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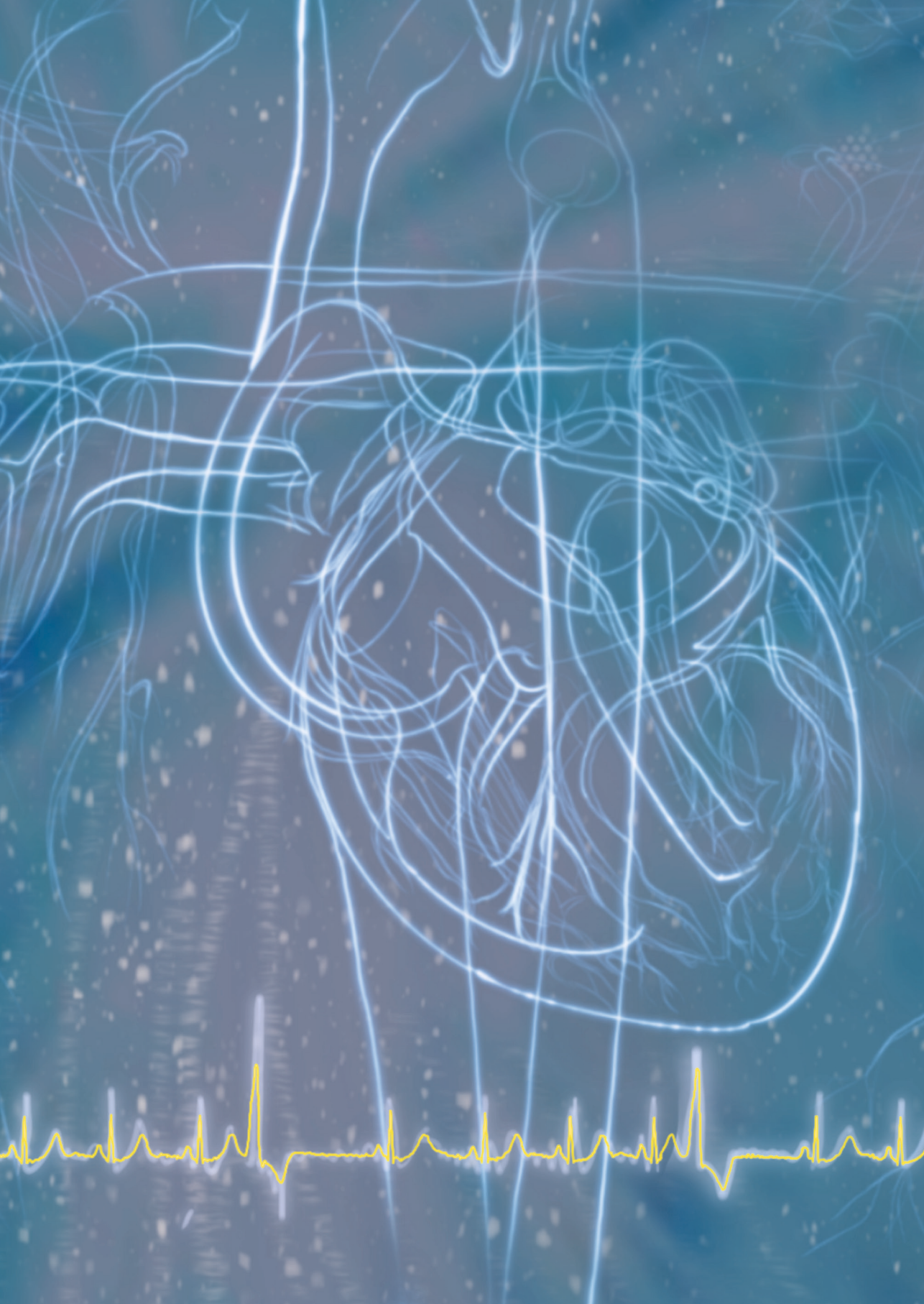

