QUIZ

The EKG Quiz: "The obvious!"

Fathi I. Ali

Department of Medicine, Division of Cardiology, Vanderbilt University School of Medicine, Nashville, TN, USA

History

This EKG (Fig. 1) is for a 76-year-old man with history of coronary artery disease (CAD) and palpitations. He was otherwise feeling well.

Questions

1. What is the interpretation of the EKG?

   a. Normal sinus rhythm.
   b. Normal sinus rhythm followed by a supraventricular tachycardia (SVT).
   c. Normal sinus rhythm followed by a non-sustained ventricular tachycardia (VT).
   d. Normal sinus rhythm followed by Torsade de Pointes.

2. Best next course of action based on this EKG:

   a. No action is needed.
   b. Electrophysiological study and possible ablation of an SVT.
   c. Electrophysiological study and possible ICD implantation if VT is induced.
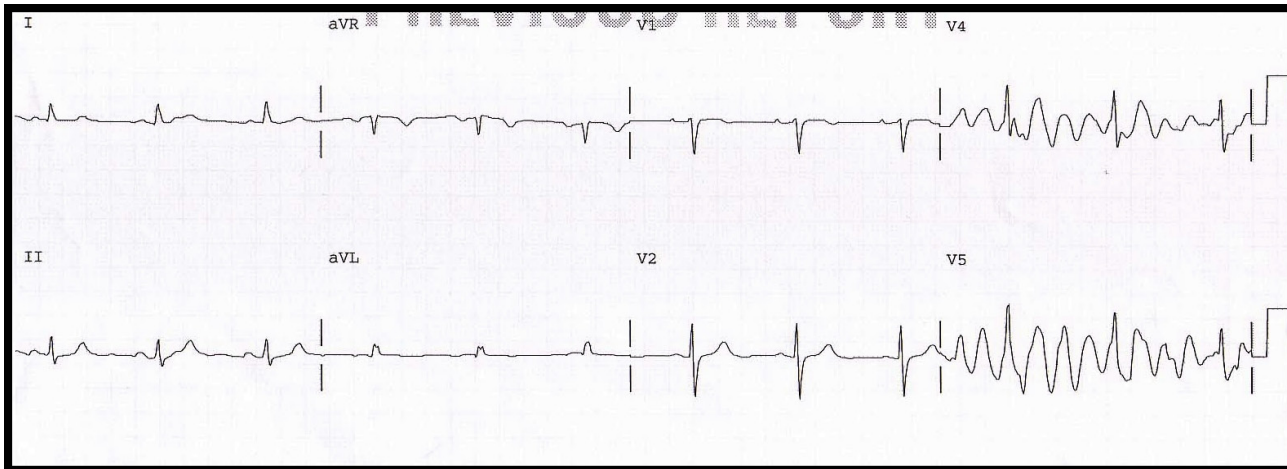   d. Check electrolytes, check if he takes drugs that prolong QT, and give him a Holter monitor.

Figure 1. A 76-year-old man with history of coronary artery disease and palpitations.

Answers
1. A
2. A

Discussion

The initial part of the EKG shows normal sinus rhythm. The most obvious abnormality is the fast and wide waves in leads V4 and V5 towards the end of the tracing. Given the clinical history of palpitation and CAD, it is tempting to call this ventricular tachycardia (VT); however, this is not the case. These large waves are due to an artifact. The patient was in normal sinus rhythm, and no action is needed!

Surface EKG intends to pick up electrical activities from the heart only. However, it is not absolutely selective and even with best filtration it still can pick up other non-cardiac activities, typically skeletal muscles. When that happens, the tracing will show waves from these two sources, i.e., cardiac and extra-cardiac, superimposed on each other. In certain leads the extra-cardiac waves can be large, fast, and dominate the tracing, therefore resembling VT. The simultaneous cardiac waves can be small and hidden within these large body waves. To reach to the correct diagnosis one has to identify the cardiac waves in the midst of these large non-cardiac waves. A tip for doing that is to look for slower sharp inflections (cardiac QRS complexes) that occur independent of the faster and larger blunt waves (body artifacts). As illustrated in Fig.2, the easiest way to do that is to use a pair of EKG calipers and start from the normal sinus beats then follow them through the tracing to see if they march through.

