Transapical myectomy and surgical cryoablation for refractory ventricular tachycardia due to hypertrophic cardiomyopathy with apical aneurysm

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Abstract

Ventricular tachycardia (VT) associated with midventricular hypertrophic cardiomyopathy and apical aneurysm is rare, but is frequently refractory to medical therapy. We report a case of a 44-year old man with incessant VT despite undergoing catheter ablation in the neck of a left ventricular apical aneurysm. Resection of a hypertrophied midventricular muscle through an apical incision and surgical cryoablation of the aneurysm border from the epicardial and endocardial surface were performed successfully. The patient was well without ventricular arrhythmic events at 2 years postoperatively.

Keywords: Ventricular tachycardia • Hypertrophic cardiomyopathy • Surgical treatment • Cryoablation

INTRODUCTION

Monomorphic ventricular tachycardia (VT) is considered a rare complication of hypertrophic cardiomyopathy (HCM) and more likely to occur in midventricular HCM with apical aneurysm [1]. When antiarrhythmic agents fail to control VT, catheter ablation may be helpful. However, catheter ablation is not always successful and cannot treat intracavitary obstruction. Although an implantable cardioverter-defibrillator (ICD) is the main treatment for VT, recurrent ICD shocks aggravate the prognosis and the quality of life [2]. Here, we describe successful transapical myectomy and surgical cryoablation for refractory VT due to HCM.

CASE REPORT

A 44-year old man with HCM developed chest pain with subsequent loss of consciousness. A diagnosis of repetitive monomorphic VT accompanied by HCM with apical aneurysm was established. As intravenous antiarrhythmic treatment was not effective, epicardial and endocardial catheter ablation was performed at the septum in the apical aneurysm border where voltage mapping indicated the focus of VT (Fig. 1A). However, catheter ablation failed to terminate the VT, and the patient was referred to our hospital.

Electrocardiogram-gated computed tomography angiography (CTA) revealed a midventricular hypertrophied myocardium with a wall thickness of 30 mm and apical cavity ballooning (Fig. 1B and C). We decided to perform emergency surgery to eliminate VT and midventricular obstruction.

The operation was performed by median sternotomy and cardiopulmonary bypass with bicaval cannulation. The direct intracavitary pressure measurement showed a pressure gradient of 50 mmHg across the midventricular obstructive portion. After cardioplegic arrest, a 6-cm incision was made along the left anterior descending artery at the apex of the left ventricle (LV). The LV muscle from the apex to the mid-portion was resected gradually and carefully through the apical incision (Fig. 2A). Then, the apical aneurysm border in the septum was ablated from the epicardial and endocardial surface simultaneously using a cryoablation system (CCS-200, Cooper Surgical, Shelton, CT, USA) (Fig. 2B). The probe was cooled to −60°C and applied for 3 min. The incision was closed using double polypropylene running sutures. The direct pressure measurement revealed no pressure gradient across the mid-portion of the LV. The total mass of the resected LV muscle was 35.0 g (Fig. 2C).

The postoperative course was uncomplicated. Postoperative CTA revealed the significantly augmented LV cavity (Fig. 1D and E). The patient remained free from VT recurrence at two years postoperatively.

DISCUSSION

In patients with HCM, catheter ablation is sometimes inadequate because a VT circuit is often located deep within the hypertrophied myocardium [1]. In addition, haemodynamic pressure overload of the LV apex due to mid-cavitary obstruction is regarded as a potential cause of VT onset. In such cases, surgical myectomy

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combined with cryoablation can be effective. Transapical myectomy is an efficient procedure for enlarging the LV cavity, increasing stroke volumes and eliminating intracavitary obstruction while preserving the mitral apparatus [3, 4]. Surgical cryoablation under cardiac arrest can ablate deep lesion, and preoperative electroanatomical mapping enables accurate lesion set [5].

In the present case, transapical myectomy and cryoablation were effective for refractory VT due to midventricular HCM with apical aneurysm. Although the patient, who has been taking amiodarone and a beta-blocker, has not had any cardiac events without ICD implantation, close observation needs to be continued.

Conflict of interest: none declared.

REFERENCES


