

Where Is the Pacemaker Wire?

Discussion

Jerry W. Jones, MD FACEP FAAEM

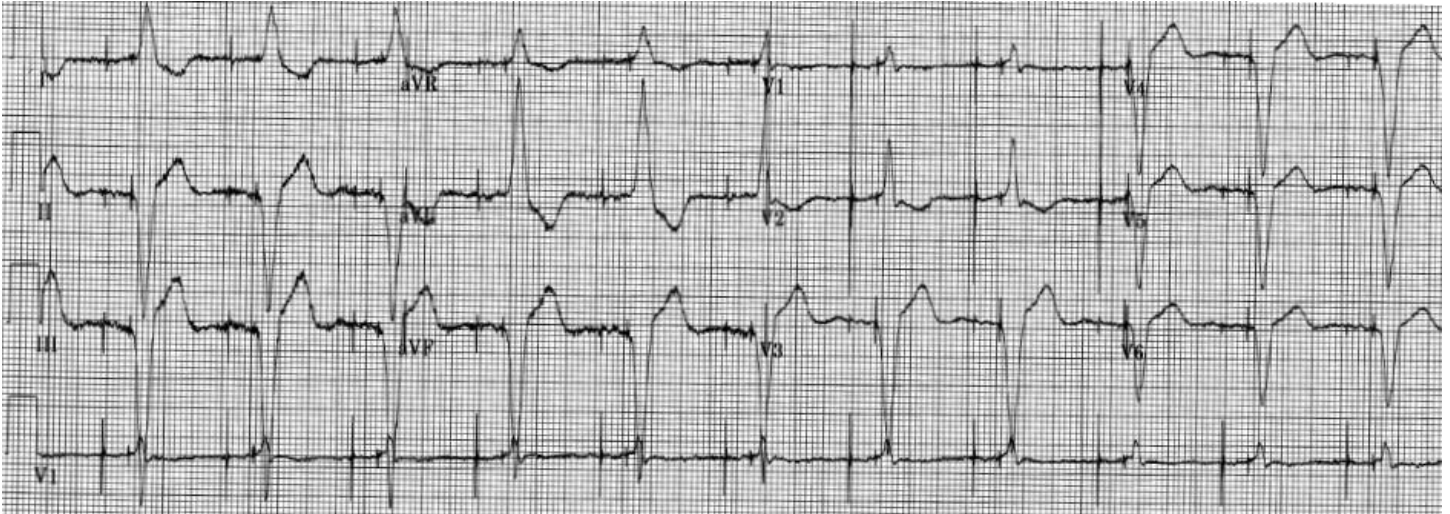


Figure 1

A pacemaker wire properly placed in the apex of the right ventricle should create a left bundle branch block pattern with QS complexes in Leads V1 and V2 – but that is NOT the case here!

FYI – this is a pseudo-misplacement of the pacer wire. The wire is actually in the right ventricle where it is supposed to be. Such “pseudo-” patterns are not unusual. If you see pacemaker patients, you *will* encounter them from time to time – so you should be able to recognize the pattern when you see it. Besides, *real* pacemaker wires in the left ventricle are quite rare.

Here is a snippet of a patient (without a pacemaker) with an ECG demonstrating RBBB:

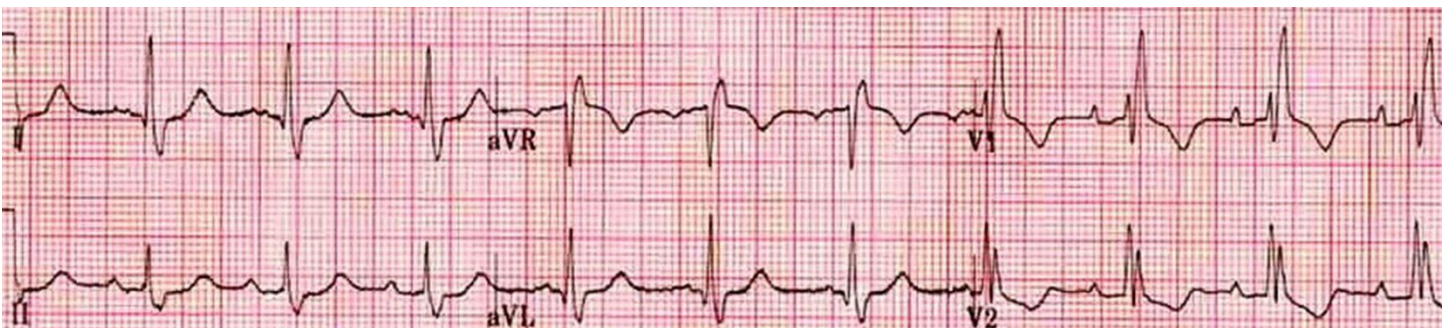


Figure 2 – RBBB, no pacemaker

Now here is an ECG with the pacemaker wire actually placed in the left ventricle... (This ECG is formatted into TWO columns: limb leads on left, precordial leads on right.)

