Mahaim-type accessory pathway and right bundle branch electroanatomic delineation

Marta Ortega, MD,[*] Sergio Castrejón Castrejón, MD,[†] Jose Luis Merino, MD, PhD,[†] Federico Gutiérrez-Larraya, MD, PhD[*]

From the [*]Department of Cardiology, Children´s Hospital La Paz, Madrid, Spain and [†]Department of Cardiology, Hospital La Paz, Madrid, Spain.

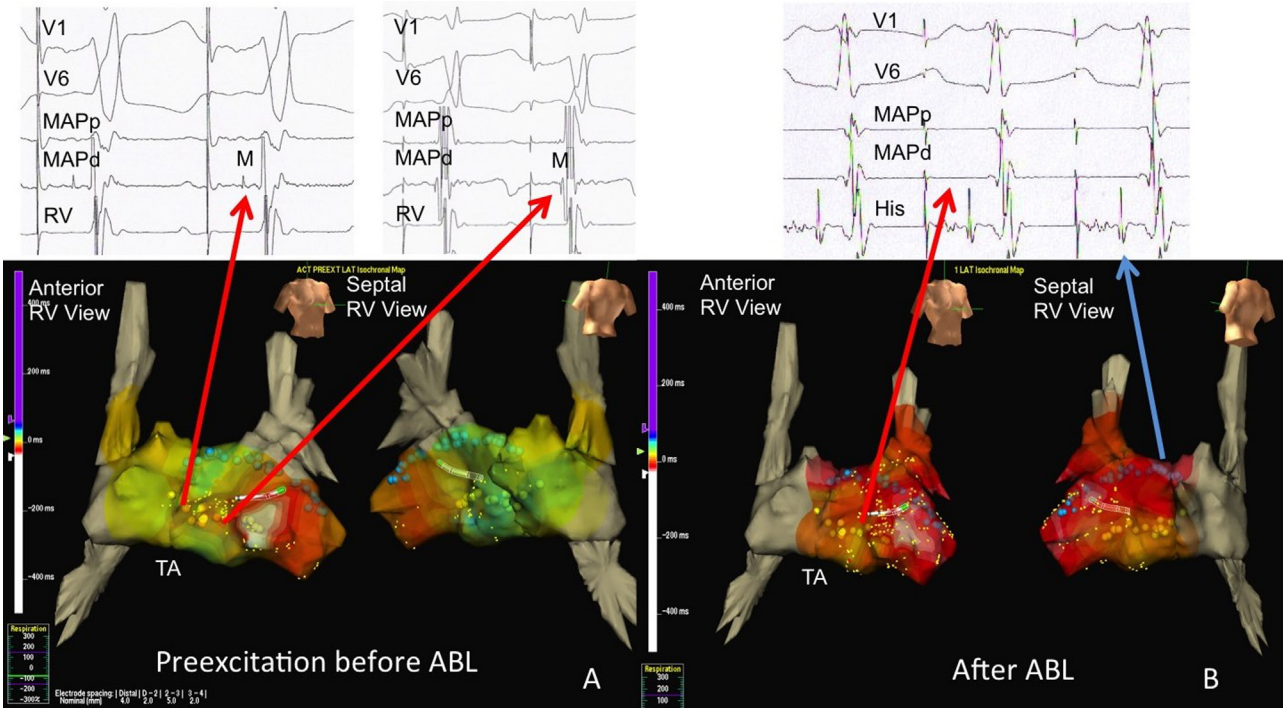

Figure 1 Electroanatomic activation map during RA stimulation (**A**) before and (**B**) after MAP ablation. Signals obtained at the ablation catheter located at the free lateral wall are shown. MAP anatomical disposition (yellow dots). Right bundle branch anatomical disposition (blue dots). M = mahaim accessory pathway potential; MAPd = distal ablation catheter recording; MAPp = proximal ablation catheter recording; RV = right ventricle; TA = tricuspid anulus; V1 and V6 = electrocardiographic lead recordings.

Introduction

Mahaim fiber is described as being a slow and antegrade-only conducting atrioventricular pathway capable of inducing antidromic reentrant tachycardia and preexcitation. We present a case in which the anatomic course of the pathway and its relationship with the right bundle branch are depicted with electroanatomic activation mapping.

Case study

A 9-year-old patient was studied after a documented syncopal wide QRS complex tachycardia. After pharmacologic cardioversion, echocardiographic evaluation revealed normal left ventricular size and function and excluded structural heart disease. An electrophysiologic study proved antidromic tachycardia due to the presence of a Mahaim-type accessory pathway (MAP). MAP physiology was demonstrated when the following features were proved: prolongation of stimulus-delta interval, preexcited decremental AV

KEYWORDS Mahaim-type accessory pathway; Electroanatomic course
ABBREVIATIONS APP = Accessory pathway potential; **MAP** = Mahaim-type accessory pathway; **RA** = Right atrial; **RV** = Right ventricle
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KEY TEACHING POINTS

- This case illustrates for the first time the 3-dimensional delineation of a Mahaim-type accessory pathway together with the right bundle branch and their distal ventricular insertions.
- The anatomical disposition of Mahaim fibers' distal insertions and the activation map obtained with and without preexcitation are helpful in understanding tachycardia QRS morphology.
- Electroanatomic mapping of Mahaim accessory pathway potential is useful in gaining accuracy at ablation.

conduction, AH prolongation with HV shortening during coronary sinus (CS) pacing, shorter HV and HA intervals during tachycardia than during ventricular stimulation at tachycardia cycle length. Pacing at the right atrial (RA) lateral wall increased preexcitation, showing the same QRS morphology as in tachycardia.

The anatomic course of MAP was studied thoroughly and outlined by following and displaying the points at which accessory pathway potentials (APPs) were recorded during RA lateral wall pacing, along the tricuspid annulus and the right ventricular endocardium. Effective APP guided MAP radiofrequency ablation[1,2] was performed near the proximal portion of the MAP. The electroanatomical activation map of the RA and right ventricle (RV) showed ventricular activation and the anatomic location and course of the right bundle branch and the MAP during pacing at the RA lateral wall, with and without preexcitation, before and after radiofrequency ablation (Figures 1A and 1B). The figure illustrates, for the first time, the anatomical disposition of MAP (yellow dots) together with the right bundle branch (blue dots), showing their spatial relationship. The MAP had a lateral course from the tricuspid annulus to the RV apex, whereas the right bundle branch had a septal course. The earliest activated region of the RV myocardium remained the same with and without preexcitation, suggesting the site of MAP ventricular insertions coincide with distal right bundle branch insertions.

Speculations have been made on the exact locations of Mahaim fiber insertions and their relationship with the right bundle branch, but this structure has never been 3-dimensionally depicted with electroanatomical activation mapping. Other studies[3] have previously defined the anatomical disposition of APP, but no activation map was performed. This case illustrates for the first time the 3-dimensional delineation of a MAP together with the right bundle branch and their distal ventricular insertions.

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