

# Assault-induced Takotsubo cardiomyopathy associated with persisting anterograde amnesia and myopathy

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**Abstract** Takotsubo cardiomyopathy is characterized by transient left ventricular dysfunction, electrocardiographic changes, and minimal release of myocardial enzymes that mimic acute myocardial infarction in patients without coronary artery disease. Takotsubo cardiomyopathy is frequently triggered by emotional or physical stress and occurs primarily in post-menopausal women. The pathomechanism of Takotsubo cardiomyopathy is, so far, unknown. Stress-induced amnesia is probably induced by perturbation of the hippocampal function. Assault-induced Takotsubo cardiomyopathy associated with amnesia has not been reported so far. In a 77-year-old Caucasian female, hospitalized because of confusion, anterograde amnesia, and hypertension after she had been assaulted by a female who sneaked up to her when she was unlocking the door of

her apartment, Takotsubo cardiomyopathy was diagnosed based on clinical findings, electrocardiography, echocardiography, and coronary angiography. Follow-up after 8 weeks showed a regression of electrocardiographic and echocardiographic abnormalities; the amnesia for the assault, however, remained unchanged. This case shows that Takotsubo cardiomyopathy may be triggered by emotional stress induced during an assault. Assault-induced stress may not only induce Takotsubo cardiomyopathy but also amnesia for some of the events that occurred during the act.

**Keywords** Amnesia · Myocardial infarction · Emotional stress · Burglary · Metabolic myopathy

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## Introduction

Takotsubo cardiomyopathy (TTC) refers to the morphological features of the left ventricle which resemble the Japanese Takotsubo, which means a “fishing pot for trapping octopuses”. TTC is characterized by transient left ventricular dysfunction, electrocardiographic changes, and minimal release of myocardial enzymes that mimic acute myocardial infarction in patients without coronary artery disease [1]. TTC is frequently triggered by emotional or physical stress and occurs primarily in post-menopausal women. Assault-induced TTC associated with amnesia has not been reported so far.

## Case report

A 77-year-old Caucasian female was hospitalized because of confusion, anterograde amnesia and hypertension after

she had been assaulted by a female who sneaked up to her when she was unlocking the door of her apartment. The burglar held her mouth and, after she had given her a bank note, ran away. The patient became extremely agitated, and after her relatives and neighbors were alarmed and the police came she was admitted to the hospital. She had a history of hepatitis B, bilateral macular degeneration, two episodes of unexplained syncope 4 years earlier, right-sided amaurosis fugax 5 years earlier, recurrent muscle cramps, and arterial hypertension since 10 years which was well controlled with bisoprolol, ramipril, and hydrochlorothiazide. A similar episode with amnesia lasting for 1 week had occurred earlier when her husband had died 4 years ago; however, no cardiac examinations have been performed at that time.

At admission, she did not complain of chest pain; however, troponin T was positive, creatin-phosphokinase was elevated up to 203 U/l (normal, <144 U/L), and the ECG showed initially ST elevations in V<sub>3</sub> and V<sub>4</sub> and negative T waves in V<sub>2</sub> to V<sub>6</sub> thereafter. Echocardiography at admission showed hypokinesia of the midseptal and apical left ventricular regions. Coronary angiography showed only minimal signs of coronary sclerosis. Cardiac magnetic resonance imaging, performed 11 days after the event, showed no myocardial scar but a slightly reduced left ventricular function. Neurologic and psychiatric investigation revealed bilateral ptosis, reduced Achilles tendon reflexes, and anterograde amnesia for most of the assault and for the subsequent 24 h. As amnesia persisted for the following days, the initial hypothesis of transient global amnesia was abandoned and dissociative amnesia was assumed although it was not like usually in conversive amnesia partial or selective but generalized and covered a time period of 16–24 h. Interestingly, signs of fugue had also not been present during this period; moreover, the patient had participated normally in police investigation after the assault and had followed all instructions during medical care within the first hours in the hospital. Cerebral magnetic resonance imaging showed leucaraiosis and multiple non-specific spots in the white matter. She was dismissed with a medication of ramipril 5 mg, hydrochlorothiazid 25 mg, simvastatin 20 mg, bisoprolol 5 mg, and alprazolam 1 mg.

