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Ventricular Tachycardia Caused by Moderator Band in a Patient with Thalassemia Major

CASE REPORT

INTRODUCTION

Heart failure and arrhythmias associated with cardiac iron overload are known to occur in patients with thalassemia major.[1] Among arrhythmia cases, atrial and ventricular tachycardia (VT) cases have been previously reported.[1,2] This case presents a rare type of VT originating from the right ventricular moderator band.

CASE REPORT

A 27-year-old female patient diagnosed with thalassemia major, who was taking deferasirox 1 × 1440 mg, presented to the emergency department with palpitations. Ventricular tachycardia was observed on the electrocardiogram (ECG) in the emergency department (Figure 1). Rhythm control could not be maintained with intravenous 10 mg metoprolol and intravenous 300 mg amiodarone. Synchronized electrical cardioversion with 100 J was done, and sinus rhythm was provided (Figures 2 and 3). The patient was administered amiodarone 200 mg 3 × 1 and metoprolol 50 mg 2 × 1. The patient's blood tests showed hemoglobin 9.5 g/dL, iron 177 µg/dL, iron-binding capacity 30 µg/dL, total iron-binding capacity 207 µg/dL, and ferritin 7484 µg/L. An echocardiogram performed on the patient showed a left ventricular ejection fraction of 50%, second-degree tricuspid regurgitation, and a systolic pulmonary artery pressure of 35 mmHg. Cardiac magnetic resonance imaging revealed a myocardial T2* time of 2.5 milliseconds and severe iron accumulation (Figure 4). The patient underwent implantation of a ventricular chamber implantable cardioverter defibrillator. Follow-up device recordings showed ongoing VT episodes, and the patient underwent three-dimensional mapping. Right ventricular mapping performed with ECG-guided pace mapping demonstrated VT with a right ventricle (RV) moderate band morphology, 95% consistent with the mapping (Figures 5 and 6, Videos 1 and 2). These areas were ablated with 50 W radiofrequency (RF) ablation energy to achieve homogenization. No VT episodes were observed in the patient during follow-up.

DISCUSSION

Cardiac side effects are seen in patients with thalassemia major due to iron accumulation. While heart failure is the most common cause of death among these patients, it is known that deaths due to QT prolongation, ventricular arrhythmia, and torsades de pointes related to iron accumulation are also seen.[1,3] Arrhythmias are usually reentrant tachycardias.[1] Studies in patients with thalassemia major have found that patients with iron loading <10 milliseconds on the T2 sequence of cardiac MRI have a high risk of ventricular arrhythmia and a high risk of developing heart failure.[1,4] In this patient, the T2 sequence duration was less than 10 milliseconds on the MRI, and a VT episode was present.

In the literature, no patient has been reported with both thalassemia major and VT caused by a moderator band. This patient is unique in this point. The moderator band is a structure extending from the septum to the anterior papillary muscle of the right ventricle. It can cause ventricular arrhythmias, ventricular extrasystoles, VT, and ventricular fibrillation.[5,6] It has been demonstrated in animal experiments

