

## Takotsubo Syndrome Presenting with Intrauterine Fetal Death in Late Pregnancy: A Diagnostic Challenge with Peripartum Cardiomyopathy

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### Abstract

Peripartum cardiomyopathy (PPCM) is a major cause of heart failure in late pregnancy and the postpartum period, whereas takotsubo cardiomyopathy (TCM) is rare but may occur under severe stress. Differentiation between these conditions is challenging due to overlapping clinical features. A 30-year-old woman with an *in vitro* fertilization pregnancy presented at 34 weeks of gestation with dyspnea and intrauterine fetal demise. Echocardiography revealed severe left ventricular dysfunction (ejection fraction, 25%). Following surgical intervention and standard heart failure therapy, ventricular function improved rapidly, with the ejection fraction reaching 50% within one month. Despite pregnancy-related risk factors suggesting PPCM, the rapid recovery of left ventricular function favored a diagnosis of TCM. This case highlights the importance of careful clinical and imaging assessment and emphasizes that rapid ventricular recovery in late pregnancy should raise strong suspicion for TCM, even when classical PPCM risk factors coexist.

**Keywords:** Acute heart failure; differential diagnosis; peripartum cardiomyopathy; pregnancy; Takotsubo syndrome.

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## Geç Gebelik Döneminde İntrauterin Fetal Ölümle Ortaya Çıkan Takotsubo Sendromu: Peripartum Kardiyomiyopati ile Tanısal Bir Zorluk

### Özet

Peripartum kardiyomiyopati (PPKM), gebeliğin geç dönemlerinde ve postpartum süreçte gelişen kalp yetmezliğinin başlıca nedenlerinden biridir; takotsubo kardiyomiyopatisi (TKM) ise nadir görülmele birlikte şiddetli stres altında ortaya çıkabilir. Klinik bulguların örtüşmesi nedeniyle bu iki durumun ayırıcı tanısı güçtür. *In vitro* fertilizasyon ile gebe kalan 30 yaşında bir kadın, gebeliğin 34. haftasında dispne ve intrauterin fetal ölüm ile başvurdu. Ekokardiyografide ciddi sol ventrikül sistolik disfonksiyonu saptandı (ejeksiyon fraksiyonu %25). Cerrahi müdahale ve standart kalp yetmezliği tedavisini takiben sol ventrikül fonksiyonları hızla düzeldi ve bir ay içinde ejeksiyon fraksiyonu %50'ye ulaştı. Gebeliğe bağlı risk faktörleri başlangıçta PPKM tanısını düşündürmesine rağmen, sol ventrikül fonksiyonlarının hızlı toparlanması TKM tanısını daha olası kıldı. Bu olgu, peripartum dönemde gelişen akut kalp yetmezliğinde dikkatli klinik ve görüntüleme değerlendirmesinin önemini vurgulamakta ve geç gebelikte hızlı ventrikül iyileşmesinin, klasik PPKM risk faktörleri bulunsa dahi, TKM açısından güçlü bir uyarı işareti olması gerektiğini göstermektedir.

**Anahtar sözcükler:** Akut kalp yetmezliği; ayırıcı tanı; peripartum kardiyomiyopati; gebelik; Takotsubo kardiyomiyopati.

### Introduction

Peripartum cardiomyopathy (PPCM) is a rare yet life-threatening condition that occurs in the final months of pregnancy or the early postpartum period in women without a prior history of cardiac disease. Although its exact etiology remains unclear, multiple factors have been implicated, including viral infections, autoimmune responses, genetic predisposition, hormonal dysregulation, and vascular dysfunction.

Takotsubo syndrome (TS), also known as stress-induced cardiomyopathy or "broken heart syndrome," has been recognized as a distinct clinical entity in recent years. It is frequently misdiagnosed as acute coronary syndrome (ACS) due to its similar presentation. TS is believed to result from excessive catecholamine release following intense emotional or physical stress. In late pregnancy, heightened stress responses may lead to apical ballooning of the left ventricle and transient heart failure.

