JAFIB
Case Report
Journal of Atrial Fibrillation

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Ashman Phenomenon Dynamicity During Atrial Fibrillation: The Critical Role of the Long Cycles

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Abstract

A case of a patient with Atrial Fibrillation and intermittent wide complex beats. What's the mechanism?

Introduction

A 70-year-old male patient presented to the cardiology consult for a routine follow-up. Prior history of hypertension and permanent atrial fibrillation (AF) treated with Bisoprolol 5 mg once a day and anticoagulation. As part of his workup, a 24-hour Holter monitoring was obtained showing several wide QRS complex beats. What's the mechanism?

Holter analysis revealed AF with an average heart rate of 100 bpm. The patient presented with several wide QRS complex beats that were counted as premature ventricular contractions (PVCs). A closer analysis of the ECG recording allows suspecting aberrancy given the fact that the wide QRS complexes are always preceded by short-long-short sequences and the wideness of the QRS varies depending on the duration of the prior pause.

Ashman phenomenon is usually seen during AF which provides the opportunity for a variation of cycle lengths. In our case, the longer the pause; the wider the QRS complex. In [Figure 1]; a pause of 828 ms followed by a short coupling interval of 375 ms, resulted in a QRS complex of 110 ms; however, a pause of 898 ms followed by the same coupling interval, produced a QRS of 120 ms. It is conceivable, as shown in [Figure 1], that a longer pause (1328 ms) with the same coupling interval, included part of the anterior left fascicle also refractory, thus aberrancy is more remarkable (channels 1, 2, 3 of the Holter represent leads II, III and V5 of the surface ECG). This phenomenon demonstrates Ashman's dynamicity. The fact that the coupling interval of the short interval remains constant, but the preceding long cycle length varies, led us to believe that the degree of aberrancy depends on the longer cycle interval. [Figure 2] shows the comparison of a normally conducted beat (A) followed by progressively wider QRS complexes due to different level of aberration (B to D). The differential diagnosis of Ashman phenomenon should be established with PVCs.

Ashman phenomenon is a physiological response of intraventricular conduction in response to cycle length variations. Short-long-short sequences facilitate aberrancy, however, the dependency of the aberrancy on the long cycle interval, has scarcely been reported. Prolongation of the preceding long cycle generates different degrees of aberrancy (Ashman dynamicity) which is a reflection of involving the anterior fascicle in the mechanism of aberrancy. The most common manifestation of aberrancy during AF seen in clinical practice occurs in the right bundle.

Disclosures

None.

Key Words

Aberrant Conduction, Right Bundle Branch block, Ashman phenomenon.

