

CASE REPORT

Transient Long QT Development in a Patient with Takotsubo Cardiomyopathy

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ABSTRACT

QT interval prolongation on the electrocardiogram is considered a precursory sign for imminent, potentially lethal ventricular arrhythmias. Beside the inherited condition of long QT syndrome, numerous drugs, certain electrolyte disturbances and early transmural ischemia have been identified to induce reversible prolongation of the QT interval, collectively called as acquired long QT syndrome. Herein we describe a case of a patient with transient QT prolongation and Takotsubo cardiomyopathy, a rather infrequent cause of long QT development. Serial changes of the repolarization pattern were documented to demonstrate progression and resolution of the abnormal QT interval.

Keywords: Takotsubo cardiomyopathy, long QT interval, cardiac arrhythmia

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INTRODUCTION

Takotsubo cardiomyopathy (TCM) is a reversible cardiac abnormality mimicking acute coronary syndrome without coronary artery occlusion, often presenting after severe emotional distress. In some cases, the primary echocardiographic finding is complicated with QT prolongation on the electrocardiogram, potentially resulting in life-threatening arrhythmias. We present the case of a patient with TCM associated QT prolongation.

CASE PRESENTATION

A 67 year-old woman with no known cardiovascular disease was admitted with breathlessness and chest pain following severe emotional stress. Her resting electrocardiogram (ECG) recorded on admission displayed sinus tachycardia with mild ST segment changes (mild ST elevation: V1–2, ST depression: II, V5–6; Figure 1A). Bedside echocardiography showed apical akinesia and impaired left ventricular (LV) ejection fraction (EF). A control ECG

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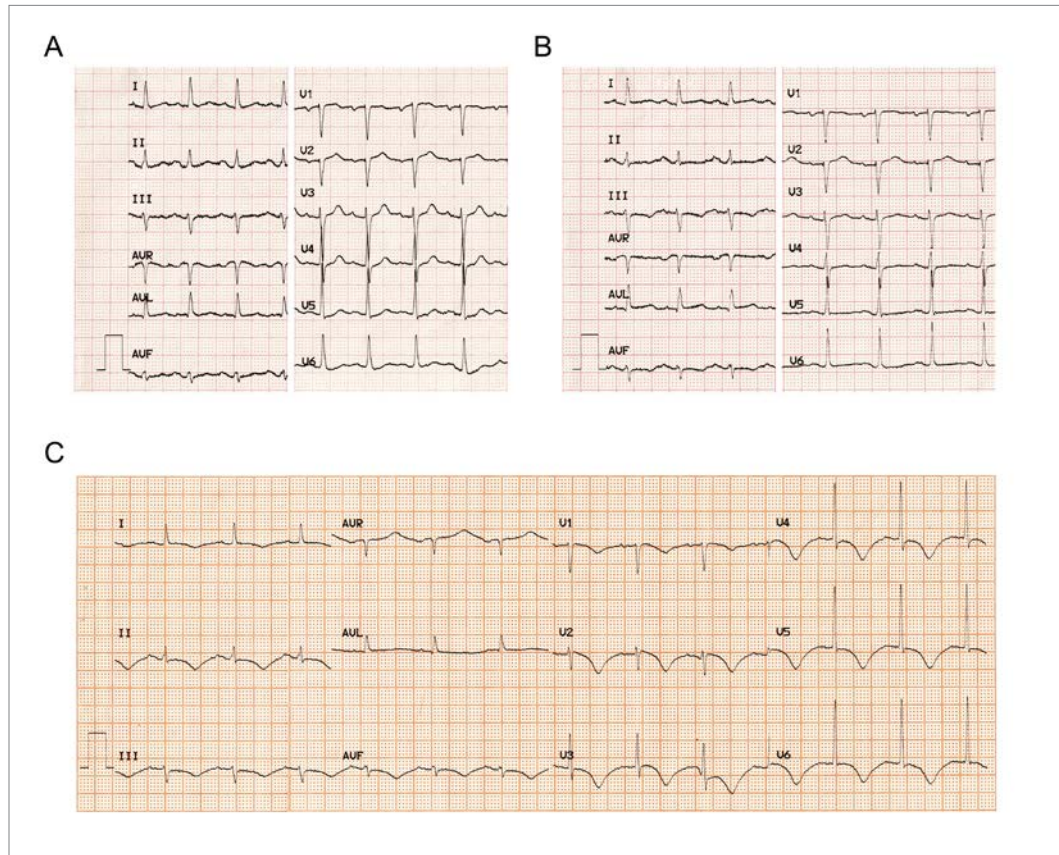