Both PPCM and TS share overlapping clinical features, making an accurate diagnosis difficult during pregnancy and the postpartum period.<sup>[1]</sup> In this report, we present the case of a 30-year-old woman with no prior cardiac history who developed acute heart failure at 34 weeks of gestation following *in vitro* fertilization (IVF).

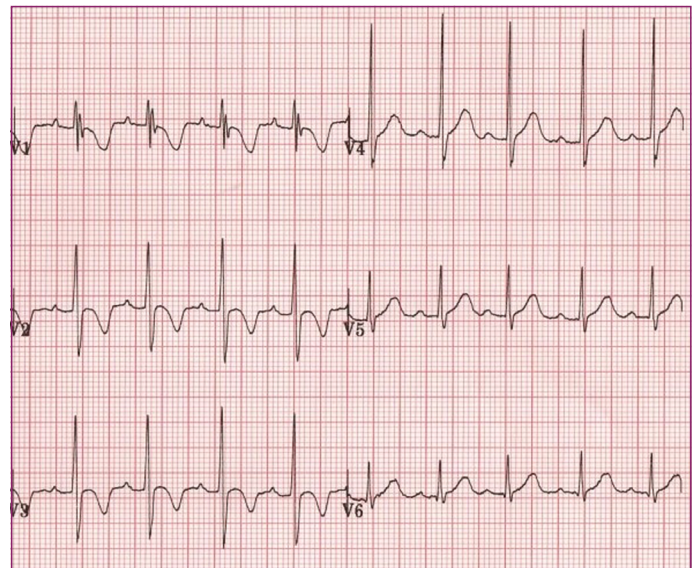
## Case Report

A 30-year-old woman with no known systemic or cardiac disease was admitted at 34 weeks of gestation with a several-day history of dyspnea and decreased fetal movements. She reported that this was her first pregnancy, achieved through IVF. On physical examination, her blood pressure was 200/100mmHg, and she exhibited bilateral fine crepitant rales extending to the mid-lung fields, an S3 gallop, and a 2/6 systolic murmur. Electrocardiography (ECG) revealed sinus tachycardia and T-wave inversions in leads V1-V3 (Fig. 1). Transthoracic echocardiography (TTE) demonstrated severe left ventricular dysfunction (EF=25%), global hypokinesia, and moderate mitral regurgitation, with normal right ventricular function (Fig. 2). Laboratory findings showed elevated troponin and proBNP levels. Notably, a previous echocardiogram performed one week earlier had documented a normal EF and left ventricular function. The obstetrics team confirmed intrauterine fetal demise, and urgent surgical intervention was planned. Preoperative thoracic computed tomography (CT) revealed bilateral pleural effusions measuring approximately 3cm, without findings suggestive of COVID-19 pneumonia (Fig. 3). The patient was electively intubated and underwent surgery. In the postoperative period, she remained intubated for six days and received optimal heart failure therapy, including diuretics and beta-blockers. One week later, follow-up echocardiography showed an improvement in EF to 35%. At the one-month follow-up, her EF had returned to normal limits, with complete recovery of left ventricular function.

