

Recurrent admission with ventricular fibrillation in the context of Takotsubo cardiomyopathy



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Introduction

Takotsubo cardiomyopathy (TTC) has been recognized worldwide, comprising 2% of admissions with acute coronary syndrome (ACS).^{1,2} In-hospital mortality varies from 3% to 5%, mainly driven by ventricular arrhythmias, intractable pump failure, cardiac rupture, or thromboembolic stroke. Moreover, the prevalence of life-threatening arrhythmias including ventricular fibrillation (VF) and ventricular tachycardia has been reported at 3%–10%. Nearly 4% of the patients develop cardiac arrest.^{1–3} However, there is uncertainty on the role of implantable cardioverter-defibrillators (ICD) for secondary prevention of sudden cardiac death.⁴ Here, we present a case of recurrent TTC with recurrent life-threatening arrhythmias, suggesting the benefit of ICD insertion regardless of the improvement in the left ventricular function.

Case report

A 53-year-old man with history of hypertension, anxiety, post-traumatic stress disorder, and recurrent admissions with ACS-TTC presented with sudden onset of chest pain. Electrocardiogram (ECG) showed injury in anterolateral leads and VF (Figure 1A). He had 2 prior similar admissions in 2015 and 2017. In 2015, he presented with VF arrest. ECG showed ST segment elevation in anterior leads (Figure 1C). His troponin level was 10.2 ng/mL. Coronary angiography exhibited only mild coronary disease in the left circumflex artery. Left ventriculography depicted an ejection fraction (EF) of 25%–30% with apical akinesis and hypercontractile base. Two years later, the patient presented again with ACS. ECG again showed ST segment elevation in anterior leads (Figure 1B). Coronary angiogram revealed no change in anatomy and a comparable left ventricular function with anterior wall motion abnormality (Figure 1G and I). He was subsequently discharged and followed up in the clinic. His medical therapy for cardiomyopathy was optimized with beta-blockers and angiotensin-converting enzyme inhibitors

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KEY TEACHING POINTS

- Relapse of Takotsubo cardiomyopathy can present with life-threatening arrhythmias.
- The substrate of ventricular arrhythmias in Takotsubo cardiomyopathy is not well known, but ventricular arrhythmias can occur despite optimal medical therapy for cardiomyopathy.
- There use of implantable defibrillators in patients with Takotsubo cardiomyopathy presenting with unstable ventricular arrhythmias lacks of solid data. However, individual case-based study should be suggested to balance benefits vs risks of the procedure.

(ACEi). Additionally, he was treated with anxiolytic and antidepressive medications. His left ventricular EF and wall motion completely normalized in a few weeks on a follow-up echocardiogram. He did well for the next 6 months. However, this time he was readmitted to another facility with sudden onset of chest pain, ECG evidence of anterolateral injury, and VF arrest (Figure 1A). Cardiac biomarkers were elevated, with troponin level of 3 ng/mL. He was transferred to our facility for coronary angiography, which showed no change in anatomy and a similar left ventriculogram consistent with TTC (Figure 1F and H). Echocardiography showed typical apical ballooning (Figure 1D and E). Based on the prior history of TTC and recurrent VF arrest on 2 different admissions, we elected to proceed with implantation of an ICD. The patient was discharged with no further hospital events.

Discussion

The rate of recurrence of TTC has been reported to vary from 2% up to 26%, being particularly high during the first year with almost 3%.^{5,6} Thereafter, the recurrence rate of the disease drops to 1% per year. Risk factors for recurrent disease have not been well identified. Male sex has been linked to higher risk of complication. The current data

