

DOUBLE JEOPARDY – A CASE OF OVERLAPPING TAKOTSUBO SYNDROME AND SPONTANEOUS CORONARY DISSECTION

Planinka Zafirovska¹, Ljubica Georgievska-Ismail²,
Fatmir Ferati³, Darko Kitanoski², Arbijon Kolari⁴, Robin Nijveldt⁵

¹ Zan Mitrev Clinic, Skopje, Faculty of Medical Sciences, Goce Delcev University, Stip, RN Macedonia

² University Clinic of Cardiology, Faculty of Medicine, University “Ss. Cyril and Methodius” Skopje, RN Macedonia

³ Clinical Hospital Tetovo, Tetovo, RN Macedonia

⁴ Faculty of Medicine, University “Ss. Cyril and Methodius” Skopje, RN Macedonia

⁵ Radboud University Medical Center, Nijmegen, Netherlands

Corresponding author: Planinka Zafirovska, Zan Mitrev Clinic, Skopje, Faculty of Medical Sciences, Goce Delcev University, Stip, RN Macedonia, e-mail: planinkaz@hotmail.com

ABSTRACT

Acute coronary syndrome (ACS) includes a spectrum of clinical conditions, with increasing recognition of myocardial infarction with non-obstructive coronary arteries (MINOCA). Among its potential etiologies, Takotsubo syndrome (TTS) and spontaneous coronary artery dissection (SCAD) present with overlapping clinical features, posing diagnostic challenges.

We present a case of a 56-year-old postmenopausal woman with recurrent chest pain and elevated troponin levels, initially diagnosed with TTS based on apical ballooning and a lack of obstructive coronary artery disease. However, persistent symptoms and echocardiographic wall motion abnormalities prompted further evaluation with cardiac magnetic resonance imaging (CMR), which demonstrated subendocardial late gadolinium enhancement (LGE) in the right coronary artery (RCA) and left anterior descending (LAD) artery territories, raising suspicion for an ischemic etiology. A subsequent coronary angiogram with optical coherence tomography (OCT) confirmed SCAD of the LAD, establishing an overlapping diagnosis of TTS and MINOCA due to SCAD.

This case underscores the essential role of the multimodal imaging in refining MINOCA diagnoses and highlights the potential interplay between TTS and SCAD. Further research is needed to clarify their shared pathophysiology and improve diagnostic and therapeutic approaches in similar cases..

Keywords: Acute coronary syndrome, MINOCA, Takotsubo syndrome, spontaneous coronary artery dissection, cardiac magnetic resonance, optical coherence tomography, echocardiography

INTRODUCTION

Acute coronary syndrome (ACS) encompasses a range of clinical presentations, with increasing interest in myocardial infarction (MI) with non-obstructive coronary arteries (MINOCA). Patients with MINOCA, who are often younger and female, can be initially challenging

to differentiate from Takotsubo syndrome (TTS) or myocarditis. Cardiac magnetic resonance imaging (CMR) plays a crucial role in establishing a definitive diagnosis [1,2].

TTS, commonly linked to stress, remains a complex entity with a prognosis that is not as

benign as previously believed. Recent data suggest that coronary microvascular disease may be a primary underlying mechanism [3,4]. Similarly, spontaneous coronary artery dissection (SCAD) is increasingly recognized in MINOCA patients and is frequently associated with emotional or physical stress [4].

We present a case of overlapping TTS and MINOCA due to SCAD in a postmenopausal woman. Informed consent was obtained from the patient.

CASE PRESENTATION

A 56-year-old female smoker with a history of anxiety presented with chest pain, elevated troponin levels, and precordial T-waves inversion on the electrocardiogram (Figure 1A). The trans-

thoracic echocardiogram revealed a non-dilated left ventricle (LV) with a borderline ejection fraction (EF) and apical ballooning (Figure 1B). The coronary angiography showed no significant coronary obstructions (Figure 1C). Given the patient's history of anxiety and clinical presentation, TTS was suspected. She was discharged five days later with improved ventricular function.

One week later, the patient continued to experience chest pain and sought a second opinion. A follow-up echocardiogram showed resolution of apical ballooning but revealed akinesia in the basal and mid-inferior walls (Figure 2A). The strain analysis confirmed reduced deformation in the basal inferior and inferolateral segments, with preserved apical strain (Figure 2B).

