

# Concealed conduction in atrial tachyarrhythmia illustrated in a heartbeat



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## Introduction

Concealed conduction is not seen directly on the surface electrocardiogram but is evident from its effect on subsequent impulses; it includes concealed incomplete penetration of the atrioventricular (AV) junction during atrial fibrillation (AF) and contributes mechanistically to so-called “slow AF.”<sup>1</sup> Manifestations of concealed conduction are numerous. We present a case that demonstrates a common consequence: unexpected failure of propagation of an impulse from atrium to ventricle.<sup>2</sup>

## Case report

A 49-year-old man with a 1-year history of palpitations and recurrent presyncope was shown on Holter monitoring to have recurrent episodes of AF and atrial tachycardia. There were multiple ventricular pauses, some in excess of 5 seconds, all owing to slow AV conduction during tachyarrhythmia episodes (Figure 1), implicating prolonged repetitive concealed conduction with incomplete yet deep penetration into the AV conduction system as the cause. The interval from the end of the chaotic atrial activity to the start of the subsequent P wave was similar to the prevailing sinus cycle length in all cases, suggesting that sinus node function was normal.

Pulmonary vein isolation was performed using the Arctic Front Cryoablation catheter (Medtronic PLC, Dublin, Ireland). Cessation of atrial tachycardia occurred as this vein was treated, but symptomatic arrhythmias recurred within days; a second ablation was performed (Figure 2), resulting in immediate and lasting elimination of atrial arrhythmias. In 5 years of follow-up with repeated Holter monitoring post-ablation, no symptoms have occurred and no bradycardia, tachyarrhythmia, or disturbance of AV conduction has been recorded.

**KEYWORDS** Atrial fibrillation; Atrial fibrillation ablation; Concealed conduction; Cryoballoon; Pulmonary vein isolation (Heart Rhythm Case Reports 2018;4:195–196)

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## KEY TEACHING POINTS

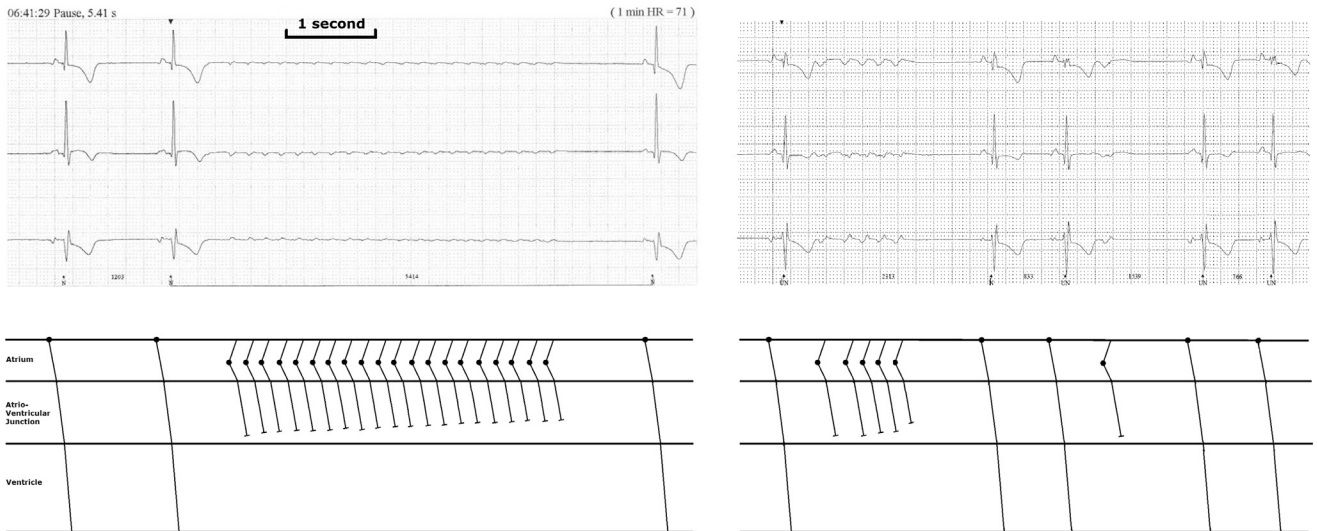
- Concealed conduction is not observed directly on the electrocardiogram; its presence is inferred from alterations of the conduction of other beats.
- In atrial fibrillation, concealed conduction can produce pauses even in patients who have normal atrioventricular conduction when in sinus rhythm.
- Ventricular pauses in atrial fibrillation can make pharmacologic management more hazardous, making ablation a more logical solution.

