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Case Report

Treatment of ventricular tachycardia in patient with a mechanical aortic valve by radiofrequency catheter ablation via transseptal approach

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Abstract

We report a case of a 63-year-old man with incessant ventricular tachycardia (VT) who was treated by left ventricular (LV) mapping and radiofrequency catheter ablation. The ablation procedure was complicated since the patient had undergone aortic prosthetic valve surgery before. Left ventricular catheterization through the mechanical aortic valve is not routinely performed because of the risks involved as they may damage or 'jam the occluder'. In our patient ablation of ventricular tachycardia was achieved via transseptal approach and through the mitral valve. During the follow-up period of two years, the patient remained free from implantable cardioverter defibrillator shocks.

Keywords: Catheter ablation; left heart catheterization through a transmitral approach; mechanical prosthetic aortic valve; ventricular tachycardia

INTRODUCTION

Many patients with an implantable cardioverter-defibrillator (ICD) need medical treatment with antiarrhythmic drugs to avoid the recurrence of clinically significant arrhythmias and to reduce appropriate ICD shocks. An alternative approach is ablative procedure as an adjunct to ICD therapy. Here we report a clinical follow up of a patient with prosthetic valvular heart disease, congestive heart failure and cardiomyopathy suffered from refractory ventricular tachycardia (VT) as an electrical storm appeared so frequently requiring appropriate ICD therapy. The antiarrhythmic drug refractory VT was finally treated with a catheter ablation procedure via transseptal approach and crossing the mitral valve since retrograde catheterization of the left ventricle is avoided due to the mechanical aortic valve.

CASE REPORT

A 63-year-old male patient was referred to our center for treatment of highly symptomatic ventricular tachycardia. Two months ago a biventricular implantable cardioverter defibrillator device implantation was performed to the patient to improve the status of refractory congestive heart failure. He had a medical history of valvular cardiomyopathy and congestive heart failure and underwent mechanical aortic valve replacement (Medtronic hall) with concomitant mitral ring annuloplasty in 1998 because of rheumatic heart disease. A right bundle branch block and right superior axis QRS morphology was observed in VT electrocardiography (ECG). Transthoracic echocardiogram revealed left ventricular (LV) dilatation and diffuse hypokinesis with an ejection fraction of 28%, and moderate mitral regurgitation. He had an incessant ventricular tachycardia proved to be refractory to several antiarrhythmic drugs such as beta blockers, lidocaine, and amiodarone. He received multiple ICD shocks; so left ventricular (LV) mapping and ablation procedure were planned for treatment of ventricular tachycardia. The passage of catheters across the mechanical aortic valve was risky due to high probability of occurrence of acute mechanical complications given the long duration of the procedure. The patient was taken to electrophysiology laboratory, after giving of intravenous bolus heparin (activated clotting time ≥ 300 sec), a Brockenborough needle and an 8-French Mullens sheath were used for transseptal catheterization under transesophageal echocardiographic guidance. The ablation catheter (D curve, 8 mm, Biosense Webster, Diamond Bar, CA, USA) was advanced into the left atrium and ventricle through the transeptal sheath (Figure 1). An LV electro-anatomic

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voltage map was formed by the Biosense-Carto mapping system to obtain the scar regions.

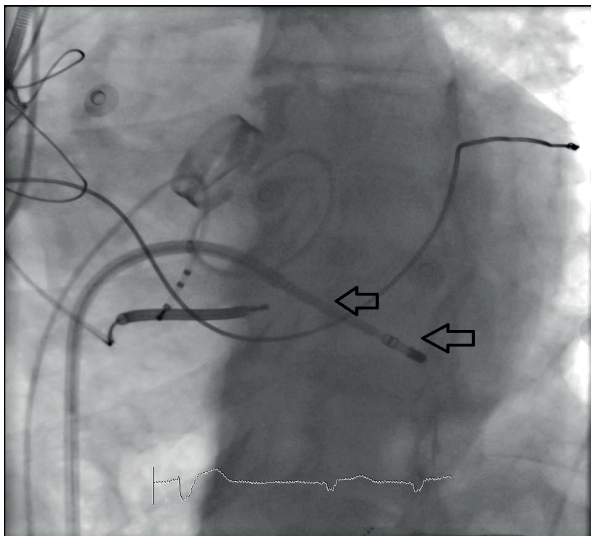

Figure 1. Image of ablation catheter (D curve, 8 mm, Biosense Webster, Diamond Bar, CA, USA) advanced into the left ventricle through the transeptal sheath