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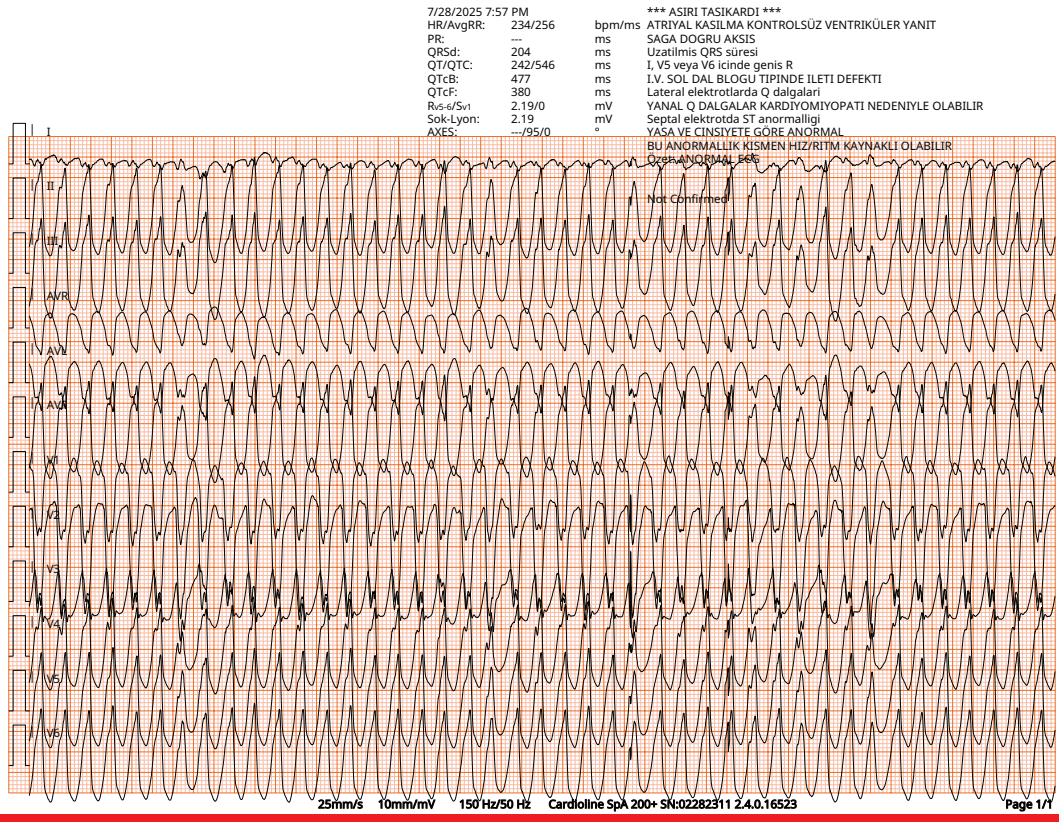

Figure 1. Patient's electrocardiogram with ventricular tachycardia.

