Outline of This Afternoon’s Presentation

• Management of Acute Coronary Syndrome
• Management of Other Important Causes of Chest Pain
  • Aortic Dissection
  • Pericarditis/Tamponade
  • Pulmonary Embolism
• Management of Chest Trauma
  • Cardiac Injury
  • Aortic Transection
• Management of Tachyarrhythmias
  • PSVT
  • VT/Wide Complex Tachycardia
Coronary Artery Disease

• A chronic disorder
• The disease typically cycles in and out of clinically defined phases:
  • asymptomatic
  • stable angina
  • unstable angina, non-ST elevation MI, acute ST elevation MI (“STEMI”) ➔ Acute Coronary Syndrome (ACS)
Plaque fissuring and rupture (unstable plaque) ➔ acute coronary thrombosis
Alternative Diagnoses for Patients with Chest Pain

- Non-Ischemic CV
  - aortic dissection
  - pericarditis
- Pulmonary
  - pulmonary embolus
  - pneumothorax
  - pneumonia
  - pleuritis
- Chest Wall
  - costochondritis
  - fibrositis
  - rib fracture
  - sternoclavicular arthritis
  - herpes zoster

Gastrointestinal
- Esophageal
  - esophagitis
  - spasm
  - reflux
- Biliary
  - colic
  - cholecystitis
  - choledocholithiasis
  - cholangitis
- Peptic ulcer
- Pancreatitis

Psychiatric
- Anxiety disorders
  - hyperventilation
  - panic disorder
  - primary anxiety
- Affective disorders
  - depression
Electrocardiograms

• ECGs taken in the absence of pain in patients with angina pectoris, and no hx of MI, is normal in 50% of cases
• Obtaining an electrocardiogram while experiencing chest pain is more rewarding
• New horizontal or down-sloping S-T segments on ECG is highly suggestive of myocardial ischemia; new T-wave inversion also may occur, but this finding w/o S-T depression is less specific
Acute Coronary Syndromes

- ST-elevation MI
- Non-ST elevation MI or ACS
Acute Coronary Syndrome (ACS)

• Unstable angina pectoris (UAP)
• Non-ST elevation myocardial infarction (Non-STEMI)
• ST-elevation myocardial infarction (STEMI)

• Differentiation of UAP from NSTEMI:

  + cardiac markers → NSTEMI
Cardiac Troponins

- Extremely specific for myocardial tissue
- Extremely sensitive to even minute amounts of myocardial damage
- Elevation parallels CK/CK-MB (3-6 hours) but important to see rise and fall
- Elevations also found in chronic kidney disease, cardiomyopathy, myocarditis, sepsis, pulmonary embolism
Biomarkers of Myocyte Death

A. Myoglobin in AMI
B. Troponin in AMI
C. CK-MB in AMI
D. Troponin in unstable angina
MEDICAL THERAPY

• Antiplatelet agents
  • Aspirin, Clopidogrel, IIb/IIIa inhibitors

• Antithrombin therapy
  • Unfractionated heparin, LMWH

• Antianginal therapy
  • Beta blockers, nitrates

• Reperfusion therapy
**REPERFUSION THERAPY**

### PTCA
- Higher initial reperfusion rates
- Lower recurrence rates of ischemia / infarction
- Less residual stenosis
- Less intracranial bleeding
- Utility when fibrinolysis contraindicated

### THROMBOLYSIS
- More universal access
- Shorter time to treatment
- Results less dependent on physician experience
- Lower system costs

Which one? It’s a matter of time!
Myocardial Reperfusion

- Re-establish Infarct Vessel Patency
- Limit Infarct Size
- ↓ Mortality
Coronary Angiography
Balloon Angioplasty
Stent
Coronary flow reserve vs. Diameter narrowing (%)

- Maximum flow
- Resting flow

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Evolution of ECG changes in STEMI

Q-wave Myocardial Infarction

- **Normal**
  - Normal tracing

- **Acute**
  - ST elevation
  - R wave
  - Q wave begins

- **Hours**
  - ST elevation

- **Day 1-2**
  - T wave inversion
  - Q wave deeper

- **Days later**
  - ST normalizes
  - T wave inverted

- **Weeks later**
  - ST & T normal
  - Q wave persists
Complications of Acute MI

- Extension / Ischemia
- Arrhythmia
- Pericarditis
- Expansion / Aneurysm
- Acute MI
- RV Infarct
- Mechanical
- Heart Failure
- Mural Thrombus
Take home concepts

Asymptomatic  Stable angina  USA/NSTEMI  ST-elevation MI (STEMI)
Other Important Causes of Chest Pain

- Aortic Dissection
  - Stigmata of Marfan’s Syndrome
  - Back pain
  - Do NOT give thrombolytic therapy!

