

# Reverse Takotsubo Cardiomyopathy mimicking inferior wall STEMI– A case report

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## Abstract:

Takotsubo syndrome is a disease of uncertain aetiology characterized by transient regional wall motion abnormality without associated coronary artery disease. Though the classical variant or the apical ballooning syndrome is most commonly seen in post-menopausal women atypical variants like reverse Takotsubo cardiomyopathy can occur in younger patients. Reverse Takotsubo cardiomyopathy more frequently presents with ST-segment depression and presentation as STEMI is rare. Here we are presenting a case of a 39-year-old lady who presented as STEMI inferior wall but eventually diagnosed to have reverse Takotsubo cardiomyopathy based on clinical, echocardiographic and angiographic findings.

**Key words:** takotsubo syndrome; reverse takotsubo cardiomyopathy; stress cardiomyopathy; stemi; cardiogenic shock

## Introduction

*Takotsubo cardiomyopathy (TTC)*, also known as “stress cardiomyopathy” or “broken heart syndrome,” is an uncommon form of cardiomyopathy characterized by reversible regional wall motion abnormality of the left ventricle (LV) without obstructive coronary arteries.<sup>1,2</sup> Usually there is apical or less frequently midventricular ballooning of the LV.<sup>3</sup> Reverse Takotsubo cardiomyopathy (rTTC) is a rare variant of Takotsubo syndrome which has distinct features in terms of patient profile and clinical presentation compared to the classic apical ballooning syndrome. It is characterized by basal hypokinesis and apical hyperkinesis usually following an emotional or physical stress.<sup>[4]</sup> Here we report a case of 39 years old lady who was diagnosed as reverse takotsubo cardiomyopathy based on clinical, echocardiographic and angiographic features.

## Case presentation:

A 39 years old lady presented with a history of fever, diarrhea, nausea, and vomiting for which she was admitted to a local hospital where she developed retrosternal chest pain with a severity of 8/10 on visual analog scale, not related to exertion. ECG was suggestive of STEMI inferior wall. She was treated in the line of acute coronary syndrome with dual antiplatelets, atorvastatin, and intravenous heparin. The fever subsided

but she developed shortness of breath which rapidly progressed from NYHA class I to class IV over the next 2 days. She also developed hypotension for which she was put on intravenous noradrenaline infusion.

She arrived at our hospital 4 days after the onset of chest pain. At arrival, her BP was 84/56 mm Hg despite noradrenaline infusion, and her pulse was 124/min. She was severely dyspneic with bilateral basal crackles. Chest x-ray was suggestive of pulmonary edema. ABG was suggestive of type 1 respiratory failure. She was intubated and put on mechanical ventilation. She was put on dopamine infusion. Initial blood investigation showed raised TLC and CRP. Troponin I was 555 ng/L, NT-pro-BNP was 8070 pg/ml. Broad-spectrum antibiotics (meropenem and doxycycline) were started. D-dimer was elevated and the direct Coombs test was negative. USG Doppler both lower limbs showed no deep vein thrombosis.

Subsequent ECG done after 2 days showed ST resolution compared to the previous one. Transthoracic echocardiography revealed akinetic basal inferior, posterior wall and basal septum, with preserved systolic function of the other walls and left ventricular ejection fraction (LVEF) of 40% with normal diastolic flow pattern.

Blood and urine cultures showed no growth. She improved gradually over the next 4 days with supportive treatment. After extubation and discontinuation of inotropic support, she was taken up for invasive coronary angiography which revealed non-obstructive coronary arteries.

Repeat transthoracic echocardiography showed complete resolution of regional wall motion abnormalities with normal LV systolic function and ejection fraction of 60%. A diagnosis of reverse takotsubo cardiomyopathy was made as per the Mayo Clinic criteria.