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CHAPTER

An accessory pathway with automaticity and bidirectional conductive capacity

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ABSTRACT

We present a case of a 12-year-old boy referred for catheter ablation because of recurrent palpitations with documented paroxysmal supraventricular tachycardia. There was no structural heart disease and baseline electrocardiogram and Holter showed no ventricular pre-excitation. During the electrophysiological study, intermittent pre-excitation with the earliest ventricular activation located halfway the coronary sinus (CS) was observed. Two spontaneous ventricular rhythms with a right bundle branch block morphology were observed: the first showed simultaneous atrial and ventricular activation with atrial and ventricular earliest activation at the mid-CS (Panel A) and the second with earliest ventricular activation at mid-CS with retrograde atrial activation via the His bundle (Panel B). Additionally, an atrial rhythm was present arising from mid-CS both with and without pre-excitation (Panel C first and second complex, respectively). Transseptal punction was performed and after radiofrequency ablation, the ectopic rhythms disappeared. Only sinus rhythm without pre-excitation remained, tachycardia was not inducible and both antegrade and retrograde block of the pathway was demonstrated. In conclusion, the electrophysiological study in this patient proved the presence of an accessory pathway that had inherent automaticity and bidirectional conductive capacity.

CASE REPORT

A 12-year-old boy presented with recurrent episodes of palpitations. Baseline 12-lead electrocardiogram showed sinus rhythm without signs of pre-excitation, and a cardiac ultrasound revealed a structurally normal heart. On a 24-h Holter, a supraventricular tachycardia was documented. After treatment with flecainide failed, he was referred to our centre for ablation.

During the electrophysiological study, sinus rhythm with intermittent preexcitation was observed. During pre-excited beats, the AH was 86 ms, and the HV interval varied depending on the degree of preexcitation. The earliest ventricular activation was present halfway in the coronary sinus (CS) close to the posterolateral mitral annulus. In addition, frequent beats with a right bundle branch block morphology and not preceded by an atrial activation indicating their ventricular origin were documented. Their earliest ventricular activation was mid-CS with a QRS morphology identical to maximal pre-excitation, suggesting an origin at the ventricular insertion of the accessory pathway. During the ventricular beats, two different atrial activation patterns were observed: one eccentric, with the atrial activation simultaneous with the ventricular activation and also located close to the posterolateral mitral annulus (Figure 1A); and a second, concentric, and with a VA time of 163 ms, and earliest atrial activation at the His catheter (Figure 1B), suggesting a retrograde atrial activation via the His bundle. Finally, an atrial rhythm with the earliest activation also at mid-CS and anterograde conduction with and without pre-excitation was observed (Figure 1C first and second complex, respectively).

All these different rhythms occurred spontaneously and were documented before ablation. Furthermore, an orthodromic atrioventricular re-entry tachycardia could be induced, with the earliest atrial activation at the same location mid-CS. A transseptal punction was performed and mapping during atrial rhythm with pre-excitation demonstrated earliest atrial and ventricular activation at the posterolateral mitral valve annulus. After 8 s of radiofrequency (RF), pre-excitation was abolished, and both the ectopic atrial and ventricular rhythms disappeared. During the infusion of adenosine, neither anterograde nor retrograde conduction through the accessory pathway was present.

