OhioHealth Emergency Medical Services Podcast Series
June 2020 Episode: Acute Myocardial Infarctions

Objectives:

1. Review the pathophysiology behind acute myocardial infarctions.
2. Review the manifestations of cardiac ischemia on the ECG.
3. Discuss prehospital recognition of ST-segment elevation myocardial infarctions (STEMI).
4. Discuss the importance of aspirin therapy and other prehospital interventions for STEMI.
5. Emphasize the importance of chest pain risk-stratification and effective communication with you patients.
6. Review the impact of the COVID-19 pandemic on prehospital STEMI care.

Podcasters

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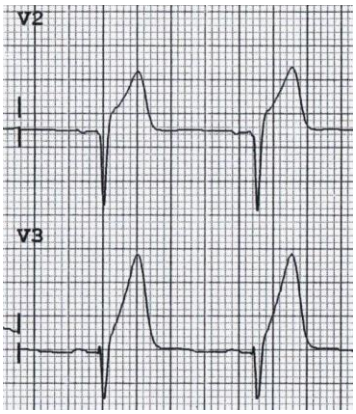
ECG Images

- ECG images obtained from Life in the Fastlane Blog: https://litfl.com

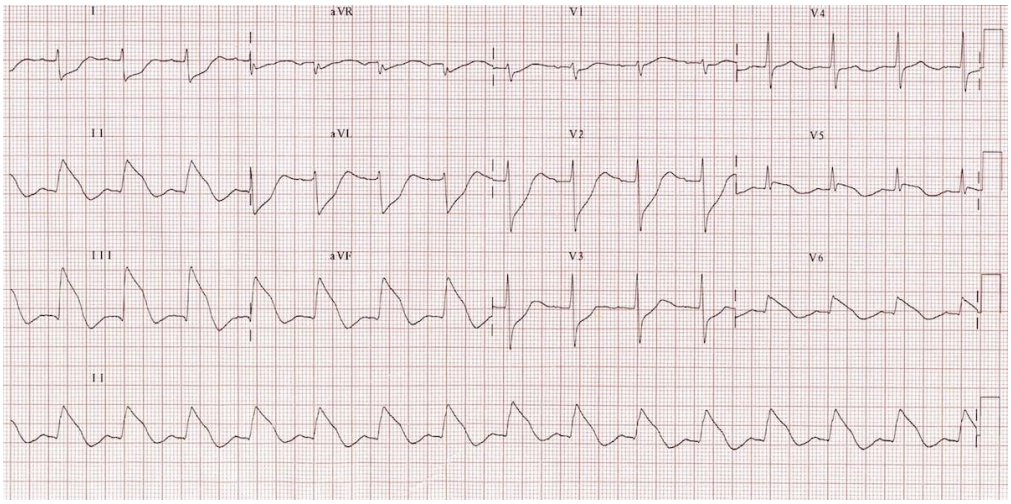
Session 1

- Case Presentation
- 47 YM with chest pain for two hours. Associated with right sided arm pain and diaphoresis
    - PMH: Cigarette smoker
    - Medications: None
    - Allergies: None
    - Vital Signs: 130/90, 85/min, 18/min, 95% RA, AF
    - Physical Exam: diaphoretic, otherwise normal
    - ECG: no ST elevation; broad-based, wide T waves in inferolateral leads
    - See ECG below for an example of broad-based, wide T waves



- Pathophysiology
    - Acute myocardial infarctions are dynamic events.
    - The natural course of coronary ischemia leads to infarction, ventricular dysrhythmias, heart failure and cardiac arrest.
    - ECG's are static while acute myocardial infarctions are dynamic events. Serial ECG's are important. Understanding the phases of myocardial infarction represented on an ECG is important (T wave abnormalities, ST segment depression, and ST segment elevation).
    - Sodium and calcium movement causes QRS depolarization
- Risk Factors
    - While typical features of acute myocardial infarctions are concerning, the absence of such features does not rule out an event. In many instances, patients present in an atypical manner. For example, in this case presentation the patient presented with right arm pain instead of left arm pain.
    - Patients that have chest pain and look ill should be taken seriously. Diaphoresis is an ominous sign.
- Scene Management
    - Maintain a low threshold for obtaining ECG's on patients, even if symptoms are atypical.
    - Early ECGs on-scene with transmission and prehospital notification of STEMI alerts helps reduce time to definitive care (in most instances, percutaneous coronary intervention).
- Treatment
    - Aspirin is the most important medication to administer. It reduces mortality from STEMI.
    - Utilize nitroglycerin for pain control. It also improves cardiac physiology and reduces the workload of the heart. Be careful with right-sided STEMI's and medications that make nitroglycerin contraindicated.
    - Utilize fentanyl for pain control and to reduce sympathetic tone.
    - Only administer oxygen to hypoxic patients.
- Definitive Care
    - Percutaneous coronary intervention (PCI): mechanical removal of the coronary clot in the catheterization lab.
    - Fibrinolysis: administering a clot-busting medication to dissolve the coronary clot.
    - PCI is preferred over fibrinolysis in most instances.
    - Regionalization is important. Have plans in place to determine best options for transport (non-PCI center then transfer to a PCI center vs. direct transfer to a PCI center).
- Case Resolution
    - Repeat prehospital ECG demonstrated inferolateral STEMI (see below). It was transmitted to the hospital and a prehospital STEMI alert was called.