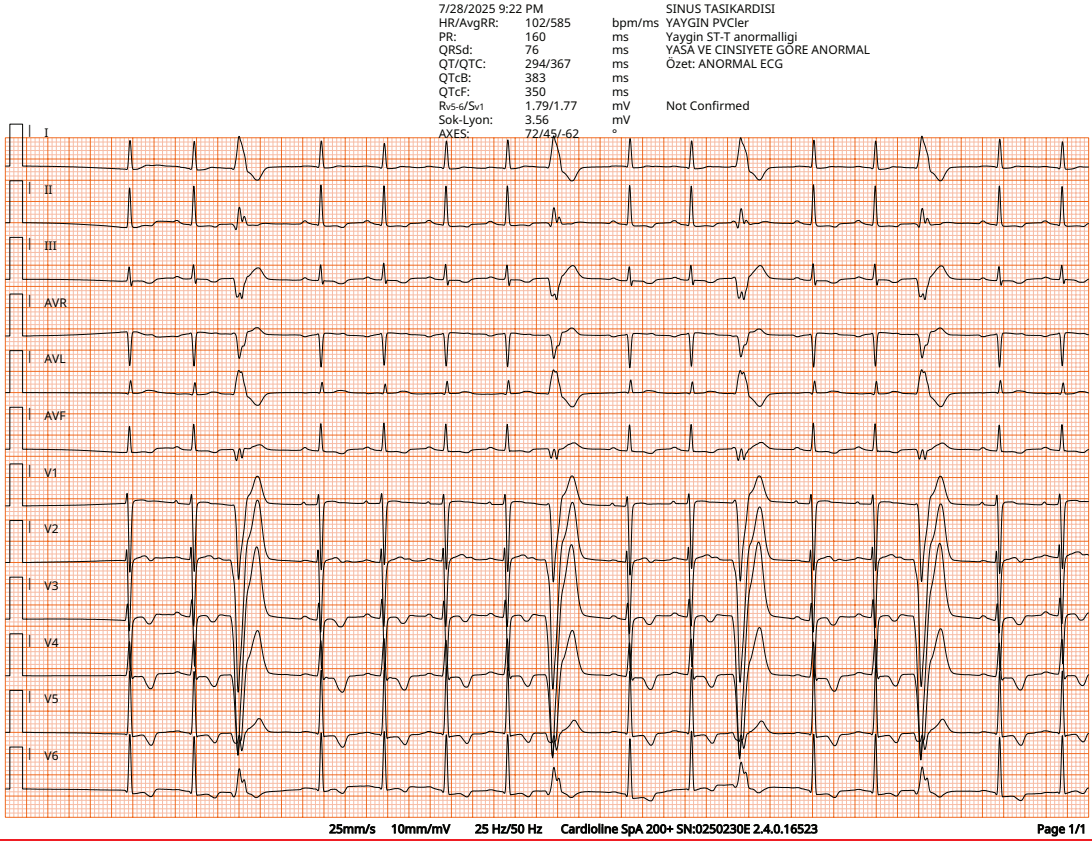

Figure 2. Patient's electrocardiogram with ventricular extrasystoles in sinus rhythm.

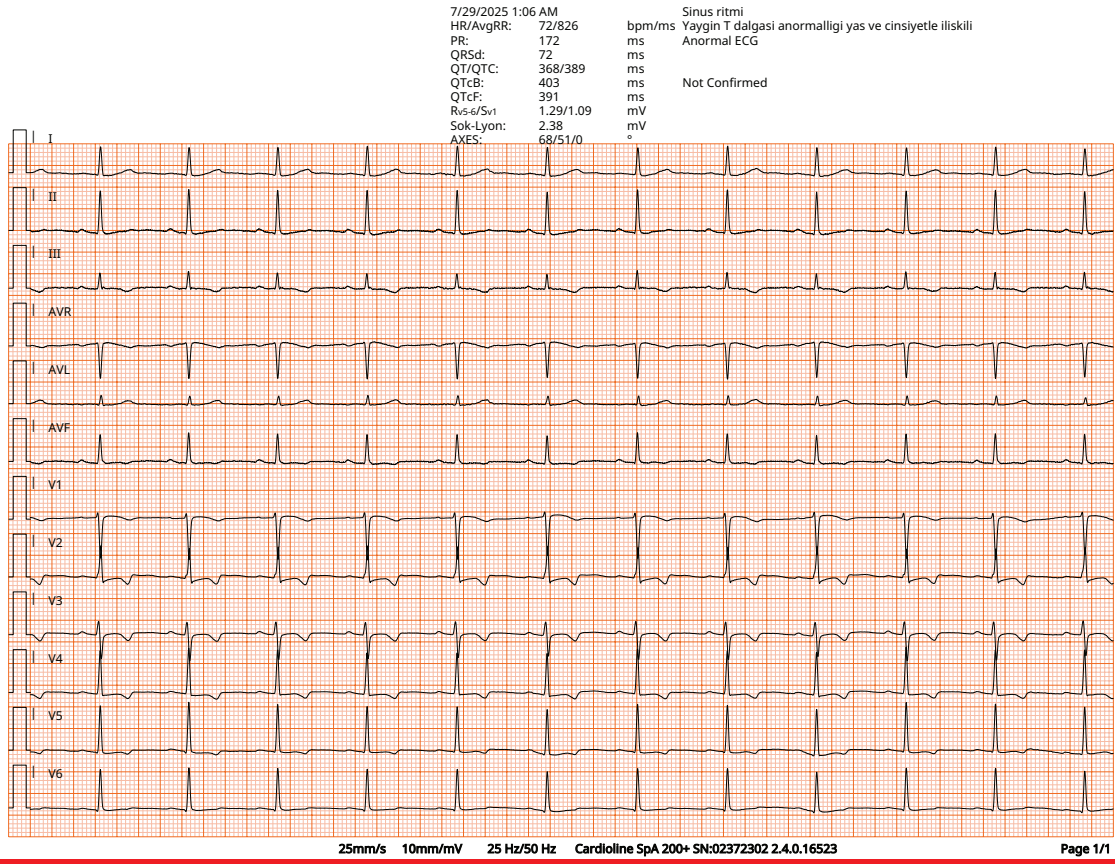

Figure 3. Patient's electrocardiogram in sinus rhythm.

