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Commentary: Spontaneous myocardial infarctions and the vital choice: Bypass or stent

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Coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI) have been compared in numerous randomized control trials (RCT) over 25 years. Both treat coronary artery disease (CAD) to relieve angina and myocardial ischemia but in very different ways. While flow-restricting coronary artery stenosis is locally dilated by PCI, a new inflow of blood supply through a bypass graft is constructed distal to the stenosis in CABG, an effect called “surgical collateralization.” Particularly in severe CAD, that difference is believed to give rise to a difference in protection against subsequent spontaneous myocardial infarction (SMI). It has been suggested CABG offers an advantage over PCI by reducing the risk of SMI, but no investigation has yet proven this concept.

The surgical collateralization bypasses not only any present culprit occlusive lesions but also any future culprit lesions proximal to the anastomosis, as illustrated in [Figure 1](#). It seems plausible that the blood supply from the bypass graft would protect the myocardial territory in the event of any later occlusion proximal to the anastomosis, whereas the local dilatation created by PCI would not.

SMI was recently brought to increased attention by publication of the 5-year outcomes of 2 RCTs for left main coronary artery disease, NOBLE (Nordic-Baltic-British left main revascularisation study)¹ and EXCEL (Evaluation of XIENCE vs Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization).² Their conclusions were conflicting. Although the NOBLE trial demonstrated superiority of CABG over PCI, the EXCEL trial showed no difference. However, there was considerable controversy about the definition of myocardial infarction used in the

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CENTRAL MESSAGE

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EXCEL trial, since the investigators used a new protocol definition of MI that clearly penalized CABG surgery, particularly in periprocedural MI incidence. However, the EXCEL trial investigators³ conceded that the incidence of spontaneous MI after interventions was clearly lower in the surgical arm than in the PCI arm, as in the NOBLE trial.

In this issue of the *Journal*, Gaudino and colleagues⁴ present an elegant meta-analysis to demonstrate that a survival advantage is seen only in SMI after intervention. Their sophisticated study sought any correlation between all-cause mortality and SMI rather than simply showing a survival advantage with CABG. Among all the reports searched in databases comparing CABG and PCI with bare-metal or drug-eluting stent, 20 full-text RCT articles reporting all-cause mortality and SMI were included in this meta-analysis. Seven trials (35%) demonstrated significant reduction in SMI in the CABG arm, and significant reduction of all-cause mortality was found only in those trials. The findings support the hypothesis that the protecting mechanism against SMI creates a survival benefit with CABG.

This SMI-preventing effect of CABG would be most apparent in patients with rapidly progressing atherosclerosis. It is a unique advantage of CABG that should be kept in mind, not only by cardiologists and cardiac surgeons, but also by all patients with CAD. I am grateful to

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FIGURE 1. Benefit of surgical collateralization. A, Myocardial ischemia is caused by a flow-restricting “culprit” lesion (CL), but other “future culprit” lesions (FCL) also exist. B, When a new blockage occurs at another lesion later, spontaneous myocardial infarction (SMI) may develop despite the previously implanted stent. C, Alternatively, the blood supply from the bypass graft would prevent SMI. CABG, Coronary artery bypass grafting.

Gaudino and colleagues for presenting this succinct and significant finding to our readers.

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