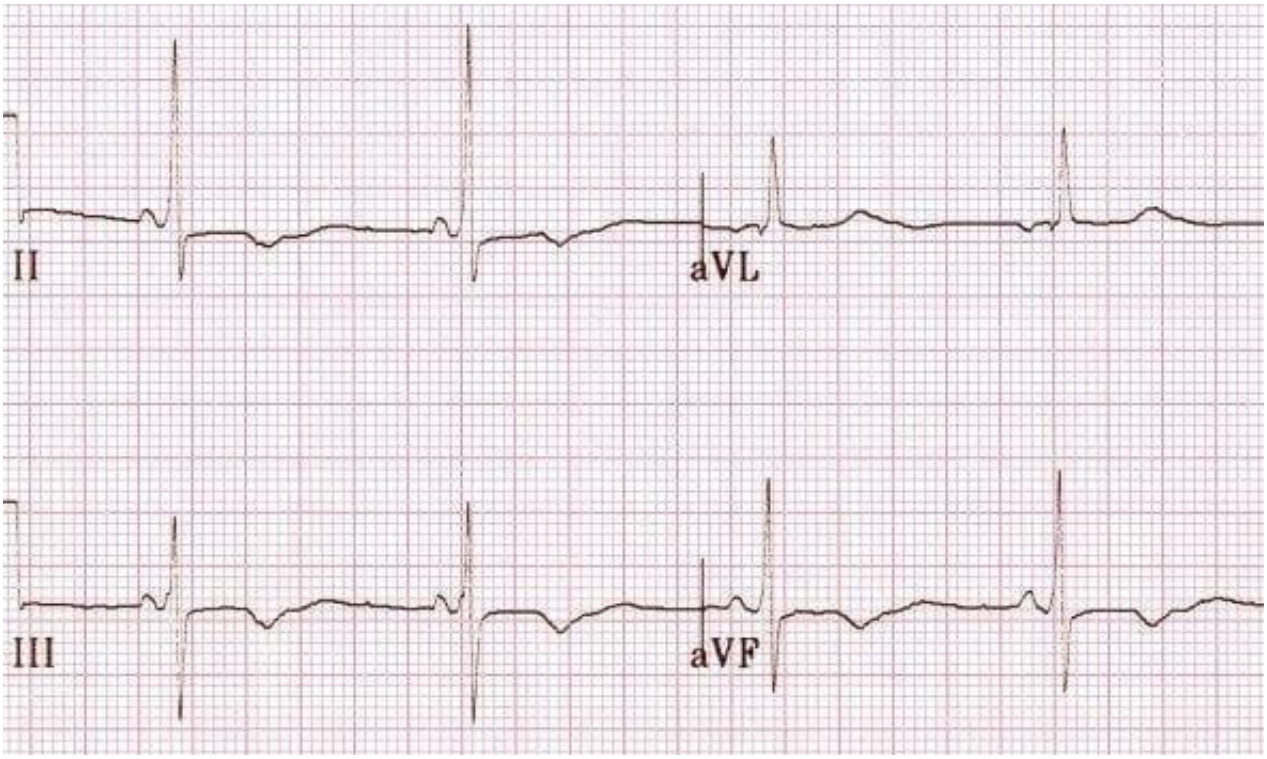
- The patient was taken to the catheterization lab for PCI and a right coronary artery clot was removed. The patient was discharged home a few days later.



