ACUTE CORONARY SYNDROME (ACS)
OVERVIEW

▸ THE CASE
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▸ ECG FINDINGS: A CRITICAL STEP
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THE CASE

- 49 year old man
  - 2 hours of chest heaviness across the upper chest
  - Improved with resting and worsened with walking about
  - No radiation, SOB, diaphoresis, nausea
- PMH: Hypertension
- PSH: None
- Social History
  - Lifetime non-smoker
  - Works as a gas station attendant
  - Immigrant from Pakistan
- Family History: No Premature CAD
PATHOPHYSIOLOGY OF ACS

▸ Stable vs Vulnerable Plaque
▸ Acute Thrombosis
  ▸ Erosion
  ▸ Plaque Disruption
▸ Other Causes
  ▸ Spontaneous Coronary Artery Dissection (SCAD)
  ▸ Arteritis or Vasculitis
  ▸ Coronary Spasm
  ▸ Coronary Embolism

Davies, M. Heart 2000;83:361-366
PATHOPHYSIology of ACS: RISK FACTORS

- Hypertension
- Dyslipidemia
  - Lp(a)
- Diabetes Mellitus
- Tobacco Use
- Family History of Premature CAD
- Obesity
- Sedentary Lifestyle
- Post-menopausal Women
PATIENT PRESENTATION

▸ What is Angina?

- Symptoms caused by cardiac ischemia
  - Chest pain/tightness/discomfort
  - Jaw, throat or arm pain/tightness/discomfort
  - Shortness of breath
  - Epigastric discomfort
- Pericarditis
  - Pleuritic
  - Worse with lying back and better with leaning forward
  - Radiates to trap muscles
- Aortic dissection or Intramural Hematoma
  - May present with syncope
  - Radiates to the back.
PATIENT PRESENTATION

- Spectrum of Presentation
  - Chronic Stable Angina
    - Anginal symptoms stable over a period of at least 6 weeks
    - Usually brought on by exertion and relieved by rest or NTG
  - Acute Coronary Syndrome
    - Encompasses Spectrum of Disease from Unstable Angina to STEMI and NSTEMI in between
    - Acute onset of angina or worsening of stable anginal symptoms
    - Worsening means onset at rest or easier onset, more frequent, more intense, longer lasting, less relief with NTG
PATIENT EVALUATION

- First Priority: Does this patient require emergent revascularization?!?
  - History and Physical
    - Ongoing ischemia
    - Heart Failure
  - ECG
    - ST-Elevation MI
    - Ischemic ECG changes
  - Chest X-Ray
ECG FINDINGS: A CRITICAL STEP

- ECG: Allows for Rapid Determination of STEMI vs other ACS
  - STEMI: A True Medical Emergency
    - New ST elevation in of 1 mm in two continuous leads except V2-3
    - For leads V2-3:
      - 0.2 mV in men 40 years old or older
      - 0.25 mV in men less than 40 years old
      - 0.15 mV in women
    - Posterior MI: Large R-waves with associated ST depressions in V1-2
  - New LBBB
  - Look for Reciprocal Changes
ECG: A CRITICAL STEP

- Signs of Ischemia
  - ST depressions
  - Deep T-wave inversions
- Pitfalls
  - Repolarization abnormality from LVH
  - Circumflex territory ischemia is often electrically silent
  - RV infarct
  - Old LBBB
PATIENT EVALUATION

- Biomarkers
  - Troponin, serial measurements
  - CK-MB, CK
  - BNP
- Evaluation of Cardiac Risk Factors
  - Lipid panel
  - HgA1C
- Imaging
  - TTE
  - Stress test with imaging (nuclear, echo)

Cath Lab Digest. Volume 17 - Issue 5 - May, 2009
Circulation. 2011;124:2350–2354
THE UNIVERSAL DEFINITION OF MYOCARDIAL INFARCTION

- Rise and fall of the troponin with one value above the 99th percentile of normal
- One of the following signs of ischemia
  - Anginal symptoms
  - New ischemic ECG changes
  - New pathologic Q-waves
  - New abnormalities on perfusion imaging consistent with IHD
  - New wall motion abnormalities on echo consistent with IHD
  - Coronary thrombosis on angiography or autopsy
BACK TO THE CASE

- **VS**
  - BP 159/100 mmHg
  - P 116 bpm
  - Sat 98% on RA
  - Pain 1/10
  - Wt 83 kg (BMI 30 kg/m2)