Two different fast VTs were induced with burst pacing under isoproterenol infusion (6mcg/min), but these tachycardias could not be mapped because of hemodynamic instability and cardioverted urgently. Scar homogenization was performed to infero-posterior basal regions of LV with low-voltage areas and zones of slow conduction exhibiting late potentials (Figure 2). No VT was inducible after ablation by burst pacing and programmed electrical stimulation (PES) under isoproterenol infusion (8µg/min).

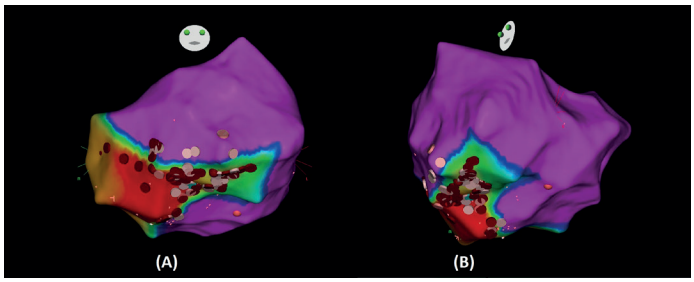

Figure 2. Images of scar homogenization performed to infero-posterior basal regions of LV with low-voltage areas and zones of slow conduction exhibiting late potentials in anteroposterior (A) and left anterior oblique (B) projections

Since the procedure, the patient has done well on antiarrhythmic treatment with metoprolol and amiodarone. During two years of follow-up, there was recorded no ventricular tachycardia events and shocks on ICD interrogations. No complications were observed after the procedure.

DISCUSSION

Although retrograde left ventricular catheterization through retrograde approach via mechanical aortic prosthetic valve showing some success has been attempted in the past, some cases were associated with major complications and even death. In our patient with a mechanical aortic valve, LV catheterization performed by transseptal pathway and passing through the mitral valve was so important for the achievement of catheter ablation. A ventricular (LV) mapping and ablation, a similar complicated procedure due to existence of a bioprosthetic aortic and a mechanical mitral valve, was performed by Herweg et al. using the same transseptal-transmitral pathway (1).

There are some risks such as immobilization or temporary dislocation of the disk by the catheter in the conventional retrograde catheterization. Although an angiographic catheter can easily pass through a homograft or xenograft prosthetic valve with retrograde catheterization, crossing of a mechanical prosthetic valve by catheter may result in acute malfunction of the prosthesis, leading to life-threatening complications. If the catheter is entrapped inside the prosthetic mechanical valve, it has to be removed by surgery (2). An experience about retrograde catheterization of left ventricle in 27 successive patients with aortic valve prosthesis was reported by Karsh et al. No complications occurred however, retrograde catheterization was not performed in patients with a recent history of systemic embolization or active endocarditis which can potentially increase the risk of embolization (3). An 8 Fr Dacron covered Sones catheter entrapped in Bjork-Shiley disk valves while transprosthetic catheterization was reported by Horstkotte et al. (4) and Kober and Hilgermann (5) in 1985 and 1986 respectively. The disks of the valve in the open position fix the entrapped catheter leading to severe acute aortic regurgitation, and both patients died 90 and 62 min after the beginning of the procedure. Autopsy demonstrated that the outer covering plastic material of the catheters was disturbed and the damaged catheters trapped within the minor orifice of the prosthesis.

In diagnostic catheterization in patients with a mechanical valve, the procedure does not last long due to staying of the catheter in the LV for a short time. On the other hand, LV radiofrequency ablation and mapping requires a much longer catheter remaining within the LV, so in our patient ablation of left ventricular tachycardia was achieved via transseptal approach and crossing of the mitral valve. Hemodynamic support during the procedure is essential and should be ready if necessary. Immediate availability of surgical backup is also so important.

CONCLUSION

In conclusion, in the present case of a patient with a valvular cardiomyopathy and mechanical aortic valve, radiofrequency catheter ablation of VT refractory to pharmacological agents can be performed via transseptal approach.

Conflict of interest: The authors declare that they have no competing interest.

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