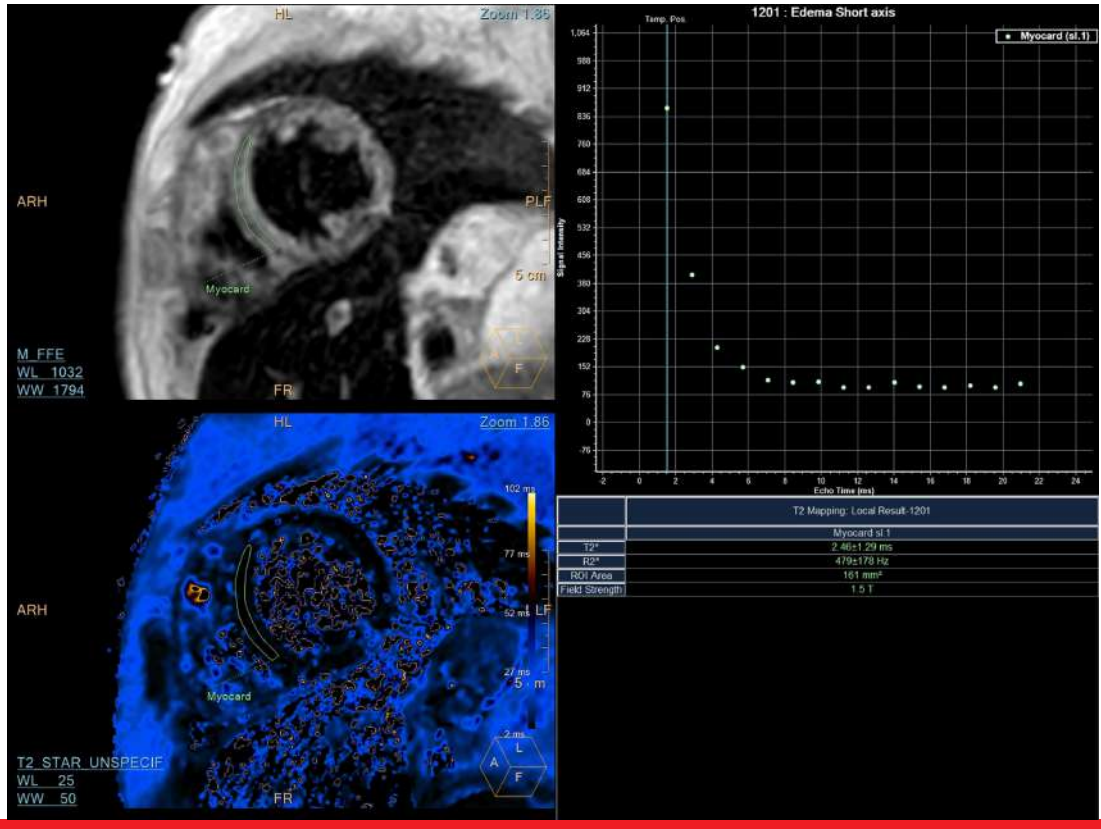

Figure 4. Cardiac magnetic resonance imaging T2 star sequence.

