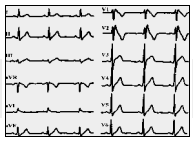

A Simple Atrial Extrasystole?

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The 12-lead electrocardiographic tracing shown in Figure 1 was recorded in a 19 year old male who was found to have an irregular heart rate at systematic examination following an attack of sinusitis. The patient did not complain of palpitations and did not have any obvious cardiac disease.

Tracing analysis

Normal sinus rhythm at a rate of 70 beats/minute is present. PR, QRS, and QT intervals are within normal range. There is no evidence for antegrade preexcitation. The third and seventh QRS complexes occur prematurely and are preceded by a P wave (P') negative in leads II, III and aVF and positive in V1. The RP' interval is longer than the P'R interval. The coupling interval of the P' wave is identical for the two events.

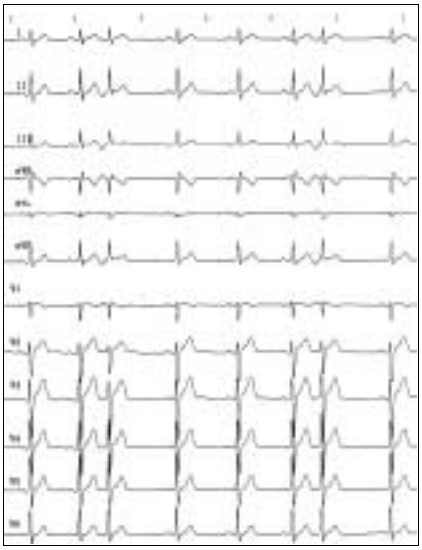

Figure 1. Twelve-lead ECG tracing during sinus rhythm at baseline.

ECG diagnosis

An atrial extrasystole is the first suspected diagnosis. Due to the P' wave morphology, this atrial extrasystole is presumed to originate in the lower part of the right or left atrium. Two other diagnoses, albeit very rare, should also be considered:

- One diagnosis assumes the existence of an accessory pathway connecting the atrium and the ventricle. This pathway is concealed in the antegrade direction and is operating only in the retrograde direction with a long conduction time (long RP'). The normally conducting sinus beat results in a normal PR interval, and the P' reflects the atrial activation due to retrograde conduction over the slow conducting accessory pathway.
- The second diagnosis assumes the existence of two pathways, both located in the atrioventricular nodal area but having different conduction velocities (dual AV nodal pathways). One conducts antegradely (fast pathway) and one retrogradely (slow pathway). The normal PR interval reflects conduction over the fast AV nodal pathway while P' reflects the atrial activation due to retrograde conduction over the slow AV nodal pathway.

Electrophysiologic diagnosis

The definite diagnosis is provided during electrophysiologic study. During intravenous administration of isoproterenol, multiple episodes of supraventricular tachycardia at a rate of 160/min could be induced. These tachycardias had a QRS-P sequence identical to the isolated "atrial extrasystole" observed during baseline [Figure 2]. Delivery of premature ventricular complexes during tachycardia at a time the His bundle was refractory resulted in premature capture of the atrium, suggest-

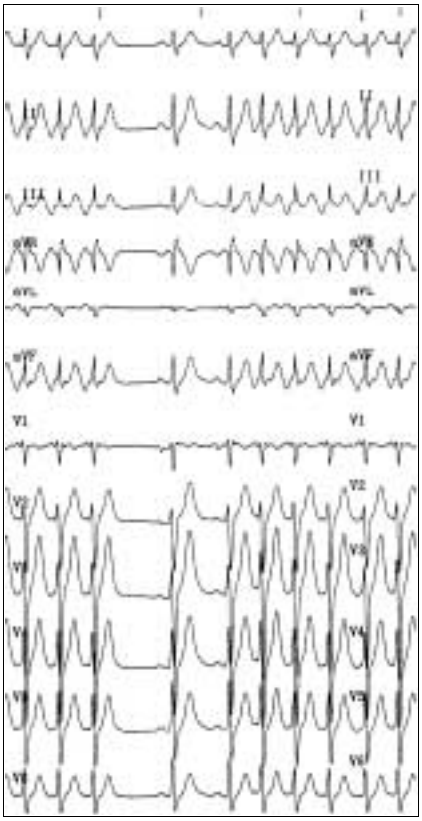

Figure 2. Twelve-lead ECG tracing after infusion of isoproterenol. Spontaneous termination of long-RP tachycardia is followed by immediate tachycardia recurrence after the first sinus conducted beat.

AV = atrioventricular

ing that retrograde atrial activation proceeded over a concealed accessory pathway. Such a finding ruled out the two other diagnoses discussed above. Extensive endocardial mapping of both right and left atrium (via the coronary sinus) localized this accessory pathway at the left posteroseptal area of the mitral valve annulus. Delivery of a radiofrequency pulse at this area ablated the accessory pathway and abolished the "atrial extrasystole." No tachycardia could be subsequently induced during atrial or ventricular stimulation before and after administration of isoproterenol.

Discussion

Long RP-tachycardia is a rare form of supraventricular tachycardia, which was first described by Coumel et al. [1] [Figure 3]. It is commonly incessant and usually drug-refractory [1–4]. This tachycardia has been observed at all ages, but has a frequent onset in early childhood [1,2]. It may be well tolerated for years, resulting in delay in diagnosis and treatment and occasionally in tachycardia-induced severe left ventricular dysfunction [2–4]. Although long RP-tachycardia can be due to atrial tachycardia or fast-slow type of AV nodal reentry tachycardia, the most frequent etiology, as in our patient, is AV reentrant mechanism involving the AV node in the antegrade direction and an accessory pathway with long conduction time and decremental AV nodal-like properties in the retrograde direction [Figure 3] [2–5]. The accessory pathway is usually located (>90% of cases) in the posteroseptal area [2–4]. Radiofrequency ablation of the pathway is the treatment of choice, resulting in arrhythmia cure and complete or partial regression of cardiac dysfunction in patients with tachycardiomyopathy [2–4]. The ECG presented in Figure 1 is an example of the aborted form of "long-RP tachycardia," involving an accessory pathway.

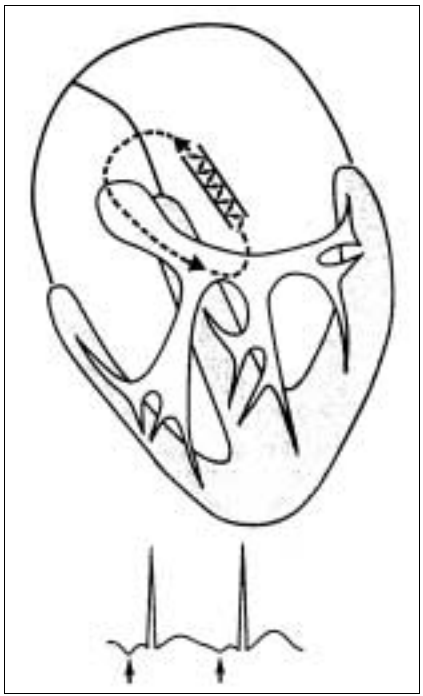

Figure 3. Schematic representation of the mechanism of the arrhythmia. AP = accessory pathway, AVN = atrioventricular node, RA = right atrium, RV = right ventricle, LA = left atrium, LV = left ventricle.

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