- Pericarditis/Tamponade
  - Pleuritic chest pain
  - Diffuse ST elevation on ECG
  - Muffled heart sounds
  - Paradoxical pulse on palpation
Other Important Causes of Chest Pain

• Pulmonary embolism
  • Recent prolonged travel/immobilization
  • Desaturation
  • Syncopal episode
    • Recent study found 1 in 6 elderly patients with syncope had PE as the cause
Management of Chest Trauma

• Acute coronary syndrome due to coronary damage
• Valve damage ➔ acute regurgitation
• Myocardial damage
  • Contusion
  • Free wall rupture/tamponade
  • Traumatic ventricular septal defect
• Traumatic aortic transection (deceleration injury)
Aortic Transection

- Deceleration injury (mobile ascending aorta and fixed descending aorta)
- Survivors to ED show tear at ligamentum arteriosum
- May have retrosternal or back pain, dyspnea, stridor, dysphagia
- May have harsh systolic murmur
- May have pulse difference between upper and lower extremities
- Need high index of suspicion!
Deceleration Injury

- Aortic tear
  - Fixed descending aorta
  - Mobile arch
- Acute subdural brain hematoma
- Kidney avulsion
- Splenic pedicle
Electrocardiograms and Arrhythmias
ECG Leads

• II, III, AVF  Inferior wall  
• V1-2  Septum  
• V3-4  Anterior  
• V5-6  Lateral  
• I, AVL  High lateral
Localization of MI

• Anterior MI – LAD and/or diagonal
• Posterior MI – circumflex or RCA
• Inferior MI – RCA or circumflex
  • The apex receives blood from all 3 arteries
Localization of MI

LCx or diagonal branch of LAD

RCA or LCx

LAD

LCx or diagonal branch of LAD

LCx or diagonal branch of LAD
Assessment of Tachyarrhythmia

• Hemodynamically stable or unstable – “When in doubt, shock it out”
• Regular or Irregular – If irregularly irregular probably atrial fibrillation (could be chaotic or multifocal atrial tachycardia)
• If regular, is it narrow or wide complex (WCT)?
Differential Diagnosis of Regular Narrow Complex Tachycardia

- Sinus tach – Try carotid sinus massage
- Atrial flutter – can use adenosine to unmask
- PSVT
  - AVNRT (dual AV pathways)
  - AVRT (bypass tract)
  - Ectopic atrial tachycardia
Differential Diagnosis of Wide Complex Tachycardia

• SVT with aberrancy or pre-existing bundle branch block – consider adenosine

• VT
  • Look for dissociated P waves
  • Rabbit year size – The more it looks like right bundle, the more likely that it’s SVT
  • The more bizarre (e.g., QS in V6), the more likely it’s VT
  • Age of patient
VT With AV Dissociation
QRS Morphology in Leads V1, V6:

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<th>Favors SVT</th>
<th>NO Help</th>
<th>Favors VT</th>
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Management of Tachyarrhythmias

Regular tachycardia

Hemodynamically unstable

Electrocardioversion (rhythm strip and, if possible, 12-lead ECG)

Wide QRS complex

VT or unknown mechanism (VT with narrow QRS complex is rare)

Definite SVT

Definite SVT

SVT and bundle branch block

SVT with preexcitation

Short-term therapy for VT

Atrial fibrillation with preexcitation

Narrow QRS complex (< 120 msec)

Most patients have SVT; rarely VT with narrow QRS complex is seen (go to A)

Continuous 12-lead ECG recording

Success with vagal maneuvers?

Yes

Continuous 12-lead ECG recording

Success with IV adenosine (Adenoscard), 6 mg (repeat with 12 mg if needed)?

No

Yes

Success with IV verapamil (or alternative), IV diltiazem, or IV beta blocker?

No

Yes

Termination, unmasking of atrial flutter or atrial tachycardia

Further analysis of ECG

IV procaainamide, IV propafenone (Rythmol), IV flecanide (Tambocor), IV butilide (Corvert), or electrocardioversion