

## Short-long-short sequence-induced torsade de pointes after transcatheter aortic-valve implantation

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### Introduction

The gold-standard treatment of symptomatic aortic stenosis (AS) is surgical aortic-valve replacement (SAVR); however, many patients owing to high operative risks are not candidates for this treatment (1). Hence, transcatheter aortic-valve implantation (TAVI) was introduced to be an alternative modality to SAVR. Because of older patient population and structural heart disease, TAVI patients may have proarrhythmic tendencies related to electrolyte imbalances and drug-drug interactions. Among patients with pacemakers, implantable cardioverter-defibrillators (ICD), and cardiac resynchronization therapy (CRT) receivers, the proarrhythmic effect of pacing was described earlier (2-4). Torsades de pointes (TdP) is a polymorphic ventricular tachycardia in the setting of a prolonged QTc interval (5); however, pacing related episodes and triggered activity related TdP in AS patients were cited in several reports (2-4, 6, 7). This report describes a 78-year-old patient being VVI paced, who experienced a short-long-short sequence-induced TdP without QT prolongation in intensive care unit after TAVI.

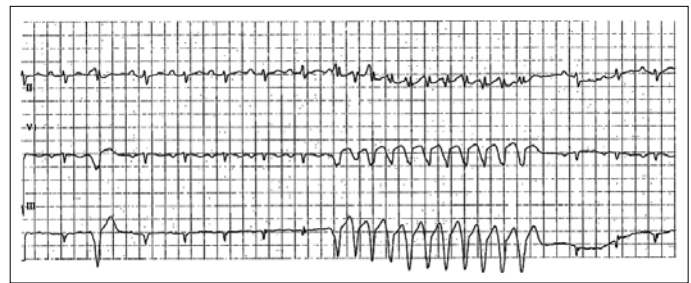
### Case Report

Seventy-eight-year-old female was admitted to the hospital with progressive dyspnea. She underwent pacemaker implantation two months ago because of an intermittent third-degree atrioventricular block. The initial transthoracic echocardiography (TTE) revealed severe AS (mean gradient, 50 mm Hg; aortic-valve area, 0.8 cm<sup>2</sup>) and mild aortic regurgitation with normal ejection fraction (65%). The heart team decided to perform TAVI via a trans-femoral approach utilizing a 29-mm CoreValve (Medtronic, Minneapolis, MN) successfully 3 days after coronary intervention. Post-procedural TTE showed a well-functioning bioprosthetic valve and mild aortic insufficiency.

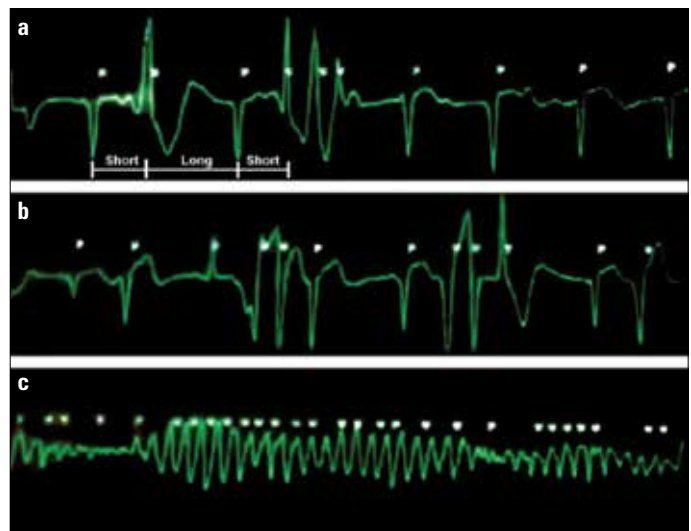
On the post-procedural third day, ventricular extrasystoles (VES) with short-long-short sequences and non-sustained ventricular tachycardia (VT) with right bundle branch block pattern (RBBB) were seen on the monitor (Fig. 1). The patient later experienced TdP (Fig. 2). Following 300 J defibrillation, regular rhythm was maintained. There was no QT prolongation (QT=420 milliseconds) and pacemaker malfunction, and her electrolytes were within normal limits. She had no ischemic symptoms or electrocardiogram (ECG) abnormalities. Although we increased pacemaker basic rate to 80 beat/minute, because of the absence of a conclusive cause of TdP, the heart team decided to upgrade the pacemaker to a dual chamber pacemaker-defibrillator (DDD-ICD) as it would be safer for the patient. The patient was discharged from the hospital after 2 days of ICD implantation with good clinical condition.

### Discussion

In the elderly population, AS is a common medical problem. Patients with severe symptomatic AS with high risk profile are candi-



**Figure 1. Morphology of ventricular extra-systoles and ventricular tachycardia indicate the origin of arrhythmia from left ventricular outflow tract**



**Figure 2. a-c. Short-long-short sequence (a, b). Torsade de pointes (c)**  
dates for TAVI and tend to be older than those who undergo SAVR. Therefore, they may be more susceptible to arrhythmias. Not only treating the underlying heart condition, but also the post-procedural care of the older patients and managing the complications may be important for the outcome.

Most common arrhythmias are bradycardia and atrioventricular block after TAVI, and it has been shown that approximately every 7<sup>th</sup> patient undergoing TAVI requires a permanent pacemaker after the procedure (8). Tachycardia is unusual and there are a few case reports presenting VT after TAVI procedure in the literature (9, 10). However, our case is the first one presenting TdP after TAVI. In our case, the origin of VES and VT were most probably the left ventricular outflow tract (LVOT) because of RBBB morphology in ECG. Patient underwent pacemaker implantation two months before TAVI. Before pacemaker implantation, the rate of the idioventricular rhythm was 30/minute, and QT was 470 milliseconds. In our case, after pacemaker implantation, the measured QT interval was 420 milliseconds at a rate of 65 beats/minute; however, the right ventricular apex pacing could disguise left ventricular electrical remodeling as well as QT prolongation, which may enhance the susceptibility for arrhythmias in such patients.

Furthermore, in AS patients, hypertrophic myocardium may generate the substrate for arrhythmias via triggered activity (6). Vos et al. (7) showed that six weeks after creating a complete AV block in the dog leads to electrical remodeling due to the altered electrophysiological properties of the hypertrophic myocardium and subsequently an

arrhythmogenic susceptibility. Short-long-short sequences that led to TdP may have been the manifestation of triggered activity in our case. Therefore, we performed DDD-ICD implantation for the prevention of sudden cardiac death.

## Conclusion

In this case, we emphasize the precise care of post-procedural TAVI patients. They are older and fragile; therefore, may be the candidates for arrhythmias. Despite the treatment of severe AS with either TAVI or surgery, a tendency toward arrhythmia may remain as the reverse remodeling process continues. Even after a successful intervention, an unexpected death can occur due to malignant arrhythmias.

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