The cardiac magnetic resonance imaging (CMR) demonstrated a non-dilated LV with an EF of 56%, hypo/akinesia of the basal and mid-in-



Figure 1. *Electrocardiogram showing inverted T waves (1A); Echocardiogram showing apical ballooning in 4 Ch view (1B); Angiogram with no evident coronary obstructions (1C)*

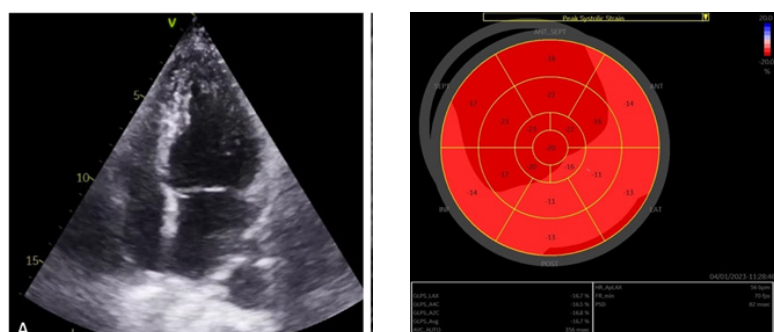


Figure 2. *Echocardiogram showing absent apical ballooning, but present inferior akinesia (2A); Strain analysis confirmed reduced deformation in the basal inferior and inferolateral segments, with preserved apical strain (2B).*

ferior wall, and mild residual apical ballooning. Elevated T1 (1100ms) and T2 (72ms) mapping in the apical septum, along with hyperintensity on T2 STIR images (Figure 3B) indicated myocardial edema in the same region. Late gadolinium enhancement (LGE) revealed subendocardial ischemic patterns in the basal and mid-inferior segments, suggesting myocardial infarction (MI) in the right coronary artery (RCA) territory. Addi-

tionally, a subendocardial scar in the anterolateral segment suggested MI in the circumflex (Cx) or left anterior descending (LAD) artery (Figure 3C).

Based on these findings, a diagnosis of MI-NOCA overlapping with TTS was made, and appropriate treatment was initiated. A subsequent coronary angiogram with optical coherence tomography (OCT) revealed spontaneous dissection of the LAD.

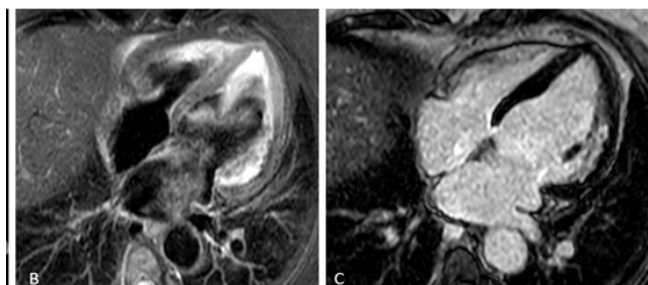


Figure 3. Cardiac magnetic resonance showing signal hyperintensity on T2 STIR 4Ch in apical segments (3B); Subendocardial LGE in mid lateral segment in 4Ch PSIR sequence (3C).

DISCUSSION

Takotsubo syndrome (TTS) and spontaneous coronary artery dissection (SCAD) are distinct conditions with overlapping clinical presentations, including chest pain, electrocardiogram changes, and troponin elevation. TTS is characterized by transient left ventricular (LV) wall motion abnormalities, typically involving the apex, and usually resolves within days to weeks without causing permanent myocardial damage. It predominantly affects postmenopausal women and is often triggered by emotional or physical stress, generally carrying a favorable prognosis [5,6]. Although the exact pathophysiology remains unclear, TTS is linked to excessive sympathoadrenal activation, elevated catecholamine levels, and enhanced β -adrenergic signaling, with potential underlying endothelial dysfunction and impaired coronary vasodilation [3]. SCAD, on the other hand, involves a tear in the coronary artery wall, leading to the formation of a false lumen. The subsequent compression of the true arterial lumen can compromise coronary blood flow, resulting in ischemia and, eventually, infarction [4]. SCAD primarily affects the low-risk female patients, it is frequently associated

with stress, and accounts for a significant proportion of acute myocardial infarctions (MIs) in young and pregnant women [7]. Studies indicate that patients with SCAD are approximately seven times more likely to have concomitant TTS, and vice versa, suggesting a notable correlation between the two conditions [6].

