CASE REPORT

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Selective slow pathway ablation using transseptal approach in a patient with surgically corrected partial atrioventricular canal defect and atrioventricular nodal reentrant tachycardia of the common type

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A 26-year-old woman with partial atrioventricular (AV) canal defect surgically closed with pericardial patch in a mode that the triangle of Koch had become part of the left atrium underwent successful slow pathway ablation for slow–fast AV nodal reentrant tachycardia. Transseptal approach was used because of the atypical post-operative anatomy. Transseptal catheter ablation of the slow pathway can be a reasonable and safe alternative in patients subjected to this type of operation.

Introduction

Atrioventricular nodal reentrant tachycardia (AVNRT) is one of the most common types of paroxysmal supraventricular tachycardia. The mechanism of AVNRT is reentry associated with dual or multiple AV nodal pathways.[1] Radiofrequency catheter ablation of the slow pathway is considered to be the treatment of choice for patients with symptomatic AVNRT.[1] Ablation is usually performed on the right atrial septum in the triangle of Koch. Very rarely right-sided ablation is not possible. In such cases, left-sided approach, transseptal or retrograde to the slow or fast pathway, is used.[2–5]

Case report

A 26-year-old woman with an 8-year history of paroxysmal palpitations was admitted to our hospital for evaluation of right bundle branch block (RBBB) tachycardia. Her previous medical history included surgical correction of partial AV canal defect at the age of 9 years and catheter ablation of incisional tachycardia 4 months before current admission, both performed at our institution. During surgery, the anterior rim of the defect was found to be very narrow and the risk of trauma to the AV conduction axis and subsequent heart block was deemed very high. Consequently, the defect was closed with pericardial patch in a mode that the triangle of Koch, including the coronary sinus ostium, the compact AV node, and the non-branching His bundle (HB), remained on the left side of the patch and actually became part of the left atrium. A cleft in the anterior leaflet of the mitral valve was repaired as well. Nine years later, she started to have paroxysms of pre-syncopal narrow QRS complex tachycardia at a rate of 220 bpm and AV ratio 1:1. Treatment with sotalol, propafenone, and amiodarone was modestly effective. This tachycardia proved to be due to an atrial macro-reentrant, incisional mechanism and was successfully ablated in the right atrial free wall between the lower pole of the incisional scar and the inferior caval vein. Four months later, she had recurrent palpitations and an RBBB tachycardia at a rate of 200 bpm with AV ratio 1:1 was recorded. Recurrence of the incisional tachycardia was suspected and a second electrophysiological study was performed, with 20-polar catheter in the right atrium around the tricuspid valve annulus and steerable 4-polar catheter in the presumed HB area. The HB potential was barely detectable in sinus rhythm over the septal area, rather an RB potential was recorded by the distal electrode pair. Her incisional tachycardia was uninducible, but slow–fast AVNRT was easily and reproducibly induced instead (*Figure 1*). The multipolar catheter was repositioned with its tip in the right ventricle and its proximal part in the right atrium. Because of the mode of heart surgery performed and the impossibility to record a reliable HB potential, we decided to perform left-sided ablation using transseptal approach. After the needle tip position was verified by contrast injection, the septum was punctured and a sheath and ablation catheter was introduced in the left atrium. The catheter was positioned on the left-sided aspect of the lower interatrial septum with its tip caudal and posterior in relation to the distal electrode of the HB catheter (*Figure 2*), most probably on the mitral edge of the pyramidal space. At that site, annular electrogram was recorded, with large A and larger V potential, and potential amplitude ratio >0.5. Radiofrequency application at this place induced sustained accelerated junctional rhythm and the tachycardia was rendered uninducible. The AV conduction remained unaffected.

Discussion

Atrioventricular nodal reentrant tachycardia can be cured by ablating the slow or fast pathway. More than 95% of typical AVNRT can be cured by a slow pathway ablation with a low risk of atrioventricular block.[1] A substantial variability of AV node anatomy and pathophysiology may be the cause of unsuccessful ablation of the slow pathway. In such a case, a left-sided approach is recommended. Although there are several reports on left-sided ablation of the slow or fast pathway,[2–5] only one among them is describing transseptal

Figure 1 (*A* and *B*) Induction of slow–fast AVNRT after an AV jump of 116 ms. (*C*) V-A-V response after cessation of ventricular pacing that entrained the atrium. Shown are ECG leads I, aVF, V1, and intracardiac electrograms from the septal right atrium (HRA 11 through 18) and from the presumed HB area. Pacing is effectuated through the ablation catheter (ABL), located in the atrium (*A* and *B*) or in the ventricle (*C*).

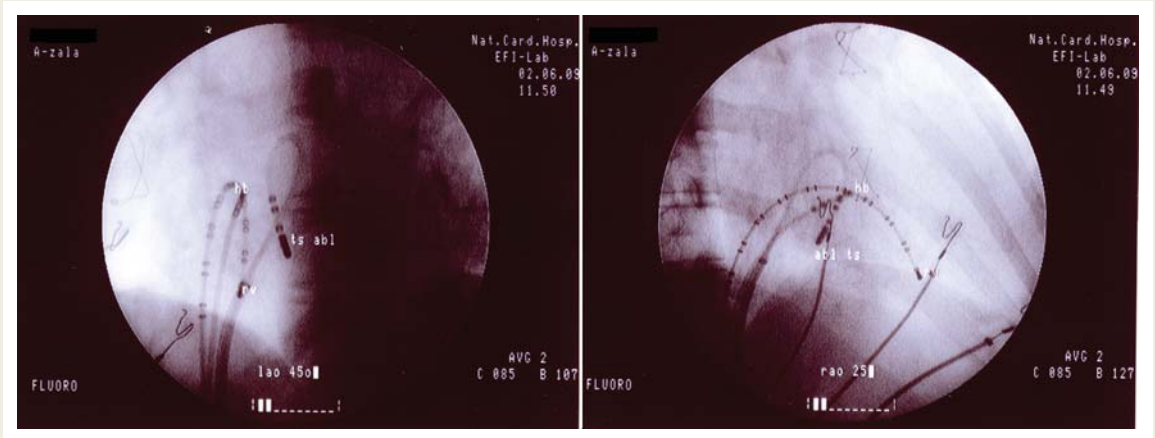

Figure 2 Fluoroscopic position of the ablation catheter (ts abl) during the effective application in 25° right (left panel) and 45° left (right panel) anterior oblique projections. hb, His bundle catheter; rv, distal part of the 20-polar catheter, located in the right ventricle.

approach to the slow pathway.[3] However, we were not able to find any reports on catheter ablation of AVNRT in patients with congenital heart anomaly following the mode of operation described above. Our case shows that when atypical post-operative anatomical properties are observed on the right septal side, left-sided ablation of the slow pathway can be employed safely and effectively.

In conclusion, patients after surgery for congenital heart defects may suffer not only post-operative tachycardias, but AVNRT as well. If the operative technique used makes right-sided septal approach unreliable, transseptal approach offers alternative way to successful ablation.

Conflict of interest: none declared.

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