LIMB LEADS

PRECORDIAL LEADS

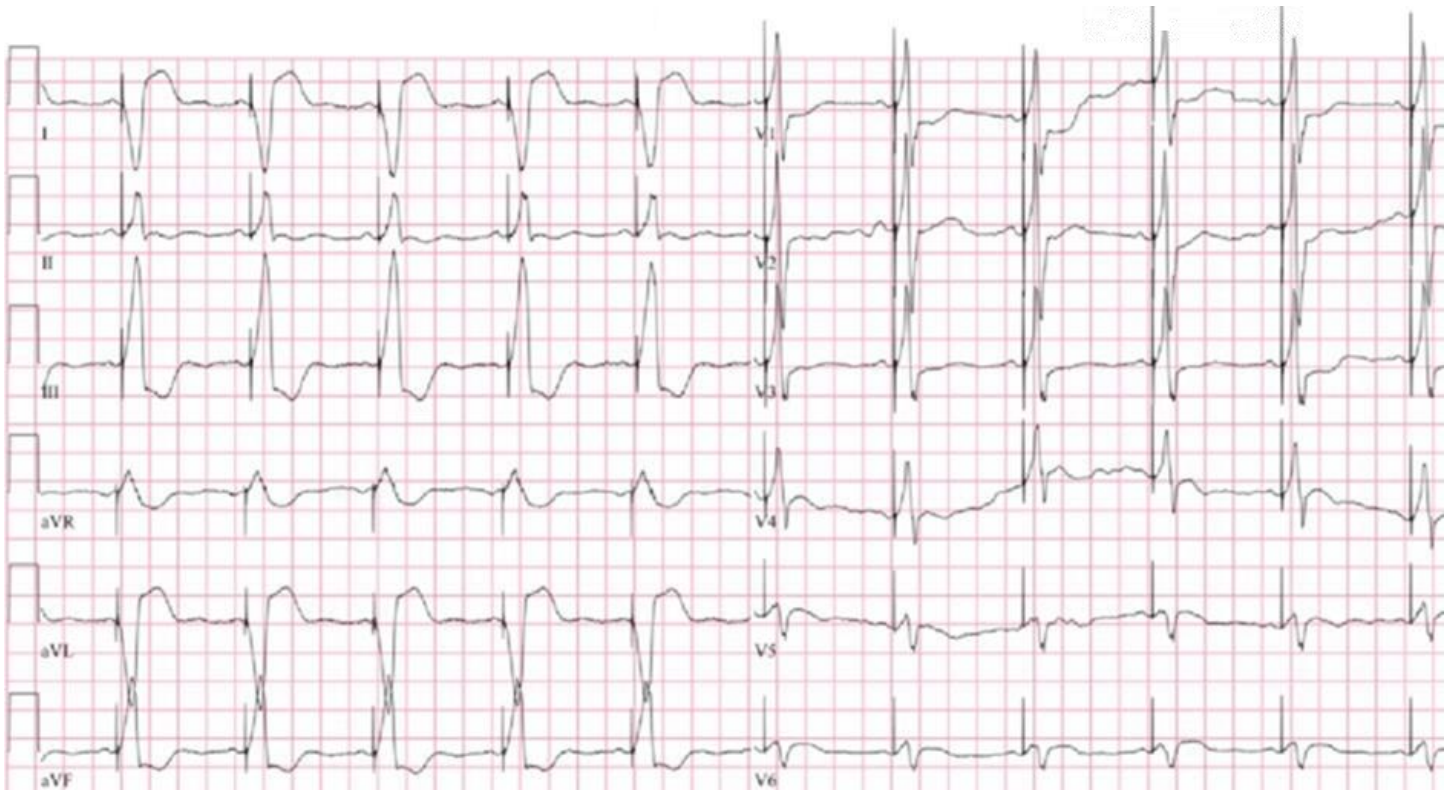


Figure 3

Here is what to look for:

1. If the pacemaker wire is really in the LEFT ventricle, it will produce a *real* RBBB pattern because it is activating the left ventricle first. And if it is a real RBBB pattern, it should manifest an S wave in Lead I. If the pacemaker wire is in the RIGHT ventricle, there will be no S wave in Lead I because there is no *real* RBBB pattern.
2. If the pacemaker wire is correctly placed in the right ventricle but demonstrating a pseudo-RBBB pattern, the QRS morphology should change from an R wave to a QS wave by Lead V3.

In the ECG without a pacemaker but with RBBB (Figure 2), you can clearly see the S wave in Lead I that is so characteristic of RBBB. You will also see the S wave in Lead I in the ECG with the pacemaker wire in the LEFT ventricle (Figure 3). It is producing a RBBB pattern – but that is NOT a *pseudo*-RBBB pattern! On this ECG, the change in QRS morphology does not occur until Lead V5!

When we look at the ECG in Figure 1, we do NOT see an S wave in Lead I and the change in QRS morphology occurred BEFORE Lead V3. Therefore, Figure 1 shows a *pseudo-RBBB* pattern and the pacemaker wire has been correctly placed in the right ventricle. A chest x-ray will also confirm this (assuming, of course, that your x-ray machine has been repaired).

Did you notice my use of the phrase “change in QRS morphology” instead of *transition lead*? In both of these ECGs with pacemakers, the change in the precordial leads was from a predominantly POSITIVE QRS to a predominantly NEGATIVE QRS. ***That is NOT a true transition!*** The precordial transition is a “one-way street” – it is strictly from an rS morphology to an Rs morphology. When you see the precordial leads beginning (in V1) with positive QRS complexes – ***the transition has already occurred BEFORE Lead V1.*** Eventually reverting back to a mostly negative QRS does NOT constitute *the* transition!

In these cases, the word “transition” is being used as a ***term of art***. A *term of art* is a word or phrase that occurs in normal conversation – but when used in the context of a specialized field, such as medicine or law, it can have a very different meaning or connotation. Of course, changing from a positive QRS to a negative QRS *is* a transition – *but not THE transition* as the term is used in electrocardiography.

Similarly, in law when charges against a defendant are “dismissed WITH PREJUDICE” that sounds really BAD – but in actuality, it is really GOOD for the defendant because it means he can never be retried for those same charges.