This case highlights the crucial role of CMR in refining the working diagnosis of MI-NOCA. SCAD typically presents with subendocardial LGE, following a coronary distribution pattern, while TTS is characterized by apical involvement, dyskinesia on CMR, and myocardial edema on T2-weighted sequences—without LGE. The European Society of Cardiology (ESC) classifies TTS into two types: primary, triggered by emotional or physical stress, and secondary, occurring in response to a medical or psychiatric emergency [8].

In our case, while TTS could have developed secondary to MI due to SCAD, the evolving imaging findings suggest that TTS was the primary event chronologically. There is ongoing speculation that the catecholamine surge in TTS may contribute to endothelial dysfunction, predisposing arteries to dissection. Additionally, the excessive hypercontractility of the basal LV segments observed in TTS might create a substrate for SCAD [9,10]. Interestingly, the presence of

subendocardial LGE in the inferior myocardial segments suggested an ischemic event in the right coronary artery (RCA) territory, despite the absence of an identifiable causal substrate. These findings reinforce the possibility of an underlying association between TTS and SCAD. Further studies are needed to explore their shared pathophysiological mechanisms and potential clinical implications.

CONCLUSION

The increasing recognition of SCAD as a cause of MINOCA highlights the need for a high index of suspicion, particularly in women with emotional or physical stress-related triggers. Given the overlapping clinical presentations of SCAD and TTS, early and accurate differentiation is essential for guiding appropriate management and secondary prevention. CMR plays a pivotal role in distinguishing between these entities by identifying characteristic myocardial patterns, infarction territories, and myocardial edema. Despite emerging evidence suggesting a potential interplay between TTS and SCAD, their exact relationship remains incompletely understood. Larger studies are needed to explore their shared pathophysiological mechanisms and to refine risk stratification strategies for patients presenting with MINOCA.

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Резиме**ДВОЕН РИЗИК – СЛУЧАЈ НА СОВПАЃАЊЕ НА СИНДРОМОТ ТАКОЦУБО И СПОНТАНА ДИСЕКЦИЈА НА КОРОНАРНАТА АРТЕРИЈА**

**Планинка Зафировска¹, Љубица Георгиевска-Исмаил²,
Фатмир Ферати³, Дарко Китаноски², Арбијон Колари⁴, Робин Нијвелд⁵**

¹ Жан Митрев Клиника, Скопје, Медицински факултет, Универзитет „Гоце Делчев“, Штип, РС Македонија

² Универзитетска клиника за кардиологија, Медицински факултет, Универзитет „Св. Кирил и Методиј“ во Скопје, РС Македонија

³ Клиничка болница Тетово, Тетово, РС Македонија

⁴ Медицински факултет, Универзитет „Св. Кирил и Методиј“ во Скопје, РС Македонија

⁵ Универзитетски Медицински центар „Редбод“, Нијмеген, Холандија

Акутниот коронарен синдром (АКС) опфаќа спектар клинички состојби со сè поголемо препознавање на миокардниот инфаркт без опструктивна коронарна болест (МИНОКА). Меѓу неговите можни етиологии, синдромот Такоцубо (ТТС) и спонтаната дисекција на коронарната артерија (СКАД) се манифестираат со клинички карактеристики кои се совпаѓаат, што претставува дијагностички предизвик. Претставуваме случај на 56-годишна постменопаузална жена со рекурентна болка во градите и покачени нивоа на тропонин, првично дијагностицирана со ТТС врз основа на апикално балонирање и отсуство на опструктивна коронарна болест. Сепак, перзистентните симптоми и ехокардиографските абнормалности на сидната кинетика наложија понатамошна евалуација со срцева магнетна резонанција (СМР), која покажа субендокардијално доцно засилување со гадолиниум (ЛГЕ) во териториите на десната коронарна артерија (ДКА) и левата предна низна артерија (ЛАД), што предизвика сомнеж за исхемична етиологија. Последователната коронарна ангиографија со оптичка кохерентна томографија (ОЦТ) потврди СКАД на ЛАД, со што беше поставена совпаѓачка дијагноза на ТТС и МИНОКА поради СКАД.

Овој случај ја нагласува суштинската улога на мултимодалното визуализирање во прецизирањето на дијагнозите на МИНОКА и ја истакнува можната поврзаност меѓу ТТС и СКАД. Потребни се понатамошни истражувања за појаснување на нивната заедничка патофизиологија и за подобрување на дијагностичките и на терапевтските пристапи во слични случаи.

Клучни зборови: акутен коронарен синдром, МИНОКА, синдром Такоцубо, спонтаната дисекција на коронарната артерија, магнетна резонанција на срце, оптичка кохерентна томографија, ехокардиографија