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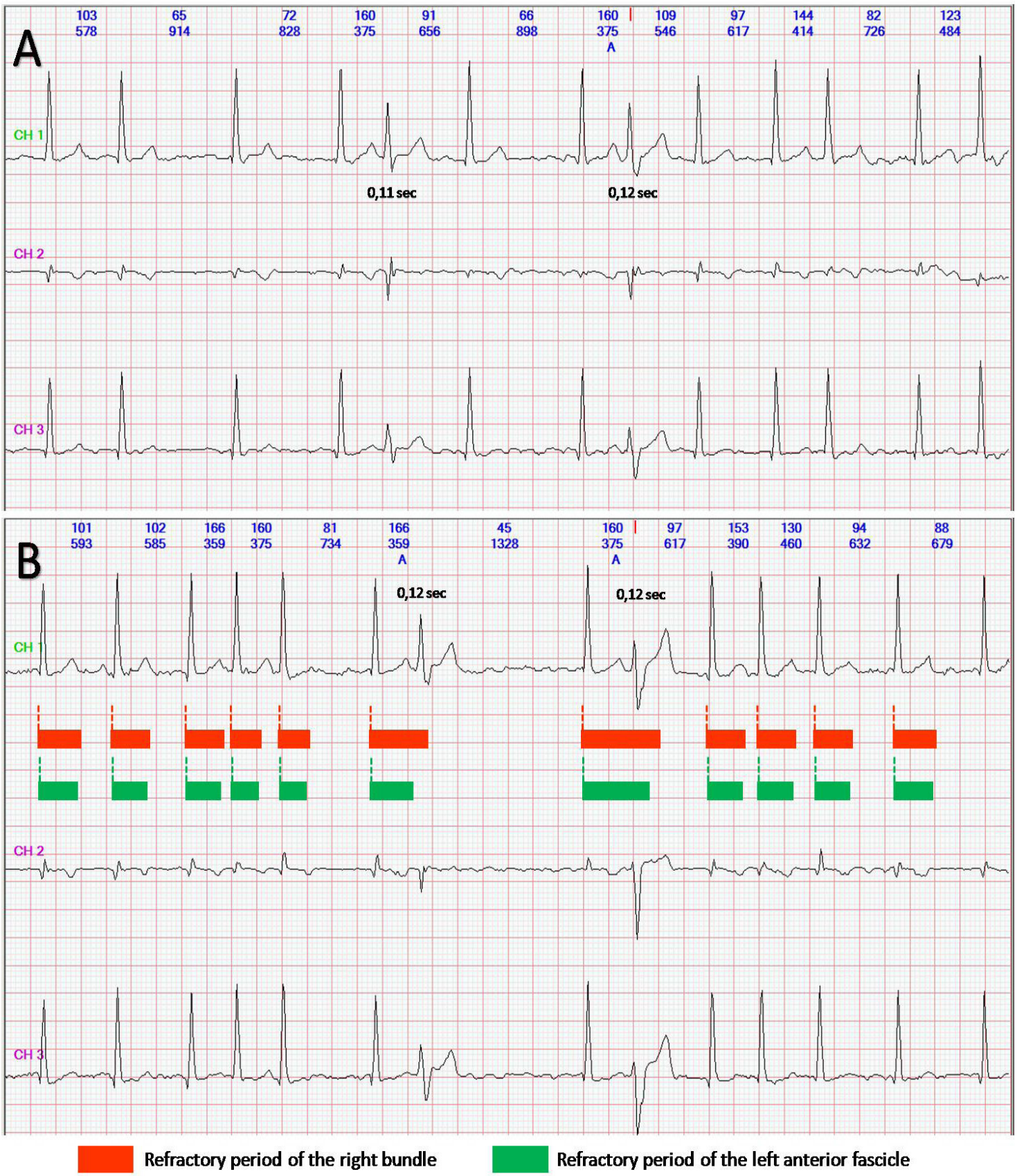

Figure 1: Panel A: Ashman phenomenon: different levels of aberrancy in the right bundle due to variations in the cycle length (See text for details). Ashman's dynamicity.
Panel B: Ashman phenomenon: major degree of aberrancy involving the right bundle and the left anterior fascicle (See text for details).

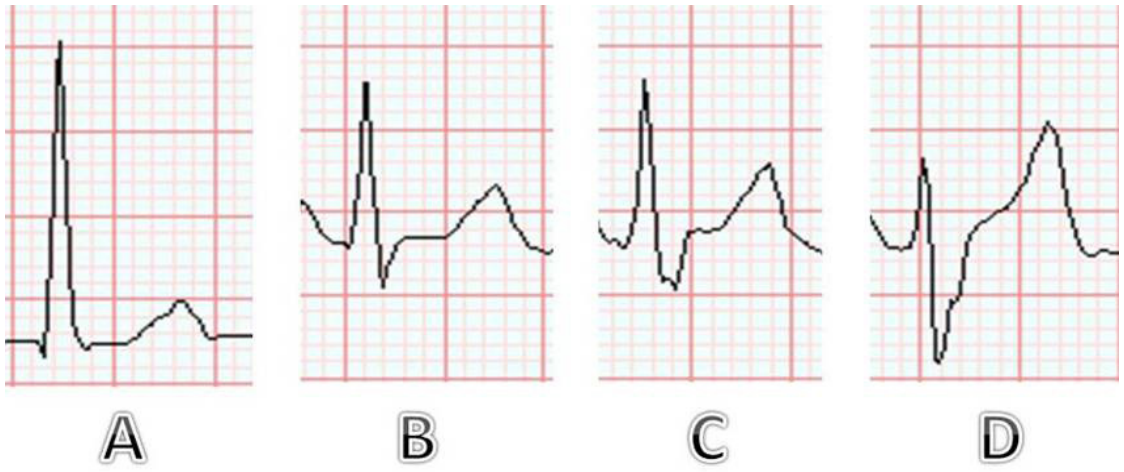

Figure 2: Comparison of a normally conducted beat (A), to different degrees of aberrancy due to Ashman's dynamicity phenomenon (B to D).