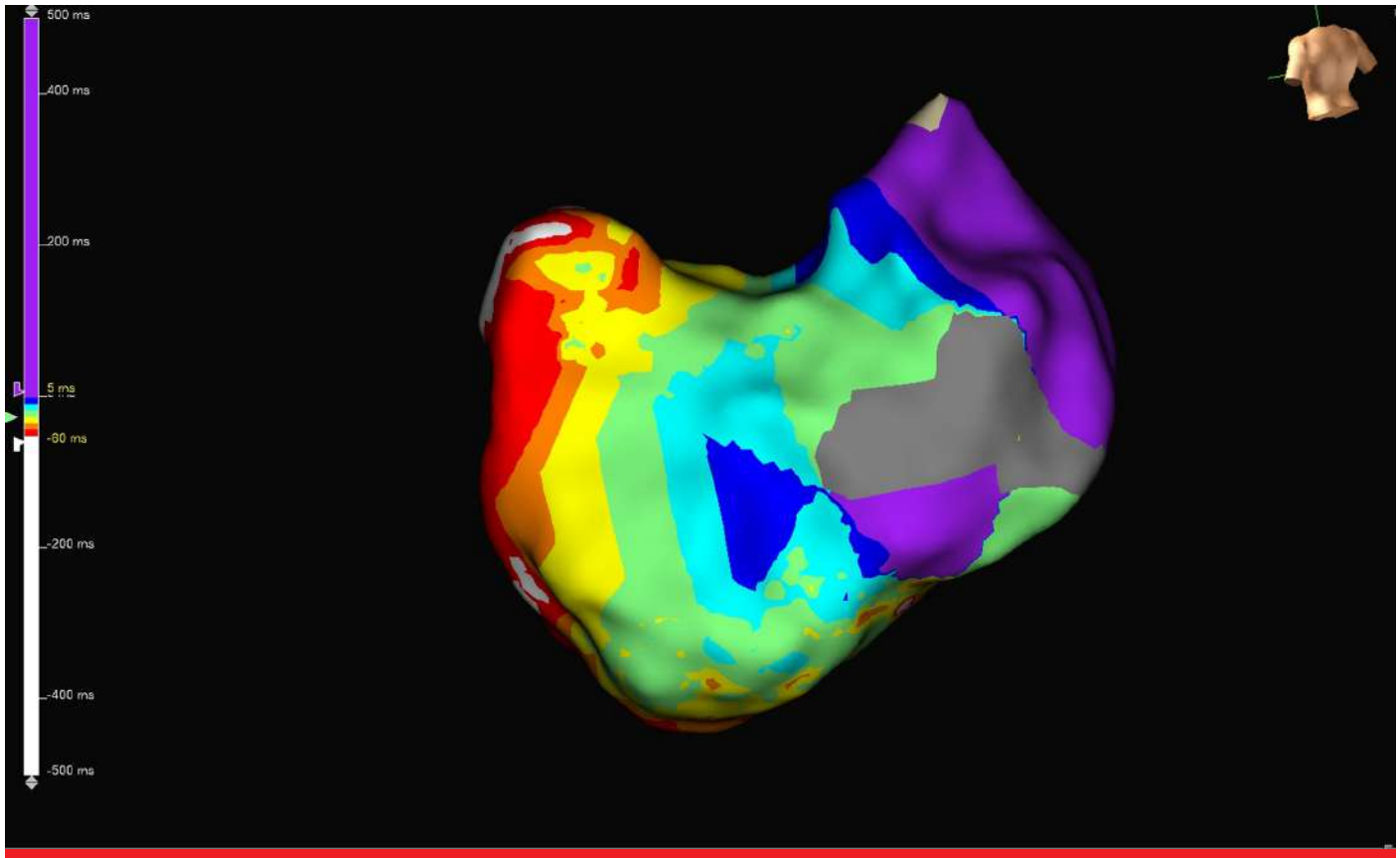

Figure 5. Local activation time map during the patient's 3D mapping.

