest with signs of hemorrhagic shock and tamponade. Initial assessment revealed:

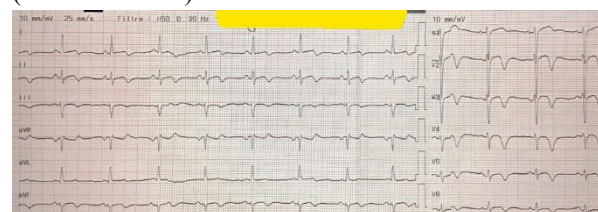
- A contused laceration on the left anterior hemithorax opposite the fourth left parasternal intercostal space, requiring surgical repair.
- Two superficial wounds on the neck (left side) and left shoulder.

An emergency chest scan revealed a hemopericardium. A left anterior thoracotomy was performed, revealing a left atrial cardiac wound associated with a hemopericardium. Surgical management included: aspiration of pericardial blood, suturing of the cardiac wound, and placement of three pericardial and chest drains. Surgical exploration revealed no damage to the coronary network.

Fifteen days later, on September 17, 2023, the patient presented with acute constrictive retrosternal chest pain without radiation. Given this clinical picture, the patient underwent a 12-lead electrocardiogram (ECG), which showed electrocardiographic changes typical of negative T waves in the circumferential leads (V2 to V6, D1, AVL, D2, D3, and AVF) (Figure 1) suggestive of acute coronary syndrome, leading to his transfer to the cardiology department of the Sidi Bel Abbès University Hospital (Algeria) for specialized care.

At this point, another ECG was performed, showing the same electrocardiographic findings. Laboratory tests showed a strongly positive initial troponin level. The patient received a loading dose of clopidogrel and aspirin with a curative dose of subcutaneous anticoagulant. An ECG was repeated the next day. It showed the same electrocardiographic abnormalities.

Figure 1: An electrocardiogram showing negative T waves in the extended anterior and inferior leads (circumferential).



The echocardiogram performed showed hypokinesia mainly in the apical segments with good mid-basal contractility and a moderately reduced left ventricular ejection fraction (LVEF) of 43% (Figure 2).

The patient underwent a coronary CT scan, which was normal, ruling out not only the possibility of acute coronary syndrome, but also confirming the integrity of the coronary network and excluding any obstructive lesions or vascular abnormalities, thus confirming the diagnosis of Takotsubo syndrome. A follow-up echocardiogram performed one week later showed



improvement in contractility and LVEF: 65%. These clinical observations highlight the complexity of the clinical picture: chest trauma, persistent dyspnea, and the absence of coronary lesions or vascular abnormalities.

Forensic medical expertise

In accordance with the expert commission order issued by the investigating judge of the court of Sidi Bel Abbès (Algeria) on November 14, 2023, a forensic medical examination was carried out. The objective was to assess:

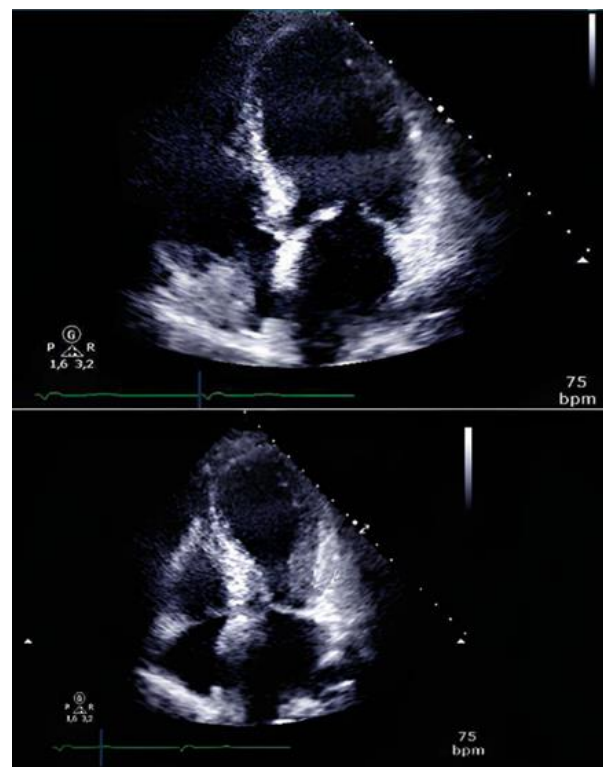
- The injuries and harm suffered by the victim.
- The various disabilities caused by the assault.
- The existence of permanent or temporary functional repercussions related to the assault.

The patient complained of chest pain that worsened when walking and pain in the left upper limb, particularly during sleep. Physical examination of the precordial region revealed:

- Three pinkish scars (2 cm each), located on the left anterior axillary line (opposite the 4th and 5th intercostal spaces) and left supra-mammary line (opposite the 4th intercostal space, mid-clavicular line).
- A pinkish scar (2 cm), left parasternal (opposite the 6th intercostal space).
- A pinkish surgical scar (15 cm), extending from the xiphoid process to the left anterior axillary line (at the level of the 5th intercostal space).