The take home message is to be systematic and not get distracted by what may look like an "obvious" abnormality!
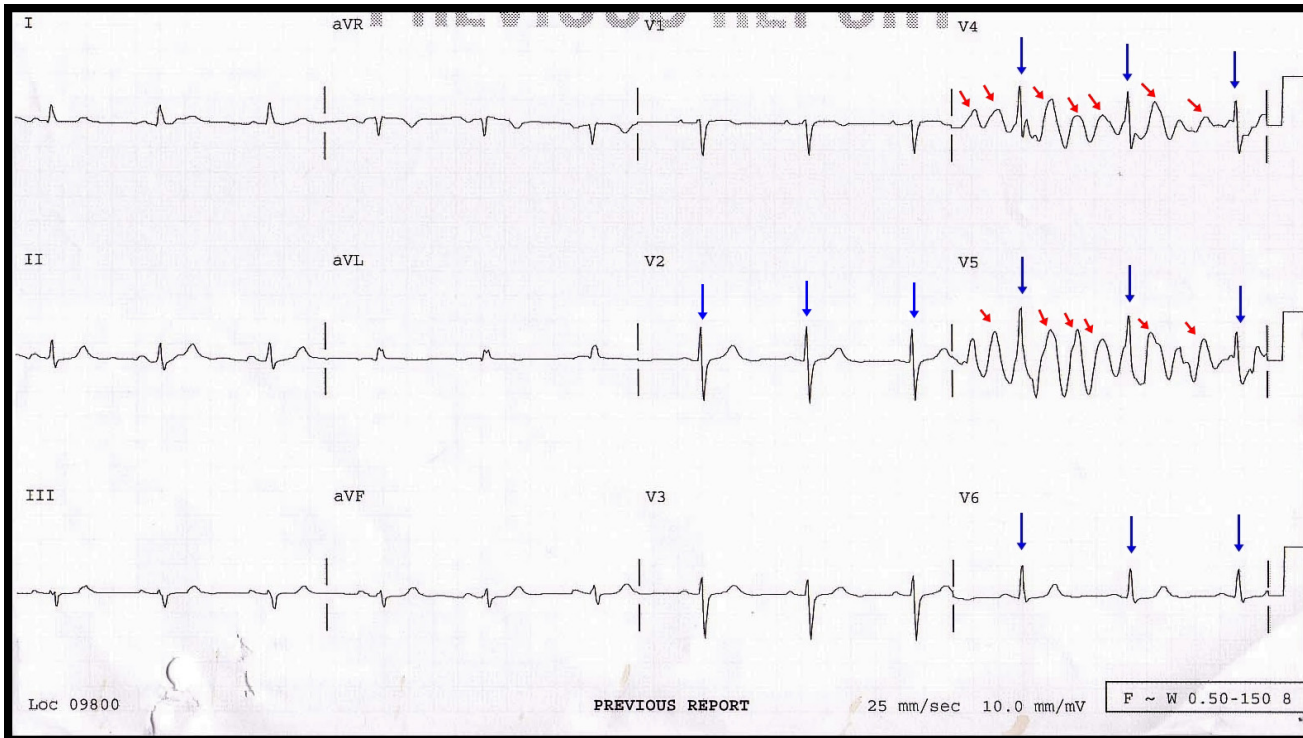
Figure 2. Body artifact can be mistaken for VT. Cardiac activities (blue arrows) are slower, sharp inflections that occur in the midst of the body artifacts which are typically faster but blunt waves (red arrows). Lead V6, which is taken simultaneously, shows no artifact at all. It clarifies the location of the QRS complexes in the artifact waves.

Suggested Reading

Knight BP, Pelosi F, Michaud GF, Strickberger SA, Morady F. Clinical consequences of electrocardiographic artifact mimicking ventricular tachycardia. NEJM 1999;341:1270–4.