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Pleomorphic ventricular tachycardia originating from Purkinje fiber network of left anterior fascicle

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Abstract A 55-year-old woman with recurrent syncope and palpitation experienced polymorphic ventricular tachycardia (VT) and more than 3 monomorphic VTs with a right bundle branch block configuration as inferior, middle, and superior axis. During the pleomorphic VT, the diastolic potential (dp) was recorded at the anterolateral left ventricle. Changes in the QRS morphology were associated with the time between dp and onset of QRS complex (dp-V interval), and prolongation of dp-V interval terminated the VT. In addition, the delayed potentials were seen during sinus rhythm around this area. Delivery of radiofrequency current targeting the delayed potentials abolished all the VTs. Different exits from relatively large area of slow conduction in the left anterior fascicle might have produced the pleomorphic VTs.

Keywords: Pleomorphic ventricular tachycardia; Polymorphic ventricular tachycardia; Diastolic potential; Delayed potential; Left anterior fascicle; Purkinje fiber network; Syncope; Radiofrequency ablation

Introduction

Idiopathic ventricular tachycardia (VT) with a right bundle branch block (RBBB) and left-axis deviation originating from the area of left posterior fascicle has been well-known.[1-5] In rare instances, idiopathic left anterior fascicular VT has also been demonstrated.[6] Both VTs are verapamil sensitive, and ablation of the diastolic potential representing the Purkinje potential has been effective in eliminating the VTs.[3-8] In the present case report, a patient with recurrent syncope and palpitation demonstrated pleomorphic VTs[9] originating from the Purkinje fiber network of left anterior fascicle, in which the critical diastolic potentials and delayed potentials were identified during the VTs and sinus rhythm.

Case report

A 55-year-old woman who had experienced syncope while walking in December 2007 was referred to our hospital in February 2008. She had experienced another episode of syncope in March 2006, and recurrent palpitation attacks in January, April, and May 2007, when monomorphic VT with her blood pressure of 78/50 mm Hg were documented (Fig. 1A, left). During sinus rhythm with a heart rate of 56/min, the 12-lead electrocardiogram (ECG) showed no apparent abnormal findings including QT interval (0.42 seconds) (not shown). Although mild mitral regurgitation due to mitral valve prolapse of anterior leaflet was found by echocardiography, left ventricular ejection fraction was 71%, and the patient had no signs of heart failure. Exercise stress test provoked pleomorphic VTs with an RBBB configuration as inferior, middle, and superior axis (Fig. 1A and 1B). A 24-hour Holter ECG demonstrated nonsustained polymorphic VT (Fig. 1C).

After obtaining written informed consent, the electrophysiologic study was performed with no antiarrhythmic agents in the fasting state. Four quadripolar catheters and a 20-polar catheter were positioned in the right atrium, His bundle area, right ventricular apex (RVA), coronary sinus, and the anterolateral left ventricle (LV), respectively (Fig. 2A, left). Intravenous isoproterenol administration (0.5 μg/min) provoked a nonsustained pleomorphic VT (Fig. 2A, middle, and B). During the pleomorphic VT, the diastolic potentials (dp[s]) were recorded at the distal

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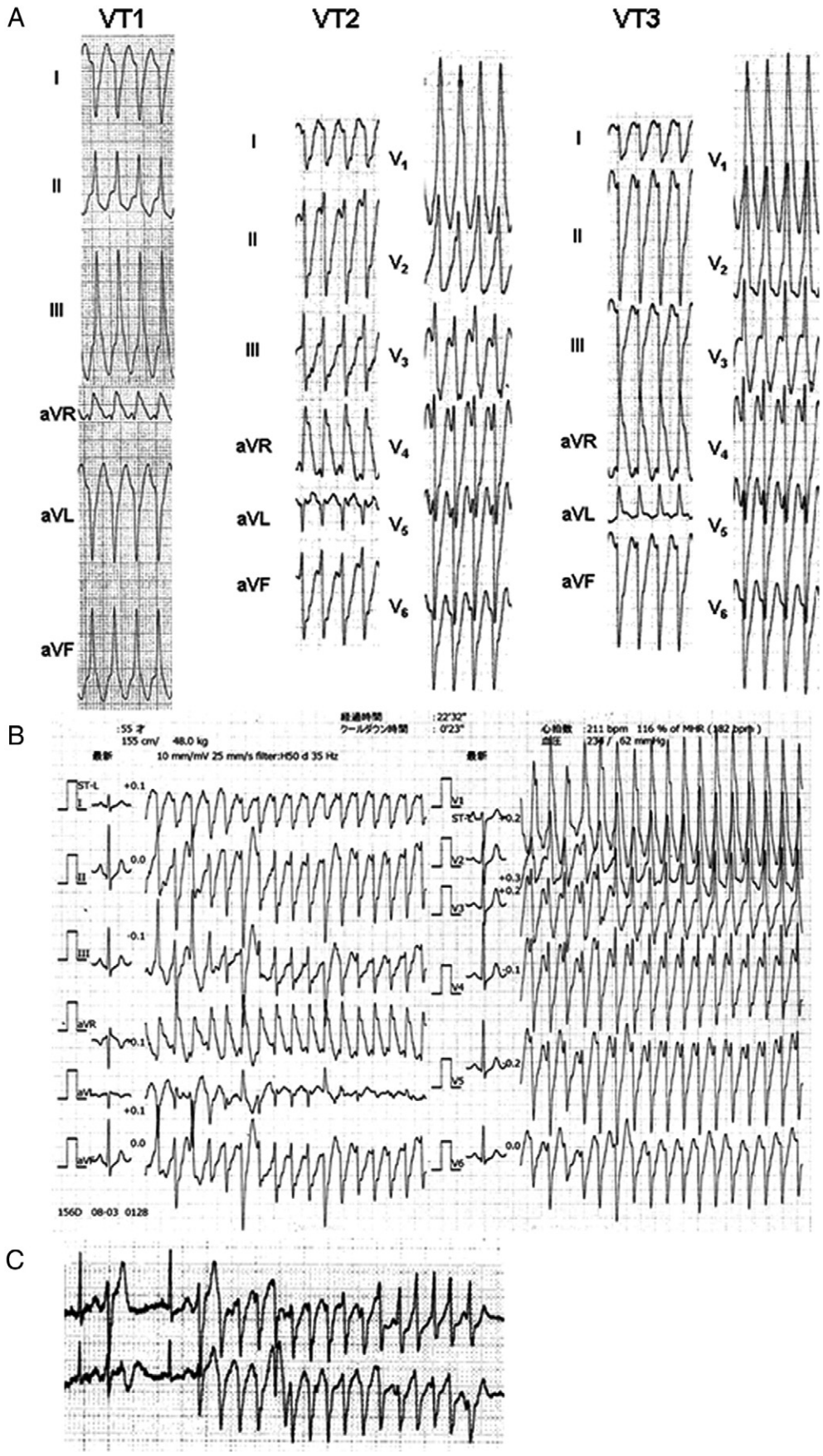

Fig. 1. Pleomorphic and polymorphic VTs. (A) Twelve-lead ECGs of VTs recorded in May 2007 (VT1) and induced by exercise stress test (VT2 and VT3). (B) One example of the VT during exercise stress test. (C) Holter ECG recording of polymorphic VT.