SHORT COMMUNICATION

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Radiofrequency catheter ablation of atrioventricular nodal re-entry tachycardia: selective approach to the slow pathway via the cephalic veins

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Inferior venous access to the right heart is not possible in some patients due to vena caval obstruction. Here we describe a case of a patient with atrioventricular nodal re-entry tachycardia where radiofrequency ablation from the inferior vena cava was impossible because of the presence of important stenosis of the distal part of the vein. Catheter ablation of the slow pathway could be performed successfully using a superior approach via the cephalic veins.

Case report

A 72-year-old woman presented with a 10-year history of medically refractory supraventricular tachycardia. At a young age, she underwent surgical treatment for diaphragmatic relaxation. Then an elctrophysiologic evaluation and, possibly, radiofrequency (RF) catheter ablation were planned. A quadrapolar electrode catheter was inserted in the right femoral vein, but it was not possible to advance it into the right atrium due to an obstacle in the junction between the inferior vena cava (IVC) and the atrium. A subsequent venography documented a severe dilatation and deviousness followed by a significant stenosis of the distal part of the IVC (*Figure 1*). A decapolar and a steerable quadrapolar diagnostic catheter were inserted into the coronary sinus (CS) and the right atrium via the left and right cephalic veins, respectively, punctured by means of a modified Seldinger technique at the antecubital region on both arms. In fact, the basilic veins were not accessible and, as a first step, the subclavian and jugular veins were avoided because of the potential complications. By programmed atrial stimulation, a typical atrioventricular nodal re-entry tachycardia (AVNRT) resulted reproducibly inducible (*Figure 2*). Then, the diagnostic quadrapolar catheter was replaced by a deflectable ablation catheter with a 4 mm tip electrode that was advanced into the right atrium in proximity to His position. By deflecting the ablation catheter downwards and posteriorly, the posterior aspect of Koch's triangle was easily mapped in detail during sinus rhythm (*Figure 3*). A slow pathway potential was localized along the tricuspid annulus immediately anterior to the CS ostium. By applying a counterclockwise torque on the ablation catheter, we obtained a stable catheter position. Three RF energy applications delivered at this site for 20 s, in the temperature control mode, resulted in the early occurrence of an accelerated junctional rhythm. Energy delivery was terminated if VA conduction block was observed in correspondence of CS electrodes during the junctional rhythm. Subsequently, no arrhythmias were induced by means of programmed and incremental atrial stimulation, even during isoproterenol infusion. There were no complications and no recurrent tachycardia during follow-up.

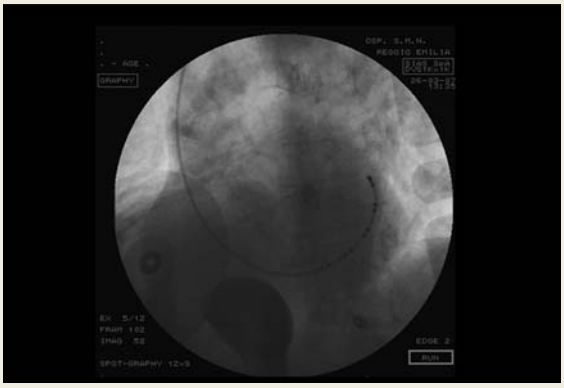

Figure 1 Left anterior oblique fluoroscopic view (30°) showing the decapolar electrode catheter inserted through the left cephalic vein and positioned within the coronary sinus. Venography from the right femoral vein shows a severe dilatation and deviousness of the distal part of IVC, followed by a significant stenosis between the vein and the right atrium.

Discussion

Selective RF catheter ablation of the slow atrioventricular nodal pathway is currently considered the first-line therapy for patients suffering from recurrent symptomatic AVNRT. The ablation catheter is usually advanced to the ablation site via the IVC that is believed to allow for better stability of the catheter. However, inferior venous access to the right heart is not possible in some patients due to congenital or acquired vena caval obstruction. Successful ablation of a slow AV nodal pathway was previously described by using an alternative approach via jugular, subclavian, basilic, or azygous veins.[1–3] In this report, we describe one case in which the conventional approach was impossible because of the