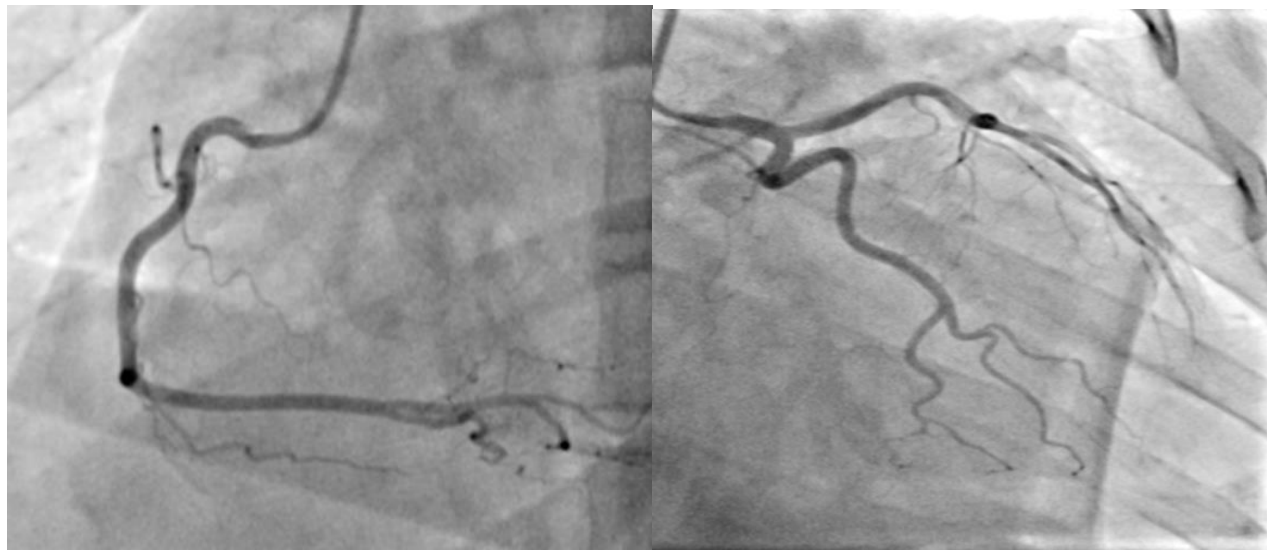
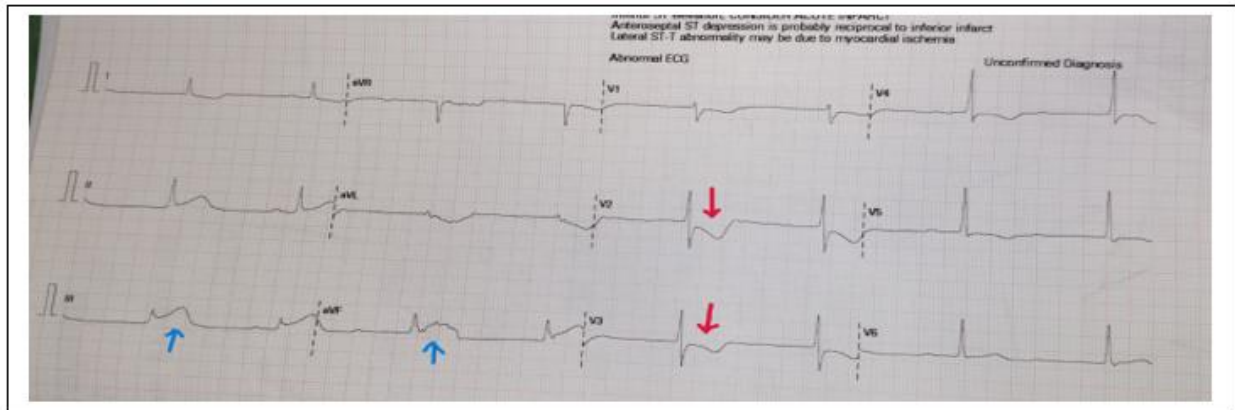
**Discussion:**