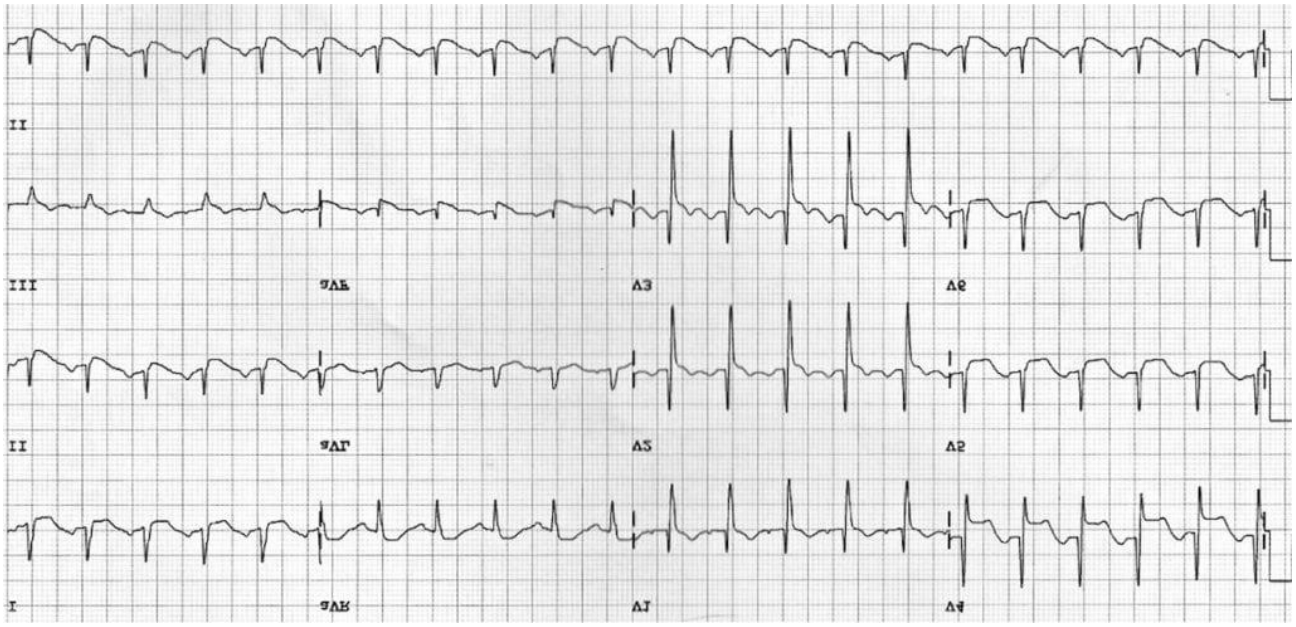
Session 2

- Categories of Chest Pain
  - STEMI
    - STEMI patients are managed as described above.
  - No STEMI but ischemic ECG findings
    - Patients with chest pain and other symptoms with ischemic ECG findings will likely require hospitalization, advanced cardiac testing and possibly cardiac catheterization.
    - Please refer to the section below for non-STEMI ischemic ECG patterns.
  - Normal ECG but elevated troponin levels
    - Troponin is a blood marker for cardiac damage.
    - Elevated levels may indicate cardiac ischemia.
  - Normal ECG and troponin levels but high-risk
    - Patients in this category may still require hospitalization and advanced cardiac testing
  - Non-cardiac chest pain
    - Some cases may be benign.
    - Other causes may be life-threatening: pulmonary embolism, aortic dissection, etc.

