بسم الله الرحمن الرحيم
PRIMARY PCI IN STEMI:
STATE-OF-ART

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PPCI in STEMI
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CLINICAL DATA

- E M A B S
- 76 Years
- Type 2 DM
- Obese
- Ex smoker
Monday 9 March 2015

- ED
- Acute severe typical prolonged chest pain
- Maintained hemodynamics
- ECG: STEMI (Anterior MI) + RBBB
- ECHO:
  - RSWMA in LAD territory
  - EF 45%
Pre ECG 9 March 2015
Therapy

- Pain control
- DAP
- INTERGLIN
- SK not available
- Coronary angiography
- Primary PCI 10 Hours after FMC
RCA
LEFT SYSTEM spider using guiding XB 4 7F
Wiring of the lesion pilot 50
SUPPORT WITH BAALLOON
Where we are?
Where we are?
Where we are?
IC intergrlin and NTG
What to do?

Thrombus Aspiration or Balloon Dilatation
2 × 20 mm
Endaveor resolute 3.5 × 38
Angiographic success

BASLINE

FINAL
Post-PCI ECG
Post-PCI course

- Pain-free
- Stable hemodynamics
- Electrically stable
- ST resolution and disappearance of RBBB
- Maintained LV dimensions and function
- Discharge at 72 hours
- Clinical success
Pre-discharge ECG
Acute Coronary Syndromes
1.41 million hospital admissions for ACS in 2010

- NSTEMI (biomarker +): 50%
- STEMI: 22%
- Unstable angina: 28%

NSTE-ACS
Mortality in Acute Coronary Syndromes
Death from admission to 6 mos (GRACE n=43,810)

Fox KAA et al. BMJ. 2006;333:1091.
AMI: Pathophysiology

Ruptured plaque with occlusive thrombus
Treatment of Acute Coronary Thrombosis: The reperfusion wars

rt-PA

PTCA
Fibrinolytic therapy

Did save lives compared to placebo, **BUT**

- At best, restored TIMI 3 flow in 55% (rt-PA), +
- ↑ Incidence of recurrent ischemia and reinfarction +

ICH
0.5-1.0% of pts

2 hours after t-PA

6 hours after t-PA
From PAMI to 23 RCTs of PCI vs. Lysis

N = 7,739

**Event rate**

- **Death**
  - Lysis: 9.3%
  - PCI: 7.0%
  - *p* = 0.0002
- **Reinfarction**
  - Lysis: 6.8%
  - PCI: 2.5%
  - *p* < 0.0001
- **Hemorrhagic stroke**
  - Lysis: 1.0%
  - PCI: 0.1%
  - *p* < 0.0001
- **Total stroke**
  - Lysis: 2.0%
  - PCI: 1.0%
  - *p* = 0.0002

NRMI: Evolution in Reperfusion

774,279 reperfusion eligible STEMI pts at 2,157 hospitals from 1990-2006

Type of Reperfusion Therapy

- Either: 70.8%
- Primary PCI: 43.2%
- Fibrinolysis: 28.1%
- None: 27.6%

Gibson CM et al. Am Heart J 2008;156:1035-44
NRMI: Evolution in Reperfusion

1,146,609 STEMI pts at 2,157 hospitals from 1990-2006

Improvements in Medical Therapy: Discharge Meds

All $P_{\text{trend}} < 0.001$

- Aspirin
- Beta-blocker
- ACE-I/ARB
- Lipid-lowering agent
- Other oral antiplatelet

The relative risk of 1-year mortality increases by 7.5% for each 30-minute delay.

Evolution of Primary PCI

**Device**
- PTCA
  - Bare metal stents
  - Drug-eluting stents

**Drugs**
- Heparin
  - Heparin + GPIIb/IIIa
  - Bivalirudin + ADP antagonists
STEMI Success has Plateaued!

Remaining challenges in STEMI reperfusion therapy

- Further reductions in DBT (apparently) not beneficial
  - Symptom time to first medical contact unchanged
- Suboptimal salvage of myocardium
  - Reperfusion success only ~65%
    - In part due to distal embolization
  - Reperfusion injury
- Mortality remains high in cardiogenic shock and out-of-hospital cardiac arrest
- Ongoing inflammation → high rates of non-culprit lesion-related events
Therapies to Enhance Myocardial Recovery

**Epicardial Reperfusion/ Systems of care**
- Regionalization of STEMI care
- Pre-hospital ECGs
- Pre-hospital cath lab activation
- Bypass non-PCI hospital
- Bypass PCI-hospital ED
- Onsite primary PCI team

**Microvascular integrity/ function**
- Thrombus aspiration
- Intracoronary abciximab
- MGuard stent
- Adenosine
- Sodium nitroprusside
- Ca^{2+} channel blockers

**Cell Therapy**
- Autologous endothelial/bone marrow progenitor cells
- Cardiac stem cells

**Cardioprotection**
- Pre- and post-ischemic conditioning
- Non-infarct related artery reperfusion
- Mechanical LV unloading
- Cyclosporine
- Mitochondrial targeting peptides
- Losmapimod
- Exenatide
- Nitric oxide
- Supersaturated oxygen
- Hypothermia
Microscopic distal emboli and no reflow

TIMI 3 flow with absent microvascular perfusion
Approaches to **Thrombus** in STEMI

All promising, none yet definitive

- Aspiration
- Intraleision GPIIb/IIIa
- Stent-based exclusion
Mechanical Approaches to Thrombus

Thrombus aspiration
(Rinspirator, Pronto, Export, Rescue, Diver CE, etc.)

Thrombectomy
(AngioJet, X-Sizer)

Distal protection
(GuardWire, FilterWire, AngioGuard, etc.)
Distal Protection and Thrombectomy in AMI

Macroscopic embolic debris can be retrieved from >75% of cases
How effective is manual thrombus aspiration?
Do whatever it takes to reduce time from symptom onset to ER arrival and time from ER arrival to PCI!

↑ Public awareness of MI Sx
Chest pain centers of excellence with lower DBTs and excellent outcomes
Regional coordination
Ambulance ECG telemetry
Ambulance/ER CCL activation
ICs sleep in hospital
Continual QI
Treatment of STEMI

Conclusions

- STEMI comprises ~22% of all ACS admissions; the incidence is falling, and the case fatality rate is also markedly decreasing, explaining much of the survival in pts with coronary heart disease

- Rapid reperfusion with primary PCI saves lives and prevents recurrent ischemia and reinfarction with STEMI – the faster the better! But there may be diminishing gains...

- The evolution from PTCA to BMS to DES has reduced recurrent ischemia and restenosis, but not death or MI

- Myocardial salvage is suboptimal in STEMI, and new strategies are required to reduce infarct size
References:

State-of-the-Art in ACS and STEMI

Gregg W. Stone MD, Columbia University Medical Center Cardiovascular Research Foundation

2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines
THANK YOU