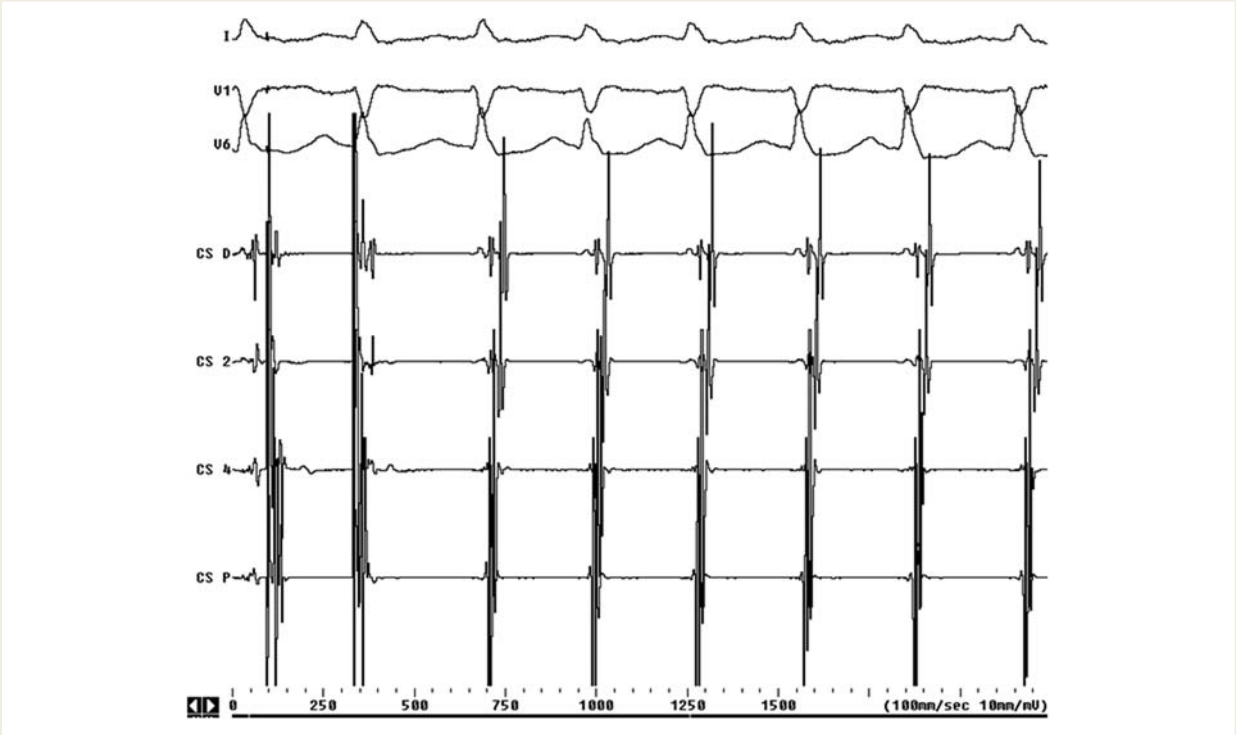

Figure 2 Induction of AVNRT by programmed atrial stimulation. Surface ECG leads I, V1, and V6 simultaneously recorded with bipolar intracardiac electrograms from the decapolar coronary sinus catheter. CSD, distal coronary sinus; CS 2 and 4, middle coronary sinus; CSP, proximal coronary sinus.

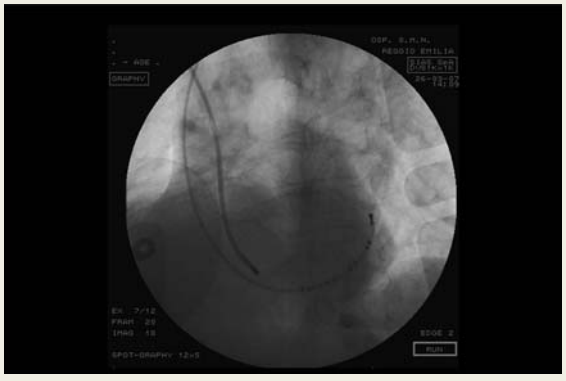

Figure 3 Left anterior oblique fluoroscopic view (30°) showing the decapolar catheter placed into the coronary sinus and the bidirectional mapping/ablation catheter deflected in the posterior portion of Koch's triangle, where a slow pathway potential was recorded.

presence of important stenosis of the junction between IVC and right atrium. The patient underwent surgical correction of diaphragmatic relaxation when she was young and it is probable that the subsequent fibrotic reaction produced a stretch and deformation of sub-diaphragmatic veins. An approach via both the cephalic veins was utilized to ablate the slow nodal pathway. The posterior area of Koch's triangle was correctly localized and precise ablation of the slow pathway was possible with a low number of RF applications required. A decapolar catheter was placed in the CS and it allowed for simultaneous recordings from the atrium and ventricle. That permitted adequate monitoring of VA conduction with one catheter during the junctional rhythm associated with slow pathway ablation, critical to avoid inadvertent AV block.

Conclusions

Catheter ablation of the slow AV nodal pathway can be performed successfully and safely in patients with inferior venous barriers to the right heart using a superior approach via the cephalic veins.

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