

## Cardiology and cardiac surgery

THE MOST IMPORTANT DEVELOPMENTS in cardiology and cardiac surgery in recent years have come from the implementation of ideas and techniques that have taken many years to bring to fruition.

**Prevention.** Recognition that drugs may have multiple effects is a major advance. Statins reduce the incidence of recurrent vascular events because they decrease plasma lipid levels, and also because they reduce the likelihood of plaque rupture and subsequent thrombotic arterial occlusion. Angiotensin-converting enzyme (ACE) inhibitors control blood pressure, but also lower the risk of subsequent death, myocardial infarction and stroke,<sup>1</sup> perhaps because they reduce adverse cardiac remodelling and modify vasomotor function.

While we recognise the importance of risk factors such as obesity and lack of fitness, patient compliance, smoking and low rates of treatment of hypertension and dyslipidaemias remain major problems.

**Diagnosis.** Echocardiography continues to improve technically, and, for most patients, is the definitive investigation of cardiac morphology and function. Small portable machines that can be used as an extension of physical examination may revolutionise practice.

Magnetic resonance imaging rivals echocardiography for examining the heart and great vessels, and can evaluate myocardial perfusion and viability. However, its inaccessibility and expense mean it will not displace echocardiography for most patients.

Electron beam computed tomography (CT) can show coronary artery calcification, but its value in screening for disease is not yet clear. Contrast studies with multislice spiral CT show details of coronary artery morphology and may replace angiography for some purposes.

Despite much research into the genetic basis of cardiovascular diseases, knowledge and technology are not yet sufficiently developed for this to be clinically useful.

**Intervention.** The use of serum markers of myocardial damage (eg, troponin) has redefined the spectrum of *acute coronary syndromes*<sup>2</sup> and improved identification of high-risk patients, for whom early angiography and revascularisation by angioplasty (with platelet glycoprotein IIb/IIIa inhibitors) or surgery is warranted.

The best way to limit damage and reduce mortality in patients with *myocardial infarction* is to restore flow in the infarct-related artery as soon as possible. When it can be done promptly enough, angioplasty is safer and more effective than lysis.<sup>3</sup> Issues of prehospital delay, diagnosis by paramedics before admission and the availability of interventional services need to be addressed. Thrombolysis, perhaps initiated in ambulances on the way to hospital, still offers the best outcome for most patients.

It is difficult to compare angioplasty with surgery for treating *chronic angina* because of continuous modifications and improvements in both fields. While angioplasty is now usually combined with stenting, surgeons now prefer arterial conduits to saphenous vein grafts because of their superior long-term patency, and have developed techniques such as grafting the beating heart without cardiopulmonary bypass,

limited-access surgery and even robotic surgery to reduce morbidity. In patients with multivessel disease who might be helped by either technique, angioplasty with stent deployment is as successful and safe as surgery,<sup>4</sup> but more often requires further interventions

because of restenosis. The use of stents which elute an immunosuppressive drug (eg, sirolimus) may reduce this risk, but surgery will still be necessary for chronically occluded vessels, for most lesions of the left main trunk, and probably for multivessel disease in patients with diabetes.

Chronic *heart failure* is becoming more prevalent. There is excellent evidence for the value of ACE inhibitors,  $\beta$ -blockers and spironolactone. A small number of patients will still undergo transplantation, but ventricular-assist devices (implanted pumps) may offer definitive treatment rather than simply a bridge to transplantation.

Treatment of *arrhythmias* has changed. The perceived usefulness of antiarrhythmic drugs (apart from  $\beta$ -blockers) for suppressing ventricular tachyarrhythmias has declined. Class 1 agents such as quinidine are now rarely used as they may be pro-arrhythmic. Radiofrequency ablation can cure most recurrent supraventricular arrhythmias, but the best approach to managing atrial fibrillation remains unclear. Complex implanted devices can pace for bradycardia, suppress ventricular tachycardia and terminate ventricular fibrillation,<sup>5</sup> but cost limits their widespread use. The best hope for reducing mortality from out-of-hospital cardiac arrests may be to provide automatic defibrillators in public places.

**Conclusion.** The benefits of developments in imaging, percutaneous coronary intervention and surgical innovation are limited by poor compliance (particularly in modifying risk factors). Ultimately, society must decide how much we can afford to spend on such expensive developments as magnetic resonance imaging or implantable defibrillators.

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