Where would you anticipate ablating the premature complexes shown on 12-lead ECG in Figure 1?

**Answer Options**

A. Aortomitral continuity  
B. Mitral valve annulus  
C. Tricuspid valve annulus  
D. Left ventricular septum  
E. Left ventricular papillary muscle
ANSWER TO JANUARY 15th QUESTION

D. Ventricular pacing induces antegrade atrioventricular (AV) conduction block

**Explanation**

This is a case of repetitive nonreentrant ventriculo-atrial synchrony (RNRVAS) (Figure A).1,2 During the episode, ventricular pacing at lower rate (80 beats per minute; 750 ms) results in retrograde P wave. The P wave falls in postventricular atrial refractory period (350 ms; Option C) and is appropriately not tracked with ventricular pacing, thus preventing pacemaker-mediated tachycardia. Because of the long AV delay (400 ms) and high lower rate (80 beats per minute; 750 ms), the atrial escape interval3 after V pacing is short (750–400=350 ms), resulting in the atrial pacing output occurring ≈120 ms after retrograde P wave onset, when the atrium is still physiologically refractory. The pacing stimulus thus does not capture the atrium, thereby lack of any conducted QRS complex to inhibit the next ventricular pacing output, resulting in ventricular pacing after expiration of AV delay interval (400 ms), and the cycle repeats. The episode sustains because all atrial events are retrograde P waves, and there is no captured P wave to generate antegrade conducted QRS complex. Option D is false because there is no evidence of antegrade AV block.

As shown in the figure, the episode begins with a premature atrial complex (*) sensed during postventricular atrial refractory period (350 ms), thus not inhibiting subsequent A pacing output. The atrial pacing output occurs determined by the lower rate limit (750 ms after previous atrial pace output). The conducted QRS from the premature atrial complex, however, incidentally occurs just after the A pace output, thus falling in V blank after A pace (crosstalk window, 65 ms), and is thus functionally undersensed (Option A). This results in ventricular pacing output after expiration of AV delay (400 ms), with retrograde P wave initiating repetitive nonreentrant ventriculo-atrial synchrony (Option B).

The episode termination occurs after another premature atrial complex (†) leads to antegrade AV conduction resulting in a fusion complex with the ventricular paced QRS (narrower, ‡). The antegrade capture of the AV conduction system makes it refractory and prevents retrograde P wave after the ventricular pacing (Option E). The subsequent atrial pace output at atrial escape interval (350 ms) is thus able to capture the atrium and result in antegrade AV conduction. The resulting QRS complex is appropriately sensed and inhibits ventricular pacing, terminating the episode of repetitive nonreentrant ventriculo-atrial synchrony.

Onset of a different episode of repetitive nonreentrant ventriculo-atrial synchrony as recorded by the device is shown in Figure B.

**REFERENCES**

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