Follow-up echocardiography after 5 weeks showed a normal systolic function and no wall motion abnormalities. Eight weeks after the event, the amnesia for the assault was still present and she was anxious and required psychologic and psychiatric therapy. Three months after the event, the patient had developed symptoms basically fulfilling the diagnosis of a post-traumatic stress disorder whereby flashback in her case were reduced to reliving the feeling of anxiousness triggered by the information that foreigners had been seen in the building she lives in. Amnesia was unchanged to former investigations. Psychiatric medication

had initially consisted of benzodiazepines on demand, and after the confirmed development of post-traumatic stress disorder antidepressant medication with mirtazapine 30 mg/d has been started.

## Discussion

The most probable explanation for the patient's cardiac and psychiatric disorder is assault-induced emotional stress. It

**Table 1** Emotional triggers of Takotsubo cardiomyopathy (listed is only the first description in the literature)

Anger/frustration/financial or employment problems	
Business failure with loss of life savings	[4]
Losing money in casino	[5]
Loss of life savings	[4]
Frustration regarding work environment	[4]
Interpersonal conflict	
Quarreling	[6]
Meeting involving a sexual harassment case	[7]
Lengthy divorce	[4]
Severe depression	[8]
Upsetting telephone call	[9]
Relocation of permanent residence	[4]
Grief/loss	
Spouse leaving for war	[5]
Death/funeral of family member	[6]
Anniversary of son's death	[4]
Sense of loss after retiring from occupation	[4]
Panic/fear/anxiety	
Acute psychoses	[6]
Diagnosis of cancer	[10]
Excessive alcohol consumption	[6]
Insomnia	[11]
Legal proceedings	[5]
Medical examination	[12]
Near drowning	[6]
Panic attacks	[6]
Patient's dog caught in a raccoon trap	[5]
Public presentation	[6]
Traveling	[12]
Fall outdoors with fear freezing to death	[4]
Flat tire in a remote road without cell phone	[4]
Fall at home with fear of not being found	[4]
Hurricane	[13]
Earthquake	[14]
Son's departure for holidays	[15]
Hospital discharge	[16]
Official letter	[17]
Dinner invitation	[17]

has been known for many years that the psychological stress of a burglary can precipitate a major health crisis in elderly patients, necessitating urgent admission to a hospital [2]. TTC, induced by emotional or physical stress, has been a well-acknowledged acute cardiac problem with considerable morbidity and mortality due to arrhythmia, cardiogenic shock, and ventricular rupture [1, 3]. Differential diagnoses for TTC like pheochromocytoma or myocarditis have been excluded in our patient based on clinical findings [1]. A variety of emotional stressors have been reported, as listed in Table 1; however, assault as precipitating stressor of TTC has not been reported so far.

The pathomechanism of TTC remains unclear. Abnormal catecholamine dynamics related to emotional stress and reduction of estrogen levels following menopause seem to play a role [1, 18, 19]. At present, it is uncertain if preexisting neurologic or psychiatric morbidities, like in our patient, may favor the occurrence of TTC. The exact neurologic comorbidity in the reported patient is so far unknown. Investigations for neuromuscular disorders were proposed but have not yet been carried out. Neuromuscular disorders have been previously identified in patients with TTC [20, 21], and due to the clinical presentation it cannot be excluded that the described patient also suffered from a mild neuromuscular disorder.

Amnesia may be induced by emotional stress, as reported in a 72-year-old woman after a burglary in her home [22]. Transient global amnesia was initially assumed, due to the persistency of the symptoms, the nature of the event leading to this condition, and the fact that the patient had experienced a similar episode of amnesia induced by emotional stress before the patient has been diagnosed with dissociative amnesia. The pathomechanism for stress-induced amnesia is that of a perturbation of hippocampal function due to dysregulation in the GABA/glutamate balance induced by emotional stress [23]. TTC associated with amnesia has so far not been reported.

Although, hypothetically, beta-blocking agents would be expected to provide pharmacologic protection, TTC occurred in our patient during a therapy with beta-blocking agents. A similar observation is reported by others who found that 20% of TTC occurred during a therapy with beta-blocking agents [4].

This case shows that TTC may be triggered by emotional stress induced during an assault. Assault-induced stress may induce not only TTC but also amnesia for some of the events that occurred during the act.

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