## Discussion

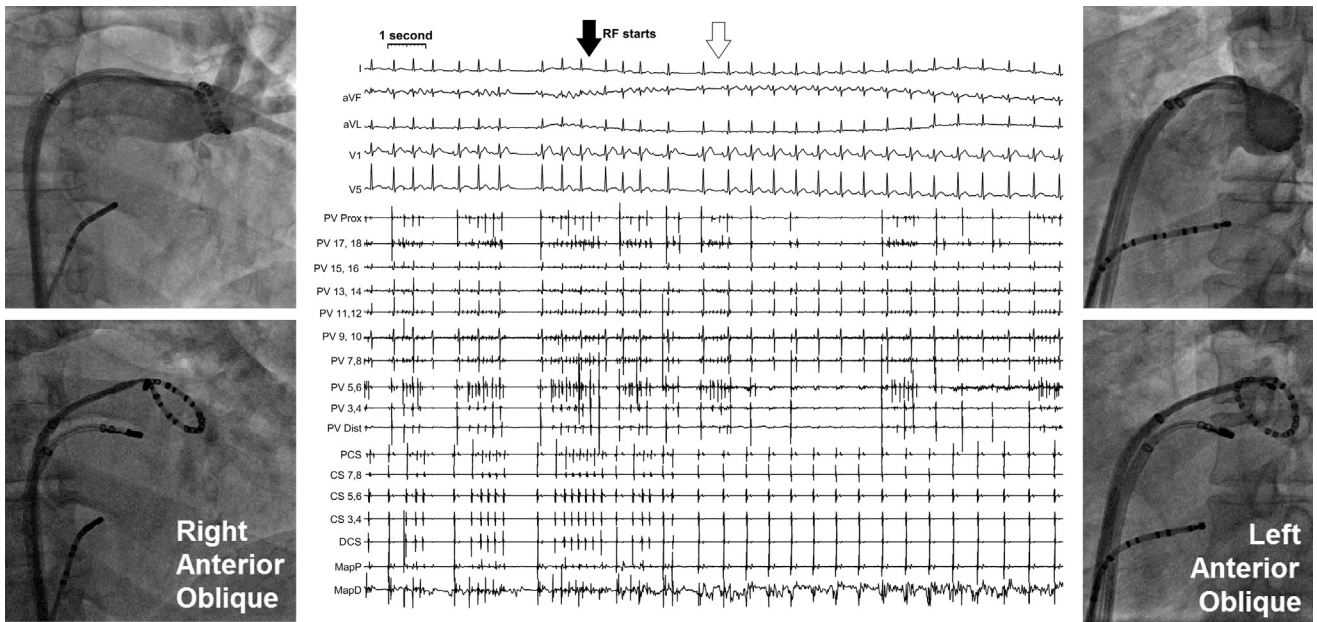
We describe a patient with ventricular pauses occurring during atrial tachyarrhythmias despite the presence of normal AV conduction in sinus rhythm and apparently functionally normal sinus node. We attribute the pauses to the presence of concealed conduction during the tachyarrhythmia episodes, a phenomenon that is commonly described but rarely as pronounced as in this case. The patient is remarkable for the absence of an effective escape rhythm. An escape rhythm would have curtailed the pauses that were observed, masking the effect of the concealed conduction.

The phenomenon seen in this patient is difficult to explain other than by concealed conduction. Alternative explanations require either invoking the presence of coincidental phenomena with simultaneous onset and offset, such as transient high-grade AV block coincident with the atrial arrhythmia. Slightly less improbable is the possibility of vagally mediated AT and simultaneous advanced second-degree AV block; however, the absence of slowing of the sinus rate before the episodes and the subsequent response to ablation argue strongly against this.

Concealed conduction of action potentials into the AV conduction system is overwhelmingly the most likely



**Figure 1** Examples of pauses from 2 different Holter recordings from the same patient. The corresponding ladder diagram is presented below the clinical recording. In each case, the pause relates to a nonconducted supraventricular ectopic beat or sequences of beats. In each case, the interval between the last ectopic beat and the subsequent sinus beat is shown to be similar to prevailing sinus cycle length, exonerating the sinus node from involvement in generating the pauses.



**Figure 2** On the second ablation, atrial tachyarrhythmias similar to those documented on Holter monitoring were mapped to the left common pulmonary vein. A single point of reconnection of the vein was detected. Ablation at 25 W (dark arrow) resulted in isolation of the vein within 5 seconds, permitting the atrium to return to sinus rhythm despite continued chaotic activity in the vein.

explanation for the ventricular pauses seen in our patient. Increased awareness of this underappreciated electrophysiological phenomenon can prevent unnecessary pacemaker implantation for apparent AV nodal disease.

**References**

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