A 73-year-old woman with hypertension, diabetes mellitus type II, obesity, paroxysmal atrial fibrillation, history of stroke, presented with subacute shortness of breath and lower extremity edema. Two rhythm strips from her cardiac rhythm monitor are shown. What is the mechanism of her bradycardia.
Circulation: Arrhythmia and Electrophysiology – CHALLENGE OF THE WEEK

Answer Options:

A. 2:1 Atrioventricular block with intermittent complete atrioventricular block.
B. 2:1 Atrioventricular block with right and left bundle branch blocks.
C. 2:1 Atrioventricular block with competing ventricular rhythm.
D. Complete atrioventricular block with left and right bundle branch escape rhythms.
E. Complete atrioventricular block with junctional escape rhythm and rate-related left bundle branch block.

Noheria A. Challenge of the Week: July 23rd Question
ANSWER TO JULY 23rd QUESTION
D. 2:1 Atrioventricular block with competing ventricular rhythm.

Explanation
The top tracing starts with sinus rhythm and 2:1 AV block with two P waves for every QRS complex. There is right bundle branch block (RBBB). As shown in the figure, the PP intervals gradually lengthen from left to right. There is a competing underlying ventricular escape rhythm (left bundle branch block [LBBB] morphology) at RR_{ventricular} intervals that becomes manifest once the conducted RR interval (i.e. 2 x PP interval) becomes longer on account of sinus rate slowing.

The lower tracing conversely shows that as the sinus rate accelerates the 2:1 conducted rhythm overtakes the ventricular escape rhythm.

In both tracings during the transition between the 2:1 supraventricular conducted rhythm and the ventricular escape rhythm there are fusion beats labeled with asterisks (fusion between RBBB supraventricular complex and LBBB morphology ventricular escape). These demonstrate pseudonormalization of the QRS complex (disappearance of RBBB on account of fusion).

There is no evidence of loss of 2:1 conduction (Option A). The loss of AV dissociation confirms the competing rhythm as ventricular escape rather than LBB aberrancy (Option B). There is clear evidence of 2:1 conduction when 2 x PP intervals are faster than the ventricular escape rhythm invalidating Options C & D.
2 x PP\textsubscript{pre} interval
2 x PP\textsubscript{post} interval
RR\textsubscript{ventricular} interval

* Fusion complexes with QRS pseudonormalization

Noheria A. Challenge of the Week: July 23\textsuperscript{rd} Answer