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# The critical role of POCUS in the early detection of acute takotsubo cardiomyopathy in an atypical patient

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**Abstract**
Takotsubo cardiomyopathy (TC) is a reversible cardiac syndrome typically triggered by emotional or physical stress. It commonly presents in postmenopausal women and mimics acute coronary syndrome. We present a rare case of TC in a previously healthy 30-year-old female, complicated by cardiogenic shock and requiring mechanical circulatory support. Early point-of-care ultrasound (POCUS) enabled rapid diagnosis and timely management, resulting in full recovery.

**Keywords:** Takotsubo cardiomyopathy, cardiogenic shock, Impella, point-of-care ultrasound, young female

## Introduction
Takotsubo Cardiomyopathy (TC) is triggered by intense emotional or physical stress. We present a unique case of Takotsubo cardiomyopathy complicated by cardiogenic shock in a healthy 30-year-old female with no predisposing risk factors.

## Case Report
A 30-year-old female with a history of anxiety presented to the emergency department after suffering a cardiac arrest at work, with return of spontaneous circulation achieved after two defibrillator shocks. According to her family, she had experienced high levels of work-related anxiety over the past two weeks.

Initial workup revealed akinesis and severely reduced left ventricular ejection fraction (LVEF) of 20% on point-of-care ultrasound (POCUS) and subsequent formal echocardiography. Chest X-ray demonstrated fulminant pulmonary edema. Her cardiac arrest was suspected to be due to arrhythmia and cardiogenic shock secondary to acute severe Takotsubo cardiomyopathy. She developed acute hypoxemic respiratory failure due to pulmonary edema and required intubation with vasopressor and inotropic support, including norepinephrine, milrinone, and epinephrine.

Due to refractory cardiogenic shock and hemodynamic instability, the patient was emergently taken to for cardiac catheterization, with no evidence of obstructive coronary artery disease. The decision was made to place an Impella pump, leading to clinical improvement. The Impella was removed the following day, and she was successfully weaned off vasopressors, extubated, and a subcutaneous implantable cardioverter-defibrillator was placed for secondary prevention. She was subsequently discharged home in stable condition.

This case demonstrates a rare and severe presentation of Takotsubo cardiomyopathy complicated by cardiogenic shock in a young, previously healthy 30-year-old female. TC accounts for approximately 1-3% of cases presenting with suspected ST-elevation myocardial infarction, with a prevalence in women who are over 55 years old. While Takotsubo cardiomyopathy is generally considered a benign and reversible condition, mortality is often related to complications such as arrhythmias, including atrial fibrillation, ventricular tachycardia, and cardiogenic shock in up to 20% of patients. Emotional stress is a well-documented trigger and remains the predominant etiology for our patient. In our patient, POCUS was used to aid in the early detection of an uncommon and severe manifestation, particularly in a patient without traditional risk factors, leading to timely interventions and an improved outcome for this patient.

## Conclusion

In conclusion, this case highlights the importance of early recognition where POCUS is an invaluable tool leading to management of Takotsubo cardiomyopathy, particularly in atypical patients presenting with cardiogenic shock. While TC is often considered a transient and reversible condition, severe cases can lead to life-threatening complications, including arrhythmias and hemodynamic instability. The use of POCUS proved valuable in the rapid identification of cardiac dysfunction, guiding timely interventions such as hemodynamic support and mechanical circulatory assistance, which ultimately led to a full recovery.

In conclusion, this case shows the crucial role of early recognition and intervention in Takotsubo cardiomyopathy, particularly in atypical presentations with cardiogenic shock. POCUS proved to be an invaluable tool in the swift identification of cardiac dysfunction. While TC is generally considered a transient and reversible condition, severe cases can result in life-threatening complications such as arrhythmias and hemodynamic instability. The use of POCUS enabled timely diagnosis and intervention, ultimately leading to a full recovery.

Although Takotsubo cardiomyopathy is poorly understood, it is thought to be a transient condition that most patients completely recover from. This report of a 30-year-old female with no predisposing genetic or past medical conditions further highlights the importance of understanding the disease process to enhance medical intervention and outcomes in patients with suspected Takotsubo cardiomyopathy.

In the critical care setting, early recognition using POCUS to assess for depressed ejection fraction and ventricular akinesis, along with hemodynamic evaluation for shock syndromes, is essential for timely intervention.

## Discussion

Takotsubo syndrome is estimated to represent 1-3% of those presenting with suspected STEMI, with a higher prevalence of 5-6% for women, with the majority being over 55 years of age. The pathogenesis of Takotsubo cardiomyopathy is poorly understood but is thought to involve the activation of the sympathetic nervous system and the excess release of catecholamines after the body endures a stressor. Common complications following Takotsubo syndrome involve arrhythmias such as atrial fibrillation and ventricular tachycardia, and cardiogenic shock. Cardiogenic shock following a stress cardiomyopathy is a common manifestation. The incidence of cardiogenic shock in patients suffering from Takotsubo ranges between 6% and 20%. Here, we present a rare case of Takotsubo cardiomyopathy in a young, healthy 30-year-old female with no prior medical history complicated by cardiogenic shock. Of note, her only risk factor may have been the additional stress and anxiety she had been experiencing from work for two weeks before her cardiac arrest. Nevertheless, for a disease course that is often considered benign, her steep decline in ejection fraction below 20%, requiring an Impella heart pump placement, further underscores the uniqueness of this case. Additionally, although no specific echocardiography findings were noted for *Staphylococcus epidermidis*, the positive blood culture may explain the sudden onset of cardiac arrest in a 30-year-old female without any previous risk factors. The most commonly documented systemic infections due to *Staphylococcus epidermidis* involve infective endocarditis and osteomyelitis. Furthermore, the etiology of *Staphylococcus epidermidis* bacteremia ranges from the contamination of needles in patients with a history of IV drug abuse to infections that arise from medical device placement, such as catheters and prosthetic heart valves. Therefore, the lack of patient history and predisposing risk factors warrants further investigation into the cause of her bacteremia and whether this may have contributed to the exacerbation of symptoms tied to her diagnosis of Takotsubo cardiomyopathy.

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