Myocardial Infarction Complications

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Acute Myocardial Infarction

Still # 1 cause of morbidity and mortality (worldwide)
Definition of Myocardial Infarction

In 2007 a task force was formed for the Redefinition of Myocardial Infarction (Euro Heart J. 2007, 28: 2525–2538)
2007 Universal Definition of MI (Evidence of Myocardial Necrosis in a clinical setting of MI)

- TYPE 1 Primary Coronary Event (Plaque Rupture, Thrombotic Event)
- Type 2 Supply Demand Mismatch
- Type 3 MI resulting in SCD
- Type 4a MI associated with PCI
- Type 4b MI associated with IST (in-stent thrombosis)
- Type 5 MI associated with CABG
AMI

- Transmural: Ischemic Necrosis involving all layers of Myocardium (Endo, Myo, Epicardium)
- Nontransmural: Involves the Endocardium alone or Endo + Myocardium
STEMI VS NON–STEMI

- More commonly used in clinical setting
- Most of our practice guidelines are based on this classification
- Does Not distinguish between Transmural or Nontransmural
- Q Waves & ST–Segment Elevation is associated with higher “EARLY” mortality/morbidity
Risk Factors (Framingham Trial)

- Age MEN 45, WOMEN 55
- Hx of CAD
- HTN
- DM
- TOBACCO

- Hyperlipidemia
- FH
- PAD
- “Renal Failure”
Complications of AMI (Grasso and Brener Cleveland Clinic)

- Ischemic – angina, reinfarction, extension
- Mechanical – CHF, Cardio-shock, MV dysfunction, Aneurysms, Cardiac Rupture
- Arrhythmic – Atrial or Vent., Sinus or AV node dysfunction
- Embolic – CNS/Peripheral
- Inflammatory – Pericarditis
Ischemic Complications

- Angina post MI – highest in Non-STEMI and those RX with Fibrinolytics (than those RX with PCI)

- Reinfarction – highest in Diabetics and those with prior MI. Highest also in those RX with Fibrinolytics (5 – 30%)

- Infarct Extension – reocclusion of artery involved (post fibrinolytics or pci)

- Rx consist of AHA/ACC guidelines with Meds, and or revascularization if clinically warranted.
Mechanical Complications

- VSD/VSR – Incidence has dropped with reperfusion rx (0.2% GUSTO – 1, vs 1–2% pre thrombolytic era). Highest at risk: older female with an Anterior MI esp. Transmural Anterolateral, CHF and increasing HR. Can occur 2 – 5 days post infarct as per current literature. Dx based on clinical, noninvasive and invasive–new holosystolic murmur, echo findings, new right heart O2 step–up. “Mortality with medical Rx is 24% at 72 hrs and 75% at 3 weeks. Early surgery is Rx of choice.
Mechanical

- MR – mild to moderate can occur in 13 – 45% of post MI cases (Coron Artery Dis. 13: 2002; 337–334), poor prognosis (Gusto–1). Papillary Muscle Rupture can occur @ 13 Hrs post MI (SHOCK Trial), found in 7% of cardiogenic shock. PMR – most common in IWMI (Posterior medial papillary blood supply only from RPD)

- Rx: Afterload Reduction (Nipride, IABP) eventually surgery
Mechanical Complications

- LV Wall Rupture:
- 3% of MI’s (10% mortality post MI)
- 90% occur < 2 weeks post MI
- Electromechanical disassociation and SCD

- Look for signs of Tamponade: JVD, Pulsus Paradoxus, Distant Heart Sounds, Rub, Low Voltage
- Bedside Echo, PA Line
- Rx: Emergency Pericardiocentesis and Emergency Open Heart Surgery
Mechanical Complications

- Pseudoaneurysm = contained rupture of LV Free Wall by Pericardium + Mural Thrombus
- ST Elevation > 3 days post MI suspect pseudoaneurysm
- Tachyarrhythmias, CHF, Systemic Embolism
- Echo, MRI, CT
- Surgery
Mechanical Complications

LV Dysfunction and Cardiogenic Shock:
Depends on size, location of infarct, prior MI, Preinfarct LV Function
As expected high mortality @ 81 % Medically Rx PCI & CABG have reduced mortality to 50% (ACC/AHA guidelines)
Mechanical Complications

- Aneurysm:
  - Apical Transmural > Posterior–basal Infarcts 1 – 5% incidence
  - Involves all 3 layers (Endo, Myo & Epi)
  - Rupture is rare
  - Rx: Medical Regimen + Coumadin if Thrombus is noted
Arrhythmic Complications

- PVC’s present 90%
- VF 2 – 4 % AMI
- Lidocaine – no survival benefit! Amiodarone is drug of choice + Conventional Medical Rx Beta Blockers, etc
- Amiodarone + Lidocaine for breakthrough Vent. Arrhythmias
- ICD (Madit I & II trials)
- Ablation
Arrhythmic Complications

- PSVT <10% of AMI’s

- Brady arrhythmias – most common with IWMI’s (AV Nodal Block, SB, Junctional Rhythm)

- Infranodal Conduction Abnormalities with Escape Ventricular Rhythm seen 1* in AWMI’s (poor prognosis)

- Atropine

- Temporary Pacing
Embolic Complications

- Systemic < 2% post MI
- Mural Thrombus present @ 20 % post MI
- Incidence of Mural Thrombus @ 60% with Large AWMI’s
- Due 1* to LV Wall Motion Abnormalities/Aneurysm
- Atrial Fibrillation
- Presentation: CVA, Limb Ischemia, Mesenteric or Renal
- Anticoagulation
Inflammatory

- Pericarditis @ 10% of AMI’s
- 1* with Transmural MI’s
- 1 – 3 days post MI
- Atrial Fibrillation can be seen
- Pleuritic Pain + global saddle-shaped ST Elevation on ECG
- Dressler’s (autoimmune) less seen post early reperfusion era
Closing

- Early Intervention is the Key to preventing catastrophic complications of AMI.
- Rx Complications aggressively
- Risk Modfications etc
Contributors

- Richard Gorlin MD Mt. Sinai NY Gorlin’s Valve Formula
- Philip Samet MD Director of Cardiology Mt. Sinai Miami Beach, Onkar Narula MD, Roger Javier, Charles Byrd MD Original SA Node Recovery Studies and Abnormalities
- Francis Hildner MD Cardiac Cath Director of Mt. Sinai Miami Beach and Founder of the FSCAI
- Arthur Aggaston MD CT Ca++ Score and SBD