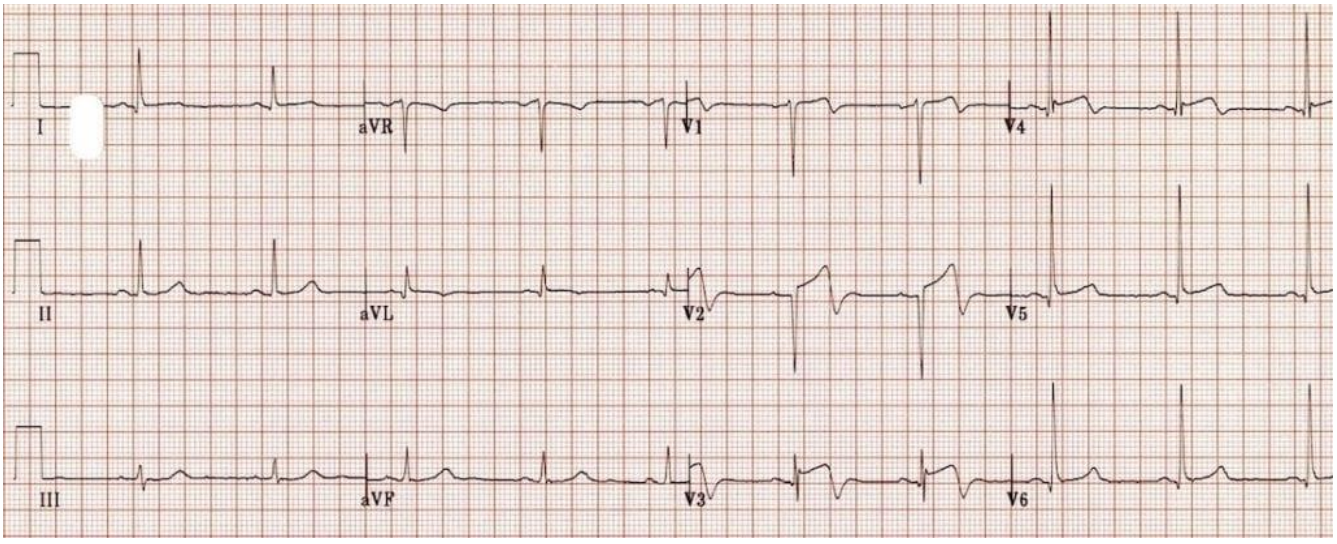
- Ischemic ECG Findings
    - T Wave Inversions



