



Inverted Takotsubo Syndrome: An Atypical Case in a Young Woman Following an Appendectomy

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

We report a rare case of inverted Takotsubo syndrome in a 24-year-old woman. Takotsubo syndrome, also known as stress cardiomyopathy or broken heart syndrome, is a transient condition characterized by acute and reversible dysfunction of the left ventricle. Cardiac auscultation showed regular heart sounds without audible murmurs, while pulmonary auscultation revealed crackles at the lung bases. The abdominal examination was unremarkable. This case of a young 24-year-old patient with no significant cardiovascular history presenting with inverted Takotsubo syndrome following surgery for complicated appendicitis highlights the importance of recognizing this condition in atypical populations. The patient's favorable clinical course, with complete recovery of left ventricular function at four weeks and no recurrence during one year of follow-up, is consistent with the generally good prognosis associated with Takotsubo syndrome.

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1. INTRODUCTION

Takotsubo syndrome, also known as stress cardiomyopathy or broken heart syndrome, is a transient condition characterized by acute and reversible dysfunction of the left ventricle. It is often triggered by intense physical or emotional stress [1]. Clinically and electrocardiographically, this cardiomyopathy mimics an acute myocardial infarction but is distinguished by the absence of significant obstructive coronary artery disease on angiography [1]. The inverted Takotsubo, where the base of the left ventricle is hypokinetic or akinetic with apical hyperkinesis, is a less common and less documented form of this condition [2].

The prevalence of Takotsubo syndrome is estimated at 1 to 2% of patients presenting with ST-segment elevation myocardial infarction (STEMI) [3]. Postmenopausal women constitute the majority of cases, although the syndrome can affect younger individuals and men, albeit more rarely [4]. The case we report is particularly rare as it involves an inverted Takotsubo syndrome in a 24-year-old woman.

2. CLINICAL PRESENTATION

A 24-year-old patient with a history of appendectomy complicated by an appendicular abscess developed constrictive retrosternal chest pain radiating to the left upper limb three days

after her postoperative stabilization. This pain prompted her transfer to the cardiology department for further evaluation.

Upon admission, the patient did not report any flu-like symptoms. Clinical examination revealed a blood pressure of 100/67 mmHg, a heart rate of 120 beats per minute, and oxygen saturation of 96% on room air. Cardiac auscultation showed regular heart sounds without audible murmurs, while pulmonary auscultation revealed crackles at the lung bases. The abdominal examination was unremarkable.

The electrocardiogram showed ST-segment depression in the lower lateral leads associated with negative T waves in the apico-lateral region (Fig. 1). Troponin levels revealed a positive trend, indicating myocardial necrosis. Transthoracic echocardiography showed apical hyperkinesis with basal hypokinesis of the inferior and anterolateral walls and a left ventricular ejection fraction of 35% (Fig. 2).

Initially managed as an acute coronary syndrome, the patient was started on dual antiplatelet therapy, curative anticoagulation, and beta-blockers. Coronary angiography revealed no abnormalities in the coronary network (Fig. 3). Immunological, thyroid, and phosphocalcium workups were normal, leading to the diagnosis of inverted Takotsubo syndrome

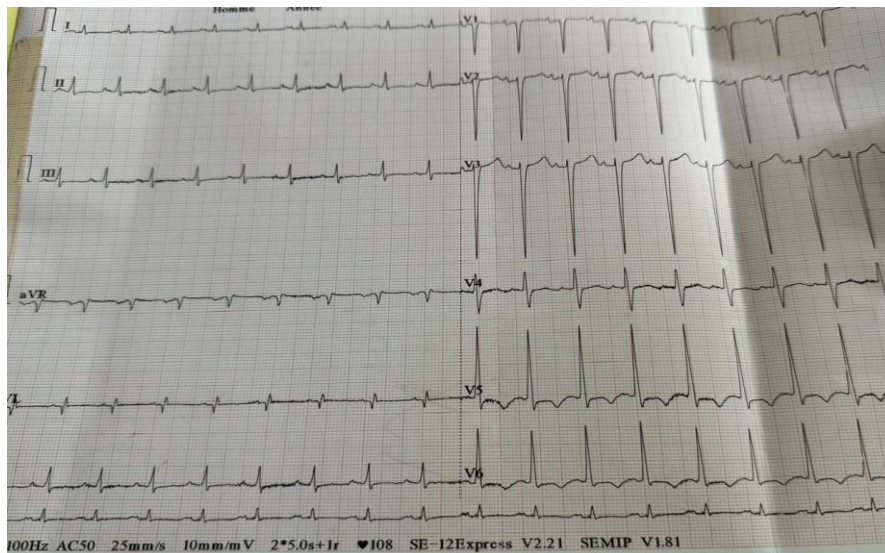


Fig. 1. Admission ECG



Fig. 2. Transthoracic echocardiography



Fig. 3. Coronary angiography

The clinical course was favorable, with normalization of left ventricular function on follow-up transthoracic echocardiography performed four weeks later. No left ventricular wall motion abnormalities were detected, and the ejection fraction had returned to normal. During one year of follow-up, the patient did not experience any recurrence of cardiomyopathy, and the follow-up echocardiograms showed normal results.