FIGURE 1. 12-lead electrocardiograms recorded on admission (A), at 1 hour (B) and on the second day (C).

recorded one hour later displayed dynamic T wave changes (flattening T waves in the precordial leads; Figure 1B). Baseline laboratory results revealed an elevated level of cardiac troponin T, and the patient was therefore referred for invasive investigation of the suspected myocardial infarction. Normal coronary arteries were confirmed on the coronary angiogram. A repeated echocardiography demonstrated apical ballooning and a significantly reduced LVEF of 30% (Figure 2A). After all, she was diagnosed with TCM and commenced on bisoprolol, perindopril, eplerenone and rosuvastatin. Electrolytes were supplemented orally for borderline hypokalemia. The next day she developed a prolonged corrected QT (QTc) interval, which evolved into a marked prolongation of 640 ms with deep, inverted T waves (Figure 1C). This necessitated strict ECG monitoring for the potential occurrence of ventricular arrhythmias. In the following days, consecutive ECGs showed gradual regression of the markedly prolonged QTc interval, which reached a near-normal QTc of 460 ms on day 8 (Figure 3). A repeated echocardiogram displayed gradual increase of LVEF, reaching 48% in a week. Throughout the eight days of hospitalization, the patient was hemodynamically stable without any tachy- or bradyarrhythmia episodes.

At one-month follow-up, she presented with a completely normal repolarization pattern (Figure 3) and normal echocardiogram (Figure 2B). The patient and the institution consented with the publication of the case.

DISCUSSION

Takotsubo cardiomyopathy is a reversible cardiac disorder characterized by apical ballooning and transient reduction of LVEF, associated with clinical signs and ECG abnormalities mimicking acute coronary syndrome in the absence of coronary artery disease. It is typically triggered by intense psychological or emotional stress and occurs predominantly in postmenopausal women. Various mechanisms have been postulated in the background of TCM, however myocardial toxicity due to excessive catecholamine release is believed to be the most probable etiology.^{1,2}

A typical echocardiographic finding in TCM is the wall motion abnormality confined to the apical region of the heart. ECG abnormalities may include ST segment elevation, T wave inversion and, in more than 50% of the cases, QT prolongation.^{3,4} Although the latter may account for a

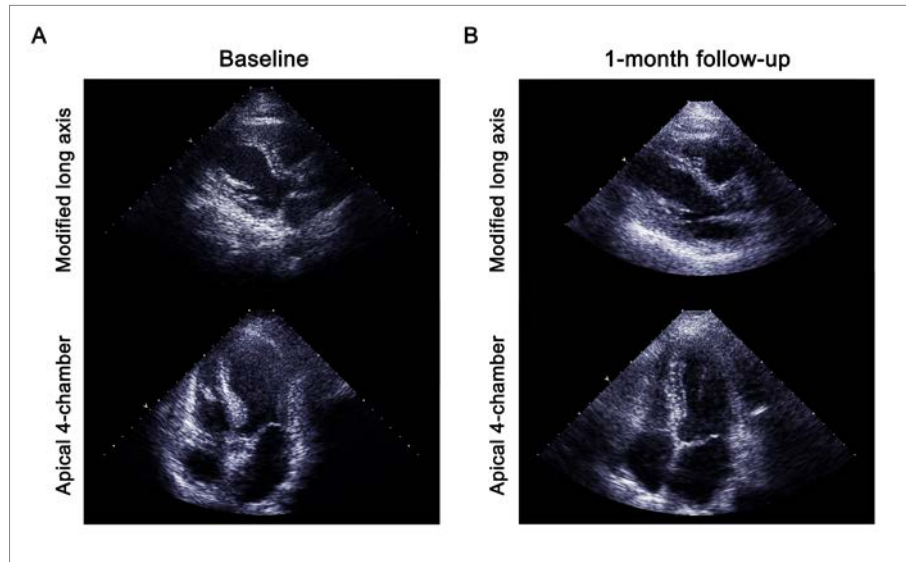


FIGURE 2. A) Modified long-axis and apical 4-chamber views of the heart on echocardiography after admission showing apical ballooning of the left ventricle and a reduced ejection fraction. B) Normal echocardiographic picture at one-month follow-up.

