

EMC 451

Advanced ECG Interpretation

Unit 9: Acute Coronary Syndromes

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Unit Objectives

- Upon completion of this unit, you should be able to:
 - Define acute coronary syndrome (ACS)
 - Describe each of the 3 ACS: unstable angina, non-Q wave infarction, Q wave infarction
 - Describe the precipitating events of ACS of plaque rupture, thrombus formation, and vasoconstriction
 - List the determining factors of infarction
 - Compare and contrast ischemia, injury, and infarction
 - Identify the EKG changes associated with ischemia, injury, and infarction.
 - Describe the clinical presentations of ACS, including atypical presentations and anginal equivalents.
 - Identify the risk factors of ACS

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ACS Defined

- Sudden ischemic disorders of the heart
- Include unstable angina and acute myocardial infarction
- Represent a continuum of similar disease processes

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Unstable Angina

- Acute ischemic event without tissue death.

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Non-Q Wave Infarction

- Acute ischemic event with tissue death, no Q wave develops on the EKG.

Q Wave Infarction

- Acute ischemic event with tissue death, development of Q waves in serial EKGs.
- Q wave infarcts tend to be larger.

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Plaque Rupture

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Thrombus Formation

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Thrombus Formation

2. Transverse section of a coronary artery. The plaque cap has a fissure which has allowed blood into the lipid core, allowing the formation of a massive thrombus within the plaque itself.

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Vasoconstriction

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Factors of Infarction

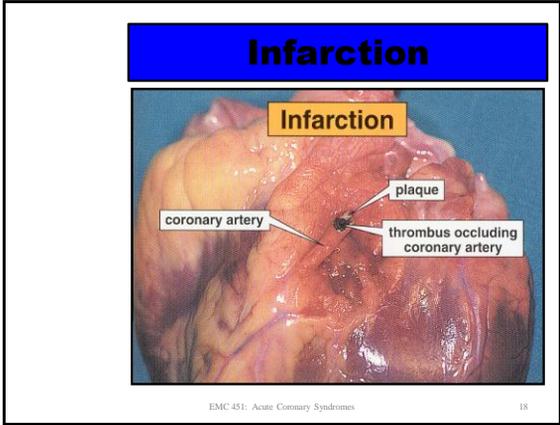
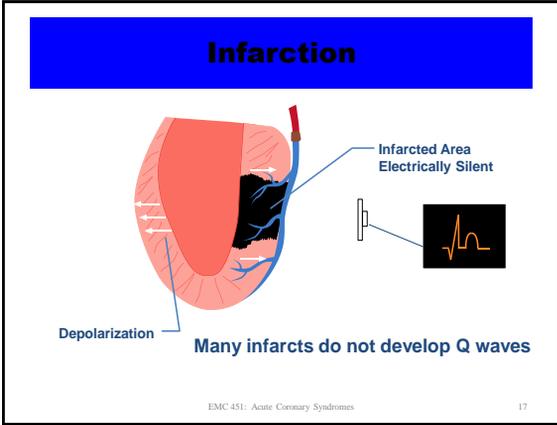
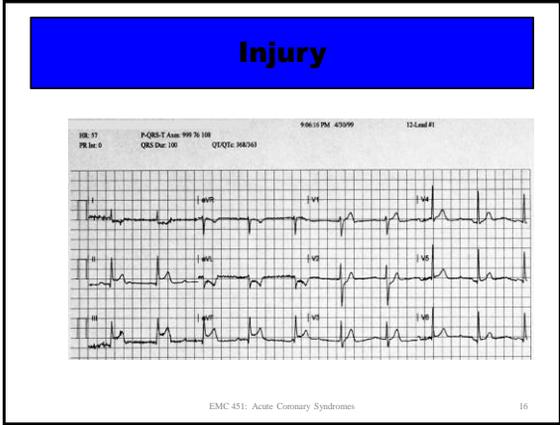
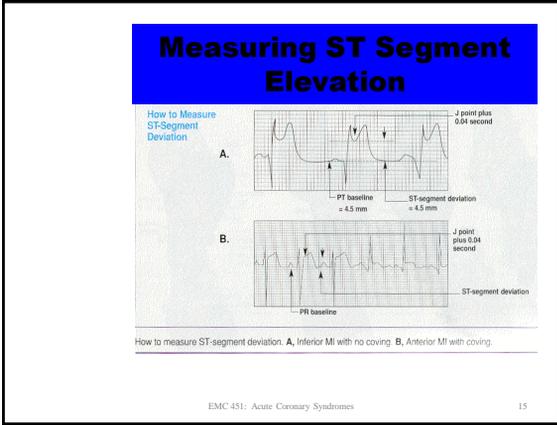
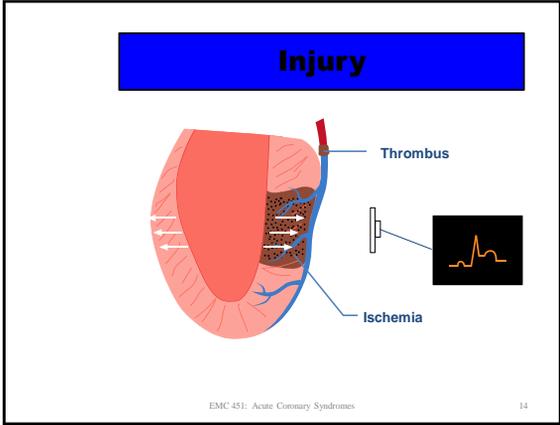
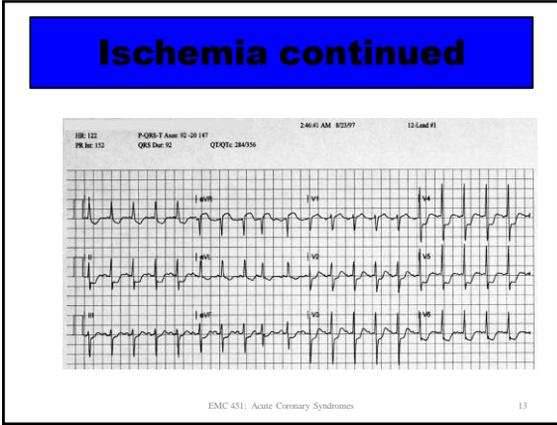
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Well Perfused Myocardium

