CHEST PAIN IN THE ED

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MSN 434 Common Problems in the Emergency Nursing
Epidemiology

• Chest Pain (CP) represents 5% if the ED Visits
  – Approx 5 million visits/year
  – 40% of admissions
• Acute MI(AMI) leading cause of death in the US
• Error in diagnosis of CP accounts for approx 20% medical malpractice
Why the misdiagnosis?

- CP is often the result of referred pain from other organs
- Diagnosis must be based on history and physical exam
- CP always respresents a possible cardiac event
- Often Laboratory tests to r/o MI are not helpful in the ED.
What’s included in your differential?

• The BIG SIX (6 most serious dx from CP)
  – Unstable Angina (Acute Coronary Synd)
  – Acute MI (Acute Coronary Synd)
  – Aortic Dissection
  – Pulmonary Embolus
  – Spontaneous Pneumothorax
  – Boerhaave’s Syndrome
Acute Coronary Syndrome

• Acute Chest Pain due to myocardial ischemia
• Initial assessment is difficult to differentiate b/w acute MI and Unstable Angina
• Typical ED pop with c/o acute chest pain
  – 15% will have acute MI
  – 25-30% will have Unstable Angina
History

• Evaluating of Current complaint:
  – Pain location, duration, quality, severity
  – Radiation
  – Relief/Exacerbation
  – Associated Symptoms
  – Trauma
PMH

• Other cardiac history
• Previous admissions
• Previous test results (i.e. EKG, Treadmills, MUGA, Echo, CXR)
• Rx History
Risk Factors for MI

- **Absolute Risk Factors**
  - Family History
  - HTN
  - DM
  - Smoking
  - Elevated Cholesterol

- **Contributory**
  - Age over 30
  - Male
  - Obesity
  - Sedentary life style
  - Cocaine use
Risk Factors for Pulmonary Embolus

- Immobilization
  - Paralysis
  - Paresis
  - Plaster
  - Plane
- Recent Surgery
- Trauma
- Obesity
- Cardiac Disease
- Burns
- History of PE or DVT
- Hypercoaguable states
  - Pregnancy
  - Protein C/S deficiency
  - AT III Deficiency
  - Malignancy
  - Estrogen therapy
- Cancer
Risk Factors: Aortic Dissection

• HPTN (95% of pts with dissection)
• Predisposing Conditions
  – Marfan’s
  – Ehlers-Danlos syndrome
  – Turner’s syndrome
  – Coarctation of Aorta
  – Pregnancy
  – Trauma
Risk Factors: Esophageal Pain

• Sensitivity to gastric acid
• Disorders of motility
• Reflux
• Spasm
• Achalasia

• Approx 20% pts admitted for CP actually have esophageal pain
• Hiatal Hernia is present in about 50% of pts over 50
Physical Exam

Look for signs of cardiac cause:
- Tachypnea
- Tachycardia
- Diaphoresis
- Cyanosis
- Pallor
- Obtain BP in both arms
- Reproducible pain
- General Appearance
Physical Findings: Angina

• Angina
  – Episodic, lasting 5-15 min
  – Induced by exertion
  – Relieved in 3-5 min with rest or SL NTG
  – CP
    • Retrosternal in 90% of pts
    • Radiates to neck, shoulder or arms in 70%

• Unstable Angina
  – Pain at rest or minimal activity
  – Pain prolonged or more severe
  – Pain occurring with increased frequency
Physical Findings: MI

- Pain longer than 15-30 minutes, progressive
- Dull or pressure-like pain in the midsternal or peristernal
- Associated symptoms
  - Nausea, vomiting, dyspnea, SOB, Diaphoresis, lightheaded ness
- New Murmur: Papillary muscle dysfunction
- Extrasystolic sound- Very difficult to illicit in ED setting
- ST seg Elevation in 2 contiguous leads (80% MI) or New ST depression and T wave inversion (20% MI)
Physical Findings: MI

• Beware of five causes of silent MI or atypical presentations
  – D: Diabetes
  – E: Elderly
  – A: Alcohol
  – T: Trauma to thoracic spinal cord
  – H: Hypertension
Physical Finding: Pulmonary Embolism

- 3rd most common cause of death in US
- Decreased PaO2
- DVT
  - 25-50% of DVTs have PEs
- Clinical S&S
  - CP
  - Dyspnea (84%)
  - Cough (53%)
  - Tachypnea (92%)
  - Tachycardia (44%)
- Elevated A-a gradient
  - $140 - (PO2 + 1.2(PCO2)) = A-a$ gradient
  - A-a gradient of 10-20 is healthy
- Non-specific T-wave changes
Physical Finding: Aortic Dissection

- Hypertension and Tachycardia
  - Hypotension can occur in dissection of ascending aorta
- Abnormal aortic contour on CXR 90%
- Decreased/Unequal pulses:
  - Radial
  - Femoral
  - Carotid arteries
- Paraplegia/Neurologic presentation (40%)
- C/O Tearing chest pain, worst at onset
- Widened mediastinum on CXR
- Usually males, between 50-70 years old
Physical Findings: Spontaneous Pneumothorax

• Acute onset of pleuritic chest pain
• Dyspnea and tachypnea
• Decreased BS on side of pneumo
• If Tension Pneumo:
  – JVD
  – Hypotension
  – Initially normal heart sounds
Physical Findings: Esophageal Rupture

- Boerhaave Syndrome (esophageal rupture)
- Sudden onset of sudden, sharp substernal CP occurring immediately after an episode of forceful vomiting
- Ill appearance, diaphoretic, dyspneic
- Physical exam may be normal
- CXR normal or pleural effusion, pneumothorax, sub-Q air
- Confirm dx with water soluble contrast study
Initial Treatment

• Pts with CP need to be immediately diagnosed for the big 6!