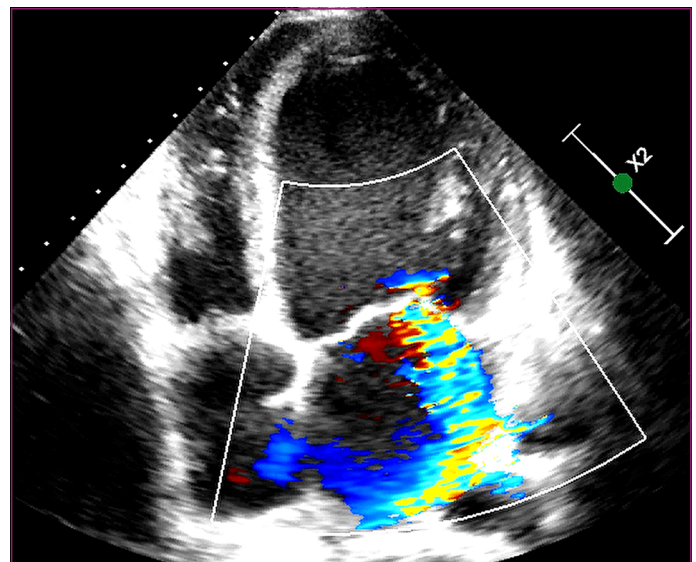
## Discussion

Pregnancy induces significant hemodynamic, hormonal, and autonomic changes, making individuals more susceptible to cardiovascular complications, including TCM and PPCM.<sup>[2,3]</sup> While PPCM is a well-recognized pregnancy-related condition, TCM remains underdiagnosed and often overlooked in this population. Due to the substantial clinical overlap between these two conditions, accurate diagnosis and timely treatment are crucial for improving maternal outcomes.<sup>[4-7]</sup>

PPCM is a type of dilated cardiomyopathy that develops in the last month of pregnancy or the first few months postpartum, leading to acute left ventricular dysfunction and heart failure. Although its exact pathophysiology remains unclear, proposed

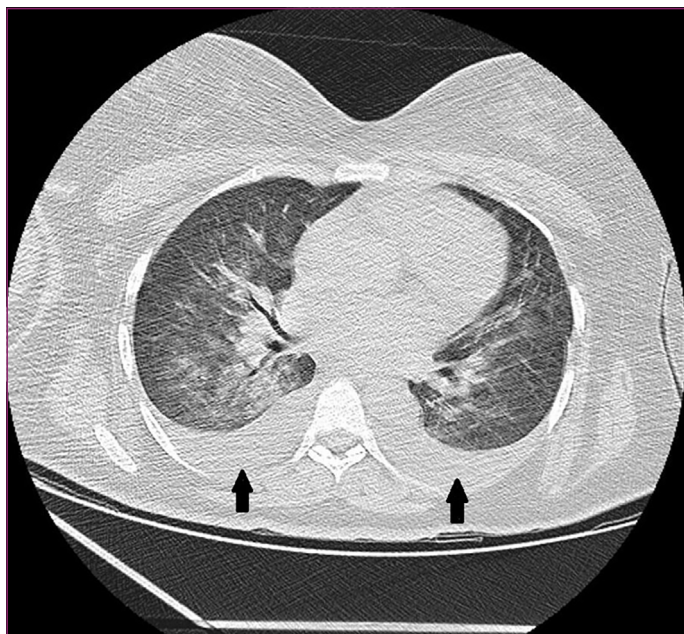


**Figure 1.** Electrocardiography (ECG) revealed sinus tachycardia and T-wave inversions in leads V1-V3.



**Figure 2.** Transthoracic echocardiography (TTE) demonstrated severe left ventricular dysfunction (EF: 25%), global hypokinesia, and moderate mitral regurgitation, with normal right ventricular function.

mechanisms include inflammatory cytokine activation, oxidative stress, and hormonal imbalances. One of the most widely accepted theories suggests that prolactin cleavage products contribute to myocardial damage by promoting oxidative stress and endothelial dysfunction. Established risk factors for PPCM include advanced maternal age, multiple gestations, hypertensive disorders, and IVF.<sup>[8-10]</sup> Conversely, TCM is a transient form of stress-induced cardiomyopathy that mimics ACS but occurs without obstructive coronary artery disease. It is most commonly observed in postmenopausal women, but an increasing number of cases have been reported in younger patients, including those in the peripartum period.<sup>[11,12]</sup> The primary mechanism underlying TCM involves catecholamine excess, coronary microvascular dysfunction, and myocardial stunning, leading to the



**Figure 3.** Preoperative thoracic computed tomography (CT) revealed bilateral pleural effusions measuring approximately 3 cm, without findings suggestive of COVID-19 pneumonia.

characteristic apical ballooning pattern observed on echocardiography. Pregnancy, labor, and delivery are well-known physiological and emotional stressors that may trigger TCM. Additionally, complications such as postpartum hemorrhage, preeclampsia, or emergency cesarean section may further contribute to the hyperadrenergic state responsible for TCM development.

