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Primary PCI for STEMI in 2014. What have we learned?

In 30 years of reperfusion treatment of ST-elevated myocardial infarction (STEMI), we have seen a reduction in mortality in STEMI patients from 15–20% in the eighties with aspirin and lytics, to 5–10% in the nineties with percutaneous coronary intervention (PCI), to less than 3% today with new drugs and devices. However, there remain several areas for future research and implementation, namely: network optimization, procedural optimization, and addressing new needs.

The efficiency of STEMI networks has the potential for saving thousands of lives and can benefit considerably from pre-hospital management; that is to say pre-hospital treatment by means of distance diagnosis and communication, and by setting optimal pharmaco-invasive strategies in different social contexts, such as rural or mountainous areas. This also applies to under-developed countries where primary PCI is not an option and a lytic treatment could be the first, if not the only option. It is important for the networks (and Scientific Societies), in order to be potentiated and expanded, to engage society at large, including referring hospitals and their administrators, patients and their organizations, the general public, and eventually, health care payers and politicians.

With regards to procedural optimization, implementation of primary PCI continues to require further improvements in order to deliver superior patency of the epicardial coronary arteries and reduced myocardial reperfusion injury, while also reducing complications related to the procedure, in particular bleeding. On this specific aspect, one of the most relevant changes introduced in the field of the primary PCI relates to the choice of vascular access. The use of the radial artery instead of the femoral artery in STEMI translates into a significant reduction in mortality, mostly due to the reduction of bleeding, as demonstrated in the RIFLE-STEACS (Radial Versus Femoral Randomized Investigation in ST-Elevation Acute Coronary Syndrome)¹ and the RIVAL (Radial Vs femoral access for coronary intervention)² trials. These data were subsequently confirmed by a

large post-hoc analysis³ and several additional investigations.^{4–6} Although the femoral artery may be preferred in some patients, such as those with a very weak radial pulse, patients needing left ventricular haemodynamic support or those in whom right ventricular pacing during primary PCI is required, the radial access should be embraced as default for STEMI patients after adequate training in elective cases.

Another relatively new – and still controversial – approach to optimize the primary PCI procedure is manual thrombus aspiration. Thrombectomy has the potential to reduce distal embolization and improve microvascular perfusion during primary PCI. Initial enthusiasm for manual thrombectomy arose after the mortality benefit observed in the TAPAS trial (N=1,071) one year after the primary PCI procedure.⁷ However, the more recent TASTE trial (N=7,244) showed no reduction in mortality at 30 days with manual thrombectomy.⁸ Recently, 1-year data from TASTE reaffirmed the mortality data from 30 days and do not appear to support any other potential benefits with this therapy⁹ However, the largest trial, the ongoing TOTAL trial (N=10,700) will help determine the effect of manual thrombectomy for important clinical outcomes. A planned individual patient meta-analysis of TOTAL and TASTE trials will have approximately 17,000 patients to examine the effect on clinical outcomes, but one could expect that thromboaspiration will have a TOTAL TASTE of TAPAS...

The evolution of antiplatelet and anticoagulant treatments over the past few decades has also contributed to the decreased morbidity and mortality associated with STEMI. Aspirin should be started rapidly, and subsequently low-dose daily aspirin is recommended for life; the addition of a P2Y12 inhibitor as dual antiplatelet therapy (DAPT) is advised early on and should be continued for 9–12 months.¹⁰ In contrast, anticoagulation administered intravenously or subcutaneously should be discontinued shortly after the procedure. The potential benefit of reducing ischaemic complications with an

antithrombotic therapy has to be balanced with the risk of bleeding. Whereas acute bleeding, especially intracerebral haemorrhage, can result in death, the premature interruption or cessation of an antithrombotic therapy can result in in-stent thrombosis. Therefore, many challenges need to be addressed to optimize the benefit/risk ratio with antithrombotics. Although DAPT is still recommended for 12 months after STEMI, the premature interruption by unexpected reasons is much safer with the new generation of DES with permanent polymers, such as the everolimus and zotarolimus eluting stents, which can be considered as safe as BMS according to recent studies including patients with ACS.¹¹ Other forms of dedicated self-expanding or mesh-covered stents and the bioresorbable technology appear promising but, to date, have not demonstrated significant reductions of mortality; furthermore, their restenosis rates are still unknown.

Since multi-vessel obstructive coronary artery disease (CAD) is observed in approximately half of the STEMI patients admitted for primary PCI, the best management approach for non-culprit lesions in STEMI patients has been a matter of debate and no consensus approach has yet been defined. Recently, the results of the PRAMI (PREventive Angioplasty in acute Myocardial Infarction) study provided important information suggesting that 'preventive PCI' of non-culprit lesions translates

into better clinical results compared with a conservative approach.¹¹ This trial confirmed one of the key concepts of revascularization treatment, i.e., that complete revascularization is better than incomplete revascularization. Indeed, it improves left ventricular function, reduces recurrences of ischaemia, including reinfarction and therefore, sooner or later it improves survival. Unfortunately, the study did not investigate the strategies more frequently employed in routine practice: completing revascularization electively before discharge, perhaps after functional assessment with a pressure wire.

In 2014, while many improvements in the care of STEMI patients have been realized, the implementation of an efficient STEMI network also reveals hitherto unanticipated needs and opportunities. Many patients who would not previously have survived the heart attack now reach the hospital and present with cardiogenic shock, anoxic cerebral damage or post-resuscitation cardiac arrest. Multidisciplinary teams need to become familiar with the use of neuroprotective measures and various assist devices for haemodynamic support. Furthermore, the perspective of cell therapy for patients with irreversible forms of post-ischaemic congestive heart failure opens a fascinating perspective for the treatment of CAD.

*Our previous issue of **Confluence** featured an interesting, extensive thrombus aspiration piece by Prof. Dr Christian Hamm, Professor Chaim Lotan, and Dr Sanjit Jolly and colleagues. You can read this, and other articles, online at www.confluencejournal.com.*

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DISCLOSURES: FR has no disclosures or conflicts of interests.

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