

High degree atrio-ventricular block: What is the mechanism?

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Electrocardiogram description

This is a 12-lead electrocardiogram (ECG) of an 85 year-old woman who presented to the emergency room due to a syncopal episode (Fig. 1).

The initial interpretation suggested a 2:1 atrio-ventricular (AV) block with first degree AV block and left bundle branch block (LBBB) (in the conducted beats) for the first three beats followed by 2:1 AV block with normal PR interval and right bun-

dle branch block (RBBB) in the conducted beats for the rest of the tracing. The possible explanations for this included preferential conduction over the right bundle followed by a P-wave that found the antegrade refractory period of the right bundle (non-conducted p-wave) for the first three beats; after a slightly prolonged P-P interval, the left bundle recovered and the right bundle blocked, allowing conduction every other beat, thus the RBBB in the conducted beats.

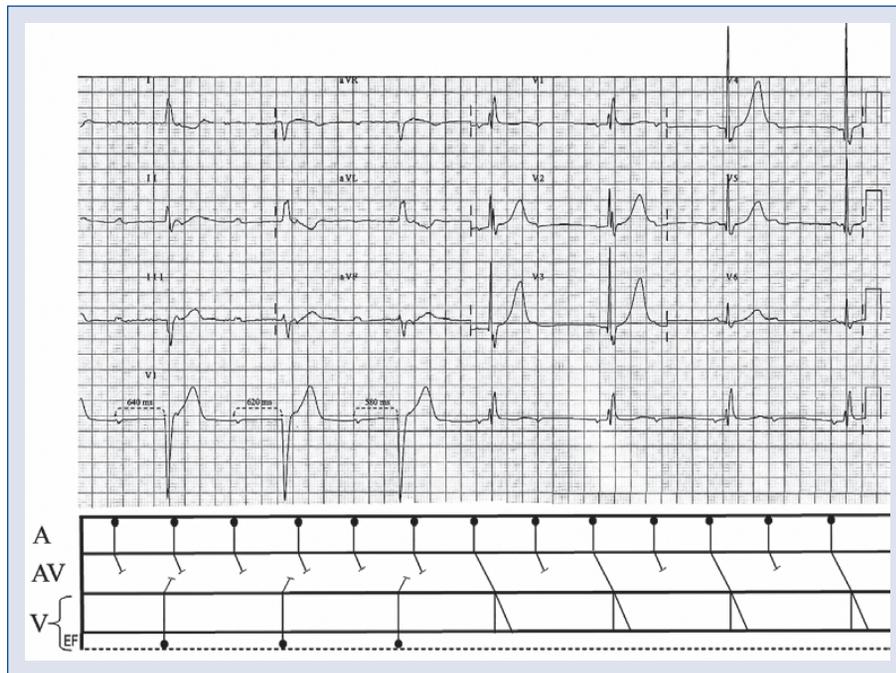


Figure 1. 12-lead electrocardiogram on admission.

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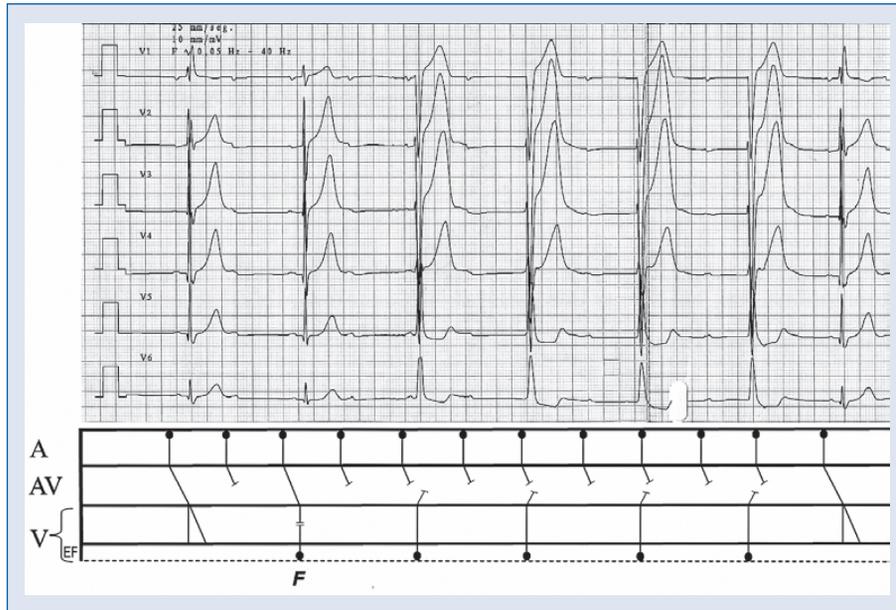


Figure 2. 12-lead electrocardiogram showing fusion beats.

However, closer examination revealed a variable PR interval during the first part of the tracing (Fig. 1, lead V1 rhythm strip), indicating complete AV block with a right ventricular *vs* aberrant hisian escape (pseudo-LBBB) followed by recovery of the left bundle allowing conduction every other beat (2:1 AV block with RBBB in the conducted beats) [1].

Extending the ECG recording by one minute facilitated the recognition of complete AV block. The presence of fusion beats (Fig. 2; indicated as F) strongly suggested a ventricular origin of the escape beats with LBBB morphology (pseudo-LBBB) arising from the right ventricle between the tricuspid ring and the pulmonary valve level (ejection fraction beats in Figs. 1 and 2) [2].

Points to ponder

This interesting ECG highlights the importance of recognizing the mechanisms involved in conduction system disease.

Infra-hisian damage (suspected due to wide QRS complexes-escapes) can manifest as a “fixed” conduction disorder or as a “dynamic” phenomenon, in which case some part of the Purkinje system may recover, allowing conduction. In the presented case,

after a brief period of complete AV block, the left bundle recovered, allowing 2:1 AV block with RBBB in the conducted beats. The key to distinguishing between sinus rhythm with first degree AV block and LBBB from complete AV block was the recognition of variable coupling intervals. By extending the recording for several minutes (long strip) the presence of fusion beats strongly suggested the origin of these beats as being the right ventricle, rather than aberrantly conducted hisian ectopic beats.

In this particular case, clinical decision-making was easy given the fact that the presence of symptomatic complete heart block with wide QRS escapes warrants pacemaker implantation.

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