ACUTE CORONARY SYNDROME

SYMPTOMS, IDENTIFICATION, MANAGEMENT

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OVERVIEW

• SYMPTOMS
  • TYPICAL
  • ATYPICAL
• IDENTIFICATION
  • EKG
  • CARDIAC BIOMARKERS
  • STEMI VS NON-STEMI VS USA
• MANAGEMENT
  • GOALS
  • CATHETERIZATION VS MEDICAL MANAGEMENT

WHAT IS ACUTE CORONARY SYNDROME?

• EVIDENCE OF Myocardial ischemia OR infarction
  • 1) ST elevation myocardial infarction (STEMI)
    • Typical EKG findings, elevated biomarkers
  • 2) non-ST elevation myocardial infarction (non-STEMI)
    • ST depression, T-wave inversion, elevated biomarkers
  • 3) Unstable Angina (UA)
    • Symptoms suggestive of ACS w/o elevation in biomarkers +/- EKG changes, normal biomarkers

SYMPTOMS – TYPICAL

CHEST PAIN
  • GRADUAL ONSET
  • EXERTIONAL (NOT PLEURITIC/POSITIONAL) (LR 2.4)
  • DISCOMFORT = PAIN
  • SQUEEZING, TIGHT, PRESSURE, FULLNESS, WEIGHT, CRUSHING, "HEARTBURN"
    • NOT SHARP, NEEDLES, STABBING
  • DIFFUSE RADIATION (C7-T4 DERMATOMES)
    • SHOULDERS, ARMS, HAND, NECK, THROAT, JAW/TEETH
      • RIGHT (LR 4.7) > BILATERAL (LR 4.1) > LEFT (LR 2.3)
  • TIMING (MINUTES NOT SECONDS)

SYMPTOMS – ATYPICAL

MORE TYPICAL OF ALTERNATIVE DIAGNOSIS
- PLEURITIC (LR 0.2) or SHARP (LR 0.3)
- LOWER ABDOMEN
- POSITIONAL (LR 0.3)
- TENDER (LR 0.3)
- LASTING DAYS
- LASTING SECONDS

ASSOCIATED SYMPTOMS - EXAM FINDINGS
- DYSPNEA
- NAUSEA OR VOMITING (LR 1.9)
- DIAPHORESIS (LR 2.0)
- S3 (KENTUCKY) (LR 3.2)
- HYPOTENSION (SBP <80) (LR 3.1)

FOCUSED HISTORY

PRIOR HISTORY OF CAD/CVD/ACS?
- HTN
- DYSLIPIDEMIA
- DM
- SMOKING
- FAM HX
- PREMATURE CVD (CAD, death from CVD in first degree relative)
  - <55 males, <65 females
- COCAINE USE
- “Cardiac risk factor burden has limited clinical value in diagnosing acute coronary syndromes in the ED setting.”

EVALUATION - OVERVIEW

- ABC's
- History/Exam
- EKG
- Cardiac monitor and resuscitation equipment
- Cardiac biomarkers
- Chest x-ray
EVALUATION

• EKG
  • > 30 YEARS OLD WITH CHEST PAIN
  • > 50 YEARS OLD WITH DYSPEA, AMS, UPPER EXT PAIN, SYMCOPE, GENERALIZED WEAKNESS
  • > 80 YEARS WITH ABD PAIN, NAUSEA, VOMITING
  • CLINICAL JUDGEMENT – ALL PATIENTS WITH CHEST PAIN
  • SERIAL EKG IN PATIENTS WITH PERSISTENT SYMPTOMS/ONGOING PAIN
    • EVERY 5 TO 10 MINUTES
    • COMPARE TO OLD EKG
    • INITIAL EKG OFTEN NONDIAGNOSTIC (65% NONDIAGNOSTIC, 20% NORMAL IN PATIENTS DE WITH AMI)
    • INCREASE SENSITIVITY FROM 55% TO 68%
    • NORMAL EKG IN FT WITH CHEST PAIN DOES NOT RULE OUT ACS

EVALUATION - EKG

• STEMI
  • Hyperacute peaked T-waves
  • ST-segment elevation
  • Leads V2/V3 ≥ 2mm men ≥ 40, ≥ 2.5mm men < 40, ≥ 1.5mm women
  • New LBBB

• NONSTEMI
  • ST depression ± T-wave inversions
  • Without ST elevation

• UNSTABLE ANGINA
  • Nonspecific or transient abnormalities
  • Clinical Angina at rest, new onset with activity limitation, change in previous angina

EVALUATION - EKG

• Contiguous Leads
  • Anterior wall: V1-V6
  • Anteroseptal: V1-V2
  • Lateral: aVL, I, V4-V6
  • Inferior: II, III, aVF
  • Right Ventricle: Right-sided leads
  • Posterior Wall: V1-V2, posterior leads
EVALUATION – CARDIAC BIOMARKERS