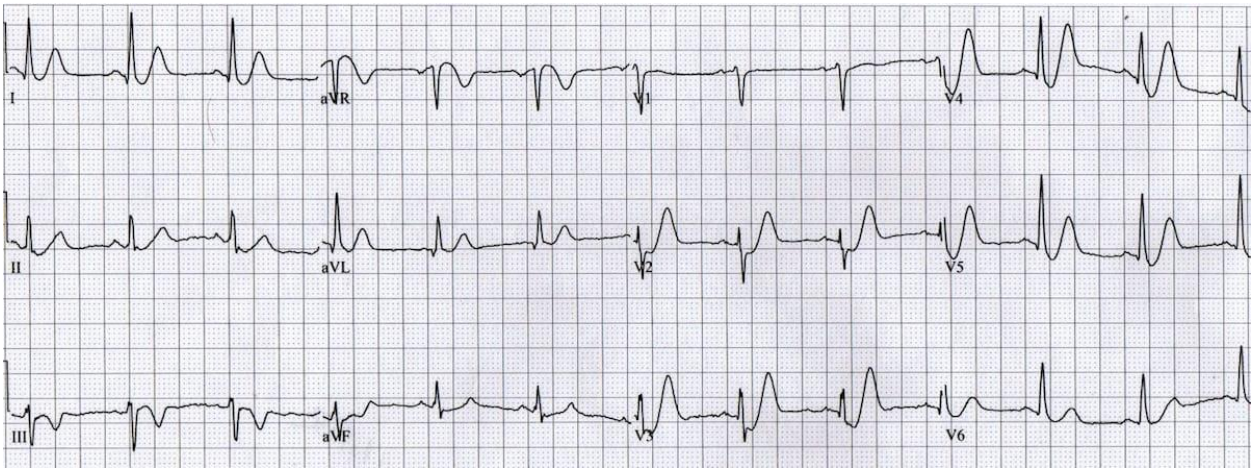
- ST Segment Depression



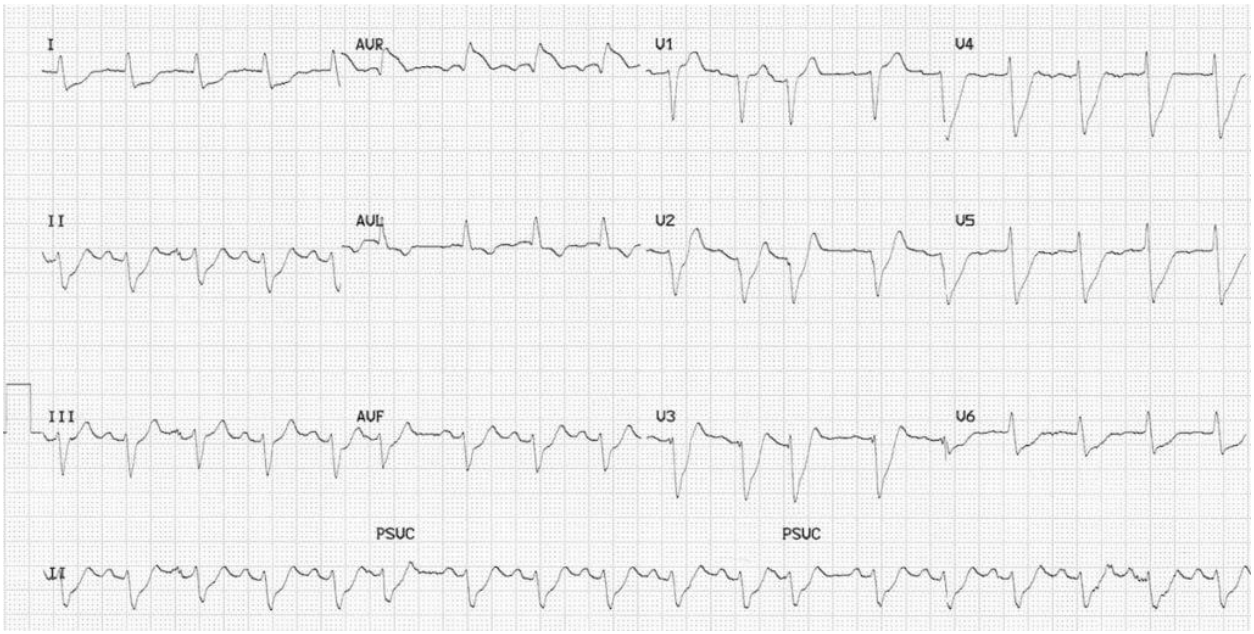
- Wellens Syndrome



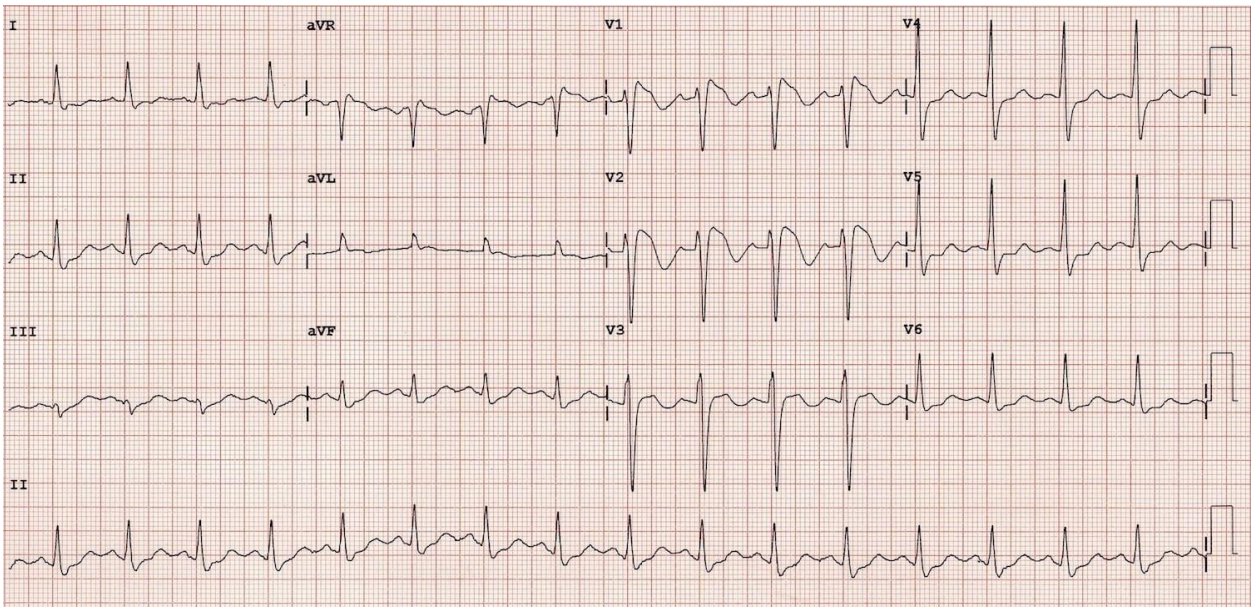
