# THERAPEUTIC OPTIONS IN CORONARY ARTERY DISEASE WITH FOCUS ON P.C.I

Dr Aniff YEAROO

- CAD – Coronary Atherosclerosis – commonest cause of heart disease and the world most important single cause of death.

- Clinical Presentations:

1. Acute Coronary Syndrome – P.C.I has become the standard of care.
2. Chronic Syndromes.

- CAD – Major cause of mortality and morbity
  despite advances in Medical Therapies
  Imaging modalities and research
- Sudden death 15-20%, 50% due to CVD.
- Atherosclerosis is a complex disease
  with multi factorial etiology, inheritance
  and traditional risk factors.
- Fissures and erosion in the intimal surface as
  causation of Thrombosis.

# THERAPEUTIC OPTIONS

- Optical medical treatment alone (more vigourous control of risk factors, changes in life style)
- FIBRINOLYSIS

# FIBRINOLYSIS

- Frequent contra indications
- Limited effectiveness in inducing reperfusion
- Greater bleeding risk
- Important alternative to mechanical revascularization
- If PCI not possible < 1.5 - 2 hrs
- Full dose pre hospital Fibrinolysis (Captim)
- Failure → urgent Coronary Angiography

# FIBRINOLYTIC AGENTS

- 1980 – All studies in Favour
  - 30% mortality
- Streptokinese 1.5m.u/1hr
- Alteplase – 100mg in l ½ hr + Infusion Heparin
- Reteplase – (Rapilysin) + Heparin
  2 bolus IV of 10mg in 30 mins interval
- Teneteplase – Single bolus
  30 – 50mg (according to weight) + LMWH
  Lovenox 0.3ml IV then 0.1ml/10kg wt B.D

# CORONARY ARTERY BYPASS GRAFT SURGERY (CABG)

Venous – Arterial Grafts

1967 - First CABG by Favaloro

1967 - First heart transplant
Barnard South Africa

1968 - Multi Vessel CABG by
Johnson

- Grafts patency 1 year SVG 80%
  10 years patency – Arterial – 90%
  SVG 60% - 50% severe stenosis
- Redo Mortality 3-7%

# PERCUTANEOUS TRANS LUMINAL CORONARY ANGIOPLASTY

- 1977 First experience by balloon only, Gruentzig in Zurich (German Physician)
- Difficult and Demanding Techniques
- With each problem a new solution enabled further progress and operators became more adventurous
- 1986 First Metal Stent (Wall Stent) implanted by Jacques Puel in Toulouse.
- Concerns about Restenosis – Emergency CABG
- Bare Metal Stents – Concerns about Restenosis and Stents Thrombosis.
- New antiplatelets agents, new devices with strong presence of the industry to develop newer materials Balloons, Drugs Eluting Stents and now Biodegradable Stents)

# CORONARY ARTERY BYPASS IN AMI

- Unfavourable anatomy for PCI
- PCI failure
- Emergency CABG only considered when a very large myocardial area is involved and surgical revascularization feasible $\leq$ 4 hours before this area is necrotic
- Urgent in the absence of pain - 3 – 7 days waiting time advisable

# RISK STRATIFICATION

- Age, HF, PHMI, HB, BP,
  St Shift, Creatinine, Cardiac Enzymes, Coronary Angiography

# ANTI PLATELETS AGENTS

1. Aspirine

- 300mg then 75-100mg daily

2. Thienopyridines

> Ticlopidine
> Clopidogrel
> Prasugrel
> Elinogrel

3.GP IIb - IIIa inhibitors

I.V - abciximab – Eptifibatide - Tyrofibran

4. Non Thienopyridines

- Ticagrelor
- Cangrelor
- Cilostazol

- Coronary Angiography standard for accessment of CAD
- Does not give information about the vessel wall, substrate of Atherosclerosis
- New intra coronary techniques to image directly the atherosclerosis plaque.

- Technical know-how with deep clinical judgment ensure us as to make the right therapeutic decision for each individual patient.
- Evidence driven P.C.I
- Above one million procedures worldwide per year (elective and emergency indications)
- Need to obtain objective evidence for P.C.I

# NON INVASIVE TESTS

- Exercise ECG (TMT)
- MS – Ct
  (Multislice Computed Tomography)
- Nuclear Perfusion Image
- Pharmacological Stress Tests
- Magnetic Resonance Imaging

# INVASIVE TESTS

- Need for Intra Coronary evaluations
- Doppler Flow – Pressure wires, FFR
- IVUS. Virtual histology.Thermography
- Optical Coherence Tomography
- IVUS allows a much more detail of Coronary atherosclerosis – limited resolution (150-200µm)
- OCT (Optical Coherence Tomography) – light based imaging modality – higher level of resolution (10-40µm), tenfold higher than conventional IVUS
- Image Atherosclerosis plaque and vessel response after Stent Implantation

- The FEASABILITY of a procedure may not be necessarily the best therapeutic option for the patient

  (Drug therapy or CABG maybe alternate suitable options)

- Role of key clinical Trials help to make the right decision for each individual patient.

- Interaction with key opinion leaders is very important, ( Paris Course Revascularization, American Heart Association etc) for contact with the latest devices and the best innovations in the field.

