

## How should stable coronary artery disease be managed in the modern era?

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*CABG offers a cost-effective and better long-term clinical outcome for many patients*

Coronary artery disease is still the single largest cause of premature death in Australia, according to the Australian Institute of Health and Welfare.<sup>1</sup> Also documented is the dramatic decline in age-related mortality from heart disease, which is largely attributed to reductions in smoking and better intervention for hyperlipidaemia and elevated blood pressure.<sup>2</sup>

As many as 85% of elective percutaneous coronary intervention (PCI) procedures are done in patients with stable coronary artery disease.<sup>3</sup> However, the only data showing prognostic benefit of intervention in reducing death and infarction in such patients come from subgroup analyses in old surgical trials,<sup>4-6</sup> which showed benefits for patients with left main, triple vessel or proximal left anterior descending stenoses, especially if there was additional left ventricular damage. These benefits lasted up to 11 years, but the surgery was compared with medical therapy that did not include aspirin,  $\beta$ -blockers or lipid-lowering therapy for most patients. The surgical group did not receive arterial conduits.

Subsequently, 11 randomised trials comparing PCI with coronary artery bypass graft (CABG) surgery for patients with multivessel coronary artery disease showed that the frequency of death and myocardial infarction was similar in both arms.<sup>7</sup> These results cannot be used to claim an outcome benefit for PCI, as the trials entered only about 5% of screened patients, and the patients were not equivalent in the severity of their coronary artery disease to those in the original CABG trials. Further, analysis of the comparative trials shows that the highest-risk group (those with diabetes) showed benefit with CABG over PCI.<sup>8</sup>

Outcomes after CABG now show that, despite this surgery being performed in increasingly sick and complex patients, the overall mortality is less than 2%.<sup>9</sup> Average length of hospital stay is now 3–5 days and return to work is usual in less than 2 months. Improved techniques have reduced the problem of cognitive impairment, and comparative studies have shown no difference with PCI in this respect.<sup>10</sup> Long-term outcomes of CABG have improved due to the increased use of arterial conduits. Repeat CABGs now make up only 3%–4% of total CABG surgery,

although this low figure may reflect a preference for PCI in repeat procedures.

PCI has flourished since its introduction 30 years ago, with its offer to patients of a sound and timely intervention for coronary artery disease — but it has not been without problems. Recoil restenosis with balloon angioplasty was largely solved by the introduction of bare-metal stents. Acute stent thrombosis is less of a problem with better anticlotting agents, and drug-eluting stents have significantly reduced the problem of late restenosis. Despite these improvements, no reported studies have shown convincing evidence that PCI reduces the finite end points of death or myocardial infarction for patients with stable coronary artery disease.

Controversy has recently arisen over the finding that patients with drug-eluting stents have an ongoing excess risk of late stent thrombosis of around 0.5% a year, presumably due to failure of endothelialisation of the stent. These events are usually associated with acute myocardial infarction, which carries a 50% mortality rate. It is now recommended that patients with drug-eluting stents stay on combined treatment with clopidogrel and aspirin for at least 12 months after implantation, and possibly permanently.<sup>11</sup> This adds to patients' financial costs and places them at extra risk of bleeding.

Two recent reports provoke additional comment. First, Griffin et al used a complicated analysis of previous data to assess the cost-effectiveness of PCI and CABG in patients with multivessel disease considered suitable for revascularisation. CABG reached the accepted level of cost-effectiveness (US\$60 000 per quality-adjusted year of life gained) but PCI did not, mainly due to the ongoing need for repeat procedures in PCI patients.<sup>12</sup>

Second, Boden et al reported a randomised trial comparing PCI with medical therapy in patients with stable coronary artery disease, which found no difference in the rate of death or non-fatal myocardial infarction at a median follow-up of 4.6 years. The PCI group initially had a reduced rate of angina, but this difference had disappeared at 5 years, largely because the medical therapy group had improved.<sup>3</sup>

The best interpretation of currently available data is that, for patients with severe coronary artery disease, the more invasive procedure with a longer recovery time (CABG) has a better long-term clinical outcome and is more cost-effective than the less invasive fast-recovery procedure (PCI). Three ongoing randomised clinical trials (CARDia, SYNTAX and FREEDOM) should further clarify the roles of PCI and CABG in treating severe coronary artery disease.

The question then arises of whether, in current practice, PCI is being used in patients with severe coronary artery disease who would be more appropriately treated with CABG. Surgeons and cardiologists have argued that patients are not being adequately advised of the surgical option.<sup>13</sup> Indeed, use of CABG is in such decline that training programs for young surgeons are at risk.<sup>14</sup>

In practice, the patient decides between CABG and PCI following discussion with a cardiologist, often while still in the angiography suite. This arrangement bypasses one of the recommendations on self-referral issues: to undertake consultation with other providers.<sup>15</sup> It has been suggested that the technical suitability of a lesion for angioplasty determines the advice given to patients, rather than the relative benefits of CABG, PCI or even medical treatment alone.<sup>16</sup>

Smoking cessation and treatment to lower lipids and blood pressure are remarkably effective in improving the outlook for patients with stable coronary artery disease. Both CABG and PCI will provide benefits if revascularisation is performed for relief of symptoms, and patients may be influenced in their choice by both the less invasive nature of PCI and by the fewer recurrent procedures offered by CABG. However, for patients with prognostically important stable coronary artery disease (ie, severe left main or triple vessel disease), current evidence indicates that CABG offers a better long-term outcome.

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