higher propensity to malignant ventricular arrhythmias, these are relatively uncommon in TCM patients, with an incidence of only 1–1.5%.¹ In a number of case reports on TCM-associated long QT and consequent torsades de pointes arrhythmia, the QT prolongation was attributed to electrolyte disturbances, bradyarrhythmia or enhanced lability of repolarization.⁵ Therefore the risk of long QT-related tachyarrhythmias may be successfully reduced by avoiding these proarrhythmic conditions via continuous monitoring, appropriate electrolyte supplementation or transvenous pacing.^{3,6} Furthermore, an implantable cardioverter defibrillator may offer more appropriate long-

term management for high-risk patients with a post-TCM QTc interval >500 ms, or for those who have suffered a syncope or cardiac arrest. The time for complete resolution of the prolonged QTc interval in TCM varies between 2 days and several months.³

Despite the pronounced QTc prolongation, our patient remained free of arrhythmia episodes. Of note, the long QTc interval peaked only in the subacute phase, which has important implications regarding recommendations for the duration of the in-hospital stay: an early discharge of patients may not allow timely documentation of this potentially life-threatening ECG phenomenon.

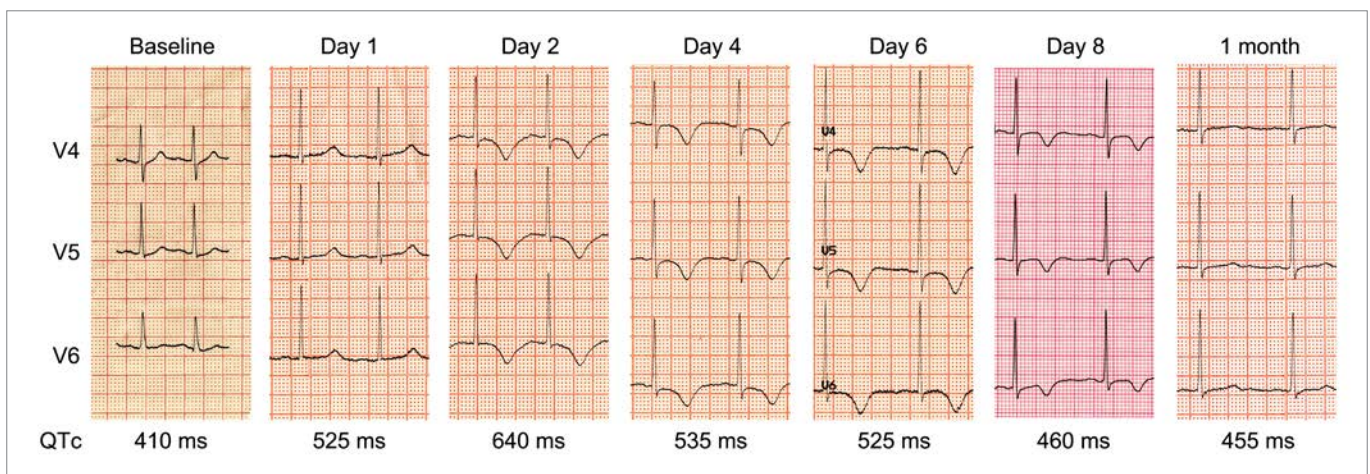


FIGURE 3. Serial electrocardiogram recordings of leads V4–V6 during the in-hospital stay and follow-up period. QT prolongation peaks on day 2 with 640 ms, then the QTc interval gradually shortens. The electrocardiogram recorded at one-month follow-up displays a completely normal repolarization pattern. (QTc: corrected QT)

Taken together, TCM and associating ECG abnormalities are reversible and tend to disappear as the LV function normalizes. The prognosis is favorable in patients who survive the acute episode without complications. Nonetheless, TCM requires strict monitoring and continuous alertness for malignant tachyarrhythmias, even when the presenting symptom has already resolved. When TCM is accompanied by QT prolongation, correction of electrolytes and the avoidance of bradycardia are of the utmost importance in order to prevent life-threatening complications. In view of the relatively high recurrence rate (11.4%) of TCM, long-term follow-up of these patients is also recommended.⁷

HIGHLIGHTS

- Takotsubo cardiomyopathy is a potential cause of acquired long QT syndrome.
- QT prolongation develops only in the subacute phase, thus appropriate length of in-hospital stay is crucial for timely ECG documentation.
- Avoidance of bradycardia and electrolyte disturbances is of the utmost importance.

CONFLICT OF INTEREST

Nothing to disclose.

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