

Authors' reply

Dear Editor,

We would like to thank Dr. Madias for the valuable interest and contributions to our case report entitled "Sinus surgery complicated by ventricular fibrillation in a young patient: Inverted (reverse) Takotsubo cardiomyopathy."^[1] Although several possibilities have been proposed, the exact underlying mechanism is not yet clear. However, growing number of case reports and series help us better understand the complicated pathophysiology of Takotsubo cardiomyopathy (TTC).^[2] We would like to answer the author as follows:

1) We agree that osteal plaque formation in the right coronary artery should not be considered a spontaneously recanalized atheromatous culprit lesion. The main reasons were permanence of ST-segment elevation during coronary angiography, mildly elevated troponin levels, ST-segment elevation and regional wall motion abnormality beyond a single coronary artery distribution, young age of the patient, and absence of any risk factors for coronary artery disease.

2) Naturally the procedure itself (endoscopy and/or surgical trauma) could be at the root of TTC; that was the idea behind our title. Nevertheless, it is impossible to discriminate the exact reason for ventricular fibrillation and TTC in this case. A great number and variety of conditions have been associated with TTC. We had named some of them in our case report draft, but we had to remove them due to limitations on the number of references. Some of the conditions and diseases reported to be associated with reverse TTC include spine surgery,^[3] general anesthesia,^[4] ophthalmic surgery,^[5] cerebellar hemorrhage,^[6] pulmonary embolism,^[7] pacemaker implantation,^[8] use of male enhancement drugs,^[9] dobutamine stress echocardiography,^[10] and local anesthesia.^[11] It is clearly visible that some authors considered the surgical procedure to be a plausible trigger, while others considered it likely to be anesthesia or medications in a similar scenario.

3) Anesthetic agents including propofol have been reported to be associated with TTC, as abovementioned, but a definite connection between anesthetic agent and TTC is impossible to establish since pre-medication, patient anxiety about surgery (emotional stress),^[12] or

surgery itself (physical stress, insufficient anesthesia) could have triggered TTC. Meanwhile, the literature search containing propofol and TTC terms suggested by the author includes cases of TTC not only after propofol infusion, but various types of surgery and medications (succinylcholine, adrenalin, remifentanyl, rocuronium, etc.).^[13] Therefore, as one can see, direct causal relationship is hard to demonstrate in case reports, including ours.

4) Prevalance of life-threatening ventricular arrhythmias in TTC is reported to be from 1% to 4%, as mentioned in the main text. We did not consider "TTC triggered by ventricular fibrillation" to be conceivable since there is no such information available in the literature, to the best of our knowledge. However, exposure to defibrillation and myocardial stunning of the left ventricle may interfere with region wall motion abnormalities seen in TTC. We underlined this issue in the discussion section.

5) No additional drugs were used after defibrillation and the patient was quickly resuscitated.

6) We thank the author for the reminder of attenuation of QRS complexes (attQRS) in TTC. AttQRS is a recently described diagnostic tool that has been shown to be associated with myocardial edema and heart failure in a few reports.^[14,15] It is based on comparison of amplitudes of QRS complexes in serial electrocardiograms (ECGs). It is commonly associated with low-voltage QRS complexes.^[15] However, attQRS is a semi-quantitative method and not always feasible, and there are no diagnostic criteria yet for its definition. As the author stated, attQRS was visible in serial ECGs of our patient, consistent with myocardial edema recorded in cardiac magnetic resonance imaging (CMRI). Nonetheless, low voltage criteria (≤ 5 mm in limb leads or ≤ 10 mm in precordial leads) were not met. Although attQRS has been shown to be linearly associated with systolic function recovery and cardiac biomarker normalization, Guerra et al. concluded that it was not reliable to differentiate acute coronary syndrome from TTC.^[14] No signs of infarction or left ventricular wall motion abnormality were found on CMRI, only myocardial edema, hence cardiac basal wall was free from myocardial infarction in CMRI.

7) ST-segment elevation in high lateral leads (DI and aVL) is not a rule in TTC. Electrocardiographic changes may vary according to the territory involved

in TTC. In addition, the cited article is about different ECGs in recurrent episodes of 2 different territories of left ventricle in the same patient with TTC.^[16] Our patient did not have recurrent episodes and ST-segment elevation was limited to high lateral leads. Rather than basal pathology, apicobasal gradient of left ventricular myocardial edema in TTC is more likely to produce ST-segment elevation and reciprocal changes.^[17]

8) Posterobasal hypokinesia detected by strain and strain rate analysis before discharge was possibly the last segment, because 1 month later, transthoracic echocardiography showed no wall motion abnormality. However, we did not perform strain and strain rate analysis during that visit. That analysis could have better confirmed improvement of left ventricle systolic dysfunction. On the other hand, CMRI revealed no scar, fibrosis or infarction, just mild myocardial edema.

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Conflict-of-interest issues regarding the authorship or article: None declared

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Cholesterol embolization syndrom

Dear Editor,

The recent report on cholesterol embolization syndrome was very interesting.^[1] Two cases were reported by Dizman et al.^[1] Indeed, this condition can be

severe and can have serious complications, including neurological and lung problems.^[2] In the present case, it was questionable whether the problem was iatrogenic. It was noted that the syndrome is a “complication of peripheral endovascular interventions.”^[3,4] In such cases, if the practitioner is able to recognize and identify the iatrogenic problem early, early man-