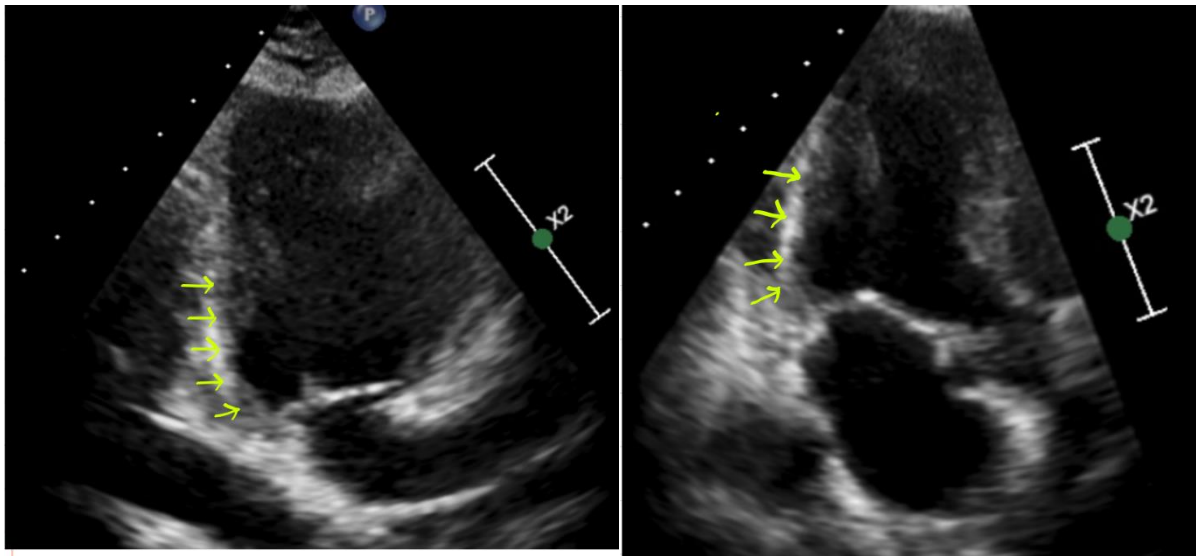
Takotsubo is a Japanese word meaning “octopus pot” which is a vase-like contraction used to fish for octopus. The syndrome was named so by Sato et al in 1990 [2], because of the peculiar “octopus pot” like appearance of the left ventricle on the ventriculogram. It is estimated that around 2% of all troponin-positive patients presenting with suspected ACS have Takotsubo syndrome [3]. Takotsubo cardiomyopathy refers to an acute but often reversible left ventricular dysfunction with clinical presentation resembling acute coronary syndrome and characteristic anteroseptal-apical dyskinesia ballooning of the left ventricle with hyperkinetic basal segments in the absence of obstructive coronary artery disease on angiogram. [3]

TTC has been classified into 4 subtypes based on the regions of the ventricular wall motion abnormality: (1) classic type, (2) reverse type, (3) mid-ventricular type, (4) and localized type [4]. The reported incidence of rTTC varies from 1% to 23% in the existing literature [5]. According to the International Takotsubo Registry, only 2.2% of patients with Takotsubo syndrome had the reversed variant [6].

90% of the patients with Takotsubo cardiomyopathy are elderly women, with an average age of 58–75 years [6]. However, the reverse TTC variant is more commonly seen in younger women. In a study by Ramaraj et al. the mean age was 36 years for reverse type versus 62 years for the classic variety of TTC [7].

Although the precise pathogenic mechanism for Takotsubo cardiomyopathy is not known, catecholamine cardiotoxicity is the most popular theory [8]. It has been suggested that perimenopausal women have a higher concentration of B2 adrenergic receptors at the apex of the left ventricle, whereas young women have B2 receptors more concentrated at the base. This might explain the difference in the age distribution between the classic and the reverse variety of TTC [8].





**Figure 1:** upper panel: ECG showing inferior wall STEMI (blue arrow: ST elevation; red arrow: ST depression); middle panel: coronary angiogram showing non-obstructive coronary arteries; lower panel: Echocardiography at presentation showing basal akinesia(left) and normal systolic function at recovery(right). (yellow arrows: basal akinesia)

Clinical features of rTTC include angina-like chest pain and/or dyspnea preceded by an emotional or physically stressful event. In our case, the physical stress was acute gastroenteritis. Acute complications like cardiogenic shock, cardiac arrest, and congestive heart failure can occur in 15-20% cases of takotsubo syndrome. Cardiogenic shock and pulmonary edema are more common in rTTC than the classic variety [9]. Our patient also had cardiogenic shock and acute pulmonary edema.

