Pharmaceutical drugs in the treatment of STEMI

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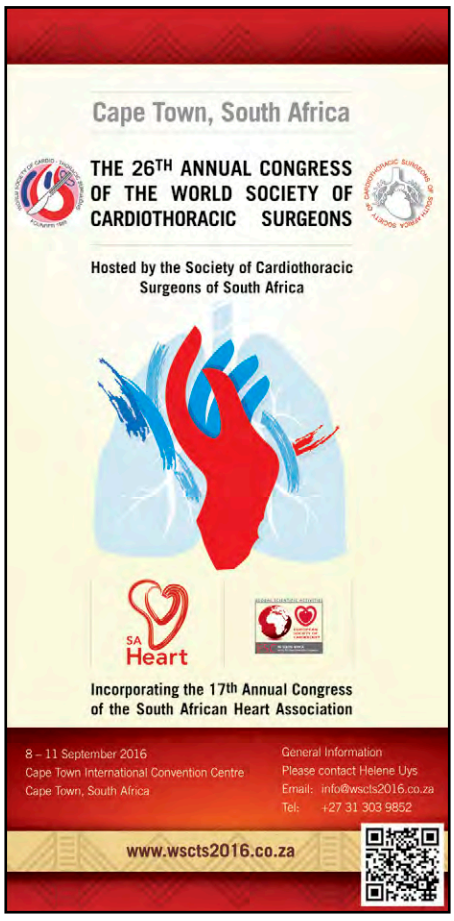
Our concept of ST-segment Elevated Myocardial Infarction (STEMI) refers to when coronary blood supply decreases abruptly after a thrombotic occlusion. The underlying mechanism leading to the thrombotic event is an unstable atherosclerotic plaque which ruptured (or cracked or eroded) exposing the content of the plaque to the blood initiating thrombogenesis.

This concept started in 1912 when Herrick made the observation that acute myocardial infarction (AMI) is caused by coronary thrombosis. Yet this critical observation that coronary thrombosis played a pathogenetic role in acute MI was only accepted in 1979.

The in-hospital mortality due to an AMI has declined from about 20% to about 5% over the last 20-30 years. Many patients will die before being hospitalised and the one-year mortality is still large.

Against this background it is critical that the occluded artery must be opened as soon as possible to establish reperfusion. This is the highest priority.

A primary percutaneous coronary intervention (PCI) should be performed in patients with STEMI of less than 12 hours duration: Class 1 indication with level of evidence A. (Class 1: benefit far outweighs the harm and level A indicates treatment has shown benefit in multiple randomized clinical trials).



THE PLACE OF DRUGS IN STEMI TREATMENT

FIBRINOLYSIS

Fibrinolytic drugs should ideally be given within 30 minutes of presentation (door-to-needle time). These drugs promote the conversion of plasminogen to plasmin which then lyses fibrin thrombi. It is contra-indicated in some (e.g. risk of bleeding) and fails to restore coronary reperfusion in 20%-40% of people and in a few it causes haemorrhagic stroke.

Fibrinolysis reduces mortality but is inferior to PCI provided that PCI can be delivered sufficiently quickly. A meta-analysis evaluated the effect of time-delays of fibrinolysis and PCI and stated that PCI consistently reduced mortality better across a spectrum of time delays up to 12 hours relative to fibrinolysis.

The STREAM trial compared a PCI strategy with a strategy of fibrinolysis followed by PCI (facilitated PCI) in 1892 patients within three hours of presentation in whom PCI could not be done within 1 hour of presentation.

The authors concluded that the outcome of the two strategies was the same but the fibrinolysis group had a higher rate of cerebral bleeding.

PCI is the preferred option and should be done within 120 minutes of presentation and if that is not possible then fibrinolysis should be given: Class 1 and level B indication. (Benefit more than harm but Limited trial evidence). Presentation of a patient longer than 12 hours after onset of symptoms should be offered a PCI.

ADJUNCTIVE PHARMACOTHERAPY TO PCI

PLATELET INHIBITION

Rapid and consistent platelet inhibition is a cornerstone of pharmacotherapy treatment early in the course of acute STEMI. All patients should receive a loading dose of aspirin followed by long-term use of aspirin. Additional anti-platelet therapy added to aspirin: Clopidogrel 600mg, prasugrel 60mg and ticagrelor 180mg are all Class 1 and level of evidence B indication. These drugs in lower doses (clopidogrel 75mg daily, prasugrel 10mg daily, ticagrelor 90mg twice daily) should be given to patients with STEMI after receiving a stent (bare metal or drug-eluting) for one year as a Class1 and level B evidence indication.

ANTICOAGULANT THERAPY TO SUPPORT PRIMARY PCI

The use of a heparin is recommended and is a Class 1 level B evidence indication.

ROUTINE MEDICAL THERAPIES

BETA BLOCKERS

Oral beta blockers started in the first 24 hours after a STEMI have a Class 1 and level of evidence B indication. Routine contra-indications should be observed.

RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM INHIBITORS

An *angiotensin-converting-enzyme* (ACE)-inhibitor should be started in 24 hours when STEMI has an anterior location, clinical heart failure after the STEMI or an ejection fraction of less than or equal to 0.40. This has a Class 1 level A indication. An angiotensin receptor blocker should be given to those intolerant to ACE-inhibitor: Class 1 level B indication.

An aldosterone inhibitor should be given to patients with STEMI already on ACE-inhibitor and a beta blocker that has an ejection fraction of less than or equal to 0.40 and either symptomatic heart failure or diabetes mellitus: Class 1 level B indication.

LIPID MANAGEMENT

High-intensity statin therapy should be given to all patients with STEMI: Class 1 level B indication. SF