

## Demonstration of Ventricular Parasystole on a Standard 12-Lead Electrocardiogram

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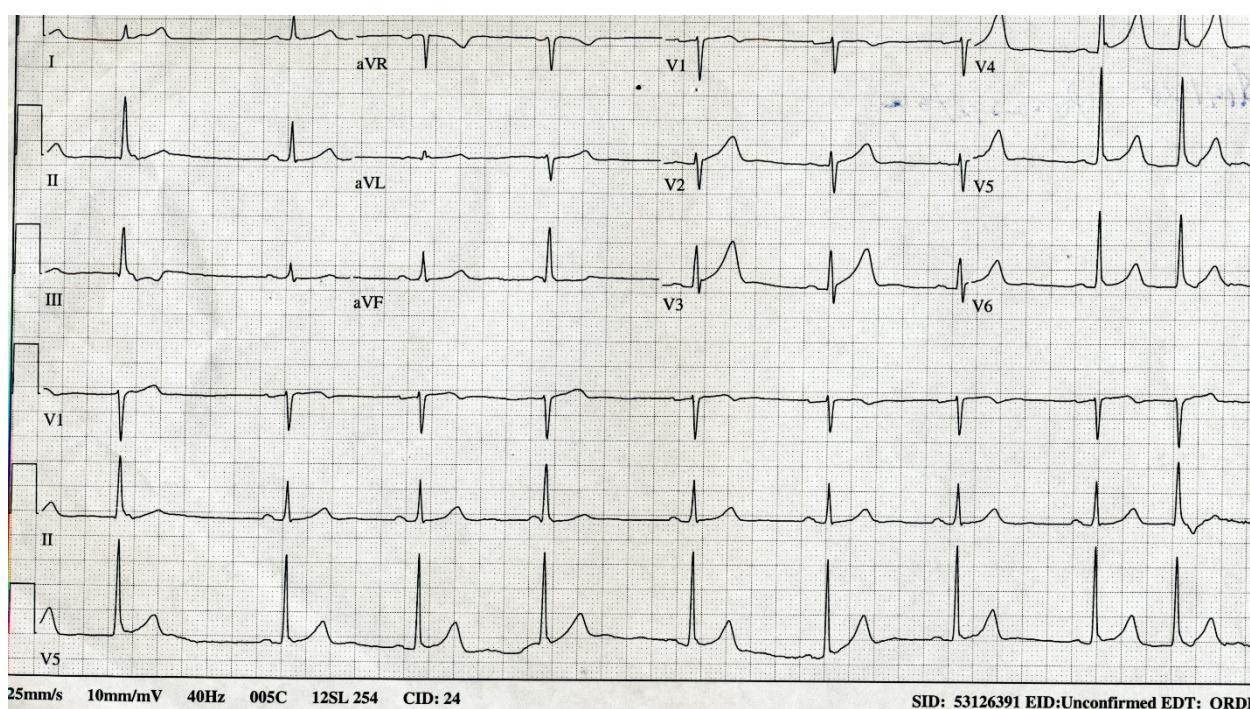
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### Case Blog



**Figure 1** The first and ninth QRS complexes are premature ventricular complexes. The fourth QRS complex is a fusion complex between sinus rhythm and PVC. The interval between the first and second PVC (the fusion complex) is twice the basic interectopic interval. The interval between the second and third PVC is three times the basic interectopic interval. The first and third PVC are closely followed by retrograde P waves (a result of retrograde conduction to the atria) while the second PVC (the fusion complex) is not followed by a retrograde P wave as the atria are still refractory due to depolarization by the sinus P wave immediately preceding this fusion complex.

During a clinical trial assessing the efficacy of ranolazine for the suppression of atrial fibrillation, a patient was encountered who, aside from paroxysmal atrial fibrillation, had premature ventricular complexes (PVC) on his electrocardiogram (ECG) (**Figure 1**). A close examination of the ECG rhythm strip revealed that these PVC's had: 1) a regular interectopic interval or multiple thereof (approximately 1720 ms), 2) fusion complexes with the underlying sinus rhythm QRS complexes, and 3) variable coupling intervals. This constellation of findings defines a parasystolic focus, making this rhythm sinus rhythm with ventricular parasystole. A dose of ranolazine 1000 mg po bid satisfactorily reduced the patient's atrial fibrillation and also suppressed virtually all of the ventricular ectopy.

Parasystole occurs when two independent foci beat separately—in this case, sinus rhythm and a ventricular focus. Because they are independent, there will be no regular link between them, which results in the triad noted above, that defines the presence of the parasystolic focus. What is unusual in this case is that the three findings—a regular interectopic interval (or multiple thereof), varying coupling intervals, and fusion complexes—are seen on a single 12-lead ECG. Almost always, it takes a longer rhythm strip to allow such relationships to become apparent. Of additional note, there must be entrance block (either persistently or at least much of the time) around the ventricular focus such that the sinus rhythm complexes do not penetrate and suppress it.

Additionally, to allow the focus to conduct out to the ventricles, there can be intermittent exit block but not persistent exit. Intermittent exit block is the likely explanation

for varying rather than constant interectopic intervals-i.e. the focus fires at a regular rate but only some (or most) of the discharges reach the ventricular tissue.