- De Winter T Waves



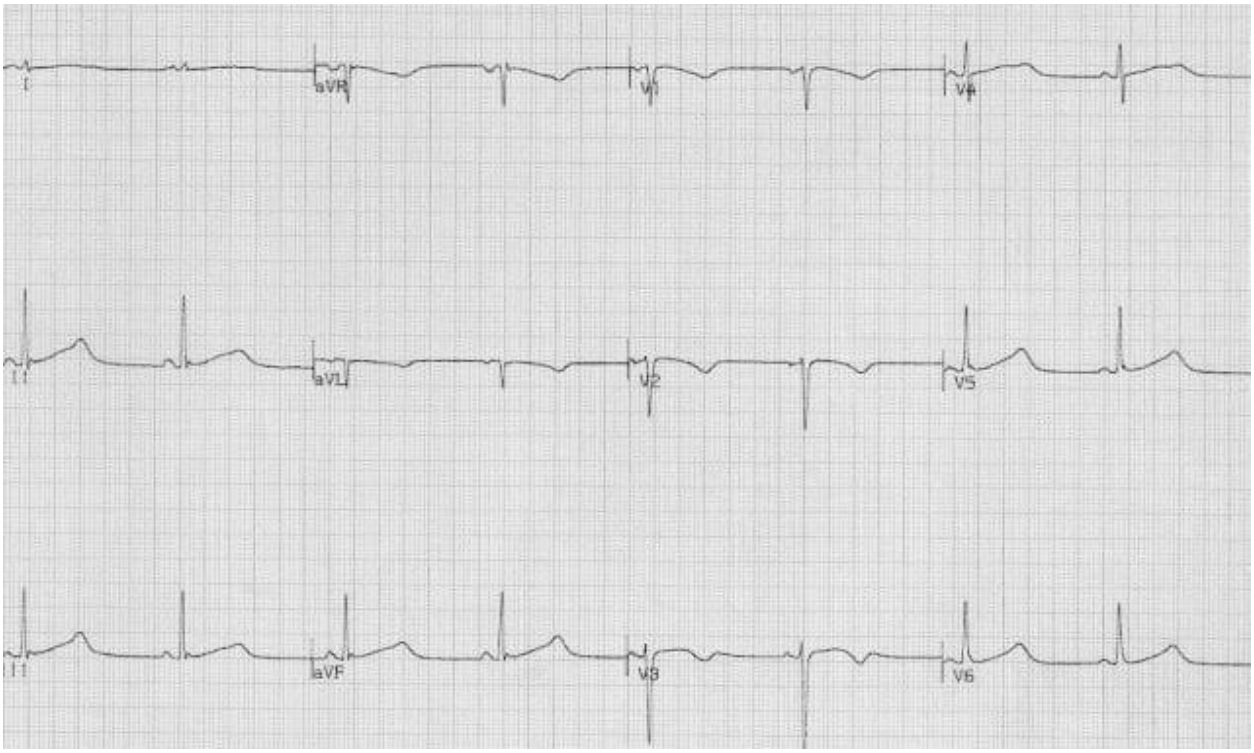
- AVR



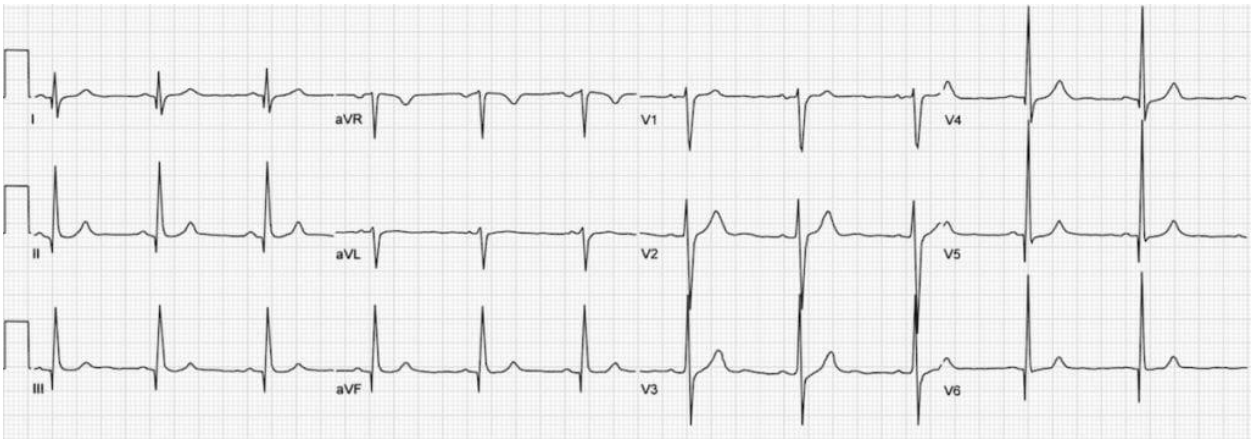
- Other Concerning ECG Patterns
  - Brugada Syndrome



