

Learning From a Really BAD-Looking ECG!

Discussion

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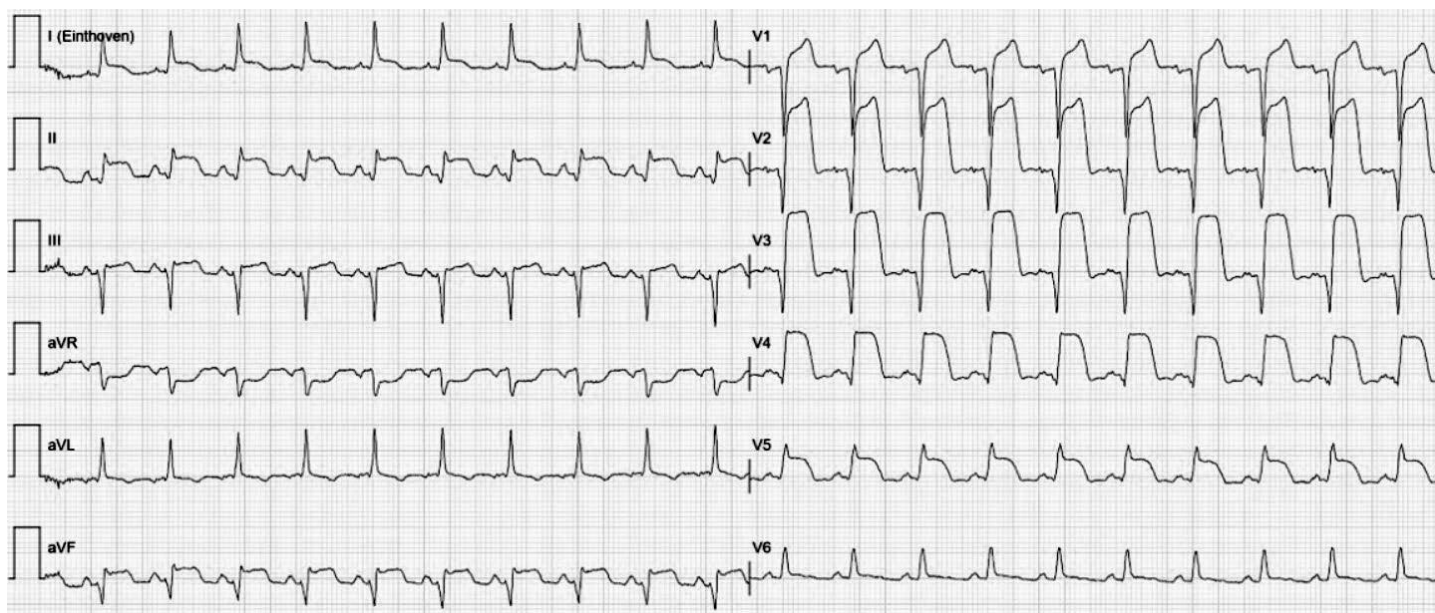


Figure 1

Which coronary artery is the culprit? Remember, as a “general rule,” LAD occlusions cause the ST elevations in Leads V1 – V4 to progressively *increase* while proximal RCA occlusions result in ST elevations that progressively *decrease* in magnitude from Lead V1 – Lead V4.

Please note that when I used the term “general rule,” I did not say *absolute*, *immutable*, *incontestible* or any other term suggesting it was “*carved in stone*.” I said “general” and you should understand that the word general used in this context indicates “*usually... but not every time*.” This ECG represents the portion that reads “...but not every time.”

Let’s get a few things out of the way: the rhythm is sinus and regular and there is no evidence of SA or AV nodal blocks.

Looking at the *frontal plane* first, we see ST elevation in Leads I, II, III, aVL and aVF. The STE in Leads III and aVL is very subtle, but it’s there! There is ST depression in

Lead aVR and T wave inversion in Lead aVL. *The STE in both Leads I and II should raise an immediate red flag! That is very important information.*

In the transverse (or horizontal) plane, we see obvious STE in Leads V1, V5 and V6 and tombstones in Leads V2 – V4!

Now I am going to become a bit of a *contrarian* (that's a fancy term for "grumpy ECG prof"). There are several articles published and available on the web that state that so-called "tombstones" are really "wide R waves" – not ST elevations (though they are a result of the same ischemia causing ST elevation). My response is "perhaps so, but if those tombstones are really just giant R waves... then where are the T waves?" None of the ECGs in my collection that manifest "tombstones" demonstrate separate T waves.

So you have already encountered two *caveats* (caveat = BEWARE!) in this article:

1. Never accept a *general* statement as an *absolute*! There are ALWAYS exceptions in medicine!
2. Never underestimate the importance and validity of your *own* experience. Perhaps there is truth and value in the statement by the authors who determined that "tombstones" were just wide R waves – but always look for the proof yourself!

OK... so now we need to determine the culprit artery. One of the first things you learn in ***The Masterclass in Advanced Electrocardiography*** is that *all three coronary arteries* – when occluded – can produce an acute inferior transmural ischemia.

So... which is the culprit?

Let's use the **Jones Method of Diagnostic Elimination**. Instead of looking for all the findings that *prove* the culprit artery, it is often easier and faster to find signs that immediately rule out the non-culprit arteries.

First, the ST elevation in both Leads I and Lead II: while an occlusion of the RCA can certainly result in an acute inferior transmural ischemia with STE in Leads II, III and aVF – **it NEVER causes ST elevation in Lead I. NEVER!**

That rules out the RCA as the culprit and leaves the left anterior descending artery (LAD) and the left circumflex artery (LCx) as potential culprits.

Second... remember this: occlusions of the LCx do NOT cause ST elevation in Leads V1 and V2! NEVER!

That leaves the LAD as the culprit.

There are a lot of “red herrings” (distractions, findings that lead you to a misdiagnosis) on this ECG.

First, you might have been misled by the progression of the ST elevation in the precordial leads. This is more typical of a *proximal occlusion of the RCA* (were you aware that an occlusion of the RCA can cause ST elevation in ALL precordial leads? It certainly can!)

Second, those ST elevations in the inferior leads are not what we would expect of an LAD occlusion – and certainly not a *proximal-to-S1* LAD occlusion! An STE ≥ 2.5 mm in Lead V1 indicates an occlusion proximal to S1. That’s evident here. But it also typically results in ST depression in Leads II, III and aVF – which is NOT present here.

Leads aVL and III have smaller degrees of ST elevation than the other leads in their vascular territories which indicates a *cancellation of forces* affecting the two leads. It is such cancellations that often hide the presence of a large area at risk in the event of a proximal occlusion of a Type 3 (“wraparound”) LAD.

Did you know that about 85% of LADs are the “wraparound” type? Remember that the next time you see an LAD occlusion. And also be well aware that even though you aren’t seeing ST elevation in certain leads... *it’s really there!* You just can’t see it because of a cancellation of forces!

Cancellation of forces is something that occurs *in the ECG machine* – not the heart! The acute ischemia isn’t really cancelled – it’s just hidden from you!

Final PEARL! | The heart never feels obligated to “play by the rules!” Expect exceptions!

BIG ANNOUNCEMENT COMING SOON!

In August, I will be starting a bi-weekly vodcast (video podcast) on YouTube. The live broadcast will be via Zoom so you will be able to ask questions and make comments in real time. More information on LinkedIn soon!