

Transhepatic Access for Radiofrequency Ablation in a Child

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Radiofrequency catheter ablation is safe and effective in children with refractory supraventricular tachycardia and poor response to pharmacological treatment. This procedure may be difficult or impossible to perform in patients with bilateral obstruction of the femoral venous access. In recent years, the transhepatic approach has been found to be safe in children. We report the case of a 19-month-old boy with permanent junctional reciprocating tachycardia who underwent transhepatic catheterization for radiofrequency ablation.

Key words: *Catheter ablation. Tachycardia. Pediatrics.*

Ablación con radiofrecuencia en niños mediante acceso transhepático

La ablación con catéter mediante radiofrecuencia en niños con taquicardia supraventricular y mala respuesta al tratamiento farmacológico es una técnica terapéutica segura y eficaz. En pacientes con obstrucción venosa femoral bilateral este procedimiento puede ser difícil o imposible. En los últimos años se ha demostrado que el cateterismo cardíaco transhepático es una vía alternativa con pocas complicaciones. Presentamos el caso de un niño de 19 meses con taquicardia incesante recíproca de la unión auriculoventricular, en el cual tuvo que utilizarse este método para realizar una ablación eficaz de su vía accesoria.

Palabras clave: *Ablación con catéter. Taquicardia. Pediatría.*

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INTRODUCTION

Radiofrequency (RF) catheter ablation in children is a widely accepted technique. Patients with bilateral femoral venous obstruction are generally rejected as candidates for this type of procedure. Recently, the transhepatic approach has been described as a safe and effective solution for diagnostic and therapeutic cardiac catheterization in children with femoral occlusion.¹⁻³ We report the case of a male infant with incessant tachycardia refractory to pharmacological treatment, in which conduction by a right posteroseptal accessory pathway was interrupted with this technique.

CLINICAL CASE

A 19-month-old boy weighing 13 kg was referred to our center for electrophysiological study and RF ablation. He had been symptomatic since the age of 3 months when, coinciding with a viral condition, he developed signs of heart failure. The electrocardiogram disclosed tachycardia of 220 beats/min with a narrow QRS complex, P axis -90° , and a P-R interval shorter than RP'. He was treated with amiodarone, alone and in association with digoxin and propafenone, which failed to control the tachycardia. The patient's clinical situation on several occasions required femoral vein cannulation during his stay in the intensive care unit. The presence of structural heart disease was excluded by echocardiography, which confirmed the existence of dilated cardiomyopathy with a 23% shortening fraction. The previous analysis was normal, including coagulation parameters. After obtaining informed consent from his parents, the child was deeply sedated with midazolam and fentanyl and a 5-F deca-polar lead was introduced through the right jugular vein into the coronary sinus (Figure 1). During percutaneous femoral

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ABBREVIATIONS

RF: radiofrequency.
AV: atrioventricular.

venous puncture, a bilateral femoroiliac venous obstruction was found, which led to consideration of the transhepatic approach. The liver was punctured with a 22-F Chiba needle and sheath (Cook, Inc.[®]) on the axillary midline, midway between the diaphragm and lower edge of the liver, then positioned under radioscopic control on the clavicular midline. After removing the sheath, the needle was connected to a syringe containing non-ionic contrast agent, which was slowly injected while advancing the needle horizontally. When the tip of the needle entered a hepatic vein and the contrast ascended to the right atrium, a 0.0018" curved guide was introduced (Cook, Inc.[®]) into the atrium. The needle was changed for a 5-F dilator that was positioned in the lower right atrium. Through this needle, a 4-F hexapolar lead was introduced. It was positioned consecutively in the His bundle and right ventricle, which made it possible to demonstrate the tachycardia mechanism and the presence of an accessory pathway with slow retrograde conduction and decremental posteroseptal properties. A deflectable 5-F bipolar lead was introduced (Medtronic[®]) (Figure 1) and RF current was applied to the mouth of the coronary sinus, where the earliest retrograde activation had been detected during tachycardia. The first application was effective. The procedure lasted 2.5 h, with an X-ray radioscopy time of 12.5 min. When finalized, the sheath was removed without requiring specific hemostasis measures. Posterior abdominal echography did not detect complications and the patient was released 48 h later, without treatment. Two months later he is still asymptomatic, in sinus rhythm, and the shortening fraction has normalized.