- Troponin
  - Troponin I and Troponin T
  - Cardiac regulatory proteins
  - Biomarker of choice
    - Increased sensitivity and specificity compared to CK-MB
    - Cut-off at 99th percentile of normal reference population
    - 80% with acute MI have elevation at 2-3 hours
    - Troponin elevation associated with increased CAD on angiogram in patients without diagnostic EKG changes (90% vs 23%)
    - No single biomarker reliably excludes MI within 6 hours
    - Repeat in 6-12 hour time frame after onset of symptoms

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EVALUATION – ALTERNATIVE DX

- CARDIOVASCULAR
  - AORTIC DISSECTION, MYOCARDITIS, PERICARDITIS

- MUSCULOSKELETAL
  - COSTOCHONDRITIS, ZOSTER, TRAUMA, RADICULOPATHY

- PULMONARY
  - PLEURISY, PNEUMONIA, PULMONARY EMBOLISM, PNEUMOTHORAX

- GASTROINTESTINAL
  - BILIARY, ESOPHAGEAL, PANCREATITIS, PUD/GASTRITIS

MANAGEMENT - STEMI

- GOALS
  - Pain relief
  - Hemodynamic stability
  - Reperfusion (percutaneous coronary intervention OR fibrinolysis)
  - Antithrombotic therapy
  - Beta Blocker
  - LIDO-TERM
    - Antiplatelet therapy, ACE inhibitor, Statin
  - EKG within 10 minutes, cardiac monitoring, IV access
  - Identify hemodynamic instability and treat accordingly (hypotension, tachycardia, hypoxia, arrhythmias)
  - Oxygen
    - Oxygen saturation > 90%, respiratory distress
    - Hypoxemia may lead to coronary vasoconstriction
  - Aspirin 325mg chewable
  - Nitroglycerin (0.4mg SL, q5min x 3), IV infusion if persistent pain
  - Use with caution in RV infarct, inferior infarct, severe AS, PDE inhibitor
  - Does not differentiate from noncardiac pain
  - Morphine 2-4mg IV
  - Beta blocker: oral to be given in first 24 hours
  - Statin: As soon as possible, atorvastatin 80mg/day
### MANAGEMENT - STEMI

- Percutaneous Coronary Intervention
  - Improved survival and lower rate ICH
  - Primary PCI recommended if done in a timely fashion
    - 90 minutes at PCI-capable hospital
    - 120 minutes if transport from non-PCI facility
  - Fibrinolytic
    - Symptoms within 12 hours and cannot get PCI in 120 minutes
    - Arrive to fibrinolysis < 30 minutes
    - Know contraindications
  - Antiplatelet therapy
    - Fibrinolysis: clopidogrel 300mg (if over 75 y/o, 75mg)
    - PCI: ticagrelor 180mg OR prasugrel 60mg OR clopidogrel 600mg

### MANAGEMENT - STEMI

- Anticoagulant therapy
  - Primary PCI: Unfractionated heparin (UFH) vs bivalirudin
  - Fibrinolysis
    - Enoxaparin (IV then SQ)
    - UFH
    - Fondaparinux
  - No Reperfusion:
    - Enoxaparin SQ
    - UFH

### MANAGEMENT – UA/NON-STEMI

- GOALS
  - Pain relief
  - Hemodynamic stability
  - Risk estimation
  - Management strategy (invasive vs medical management)
  - Antithrombotic therapy
  - Beta blocker therapy (not in patients with acute cocaine use)
  - LONG TERM
    - Statin, antiplatelet/anticoagulant, ACE inhibitor

### MANAGEMENT - UA/NON-STEMI

- Initial evaluation/management same as STEMI
  - Monitoring, aspirin, hemodynamic support, oxygen, nitrates, morphine
  - Antiplatelet therapy (in addition to aspirin)
    - Ticagrelor 180mg loading dose
  - Anticoagulant therapy
    - Urgent or early invasive (angioplasty in first 48 hours)
    - UFH or bivalirudin
  - Noninvasive
    - Enoxaparin SQ
    - UFH
    - Fondaparinux
### MANAGEMENT – UA/NON-STEMI

**Risk Stratification**
- TIMI risk score
  - Age ≥ 65 years
  - At least 3 coronary risk factors (HTN, DM, dyslipidemia, SMOKER, FAM HX)
  - Prior coronary stenosis ≥ 50 percent
  - Any ST segment deviation on initial EKG
  - 2 episodes of angina in past 24 hours
  - Elevated troponin
  - Use of aspirin in past 7 days
- Low risk (0 to 2), Intermediate risk (3 to 4), High risk (5-7)

**MANAGEMENT – UA/NON-STEMI**

- **NO FIBRINOLYSIS**
- Immediate coronary catheterization/revascularization
  - Hemodynamic instability
  - Severe LV dysfunction
  - Persistent rest angina
  - New MR or VSD
  - Sustained arrhythmias
- TIMI risk 3+ benefitted from early invasive strategy