• ABCs
  – Oxygen
  – Monitor
  – IVs
  – VS
Initial TX: Unstable Angina/MI

- ABCs
- CXR
- EKG
- Cardiac Enzymes
  - LDH will rise 12-24 hrs
  - CKMB rises in 4-8 hrs after onset of symptoms and peaks in 24 hours, clears in 48 hours
  - Myoglobin: rise within 3 hours of onset of symptoms, abnormally elevated at 6-8 hours and peak at 4-9 hours
  - Troponin I and T: Elevate 6 hours after injury, peak in 12 hours and remain elevated for 7-10 days.
  - Other markers evaluated: BNP (Cardiac Function), C-reactive protein (inflammation), P-selection (platelet activation)
Initial Tx: Aortic Dissection

- ABCs
- CXR
- Arteriogram
Initial Tx: PE

- ABCs
- CXR
- ABG
- VQ scan and or/arteriogram
Initial Tx: Pneumothorax

- ABCs
- If stable: CXR
- If unstable: chest tube
Initial Tx: Boerhaave’s Syndrome

- ABCs
- CXR
- Gastrograffin swallow
Esophageal Pain

• Usually presents 15-60 min after eating
• Described as heartburn, odynophagia, spasm-like
• NTG and GI cocktail often relieve pain
• Impossible to distinguish between esophageal and cardiac pain
Musculoskeletal pain

- Pain lasts few seconds to hours
- Positional and tender
- Pain may be prepositional upon palpation
Cardiac Work-up

• History alone cannot be used to rule out acute ischemia
• Pts must be classified according to risk for ischemia
  – Classify the pt into a I-V Risk Category depending on their findings
  – Use algorithm for decision making
Tintinalli’s Prognosis Based on Classification System for ED Chest Pain Pts

• I: Acute MI
  – Immediate revascularization

• II: Probable acute ischemia: high risk for adverse events
  – Evidence of clinical instability
  – Ongoing pain thought to be ischemia
  – Pain at rest associated with ischemic ECG changes
  – One or more positive myocardial markers
  – Positive perfusion imaging study
Tintinalli’s Prognosis Based on Classification for ED chest pain pts

- III: Possible acute ischemia: Intermediate risk for adverse events
  - Rest pain, now resolved
  - New onset of pain
  - Crescendo pattern of pain
  - Ischemic pattern on ECG not associated with pain
Tintinalli’s Prognosis Based on Classification for ED chest pain pts

• IV: A: Probably not ischemia: low risk for adverse events (requires all the following)
  – History not strongly suggestive of ischemia
  – ECG normal, unchanged from previous, or nonspecific changes
  – Negative myocardial markers

• IV: B: Stable angina pectoris: Low risk for adverse events
  – Requires all the following
    • More than 2 wk of unchanged symptom pattern or longstanding symp with only mild change in exertional threshold
    • Normal EKG, unchanged from previous or nonspecific changes
    • Negative myocardial markers
Tintinalli’s Prognosis Based on Classification for ED chest pain pts

• V: Definitely not ischemic. Very low risk for adverse events
  – Requires all the following:
    • Clear objective evidence of non-ischemic symptoms
    • ECG normal, unchanged from previous or nonspecific changes
    • Negative initial myocardial markers
Algorithm for risk-based decision making in CP (Tintinalli, 2004)

– Initial Evaluation of CP
  • Cardiac monitor
  • Pulse ox
  • VS
  • Oxygen
  • 12-lead EKG
  • Stat myocardial marker eval
  • Other labs
  • CXR
  • ASA
  • MAKE A DISPOSITION DECISION < OR EQUAL TO 1 HOUR AFTER ARRIVAL
Algorithm for risk-based decision making in CP (Tintinalli, 2004)

<table>
<thead>
<tr>
<th>Risks Classification</th>
<th>Initial EKG</th>
<th>Initial Myocardial Marker</th>
<th>Ischemia Estimate</th>
<th>Disposition</th>
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<tbody>
<tr>
<td>I</td>
<td>Acute MI</td>
<td>N/A</td>
<td>High</td>
<td>Coronary Reperfusion</td>
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<tr>
<td>II</td>
<td>Nondiagnostic</td>
<td>+/-</td>
<td>+/-/high</td>
<td>Monitored bed Consider ischemic Therapy</td>
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<td>Neg</td>
<td>Moderate</td>
<td>Admit</td>
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<tr>
<td>IV</td>
<td>Nondiagnostic</td>
<td>Neg</td>
<td>Low</td>
<td>Ed Low-risk eval</td>
</tr>
</tbody>
</table>
Discharged Pts

- Clear Follow-up instructions
- Instructed to seek prompt attention for worsening CP
- Return to ED if condition worsens
- PMD referral
Pearls

- Normal EKG and Cardiac markers do not rule out MI
- Examine every CXR closely for pneumothorax and aortic dissection
- Obtain bilateral BPs, especially in elderly
- Always treat as the worst condition possible!!!!
References