DISCUSSION

RF catheter ablation has been a major advance in the treatment of supraventricular tachycardia, being a definitive, safe, and effective method. In children with incessant tachycardia and secondary cardiomyopathy who do not respond to pharmacological treatment, this technique constitutes their only therapeutic option in practice. When the child is small and the clinical situation has required several central venous cannulations, as in our case and in patients with congenital heart diseases who have previously undergone diagnostic or therapeutic catheterization, bilateral femoral venous obstruction can occur that impedes later

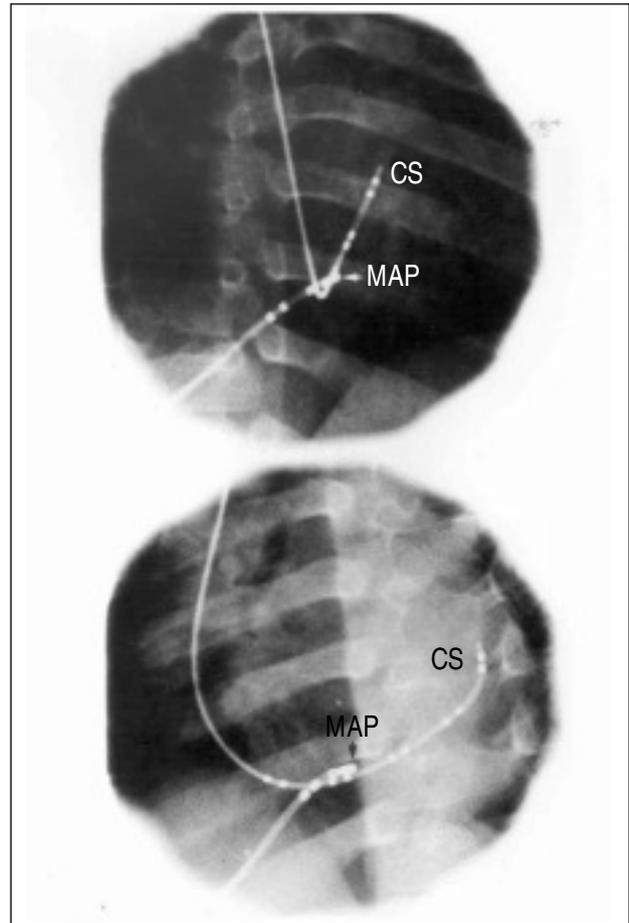


Fig. 1. Radiological recording of catheter placement in the right anterior oblique view (upper) and left anterior oblique view (lower) during RF application. A 4-F decapolar lead was positioned in the coronary sinus (CC) via the right jugular vein and a 5-F tetrapolar ablation lead (MAP) was inserted transhepatically into the mouth of the coronary sinus. The oblique trajectory of this lead, which is characteristic of this access, is appreciated.

procedures. In 1995, Johnson, Fellows and Murphy described for the first time the transhepatic approach to cardiac catheterization in children, based on earlier experiences with percutaneous transhepatic cholangiography, in which it is not uncommon to accidentally puncture the hepatic veins.⁴ After that, numerous cases of diagnostic and therapeutic transhepatic catheterizations have been reported, which has demonstrated the effectiveness and safety in patients with femoral venous obstruction, anomalies of the inferior vena cava drainage, or previous surgical interventions that block access to the right atrium, as in some cases of the Fontan technique in which the hepatic veins open onto the atrium.¹⁻³ What is more, it may eventually be considered as the technique of choice in young children in which large sheaths and catheters must be introduced, as a way of avoiding vascular damage and

obtaining more direct access to the ventricular out-flow tract and atrial septum. In RF ablation procedures, transhepatic access improves catheter stability during applications to the right AV sulcus, as well as transeptal access to the left AV sulcus, thus avoiding retrograde access through the femoral artery in infants and small children.⁵ The complications reported, such as peritoneal hemorrhage, pleural effusion, portal thrombosis, perforation of the gallbladder and peritonitis, have not occurred during RF ablation.^{1,2} In our case, this approach was chosen after confirming the presence of bilateral femoral venous obstruction, and it proved to be a rapid, uncomplicated procedure.

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