In the present case, the markedly elevated blood pressure at admission (200/100mmHg) raises the possibility of a hypertensive disorder of pregnancy, including preeclampsia, as a contributing factor. Hypertensive disorders are characterized by endothelial dysfunction, increased afterload, and heightened sympathetic activation, which may precipitate acute left ventricular dysfunction. Severe preeclampsia has also been described as a potential trigger for Takotsubo syndrome through catecholamine surge and microvascular dysfunction.<sup>[13]</sup> In our patient, liver function tests were within normal limits, and no thrombocytopenia was detected. However, shortly after hospital admission, the patient experienced rapid clinical deterioration, required endotracheal intubation, and underwent urgent obstetric intervention. Therefore, a comprehensive evaluation for proteinuria could not be completed. Although the full diagnostic criteria for preeclampsia were not documented, a pregnancy-related hypertensive disorder may have contributed to the clinical presentation and acted as an additional trigger for TCM.

To our knowledge, cases combining IVF pregnancy, intrauterine fetal demise, and rapid ventricular recovery mimicking peripartum cardiomyopathy are rarely reported. This constellation highlights the role of acute emotional and physical stress as a decisive trigger for Takotsubo syndrome in the peripartum period. Distinguishing between PPCM and TCM during pregnancy is particularly challenging due to their overlapping clinical features, in-

cluding acute heart failure symptoms, elevated cardiac biomarkers, and reduced left ventricular ejection fraction. However, there are notable differences in their clinical course and prognosis. PPCM is often associated with persistent left ventricular dysfunction, frequently requiring long-term heart failure treatment and increasing the risk of long-term cardiovascular complications.<sup>[14,15]</sup> In contrast, TCM usually resolves rapidly within days to weeks. Cardiac imaging plays a pivotal role in differentiating these conditions. Echocardiography findings in PPCM typically reveal global hypokinesia, while TCM presents with regional wall motion abnormalities. However, atypical and global variants of Takotsubo syndrome have been described, particularly in younger patients and those exposed to intense physical stress. Although ECG findings are not entirely specific, TCM often presents with ST-segment elevations and deep T-wave inversions, whereas PPCM is more likely to show non-specific ST-T wave changes.<sup>[16]</sup> Furthermore, cardiac magnetic resonance imaging (CMR) is an essential diagnostic tool, as PPCM is frequently associated with myocardial fibrosis and late gadolinium enhancement (LGE), whereas TCM lacks significant scarring. CMR could not be performed due to the patient's unstable clinical condition in the acute phase; however, the rapid and complete recovery of ventricular function strongly supported the diagnosis of Takotsubo syndrome. Although TCM generally follows a benign clinical course, some cases may develop severe complications, including respiratory distress, cardiogenic shock, arrhythmias, and left ventricular thrombus formation. Thus, close hemodynamic monitoring is essential. Treatment is primarily supportive; however, in appropriate cases, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, diuretics, and anticoagulants may be administered. Given the potential risk of recurrence, postpartum follow-up, risk stratification, and patient counseling are necessary. Recognizing TCM in pregnant and postpartum women is crucial, as increased awareness and advancements in imaging techniques suggest that this condition may be more prevalent than previously thought. Since the differentiation between PPCM and TCM remains a significant diagnostic challenge, further research is needed to identify specific risk factors, establish optimal diagnostic criteria, and develop targeted management strategies.

## Conclusion

In conclusion, PPCM and TCM are two distinct pregnancy-related cardiomyopathies that often present with similar clinical features, making differentiation challenging. However, these conditions differ in pathophysiology, prognosis, and management. The physiological and psychological stress associated with pregnancy can act as a common trigger for both disorders. Accurate diagnosis relies on advanced imaging modalities, including echocardiography, biomarker evaluation, and CMR.

Given the potential overlap in clinical presentation, careful differentiation between PPCM and TCM in pregnancy and the postpartum period is crucial for establishing appropriate treatment strategies and optimizing maternal outcomes. Recognizing these conditions early and applying the appropriate therapeutic approach are essential to reduce morbidity and improve prognosis in affected patients.

## Disclosures

**Ethics Committee Approval:** This is a single case report, and therefore ethics committee approval was not required in accordance with institutional policies.

**Informed Consent:** Written informed consent was obtained from the patient for this case report.

**Conflict of Interest Statement:** None declared.

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