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Ischemia

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Ischemia – Injury - Infarction

Myocardial ischemia causes ST segment depression with or without T wave inversion as result of altered repolarization

Myocardial injury causes ST segment elevation with or without loss of R wave

Myocardial infarction causes deep Q waves as result of absence of depolarization current from dead tissue and recording currents from opposite side of heart

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ECG and Serum Markers of ACS

Normal ECG ST-segment depression T-wave inversion ST-segment elevation Plus Q-wave

Unstable Angina: (no ST-segment elevation) Myocardial Infarction: (ST-segment elevation)

Extent of myocardial damage: Ischemia → Infarction

Serum cardiac marker release: CK-MB, Troponin T or I, C-reactive protein, P-selectin

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Serum Markers of ACS

Relative Marker Increase

Hours After Chest Pain Onset

Legend: Myoglobin, CK-MB, Troponin I, MB Ischemia, Troponin T

Upper Reference Interval

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Classical Presentation of ACS

- Central anterior chest
- Dull, fullness, pressure, tightness, crushing
- Radiates to arms, neck, back
- 30% - 55% of patients with ACS will not present with the classic pain pattern.

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Atypical Chest Pain

- **Musculoskeletal, positional or pleuritic**
- **Unilateral**
- **Sharp or stabbing**
- **Epigastric**
- **Females, diabetics, elderly, HTN**

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Anginal Equivalents

- Dyspnea
- Palpitations
- Syncope or pre-syncope
- General weakness
- DKA
- 40% of ACS patients present with anginal equivalents

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Risk Factors of ACS

- Diabetes
- Smoking
- HTN
- Age
- Gender
- Family history
- Obesity
- Stress
- Sedentary lifestyle
- Hyperlipidemia