

## Takotsubo syndrome in association with acute myocardial infarction: diagnostic caveats and clinical implications

**To the editor** In clinical practice, the coexistence of takotsubo syndrome (TS) and acute myocardial infarction (AMI) has been considered an interesting yet potentially overlooked issue.<sup>1-4</sup> In their recently published elegant clinical vignette, Konishi et al<sup>1</sup> reported an intriguing case of TS complicating AMI in an elderly male patient. We would like to comment on this case and its further implications.

First, we hold the opinion that the patient initially sustained anterior AMI that had a morphological analogy to a classic TS episode.<sup>1</sup> This type of acute coronary syndrome (ACS) presentation (with the apical ballooning pattern) was previously termed as “pseudo-TS,” generally attributed to a critical stenosis in the wrap-around left anterior descending (LAD) artery (the long LAD pattern turning around the apex and also perfusing the inferior territories of the left ventricle [LV]) leading to ischemic or postischemic myocardial stunning in the adjacent myocardial segments.<sup>5</sup> Moreover, the “pseudo-TS” pattern, unlike a true TS episode, mostly regresses gradually upon successful management of the culprit LAD stenosis<sup>5</sup> (which is consistent with the presented case demonstrating a significant improvement of anterior wall motion abnormalities on day 3 following coronary stenting<sup>1</sup>). Taken together, the presented case might be regarded as reperfused anterior AMI (possibly with ongoing severe myocardial ischemia) manifesting as the “pseudo-TS” pattern, which was also complicated by a subsequent true TS episode, possibly associated with the emergence of a new-onset giant T-wave inversion.<sup>1</sup> Since “pseudo TS” appears to be the presentation pattern of the existing ACS (and hence not a separate entity), it might have little impact on overall prognosis.

Second, the coexistence of AMI and true TS is also quite possible and might lead to

a significant diagnostic challenge in clinical practice.<sup>1-4</sup> In particular, atypical TS variants (eg, focal) might be easily overlooked in patients with AMI.<sup>2,3</sup> Of note, AMI and TS may simultaneously arise from a common trigger (eg, a strongly stressful trigger) or, more likely, one condition may complicate the other in the course of hospital stay.<sup>1,3,5</sup> Importantly, there might exist a variety of suggested risk factors for the coexistence of AMI and TS including frailty, severe systemic inflammation, physical stressors, intractable chest pain due to AMI, as well as the pattern of spontaneous coronary artery dissection on coronary angiography (with a dissection flap or possible intramural hematoma).<sup>2,3</sup> In the presence of ACS presentation, these risk factors might increase the possibility of this particular coexistence and necessitate close monitoring and further diagnostic workup (including magnetic resonance imaging).<sup>2,3</sup> Therefore, we wonder whether the patient had these particular risk factors.<sup>1</sup>

Lastly, patients with this coexistence might more likely be prone to adverse outcomes including acute heart failure, malignant arrhythmogenesis, and delayed TS recovery in the clinical setting.<sup>2-5</sup> That is why, we wonder whether the patient<sup>1</sup> had any adverse clinical events during hospital stay and after discharge.

In summary, the coexistence of AMI and TS is possibly more prevalent than expected, particularly in the presence of certain risk factors, and might have important diagnostic and prognostic implications. On the other hand, certain morphologic mimickers (including the “pseudo-TS” pattern) should also be considered to avoid the potential overdiagnosis of TS in the setting of AMI. However, further studies are still needed to fully establish the clinical implications of TS and its mimickers in patients with AMI.

## ARTICLE INFORMATION

**AUTHOR NAMES AND AFFILIATIONS** Kenan Yalta, Ertan Yetkin (KY: Cardiology Department, School of Medicine, Trakya University, Edirne, Turkey; EY: Cardiology Department, Liv Hospital, Istanbul, Turkey)

**CORRESPONDENCE TO** Kenan Yalta, MD, Cardiology Department, School of Medicine, Trakya University, 22030, Edirne, Turkey, phone: +90 5056579856, email: kyalta@gmail.com

**CONFLICT OF INTEREST** None declared.

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**HOW TO CITE** Yalta K, Yetkin E. Takotsubo syndrome in association with acute myocardial infarction: diagnostic caveats and clinical implications. *Kardiol Pol.* 2021; 79: 95-96. doi:10.33963/KP.15766

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**Authors' reply** We would like to thank Dr Yalta and Dr Yetkin for their interest and valuable comments on our article.<sup>1</sup> First, they suggested that an acute occlusion of a large wrap-around left anterior descending (LAD) artery, extending to the inferior left ventricular (LV) wall, could be manifested by a contraction pattern typical of takotsubo syndrome (TS).<sup>2</sup> However, in our patient, the LAD artery was not a large wrap-around vessel and did not supply the mid-inferior LV segment.

Second, the overlaps of risk factors might increase the possibility of the coexistence of acute myocardial infarction (AMI) and TS.<sup>3</sup> The presented patient had hypertension and was exposed to psychological stress, regarded as coronary risk factors. Those risk factors are associated with spontaneous coronary artery dissection,<sup>4</sup> which is a possible cause of TS.<sup>2</sup> However, intravascular ultrasound performed during percutaneous coronary intervention showed no specific findings suggestive of coronary artery dissection or intramural hematoma at the culprit lesion in the LAD artery. Instead, a lipid-rich plaque with a thrombus was seen in the stenotic lesion. Therefore, the etiology of AMI in the presented case might not be spontaneous coronary artery dissection or coronary spasm yet atherosclerotic plaque rupture. Meticulous follow-ups and evaluations of electrocardiograms during and after the index hospitalization might be useful in indentifying the coexistence of AMI and TS.<sup>1</sup> Mitsuma et al<sup>5</sup> reported that resurgent giant

negative T waves at 2 to 3 weeks after the onset of TS were deeper than initial negative T waves on admission, which was also observed in our patient.<sup>1</sup>

Lastly, although patients with the coexistence of AMI and TS might have poor clinical outcomes,<sup>2,3</sup> the clinical course after PCI in our patient was uneventful and associated with resolution of chest pain. Over a follow-up of 2 years, the patient remained free from major adverse cardiac events including cardiac death, myocardial infarction, and ischemia-driven revascularization.

## ARTICLE INFORMATION

**AUTHOR NAMES AND AFFILIATIONS** Takao Konishi, Naohiro Funayama, Tadashi Yamamoto, Daisuke Hotta, Shinya Tanaka, Toshihisa Anzai (TK and TA: Department of Cardiovascular Medicine, Faculty of Medicine and Graduate School of Medicine, Hokkaido University, Sapporo, Japan; NF, TY, and DH: Department of Cardiology, Hokkaido Cardiovascular Hospital, Sapporo, Japan; ST: Department of Cancer Pathology, Faculty of Medicine, Hokkaido University, Sapporo, Japan)

**CORRESPONDENCE TO** Takao Konishi, MD, PhD, Department of Cardiovascular Medicine, Faculty of Medicine and Graduate School of Medicine, Hokkaido University, West 7, North 15, Kita-ku, Sapporo, 060-8638, Japan, phone: +81 11 706 6973, email: [takaokonishi0915@gmail.com](mailto:takaokonishi0915@gmail.com)

**CONFLICT OF INTEREST** None declared.

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**HOW TO CITE** Konishi T, Funayama N, Yamamoto T, et al. Takotsubo syndrome in association with acute myocardial infarction: diagnostic caveats and clinical implications. *Authors' reply. Kardiol Pol.* 2021; 79: 96. doi:10.33963/KP.15767

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