The revised Mayo Clinic criteria is commonly used to diagnose TTC and its variants. Takotsubo syndrome is considered when all the following criteria are met [10]:

1. Transient hypokinesis, akinesis, or dyskinesis of the left ventricular mid-segments with or without apical involvement; the regional wall motion abnormalities extend beyond a single epicardial vascular distribution; a stressful trigger is often, but not always present.
2. Absence of obstructive coronary disease or angiographic evidence of acute plaque rupture.
3. New electrocardiographic abnormalities (ST-segment elevation and/or T-wave inversion) or modest elevation in cardiac troponin.
4. Absence of:
  - a. Pheochromocytoma
  - b. Myocarditis

The diagnosis of rTTC in the present case was made according to this Mayo Clinic criteria.

The most commonly reported ECG abnormality in classic Takotsubo syndrome is ST-segment elevations mimicking anterior myocardial infarction. In contrast, rTTC presents more frequently with ST-segment depression in inferior and lateral leads. ST segment elevation if present in rTTC is usually seen in the anterior precordial leads. However, interestingly in our case, there was ST segment elevation in inferior leads. [10,11]

Reversible wall motion abnormality with eventual normalization of LVEF over time is the norm in TTC. Studies have shown that rTTC patients tend to present with higher LVEF when compared to TTC patients. As per the International Takotsubo Registry study, LVEF upon admission, was slightly higher in patients with rTTC patients (mean,

43%) than that of TTC patients (mean, 41%) [6]. In our case, the ejection fraction was 40%. The right ventricle (RV) can have similar wall motion abnormality and those patients tend to be sicker [12]. In our case, RV function was normal (TAPSE-18). Repeat trans-thoracic echocardiography after four days of admission, showed complete resolution of regional wall motion abnormalities and normal LV systolic function (LVEF 60%).

Coronary angiogram in rTTC patients is typically normal or may show mild atherosclerotic plaques. [4] In our case, coronary angiogram showed non-obstructive coronary arteries.

Takotsubo syndrome can lead to a variety of complications like acute heart failure, RV dysfunction, Left ventricular outflow tract obstruction (LVOT), mitral regurgitation etc. in ~ 52% of the cases. [13]

Like all the varieties of TTC management of the reverse Takotsubo cardiomyopathy is primarily supportive. Treatment has to be tailored to the patient's risk category which is determined as per the ESC guideline. [13]

Medical management of Takotsubo syndrome includes beta-blocker in hemodynamically stable patients, particularly those with dynamic LVOT obstruction [14]. In the presence of cardiogenic shock vasopressor agents, including dobutamine and dopamine, are indicated. Though the use of catecholamines is a relative contraindication cautious use of dopamine, dobutamine, phenylephrine are indicated in symptomatic hypotension in the absence of LVOT obstruction. Low dose levosimendan infusion can be used as a catecholamine-sparing positive inotrope. [15]

As our patient was a high-risk case with hemodynamic instability she was admitted in ICU, put on mechanical ventilation and dobutamine infusion started. She improved symptomatically over the next 3-4 days; mechanical ventilation was weaned off and vasopressors were discontinued. Repeat echocardiography showed complete resolution of the wall motion abnormality. After 1 week of hospital stay, she was discharged home in a stable condition.

### Conclusion:

Reverse Takotsubo cardiomyopathy is a rare variant of the Takotsubo syndrome. The reverse variety is more common in younger women. Unlike the classical variety which may present with ST elevation in ECG,

ST depression is the predominant ECG abnormality in the reverse variety. Moreover, the presentation of Takotsubo syndrome as a mimicker of STEMI usually involves the anterior wall. Here we have presented a rare presentation of reverse Takotsubo cardiomyopathy as STEMI of inferior wall. Patient had complete recovery with supportive management.

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