Examination of other areas of the body revealed multiple whitish dermabrasion scars (1 cm each) on the left side of the neck, left shoulder, abdomen (left paraumbilical region), and left hip. No signs of cardiac or respiratory failure were observed during the clinical examination. However, the patient presented persistent clinical signs such as chest pain with dyspnea suggestive of coronary syndrome, as well as pain at the site of the wounds and surgical incisions, despite normalization of LVEF to 65%.

Figure 2: An echocardiographic view of the four chambers showing segmental kinetic disturbance affecting the apical segments.



This situation calls for close monitoring. Additional tests have been requested, such as a stress test and even cardiac magnetic resonance imaging (MRI) to detect any underlying functional or microvascular abnormalities.

Clinical data led to the conclusion that there is currently functional impairment, although the lack of conclusive evidence regarding the permanent nature of this impact was highlighted.

4. Discussion

Takotsubo syndrome, although rare in young men, should be considered in cases of post-traumatic chest pain resembling coronary syndrome, particularly when coronary examinations reveal no abnormalities [1]. The differential diagnosis with acute coronary syndrome is based mainly on the absence of coronary artery disease confirmed by coronary angiography [2], as observed in this case.

According to international consensus recommendations, early diagnosis of this syndrome is essential in order to adapt treatment and avoid unnecessary interventions [3].

Causal link between trauma and Takotsubo syndrome



Establishing a direct causal link between the initial trauma and stress cardiomyopathy is difficult due to several pathophysiological factors involved [4]. These factors include:

- Activation of the sympathetic nervous system: physical trauma causes intense stress, leading to the massive release of catecholamines, which are known for their myocardial toxicity (acute heart failure, Prinzmetal angina, etc.).
- Vascular microlesions may be secondary to stress or surgical manipulation and may cause transient myocardial dysfunction.
- An inflammatory reaction triggered by trauma and surgery may cause a systemic inflammatory response leading to impaired cardiac function [4].

In this context, medico-legal expertise must implement valuable elements to establish accountability [5]:

- Assessment of the time between the trauma and the onset of symptoms [5].
- Absence of any previous conditions, such as a history of cardiovascular disease [5].
- Consistency between imaging findings and the reported trauma [6].

In this case, the causal link between the assault and Takotsubo syndrome was established by taking into account the time lag between the assault and the onset of symptoms, the patient's prior health, and scientific plausibility.

Assessment of whether the functional impact is permanent or temporary

Although Takotsubo syndrome is often transient [7], persistent chest pain and functional abnormalities raise questions about permanent disability. Studies indicate that some patients may experience persistent symptoms or residual functional disorders even beyond the acute phase [8]. This situation also has social implications, as demonstrated by research found in the literature, which indicates long-term psychosocial and economic repercussions [9]. In this case, the socioeconomic impact leads to a temporary limitation of professional activities with significant psychological repercussions.

In Algeria, assessing whether functional impairment is permanent or temporary is particularly important in a medico-legal context, especially when determining

whether it constitutes a permanent disability [10]. This assessment is important because, according to the Algerian Penal Code, a permanent disability constitutes an aggravating circumstance in cases of intentional violence, in accordance with Articles 264 and 266 of the Penal Code [11]. And since the temporary or permanent nature of this cardiomyopathy has not yet been established, it is impossible to classify the disability as permanent.

The limitations of medico-legal assessment and judicial implications

This case demonstrates the importance of forensic expertise in guiding judicial decisions. In this context, establishing causality is essential in determining whether the consequences of the assault should be classified as violence resulting in temporary functional impairment or permanent disability. Meilia et al. (2020) indicate that for complex multifactorial cases, it is important to adopt a methodical approach, taking into account each pathological element in order to reach relevant conclusions based on scientific data, particularly in a context where the available elements could lead to multiple and contradictory hypotheses [12].

In our case, in the absence of certainty regarding the permanent nature of the functional impact currently observable, a cautious approach is required, consisting of long-term medical follow-up with periodic reassessment of the sequelae. This case also highlights the need to clearly define the concept of disability within the Algerian legal framework in order to better respond to complex medico-legal issues, and reveals the need for collaboration between doctors and magistrates to ensure fair justice that is adapted to current scientific data.

5. Conclusion

This case report highlights the difficulty of forensic evaluation of a victim presenting with Takotsubo syndrome following physical assault, an atypical form of this disease often observed in elderly women.

Assessing the causal link with the initial trauma remains difficult because many pathophysiological mechanisms are involved. From a legal standpoint, it is important to determine whether the impact is temporary or permanent. This will enable the facts to be legally classified, which was not possible at the time of the expertise due to the unpredictable evolution of the clinical condition.



This case also highlights the importance of close collaboration between experts and the justice system in order to achieve a balanced assessment. Medical follow-up is necessary to better assess its medico-legal and socio-economic impact.

Conflict of interest

The authors declare that they have no conflicts of interest.

Sources of funding

The authors received no financial support for the research, writing, or publication of this article.

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