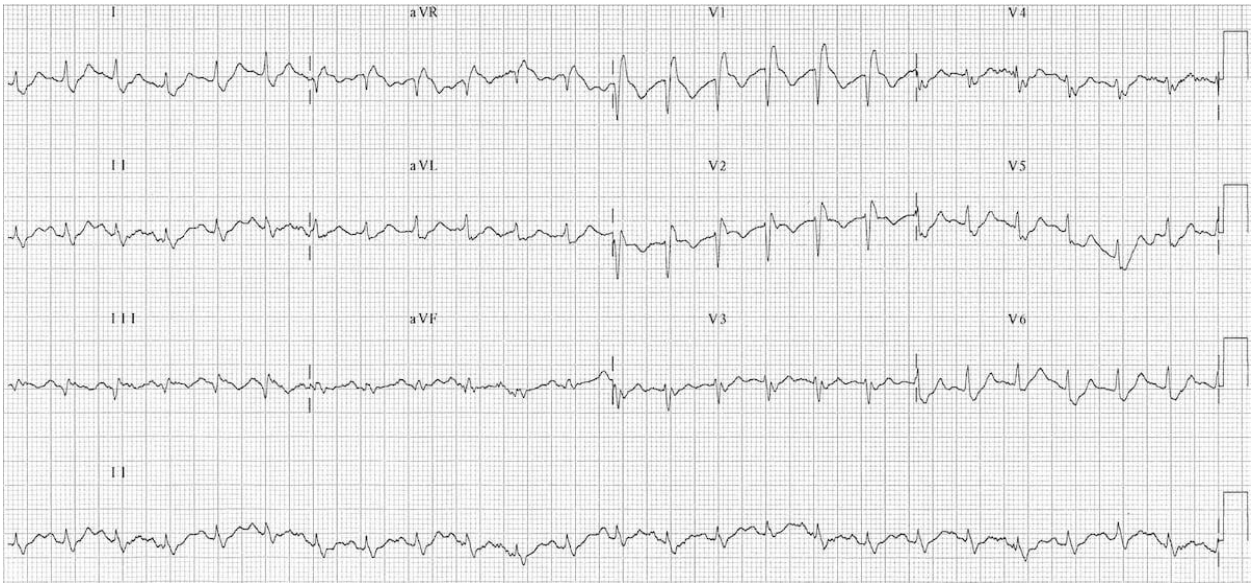
- Prolonged QTc form Congenital Long QTc Syndrome



- Hypertrophic Obstructive Cardiomyopathy



- Right Heart Strain (Pulmonary Embolism)



- Communication
  - A general understanding of the different risk stratifications of chest pain will help you communicate with your patients.
  - When an ECG does not show a STEMI, it is important to communicate a possible cardiac risk to your patients if appropriate.
  - A concise and efficient radio report is also important for the hospitals. An accurate description of the patient's condition along with the transmitted ECG can reduce time to definitive care for our patients.
- STEMIs During the COVID-19 Pandemic
  - Overall, EMS management of STEMI patients remains unchanged.
  - As with other viruses, ECG changes may be related to acute myocardial infarctions or they may be related to myocarditis and cardiomyopathies. Assume the worst-case scenario. If the patient presentation and ECG are consistent with STEMI, proceed with prenotification of the STEMI alert and ECG transmission.
  - Intra-hospital operations may be adjusted secondary to COVID-19.
- Summary and Take-Home Points
  - Ischemia is dynamic process and ECGs take a picture. Obtain serial ECGs.
  - Aspirin improves mortality and is the most important medication to administer.
  - Time to definitive care is important. Prehospital ECGs help reduce time to definitive care.
  - Lack of a STEMI pattern on the ECG does not rule out myocardial infarction.
  - Effective communication with your patients and the hospitals can improve outcomes and increase quality of care.
- Thank you for all that you do. In July and August we will be covering trauma.