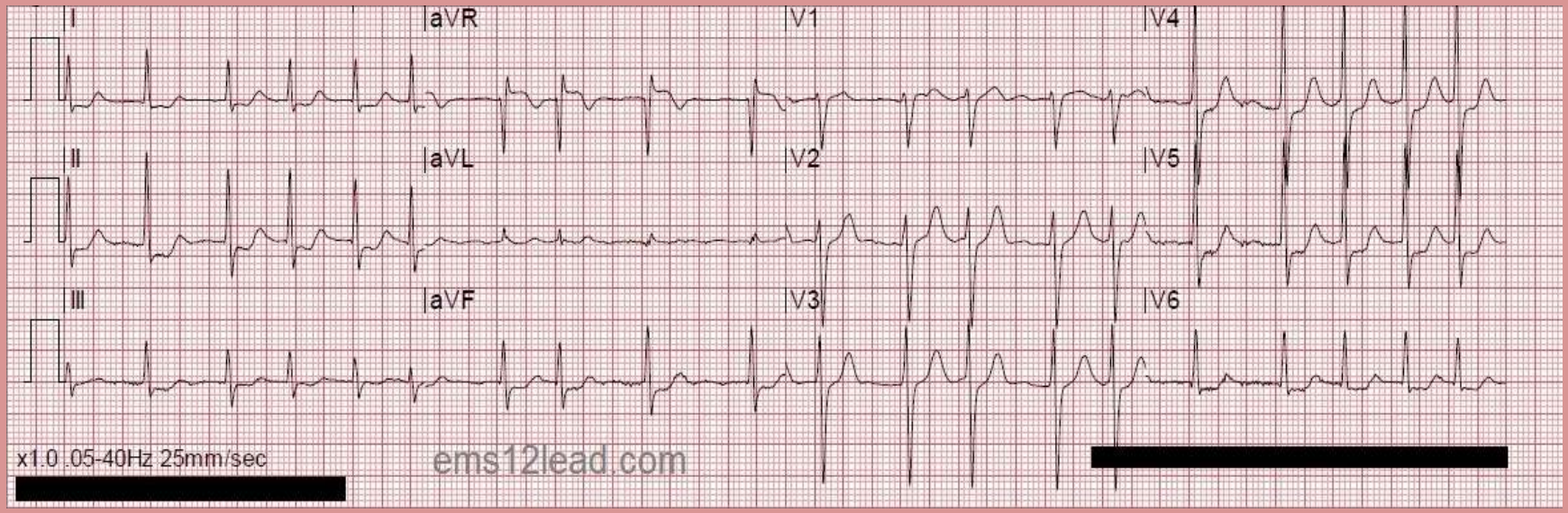
# CPER digest February 2016

**You are dispatched to a private residence for a 67 year old male patient who has been experiencing chest pain for 30 minutes. The patient states he has been previously healthy, with no known cardiac disease. Your physical assessment reveals a conscious, alert male who appears anxious and pale. He complains of feeling nauseated but denies palpitations and dyspnea. His vital signs; HR 120, BP 146/90, RR 16, $SpO_2$ 98% on room air. The following 12-Lead ECG was taken. You note the ST-elevation in aVR with diffuse ST-depression. Does this patient meet the STEMI bypass criteria?**




**If you answered no, you are correct.**

**Isolated ST-elevation in aVR may represent myocardial ischemia from Left Main Coronary Artery (LMCA) narrowing or incomplete occlusion and/or severe triple vessel atherosclerotic disease (especially when seen with diffuse ST depression). When there are no other ST-elevations, this is not a STEMI. This may be an acute coronary syndrome (ACS) from critical stenosis (coronary artery narrowing) although if the ST-elevation is isolated to aVR there is partial (though significantly reduced) coronary blood flow.**

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**This may also be due to other precipitants leading to secondary cardiac ischemia:**

- **Severe anemia**
- **Sepsis**
- **Arrhythmias**
- **Pulmonary Embolism**
- **Severe Aortic Stenosis**
- **Post cardiac arrest**

**Therefore, even though isolated elevation in aVR is not a STEMI, and does NOT meet criteria for STEMI bypass, it is an important finding and is associated with severe coronary artery disease. Although STEMI patients need early reperfusion with fibrinolysis or primary percutaneous cardiac intervention (PCI), patients with isolated elevation in aVR require expedited assessment and work-up to determine the cause. If there is significant stenosis in the LMCA, this usually requires coronary artery bypass surgery as angioplasty is usually not effective for this type of coronary artery disease.**

**When there is a complete LMCA occlusion, then the patient will have anterior ST-elevation (and often lateral ST-elevation as well), and this would meet STEMI criteria. However, complete LMCA occlusion would usually rapidly lead to cardiogenic shock, arrhythmias, and death.**

**Mechanism of STE in aVR:**

- **Lead aVR is electrically opposite to the left-sided leads I, II, aVL and V4-6; therefore, ST-depression in these leads may produce reciprocal ST-elevation in aVR.**
- **Lead aVR also directly records electrical activity from the right upper portion of the heart, including the right ventricular outflow tract and the basal portion of the interventricular septum. Infarction in this area could theoretically produce ST-elevation in aVR (along with ST-elevation in other areas).**

******Recognition of isolated ST-elevation in aVR is an important finding that should be communicated to the receiving hospital staff. As it does not meet STEMI criteria, these patients should go to the closest appropriate hospital and be assessed in the Emergency Department to determine ultimate cause and definitive treatment.******

**For further education on the topic check out Dr. Smith's blog** http://hqmeded-ecg.blogspot.ca/2014/08/the-difference-between-left-main.html