Managing acute myocardial infarction: are we ready for new advances?

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In this issue of the Singapore Medical Journal, four articles are published on acute myocardial infarction (AMI). Jim et al described predictors of inhospital outcome after a first inferior AMI;[1] Biswas et al reviewed a relatively new imaging technology for prognostication and risk stratification in patients with AMI;[2] Wei et al discussed the potential use of human stem cells for post-MI cardiac repair;[3] and Norasyikin et al investigated the prevalence of adrenal insufficiency in a small series of patients admitted with acute coronary syndrome.[4]

Ischaemic heart disease is today a major contributor of morbidity and mortality in Singapore and also worldwide.[5,6] In Singapore, it accounted for 18% of the total deaths in 2005. AMI, which reflects one end of a spectrum of the manifestations of coronary artery disease, is associated with significant mortality.[7] In addition, those who survive the infarction may face sequelae such as heart failure, recurrent major adverse cardiac events, physical functional decline and a long-lasting psychological burden. The clinical presentation of AMI itself is also highly variable. On one hand, it may be completely asymptomatic – the so-called "silent MI". On the other hand, it may manifest as chest pain or sudden cardiac death. For patients who present for medical treatment, early diagnosis and appropriate management of the AMI are both critical for a successful outcome.

The prognostic parameters upon hospital admission for patients presenting with ST-elevation MI (STEMI) include the following: basic demographics (outcome is poorer with increasing age and the female gender), presence of cardiogenic shock or heart failure and the size of the MI (which may be assessed from electrocardiography [ECG] changes and peak cardiac enzyme levels). Jim et al found that in patients presenting with a first inferior wall STEMI in the thrombolytic era, advanced age, female gender, lateral wall extension (diagnosed by ECG), complete atrioventricular and bundle branch block, absence of thrombolytic therapy and cardiac free wall rupture were all associated with a higher inhospital mortality.[1] These findings are actually not surprising, but they serve to remind us of the importance of identifying patients with higher risk profiles. Furthermore, in the modern era of AMI management, clinical outcomes of STEMIs will depend critically on the reperfusion time, i.e. the time interval between the onset of symptoms and the implementation of reperfusion therapy, which is either thrombolytic therapy or coronary angioplasty intervention.[8] The door-to-needle time for thrombolytic therapy or the door-to-balloon time for primary percutaneous coronary intervention is an important parameter which should be monitored and reduced as much as possible.[9,10] In addition, the time interval time between symptom onset to arrival at the emergency department is also very important and should be as short as possible. Finally, the choice of ancillary and medical therapies also affects the clinical outcomes.[11,12]

In the post-AMI phase, transthoracic echocardiography is usually performed to assess the left ventricular (LV) function and to detect any resultant complication.[13] Both systolic and diastolic dysfunctions have prognostic significance.[14] The presence of a LV thrombus in the setting of poor LV systolic function detected by echocardiography will require anticoagulation therapy, unless it is contraindicated. Exercise stress tests for risk stratification should be routinely considered.[11] In many cases, an invasive strategy with coronary angiography will also be adopted. This test directly assesses the culprit coronary artery and, where appropriate, may lead to percutaneous coronary intervention of the infarct-related lesion. Biswas et al published an article on BMIPP imaging, using fatty acid metabolism as a means of detecting ischaemic and viable myocardium.[2] Currently, in addition to single-photon emission computed tomography,[15] cardiac magnetic resonance studies can also aid in prognostication.[16] Whether these newer technologies will become routine investigations in the management of post-MI patients remain to be seen. Not only will these new tests need to show incremental benefit, but they should also ideally not be too technically difficult to perform (with relatively rapid throughput) and not too costly. The accompanying risks including nuclear activity/radiation exposure should also not be too high.

The promise of new imaging modalities is that they are able to identify patients who may benefit from new therapies.[5] Though reperfusion therapy has been a milestone in the treatment of AMI and has significantly improved survival and prognosis,[1] the development

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of heart failure, particularly in those with a sizable myocardial damage, remains a major challenge. Cell therapy may provide a novel therapeutic option to modify LV remodelling processes and prevent post-infarction heart failure. Over the last decade, a myriad of cell types have been tested experimentally, leading to a flurry of early uncontrolled and small-sized clinical trials. Wei et al reviewed some of the existing evidence on the beneficial effect of this promising therapy as well as the current limitations, mechanistic uncertainties and controversies.[3] It is possible that the next decade will see cell therapy be utilised as adjuvant therapeutic agents in AMI. While we need to proceed with cautious optimism, safety should always be top in our priority.

Currently, we are already doing better in reducing AMI mortality compared to the past.[17] As we optimise our management strategies for AMI, there is continuing research and advances in this field. This will undoubtedly result in a better understanding of the biology of the atherosclerotic plaque in the coronary artery as well as better imaging modalities and better novel therapeutic agents for the treatment of AMI and its complications.

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