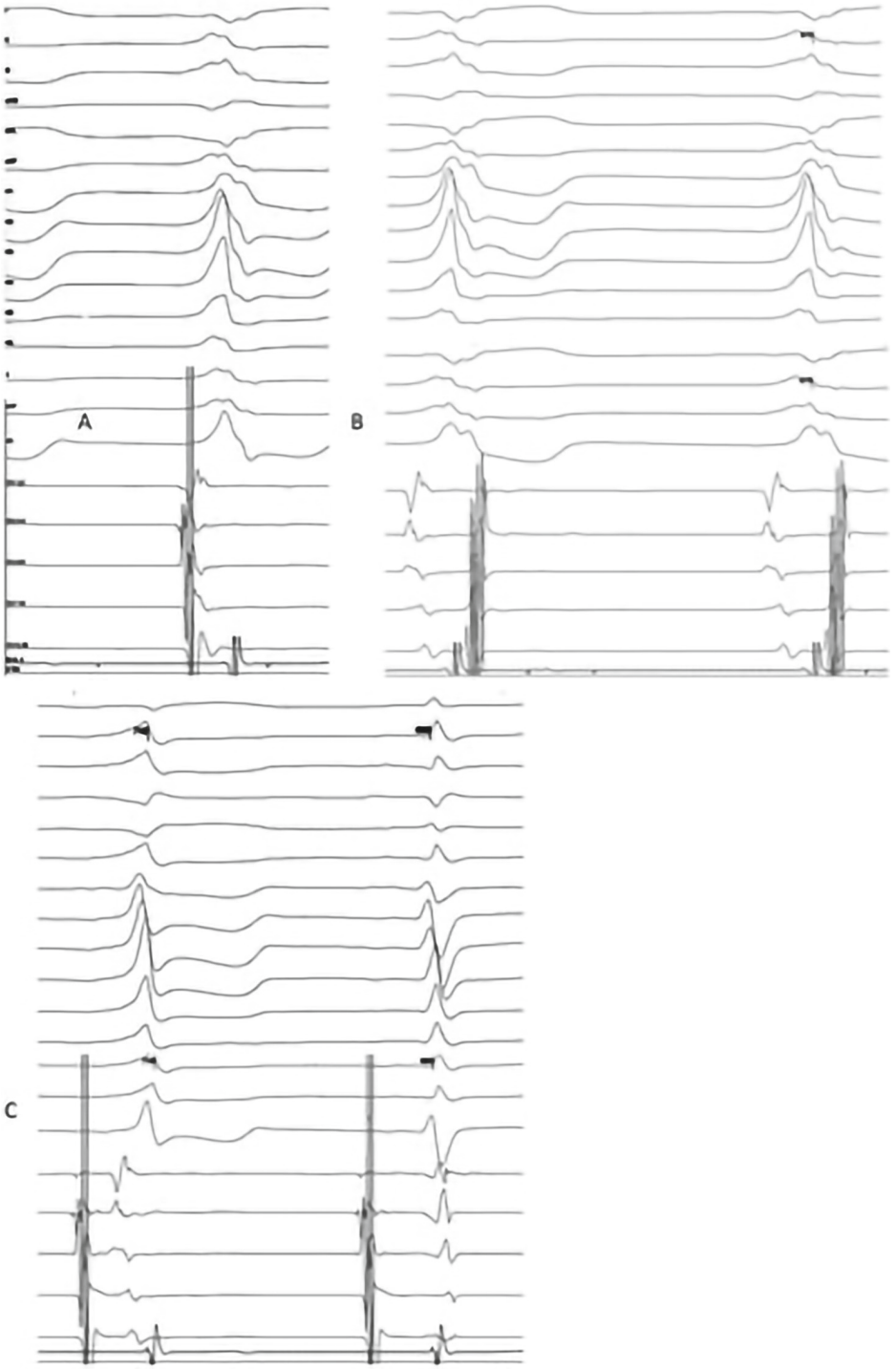

Figure 1.

CONCLUSION

All the electrophysiological findings during the study were consistent with the presence of an accessory pathway with intermittent bidirectional conductive capacity and spontaneous atrial and ventricular automaticity. This is supported by the fact that all these rhythms disappeared completely after a single RF energy application at the site of the earliest ventricular activation during pre-excitation. Spontaneous automaticity is a typical characteristic of usually right-sided atriofascicular accessory pathways.[1] On the contrary, automaticity of atrioventricular accessory pathways causing ventricular ectopy is rare, and although it has been described before, it occurred usually after ablation[2] or during the infusion of isoproterenol. To the best of our knowledge, spontaneous automaticity of an atrioventricular accessory pathway capable of exciting both the atrium and the ventricle has been described only once in an adult.[3] In summary, we present a case of a child presenting with a supraventricular tachycardia caused by an atrioventricular accessory pathway with intermittent bidirectional conductive capacity and spontaneous automaticity leading to atrial and ventricular ectopy.

REFERENCES

1. Moak JP, Moore HJ, Lee SW. Case report: spontaneous atriofascicular pathway automaticity simulating ventricular tachycardia. J Interv Card Electrophysiol 2001;5:455–62.
2. Arias MA, Sanchez AM. Automaticity with anterograde conduction of a concealed accessory pathway due to radiofrequency energy application. Int J Cardiol 2008;129:e30-4–e34.
3. Williams SE, Kojodjojo P, Linton N, Wright M, O'Neill MD. Ectopy and supraventricular tachycardia: is there a relationship? Pacing Clin Electrophysiol 2013;36:497–500