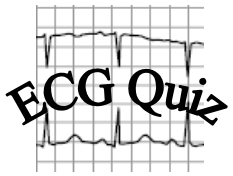

Funny-Looking Ventricular Tachycardia or Something Else?

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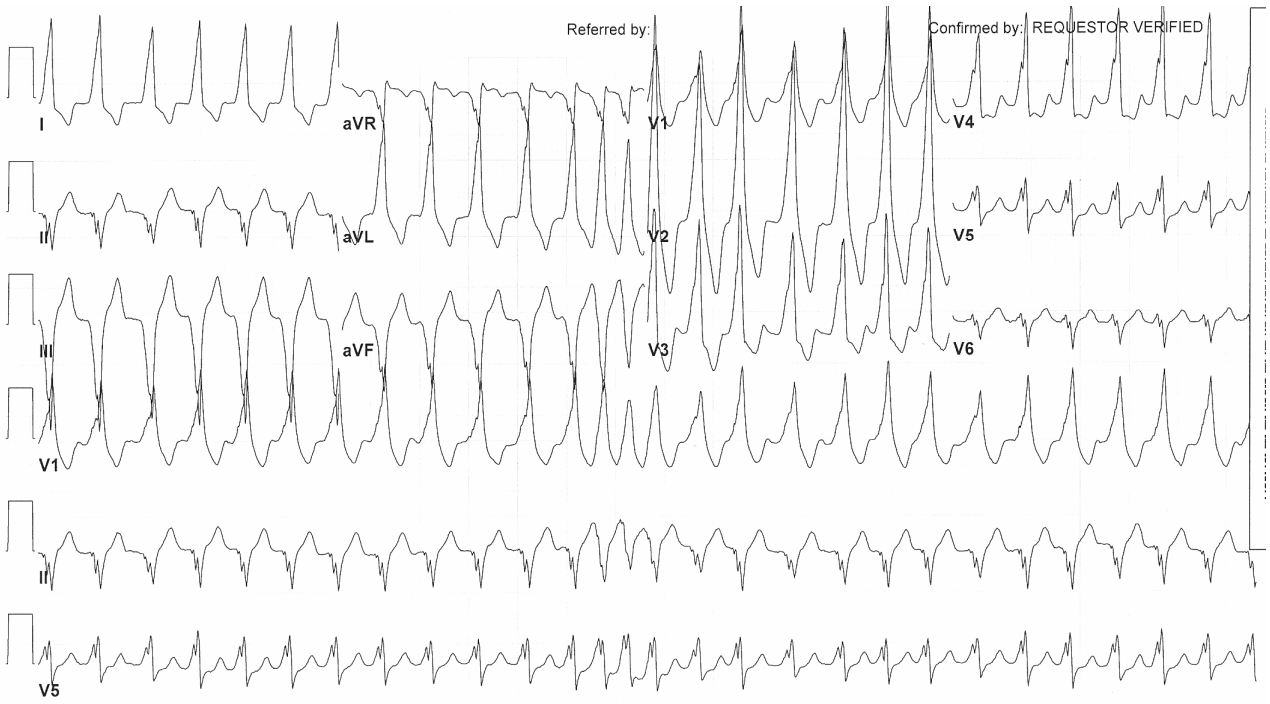
A 32 year-old white male presented to the emergency room with complaints of sudden onset dizziness, new syncope, and palpitations for the last 30 minutes. On arrival, his pulse was approximately 250 bpm and feeble. His blood pressure was 84/35. He denied any chest pain but was short of air.

His ECG is shown below:



What is the diagnosis?

(A) AV nodal Re-entrant Tachycardia

(B) Ventricular Tachycardia

(C) Atrial Fibrillation with accessory pathway (WPW Syndrome)

(D) ECG Artifact

(E) Ventricular Fibrillation

Correct Answer: C

Atrial Fibrillation (AFib) with accessory pathway (WPW Syndrome)

- AFib in patients with WPW Syndrome is potentially the most lethal arrhythmia for these patients due to its potential to deteriorate into ventricular fibrillation (Vfib).

    - In normal patients with an accessory pathway, the heart is protected from exceptionally high ventricular rates by the relatively long refractory period of the AV node. This generally limits the maximum ventricular rate. In patients with WPW, however, the accessory pathway commonly has a very short anterograde refractory period. This allows for much faster transmission of impulses from the atrial and correspondingly much higher ventricular rates can be reached.

    - The rapid ventricular rate may not allow for adequate diastolic filling of the ventricle and this in turn can predispose to hypotension. In addition, sympathetic discharge secondary to hypotension potentially can lead to an even shorter refractory period of the accessory pathway and subsequently increase the ventricular rate further. If the ventricular rate becomes too high, this can predispose to Vfib.

    - AFib usually does not conduct at a rate of more that 180 bpm through the normal AV node. On the other hand, conduction through an accessory pathway often results in more rapid ventricular rates. This usually appears as a bizarre, wide-complex, irregular tachycardia on ECG, with rates often in the 250 bpm range or higher as was noted in this patient.

What is the best initial treatment for the patient?

