Stents had similar clinical outcomes but more repeated revascularisation than did bypass surgery in multivessel disease

Serruys PW, Unger F, Sousa JE, et al, for the Arterial Revascularization Therapies Study Group. ***Comparison of coronary-artery bypass surgery and stenting for the treatment of multivessel disease.*** *N Engl J Med 2001 Apr 12;**344**:1117–24.*

QUESTION: In patients with multivessel coronary artery disease, how effective and cost effective is coronary stenting compared with bypass surgery for reducing clinical outcomes at 1 year?

Design
Randomised (allocation concealed*), unblinded,* controlled trial with 12 months of follow up (Arterial Revascularization Therapies Study [ARTS]).

Setting
67 centres in 19 countries.

Patients
1205 patients (mean age 61 y, 77% men) with angina pectoris or silent ischaemia plus ⩾ 2 lesions in different vessels or territories that were amenable to stenting. Exclusion criteria included previous bypass surgery, ejection fraction ⩽ 30%, congestive heart failure, history of stroke, and recent transmural myocardial infarction (MI). 99% of patients in the stent group and 96% in the bypass surgery group received their allocated treatment.

Intervention
600 patients were allocated to stenting and 605 to bypass surgery. Details of procedures were decided by the operator.

Main outcome measures
Combined cardiac or cerebrovascular events (death, transient ischaemic attacks, stroke, reversible ischaemic neurological deficits, MI, and repeat revascularisation) and costs for direct medical care.

Main results
Patients in the stent group had higher rates of adverse events, repeated revascularisation (table), angina (21% *v* 10%), and combined events ($p < 0.001$ for each) than did patients in the bypass group, although medical costs per patient were lower (US $6441 *v* $10 653 for procedure-related costs and $10 665 *v* $13 638 for direct medical costs at 1 y, $p < 0.001$ for both). The groups did not differ for mortality, stroke, MI (table), or quality of life.

Conclusions
In patients with multivessel coronary artery disease, coronary stents and bypass surgery had similar rates of mortality, myocardial infarction, and stroke, although stenting had more adverse events and a need for repeated revascularisation. Stenting was less expensive than bypass surgery at 1 year.

*See glossary.

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Stents v coronary bypass surgery for multivessel coronary artery disease†

Outcomes at 1 year	Stents	Bypass	RRI (95% CI)	NNH (CI)
Any event‡	26%	12%	114% (66 to 175)	7 (5 to 10)
Revascularisation	21%	3.8%	452% (259 to 749)	6 (5 to 7)
Myocardial infarction	6.2%	4.8%	29% (–20 to 106)	Not significant
			RRR (CI)	**NNT**
Mortality	2.5%	2.8%	11% (–55 to 77)	Not significant
Stroke	1.7%	2.1%	22% (–66 to 76)	Not significant

†Abbreviations defined in glossary; NNH and its CI calculated from data in article.
‡Any event = death, transient ischaemic attack, stroke, reversible ischaemic neurological deficit, or myocardial infarction.

COMMENTARY

For most patients who need coronary revascularisation, the best procedure is clear-cut: bypass surgery for left-main or extensive 3-vessel disease and angioplasty for single-vessel disease. In the "grey zone" between these 2 extremes (about 15% of patients), either procedure is an option. In the early 1990s, several randomised controlled trials in such patients found equal rates of mortality and MI, but better angina relief with surgery.[1] However, after enrollment in these trials was complete, coronary stents became available. Although stents reduce restenosis, they are more expensive than balloon angioplasty, and it was unclear whether their development made previous trials obsolete. ARTS is the first trial to compare stenting with bypass surgery, and its results are similar to those of previous trials: no difference in death, MI, or stroke, but more repeated procedures and angina in patients who received stents. Thus, the principles derived from earlier clinical trials are still applicable in the stent era.

The major concern about stents is their high cost. In previous trials of balloon angioplasty and bypass surgery, the 30% initial cost advantage of angioplasty was trimmed to < 5% over several years. In ARTS, the 40% initial cost advantage of stents was cut to 22% over 1 year but the difference was still statistically significant; however, costs in Europe are quite different from those in the USA and the follow up in ARTS was too short to capture all the late costs. Thus, the cost effectiveness of stenting compared with that of bypass surgery remains uncertain, especially in the USA. Nevertheless, stents are a safe alternative for patients with multivessel coronary disease who wish to avoid bypass surgery.

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1 Sim I, Gupta M, McDonald K, Bourassa MG, Hlatky MA. A meta-analysis of randomized trials comparing coronary artery bypass grafting with percutaneous transluminal coronary angioplasty in multivessel coronary artery disease. *Am J Cardiol* 1995;**76**:1025–9.