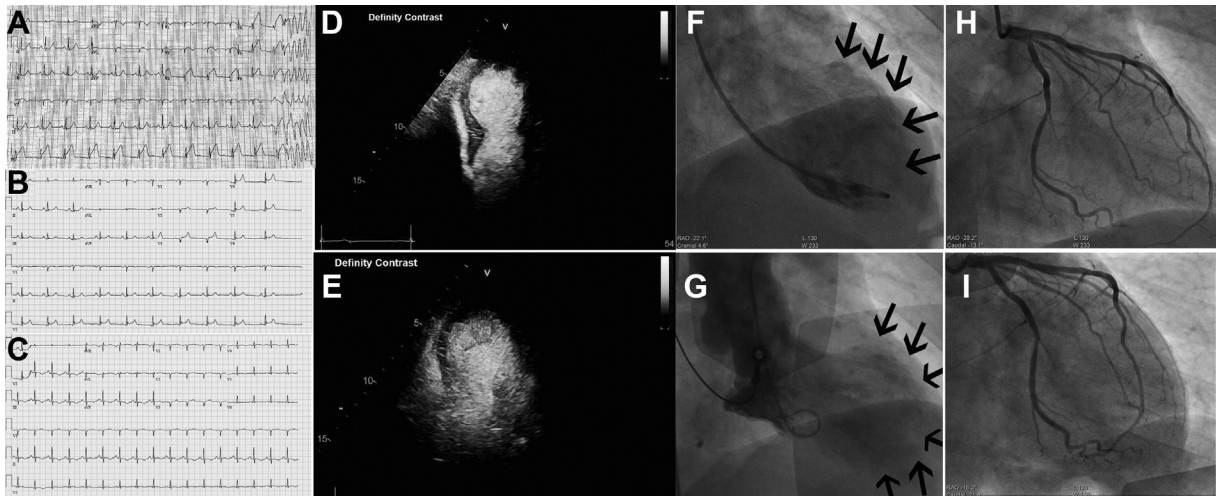


Figure 1 **A:** Electrocardiogram (ECG) in the current Takotsubo cardiomyopathy presentation depicted ST segment elevation (STE) in anterior leads showing R-on-T phenomenon at the end of the rhythm strip. **B:** ECG showing prior presentation in 2017 with STE in anterior leads. **C:** ECG from initial presentation in 2015 with evidence of anteroseptal wall myocardial infarct, age undetermined. **D, E:** Representative images with contrast echocardiography of the apical ballooning with anterior wall akinesis. **F:** Contrast left ventriculography performed in the current presentation to demonstrate wall motion abnormalities in the anterior wall (*arrows*). **G:** Contrast left ventriculography performed in the prior hospital admission (2017) with similar wall motion abnormalities in the anterior wall as panel F (*arrows*). **H, I:** Serial coronary angiography in both admissions depicting mild disease in the left circumflex arteries but otherwise widely patent left anterior descending artery.

support the use of beta-blocker in the acute setting with tachyarrhythmia. There is little evidence of continued benefit beyond convalescence.⁷

The mechanism of ventricular tachycardia/fibrillation in TTC is not well defined. A plausible substrate is myocardial edema as shown on cardiac magnetic resonance imaging. Ischemia or catecholamine surge could also play a role in the etiology.⁸ On ECG, prolonged QTc and augmented J wave are 2 precipitating factors of ventricular arrhythmias.⁹ Our patient did exhibit those on his last presentation.

Our patient developed a relapse of TTC despite treatment with beta-blockers and ACEi. In fact, medical therapy for cardiomyopathy did not seem to have an impact in avoiding recurrence of the disease, but the use of ACEi or aldosterone receptor blockers seems to have a beneficial effect on long-term mortality.⁶ Regarding symptoms, one third of the patients continued to have recurrent chest pain and required further management and evaluation, as occurred in our case.

Despite previous reports on sudden cardiac death and ventricular arrhythmias, there is uncertainty regarding implanting an ICD for secondary prevention of sudden cardiac death in patients with primary TTC.^{4,7,10} The argument against inserting cardiac devices (pacemaker or ICD) is based on the benign course and fast recovery of the cardiac function in most TTC patients.

A small cohort study suggested that bradyarrhythmias in the setting of TTC may require a permanent pacemaker insertion. However, the authors did not find enough evidence to support ICD insertion despite life-threatening arrhythmias. In the same study, there was a suggestion of insertion of a wearable cardioverter-defibrillator while awaiting the recovery of cardiac function.⁴ Since most of the patient series are retrospective, long-term follow-up on recurrent arrhythmic events is not available.

Certainly, in our case the disease recurred with a second documented VF event requiring cardiac resuscitation. Moreover, the life-threatening arrhythmic events occurred roughly 3 years apart. Luckily, both arrhythmias happened in the hospital and the patient was successfully resuscitated.

To our knowledge, our case is the first to report a recurrent TTC with life-threatening arrhythmia. This highlights the long-term risk of sudden cardiac death in this population that might be underestimated.

In retrospect, we consider that ICD should be highly considered regardless of recovery in EF. The utility of a wearable cardioverter-defibrillator is highly in doubt, as we illustrate that late recurrence is plausible.

Conclusion

Our report aims to highlight the risk of recurrent life-threatening arrhythmias in TTC despite recovery in the cardiac function. We suggest consideration for ICD insertion as a secondary prevention. Future studies with long-term outcomes are needed for a final conclusion.

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