Left ventricular perforation and dissecting subepicardial hematoma after catheter ablation for Wolff-Parkinson-White syndrome

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Abstract Radiofrequency catheter ablation of accessory bypass tracts has become a widely accepted therapy for Wolff-Parkinson-White (WPW) syndrome. The procedure typically has a high success rate with a low incidence of complications. Left ventricular perforation is a rare but serious complication of catheter ablation. Here we describe a patient who developed left ventricular perforation and a dissecting subepicardial hematoma with cardiac tamponade following catheter ablation for WPW syndrome. Immediate hematoma evacuation and direct repair of the fragile myocardium were performed under cardiopulmonary bypass, and the patient survived with no further complications.

Key words Dissecting subepicardial hematoma · Cardiac perforation · Cardiac tamponade · Catheter ablation · Wolff-Parkinson-White syndrome

Introduction

Radiofrequency catheter ablation of accessory bypass tracts has become a widely accepted therapy for Wolff-Parkinson-White (WPW) syndrome.1 This procedure typically has a high success rate and low incidence of complications.2 Left ventricular perforation is a rare but serious complication of catheter ablation.3,4 Here we present a patient who survived a left ventricular perforation and dissecting subepicardial hematoma with cardiac tamponade following catheter ablation for WPW syndrome.

Case

A 69-year-old man presented with a history of recurrent supraventricular tachycardia. As the tachycardic episodes had been poorly controlled with pharmacological treatment, the patient underwent a radiofrequency catheter ablation procedure. An electrophysiological study diagnosed type A WPW syndrome and confirmed a left-lateral accessory pathway.

A 7F radiofrequency ablation catheter with an 8-mm tip (Celsius DS; Biosense Webster, Diamond Bar, CA, USA) was introduced through the right femoral artery and placed into the mitral annulus via the aortic valve (Fig. 1). Temperature-controlled ablation was performed at a maximum temperature of 60°C with power limited to 30 watts. Radiofrequency energy was provided by a generator (Stockert 70 RF Generator; Biosense Webster). Radiofrequency current was applied repeatedly for a total of 13 applications. During the procedure, the patient experienced bradycardia and was hypotensive to a systolic pressure of 70 mmHg. Transthoracic echocardiography revealed a 10-mm echo-free space surrounding the heart. Cardiac tamponade was immediately treated with percutaneous catheter-based pericardiocentesis using a multiholed 7F pigtail catheter. The patient’s hemodynamic status subsequently improved, and he was
transferred to the intensive care unit (ICU). There he developed active bleeding at a rate of 150 ml/h and became hemodynamically unstable. At 4 h after catheter ablation, the patient was taken immediately to the operating room where median sternotomy was performed.

The pericardium was opened to reveal a large volume of clot inside the pericardial cavity. After removing the clots, a bulging saccular lesion measuring $40 \times 30 \times 10$ mm was discovered in the posterior wall of the left ventricle. A bleeding tear was identified on the lateral aspect of the bulging lesion (Fig. 2). Cardiopulmonary bypass (CPB) was quickly established because the risk of blowout rupture seemed high. After cardioplegic arrest, the bulging lesion in the posterior wall was exposed by elevating the apex. A longitudinal incision was made carefully along the surface of this lesion. This procedure revealed that the hematoma had accumulated extensively in the subepicardial space. A rupture in the myocardium was detected following evacuation of the hematoma. Given the fragility of the damaged myocardium, the mechanism of this injury could not have been simple mechanical stress induced by rough catheter handling but was likely related to the intensity of the radiofrequency energy. A wide transmural incision of the damaged ventricular myocardium surrounding the rupture was made longitudinally to ascertain the status of the more fragile endocardium just below the mitral annulus; fortunately, no major endocardial damage, such as papillary muscle rupture or mitral valve injury, had occurred (Fig. 3A). The transmural incision was subsequently repaired using horizontal mattress sutures with full-thickness bites buttressed with two strips of Teflon felt. The delicate endocardium just below the mitral annulus was reinforced with the stiff tissue of the mitral annulus (Fig. 3B). The patient was then successfully weaned off of CPB. The median sternotomy was closed and the patient returned to the ICU.

Postoperatively, the patient recovered gradually from heart failure without any other organ dysfunction. At 24 days postoperatively, the patient was transferred back to the medical ward for cardiopulmonary rehabilitation. Currently, 4 years postoperatively, the patient has been adherent to his monthly outpatient clinic visits and has remained in stable New York Heart Association class II heart failure.

Discussion

The North American Society for Pacing and Electrophysiology (NASPE) Prospective Catheter Ablation Registry reported that accessory pathway ablation was