3. DISCUSSION

This case of a young 24-year-old patient with no significant cardiovascular history presenting with inverted Takotsubo syndrome following surgery for complicated appendicitis highlights the

importance of recognizing this condition in atypical populations. The physical stress induced by major surgery and postoperative complications can serve as potential triggers for Takotsubo syndrome [2].

The patient's clinical manifestations, including constrictive retrosternal chest pain and elevated troponins, are typical of Takotsubo syndrome presentations [1]. The electrocardiogram and echocardiography provided crucial diagnostic clues, showing ST-segment depression and left ventricular kinetic abnormalities, respectively [5]. The absence of significant obstructive coronary artery disease on coronary angiography and normal immunological, thyroid, and phosphocalcium results allowed the exclusion of

other causes of myocardial dysfunction, thus confirming the diagnosis of inverted Takotsubo [3].

Diagnostic criteria include transient left ventricular dysfunction, electrocardiographic abnormalities such as inverted T waves or ST-segment depression, moderate elevation of cardiac biomarkers, and the absence of significant obstructive coronary artery disease [5]. The differential diagnosis mainly includes myocardial infarction and other forms of acute cardiomyopathy [6]. The underlying pathophysiological mechanisms of Takotsubo syndrome remain largely hypothetical. Major theories include excessive catecholamine release leading to direct myocardial toxicity, coronary microvascular dysfunction, and systemic inflammatory responses [3]. Overstimulation of myocardial beta-adrenergic receptors by catecholamines can cause coronary vasoconstriction, intracellular calcium overload, and myocyte apoptosis [4]. Additionally, studies suggest that endothelial dysfunction and platelet activation may play a role in the pathophysiology of the syndrome [3].

Recent insights into the pathophysiological mechanisms of Takotsubo syndrome suggest several contributing factors.

Excessive catecholamine release is considered a primary mechanism, leading to direct myocardial toxicity, microvascular dysfunction, and subsequent left ventricular dysfunction. Catecholamines, particularly adrenaline, bind to beta-adrenergic receptors, causing coronary vasoconstriction, intracellular calcium overload, and myocyte apoptosis.

Additionally, endothelial dysfunction and platelet activation are believed to contribute to the syndrome's pathophysiology.

Emerging studies indicate that systemic inflammatory responses might also play a role, exacerbating myocardial injury during episodes of intense stress.

For instance, a study by Smith et al. [7] demonstrated the role of inflammatory markers in predicting syndrome recurrence, suggesting a link between immune response and myocardial dysfunction. This supports the hypothesis that a multifactorial process, involving both neurohormonal and inflammatory pathways, underpins the development and recurrence of Takotsubo syndrome.

Takotsubo syndrome can be classified based on the affected region of the left ventricle: classic (apical), inverted (basal), midventricular, and focal [5]. Complications include acute heart failure, arrhythmias, ventricular thrombi, and, rarely, myocardial rupture [1].

The diagnosis is based on a combination of clinical, electrocardiographic, and imaging criteria. The ECG may show ST-segment and T wave abnormalities [6]. Echocardiography is essential to assess left ventricular function and detect kinetic abnormalities [6]. Cardiac MRI can be used to confirm the diagnosis by showing wall motion abnormalities without late gadolinium enhancement, indicating the absence of myocardial necrosis [6].

Initial treatment is similar to that of acute coronary syndrome, including anticoagulation and dual antiplatelet therapy [1]. Long-term management may include beta-blockers and angiotensin-converting enzyme inhibitors (ACE inhibitors) [2]. Close monitoring is necessary to detect any recurrence or long-term complications [2].

The patient's favorable clinical course, with complete recovery of left ventricular function at four weeks and no recurrence during one year of follow-up, is consistent with the generally good prognosis associated with Takotsubo syndrome [1]. However, it is crucial to emphasize that patients should be closely monitored for any recurrence or long-term complications. Recent studies suggest that although rare, recurrence of Takotsubo syndrome can occur, warranting ongoing vigilance [4].

4. CONCLUSION

This case highlights the importance of considering inverted Takotsubo syndrome in the differential diagnosis of acute coronary syndromes, even in young patients without significant cardiovascular history. Although rare, this syndrome can occur following major physical stress, such as complicated surgery. Early recognition and appropriate management are crucial to ensuring complete recovery and avoiding complications. This case also illustrates the possible favorable outcome with total cardiac function recovery, underscoring the importance of rigorous follow-up to prevent recurrence. Further research is needed to better understand the underlying mechanisms of this cardiomyopathy and to refine management strategies [5].

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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