(A) IV Adenosine

(B) IV Lidocaine

(C) IV Diltiazem

(D) IV Amiodarone

(E) Cardioversion

(F) IV Digoxin

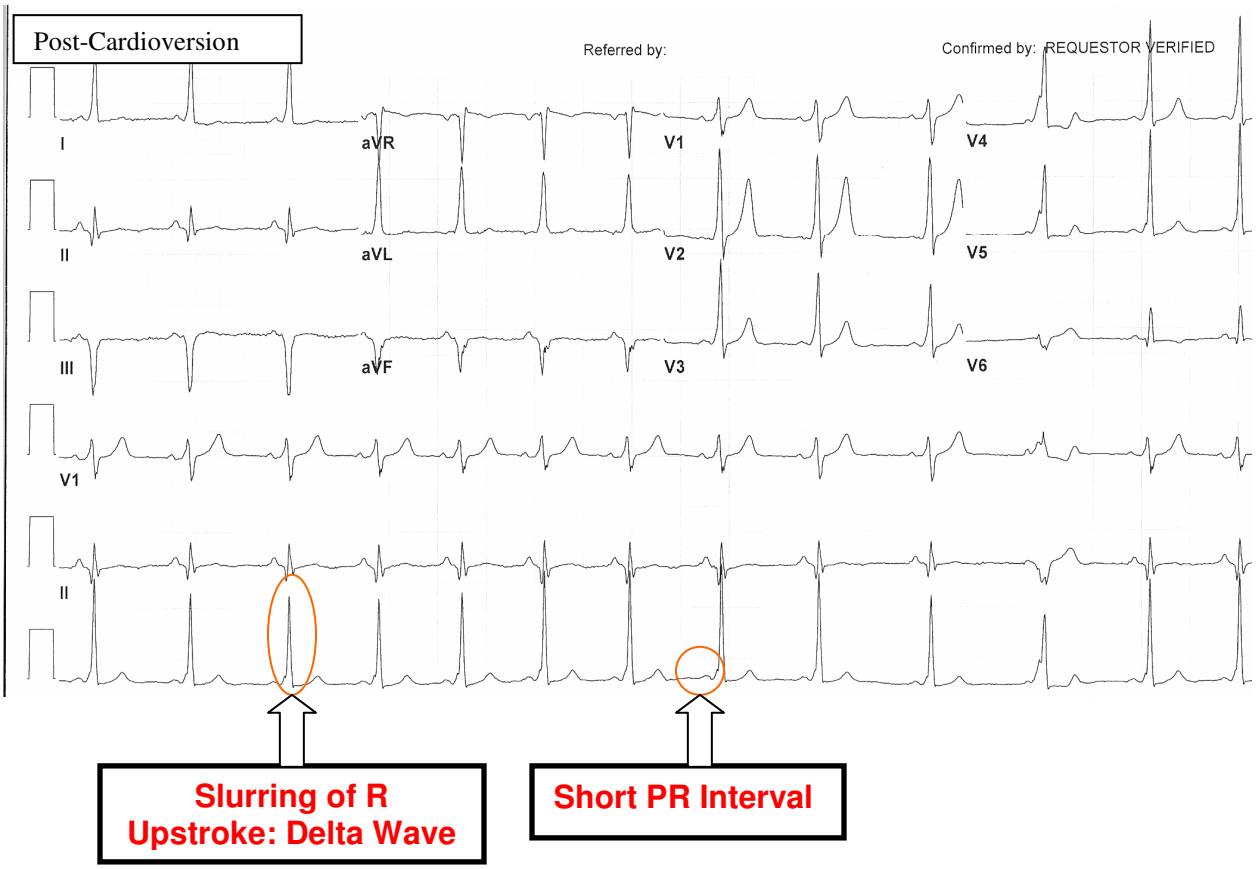
(G) IV Metoprolol

Correct Answer: E

Cardioversion

- Treatment of AFib associated with WPW is necessarily different than for a patient without an accessory pathway.
    - In WPW-associated AFib, the goal is to prolong the anterograde refractory period of the accessory pathway relative to the AV node. This slows the rate of conduction through the accessory pathway, thus the ventricular rate slows down.
    - In patients with non-WPW-associated AFib, the goal is to slow the refractory period of the AV node.
    - Standard rate control by drugs that prolong the refractory period of the AV node (e.g., calcium channel blockers, beta-blockers, digoxin, and even adenosine) conversely result in a higher rate of transmission through the accessory pathway and paradoxically increase the ventricular rate. This could have disastrous consequences possibly causing the arrhythmia to deteriorate into Vfib. Thus, such drugs are contraindicated in WPW-associated AFib. Similarly, lidocaine and amiodarone typically are not effective in this situation either.
    - If the patient is unstable with evidence of hypoperfusion, primary synchronized cardioversion should be the first-line treatment.
    - If the patient is stable, medical therapy with procainamide may be tried. Procainamide is given with a 17 mg/kg IV infusion up to a maximum of 50 mg/min. Procainamide is useful as it blocks conduction via the accessory pathway, but it has the added effect of increasing transmission through the AV node which occasionally may create a conventional atrial fibrillation that may require treatment with other medications and/or cardioversion.
    - In this case, the patient was deemed unstable and treated with synchronized cardioversion. His post-cardioversion ECG is shown below exhibiting the characteristic short PR interval and delta wave of WPW syndrome. He subsequently was referred for EP ablation of the accessory pathway.

Post-Cardioversion ECG



Additional Reading

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