- **Physical Exam**
  - Gen: Appears distressed
  - CV: RRR. Normal S1S2. No murmurs, rubs, gallops
  - Resp: Clear to auscultation
  - Abd: Benign
  - Ext: Normal pulses. No cyanosis or edema.
ACUTE TREATMENT

- Reperfusion Strategies
  - For STEMI, time is myocardium and life
- Unstable Angina/NSTEMI
  - Early invasive vs “Conservative” approach based on risk
  - Presence of ongoing ischemia, heart failure, ischemic arrhythmias despite medical management
- TIMI, GRACE scores

ACUTE TREATMENT

- Anticoagulation
  - Heparin preferred over Lovenox if going to Cath

- Anti-platelet Therapy: In general DAPT recommended for 12 months post-MI.
  - Aspirin
  - P2Y12 inhibitors
    - PLATO Trial: Ticagrelor vs Clopidogrel
      - Decreased death with ticagrelor
      - Less bleeding with clopidogrel
    - Prasugrel (for patients undergoing Cath)
      - Head-to-head may be better than ticagrelor
      - Caution in age >75, less than 60 kg or prior stroke
ACUTE TREATMENT

- Beta-Blocker
  - Decreasing ischemic and arrhythmic thresholds.
  - Benefit stronger in those not undergoing reperfusion, low EF
  - Concern is that it may cause hypotension, shock
  - Contraindicated in Brady or Tachy, BP less than 120, prolonged PR

- ACE Inhibitor/ARB/ARNI
  - Strong indication in EF less than 40%

- Mineralocorticoid Receptor Antagonist
  - Strong indication for those with EF less than 40%

ACUTE TREATMENT

- Statin
  - 16% risk reduction in death/MACE at 3 years with Atorva 80 vs Prava 40
  - Goal LDL less than 70 mg/dl

- Oxygen
  - Probably not necessary unless hypoxic

- Nitrates
  - No improvement in mortality
  - May buy time to Cath at night

THE CASE

- Loaded with ASA, ticagrelor in the ED
- Taken emergently to the Cath lab
  - Found to have severe OM lesion and underwent PCI
  - Found to have a proximal LAD lesion that was treated with PCI the following day
- Other Med Management
  - Atorvastatin 80 mg daily
  - Metoprolol 12.5 mg PO BID
  - Started on metformin for A1C 6.6%.
- Echo
  - EF 55-60% with inferior hyperkinesis
COMPLICATIONS

- Reduced complication rate in the reperfusion era
- Structural complications:
  - More common with STEMI. Usually 48-72 hours after acute event.
  - Present as acute heart failure
  - Medical/Surgical Emergency
  - High mortality ~50%
    - Papillary muscle rupture leading to acute MR
    - Ventricular Septal Defect (VSD)
    - Myocardial Rupture
- Dresser’s syndrome
- Ventricular arrhythmia
  - Idioventricular rhythm is benign
  - Ventricular tachycardia
COMPLICATIONS OF ACS

- Cath Complications
  - Retroperitoneal Bleeding
    - Presents as unexplained hypotension
    - Fluid resuscitation
    - Diagnosed by CT. Contrast extravasation denotes ongoing hemorrhage.
    - Avoid reversing anticoagulation or holding DAPT
    - Rarely requires surgery
  - AV fistula or Pseudoaneurysm
  - Contrast Nephropathy
QUESTIONS AT DISCHARGE

▸ How did this happen out of nowhere?
▸ Level of activity
▸ Sexual Activity
▸ NSAID use
▸ Wound Care
▸ Diet
  ▸ Plant-based
  ▸ Mediterranean
LONG-TERM MANAGEMENT

▶ Secondary Prevention
  ▶ Aimed at risk factor modification
    ▶ Target LDL less than 70 mg/dl
    ▶ BP target of less than 130/80
    ▶ Consider dulaglutide for DM patients
  ▶ SMOKING CESSATION!
▶ Exercise
▶ Diet
▶ Psychosocial Management
▶ Enlist the Partners
▶ Cardiac Rehab: Traditional vs Intensive
THE CASE

▸ Recurrent chest pain.
  ▸ Stress test negative for ischemia
  ▸ Diagnosed with costochondritis
▸ Adherent with medication regimen
▸ Declined cardiac rehab
▸ Delayed return to exercise
▸ Prolonged concern by wife about sexual activity
▸ Did initially lose weight but has been increasing