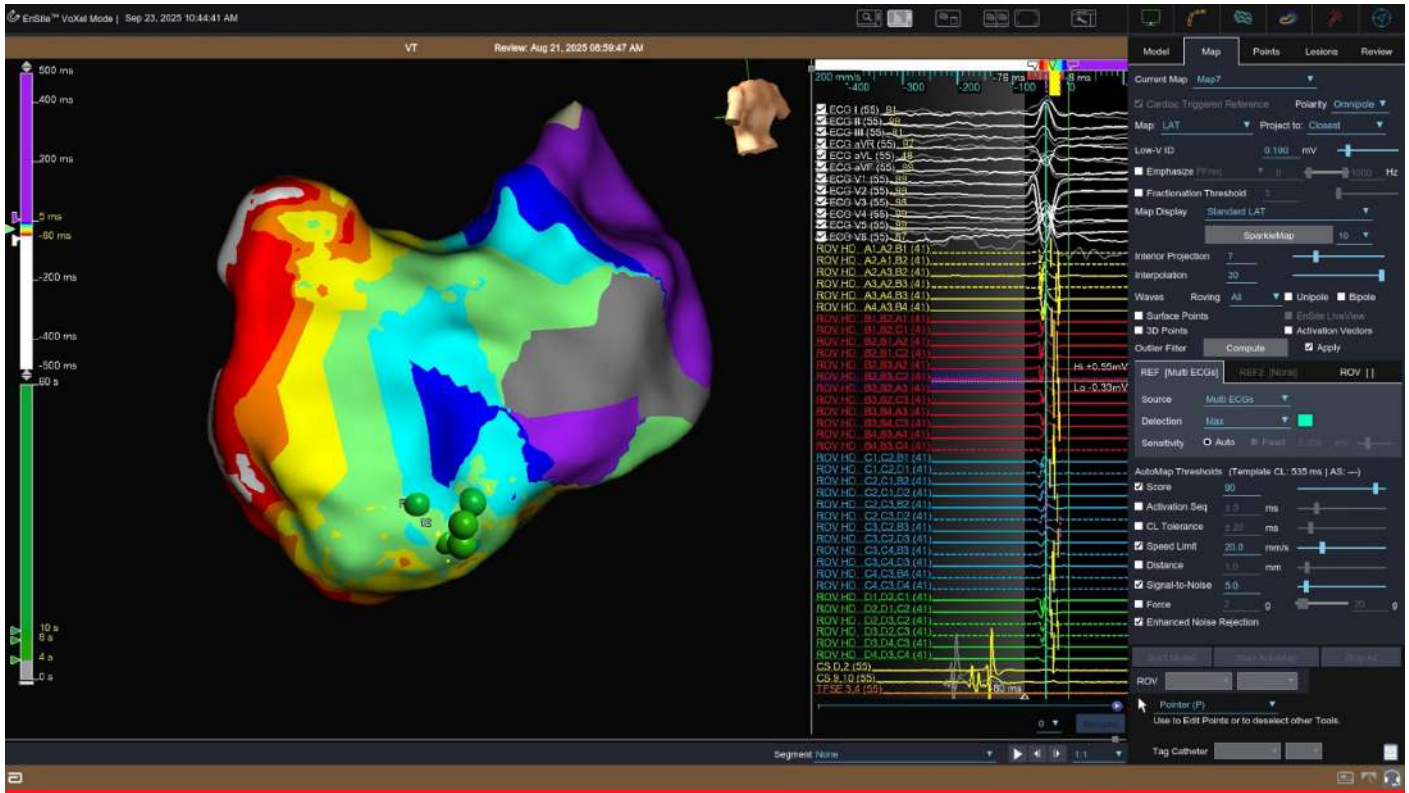

Figure 6. Locations where the RF application was applied to the patient.

that this shortens the right ventricular free wall and septum, leading to ventricular reentrant arrhythmias.[6] If RF ablation is unsuccessful in the ablation of moderator band-related ventricular arrhythmias, cryoballoon ablation can be adjuvantly performed to minimize contact problems.[7,8] RF ablation alone was effective in controlling arrhythmias in this patient.

CONCLUSION

Patients with thalassemia major are a group that requires close monitoring for arrhythmia. Monitoring patients' T2 times with cardiac MRI and performing rhythm Holter monitoring are important for early diagnosis, while particular care should be taken with reentrant tachycardias in these patients. The use of pace mapping will be helpful in identifying anatomical structures that could cause reentrant tachycardia.

Informed Consent: The informed consent was obtained from the patient for this study.

Declaration of Interests: The authors have no conflicts of interest to declare.

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Video 1: Mapping during pacing.

Video 2: Local Activation Time (LAT) activation map.

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