What is the mechanism?

Intermittent AV block after slow pathway ablation for AVNRT

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A 61-year-old woman with a 20-year history of paroxysmal tachycardia was referred for ablation. The baseline electrocardiogram (ECG) was unremarkable. During an electrophysiological study a typical (slow/fast) atrioventricular nodal reentrant tachycardia (AVNRT) at a rate of 180 bpm was induced. The slow pathway was ablated in a typical location just anterior of the coronary sinus ostium, resulting in rapid junctional beats. There was intermittent retrograde ventriculoatrial (VA) block and the ablation was stopped. The arrhythmia remained noninducible. After the intervention, the patient had intermittent atrioventricular (AV) block I and II type Mobitz I. Under isoprenaline there was 1:1 conduction up to 140 bpm with an AV block I. The patient was put on telemetry, and after 24 hours of surveillance there was complete resolution of the AV block. On the next day the ECG in figure I was recorded. An exercise stress test (EST) was performed on the same day a few hours later. The ECG obtained immediately after is shown in figure 2.

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Figure I suggests the presence of dual AV nodal conduction physiology. In sinus rhythm at a rate of 75 bpm (800 ms), after five beats with normal PR intervals a...
retrograde atrial activation with a fixed VA interval is observed. Negative P waves in leads II, III and aVF indicate retrograde atrial activation. This most likely represents preserved retrograde conduction over the slow pathway. The fact that this rather slow retrograde conduction (VA interval 480 ms) is not conducted antegradely already indicates a long effective refractory period of the fast pathway. Another possible explanation would be an automatic atrial focus from the basal right atrium or hisian ectopic activity. The fixed VA interval makes this unlikely.

In figure 2 the sinus rate is 150 bpm (396 ms). At first glance, complete AV block and AV dissociation might be suspected. However, there is a slight but repetitive variation in RR intervals. In a more detailed observation, a 3:2 AV block type Mobitz I can be detected with a progressive prolongation of the PR interval followed by a blocked P wave. After the dropped QRS complex, the PR interval resets and the cycle repeats. The patient remained asymptomatic without evidence of recurrent tachycardia or bradycardia during follow-up. The most likely explanation is that ablation abolished antegrade, but not retrograde slow pathway conduction. The loss of antegrade slow pathway conduction unmasked preexisting conduction disease in the fast pathway, as indicated by the long refractory period resulting in nonconduction of the retrograde atrial beats (fig. I) as well as in the Wenkebach phenomenon observed with exercise (fig. 2). The absence of AV block I in figure 1 suggests an intact nodal and supranodal AV conduction. A second possibility is that the fast pathway had an atypical course and was inadvertently damaged during slow pathway ablation. The patient received no medication which could have influenced the interpretation of the ECGs.

Al-Sayegh et al. [I] reported a case where a second-degree AV block type Mobitz I also occurred intermit-tently following ablation of the AVNRT. They assumed that a high vagal tone with a sudden gush of sympathetic activity is needed to demonstrate this type of block. They concluded that the autonomic imbalance was usually handled well by the slow pathway, whenever the fast pathway was blocking. This phenomenon can also be seen in Holter recordings of healthy young individuals who can develop a transient, asymptomatic, first-degree heart block indicating block in the fast and conduction over the slow pathway. The findings in figure 2 could be due to autonomic influence. We can assume that changes in autonomic influence could be the potential trigger in shifting conduction from the fast to slow pathway, resulting in sudden changes in the PR interval. Even more so because the ECG of figure 2 was obtained in the recovery period after a stress exercise. Chiu et al. [2] showed that increase in vagal tone prolonged the effective refractory period in favour of the fast pathway compared with the slow pathway.

In conclusion, the presence of antegrade block over the fast pathway at a normal heart rate after a retrograde echo beat slowly conducted over a residual retrograde slow pathway was indicative of conduction disease in the remaining fast pathway. As mentioned above, different mechanisms occurring at different times after the procedure could be responsible for these recordings.

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References

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