- In every day decision making we have to take into account many elements while remaining patient – focused.

**Table I** Classes of recommendations

| Classes of Recommendations | Definition |
|---|---|
| Class I | Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective. |
| Class II | Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure. |
| *Class IIa* | Weight of evidence/opinion is in favour of usefulness/efficacy. |
| *Class IIb* | Usefulness/efficacy is less well established by evidence/opinion. |
| Class III | Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful. |

**Table 2** Levels of evidence

| | |
|---|---|
| Level of Evidence A | Data derived from multiple randomized clinical trials or meta-analyses. |
| Level of Evidence B | Data derived from a single randomized clinical trial or large non-randomized studies. |
| Level of Evidence C | Consensus of opinion of the experts and/or small studies, retrospective studies, registries. |

**Table 3** Recommended risk stratification scores to be used in candidates for percutaneous coronary intervention or coronary artery bypass grafting

| Score | Calculation | Number of variables used to calculate risk | | Validated outcomes | Class[a]/level[b] | | Ref.[c] |
|---|---|---|---|---|---|---|---|
| | | Clinical | Angiographic | | PCI | CABG | |
| EuroSCORE | www.euroscore.org/calc.html | 17 | 0 | Short- and long-term mortality | IIb B | I B | 2, 3, 6 |
| SYNTAX score | www.syntaxscore.com | 0 | 11 (per lesion) | Quantify coronary artery disease complexity | IIa B | III B | 4 |
| Mayo Clinic Risk Score | (7, 8) | 7 | 0 | MACE and procedural death | IIb C | III C | — |
| NCDR CathPCI | (5) | 8 | 0 | In-hospital mortality | IIb B | — | 5 |
| Parsonnet score | (9) | 16 | 0 | 30-day mortality | — | III B | 9 |
| STS score[d] | http://209.220.160.181/STSWebRiskCalc261/ | 40 | 2 | Operative mortality, stroke, renal failure, prolonged ventilation, deep sternal infection, re-operation, morbidity, length of stay <6 or >14 days | — | I B | 10 |
| ACEF score | [Age/ejection fraction (%)] + 1 (if creatinine >2 mg/dL)(11) | 2 | 0 | Mortality in elective CABG | — | IIb C | — |

**Table 9** **Indications for coronary artery bypass grafting vs. percutaneous coronary intervention in stable patients with lesions suitable for both procedures and low predicted surgical mortality**

| Subset of CAD by anatomy | Favours CABG | Favours PCI | Ref. |
|---|---|---|---|
| 1VD or 2VD - non-proximal LAD | IIb C | I C | — |
| 1VD or 2VD - proximal LAD | I A | IIa B | 30, 31, 50, 51 |
| 3VD simple lesions, full functional revascularization achievable with PCI, SYNTAX score ≤22 | I A | IIa B | 4, 30–37, 53 |
| 3VD complex lesions, incomplete revascularization achievable with PCI, SYNTAX score >22 | I A | III A | 4, 30–37, 53 |
| Left main (isolated or 1VD, ostium/shaft) | I A | IIa B | 4, 54 |
| Left main (isolated or 1VD, distal bifurcation) | I A | IIb B | 4, 54 |
| Left main + 2VD or 3VD, SYNTAX score ≤32 | I A | IIb B | 4, 54 |
| Left main + 2VD or 3VD, SYNTAX score ≥33 | I A | III B | 4, 54 |

**Table 14** Recommendations for percutaneous coronary intervention in ST-segment elevation myocardial infarction

| Indication | Time from FMC | Class[a] | Level[b] | Ref.[c] |
|---|---|---|---|---|
| **Primary PCI** | | | | |
| Is recommended in patients with chest pain/discomfort <12 h + persistent ST-segment elevation or previously undocumented left bundle branch block. | As soon as possible and at any rate <2 h from FMC[d] | I | A | 83, 84, 94 |
| Should be considered in patients with ongoing chest pain/discomfort >12 h + persistent ST-segment elevation or previously undocumented left bundle branch block. | As soon as possible | IIa | C | — |
| May be considered in patients with history of chest pain/discomfort >12 h and <24 h + persistent ST-segment elevation or previously undocumented left bundle branch block. | As soon as possible | IIb | B | 88, 89 |
| **PCI after fibrinolysis** | | | | |
| Routine urgent PCI is indicated after successful fibrinolysis (resolved chest pain/ discomfort and ST-segment elevation). | Within 24 h[e] | I | A | 77–79 |
| Rescue PCI should be considered in patients with failed fibrinolysis. | As soon as possible | IIa | A | 80, 87 |
| **Elective PCI/CABG** | | | | |
| Is indicated after documentation of angina/positive provocative tests. | Evaluation prior to hospital discharge | I | B | 36, 41–43 |
| Not recommended in patients with fully developed Q wave MI and no further symptoms/ signs of ischaemia or evidence of viability in the infarct related territory. | Patient referred >24 h | III | B | 90, 91 |

- **Guidelines and recommendations should help physicians and other healthcare providers to make decisions in their daily practice. However the ultimate judgment regarding the care of individual treatment must be made by the physician in charge of his / her care.**