

EDITORIAL

Is Percutaneous Coronary Intervention Now the Default Revascularization Strategy for Unprotected Left Main Coronary Artery Stenosis?

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Contemporary evidence suggests that surgical revascularization improves survival among patients with significant left main coronary artery (LMCA) disease, relative to that achieved with medical therapy alone.¹ Percutaneous coronary intervention (PCI) is also considered a reasonable option to improve survival, compared with medical therapy, in selected patients with low to medium anatomic complexity of LMCA disease that is equally suitable for surgical or percutaneous revascularization. Furthermore, several observational studies have demonstrated favorable outcomes when a multidisciplinary “Heart Team” of an interventional cardiologist, cardiac surgeon, and non-invasive cardiologist was used to determine optimal revascularization modality in cases of unprotected left main disease.^{2,3}

complex disease, showed a significantly higher major adverse cardiac events and cardiac mortality rate at 5 years for patients with high-complexity LMCA disease defined as a SYNTAX score >33 who were treated with PCI.⁴ Of note, except SYNTAX, the other randomized controlled trials, NOBLE (Nordic-Baltic-British left main revascularization study),⁵ PRECOMBAT (Premier of Randomized Comparison of Bypass Surgery Versus Angioplasty Using Sirolimus-Eluting Stent in Patients With Left Main Coronary Artery Disease) trial,⁶ and the EXCEL (Evaluation of XIENCE versus Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization) trial,⁷ comparing PCI with CABG in patients with LMCA disease did not include patients with high complexity disease. Overall, these studies evaluating outcomes of PCI versus CABG in patients with low-to-medium anatomic complexity of coronary artery disease and with LMCA disease reported similar survival with PCI and CABG.

PCI for unprotected LMCA disease was initially reserved only for patients who were considered ineligible for CABG. Improvements in interventional technology, the availability of stents, hemodynamic support devices, and encouraging results in CABG-ineligible patients led to an uptick of this procedure despite an initial lack of data.⁸ The report from the ULTIMA (Unprotected Left Main Trunk Investigation

See Article by Mohammad et al.

Several clinical trials have compared outcomes between coronary artery bypass surgery (CABG) and PCI for LMCA stenosis. The SYNTAX (TAXUS Drug-Eluting Stent Versus Coronary Artery Bypass Surgery for the Treatment of Narrowed Arteries) trial, which enrolled 705 patients with LMCA stenosis and a range of

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Multicenter Assessment) registry characterizing the outcomes of 107 patients, the largest series on unprotected LMCA PCI at that time, however, revealed a disturbingly high 6-month death rate of 10.6% related to inclusion of high risk patients ineligible for CABG, of older age and higher-risk patient subsets of acute coronary syndromes and cardiogenic shock.⁹ With improvement in techniques and outcomes, and judicious choice of patients, PCI has now become a viable option for many patients with LMCA disease. In general, randomized controlled trials and meta-analyses of these trials comparing outcomes of PCI versus CABG in patients with low-to-medium anatomic complexity of coronary artery disease with LMCA disease that is equally suitable for CABG or PCI have reported similar survival with PCI and CABG. A network meta-analysis of 19 studies using Bayesian methods affirmed the survival advantage for PCI over medical therapy in patients with LMCA disease and reported identical benefits to the survival advantage for CABG over medical therapy.¹⁰ A more recent meta-analysis also evaluated the effects of PCI with drug-eluting stent compared with CABG for the treatment of LMCA stenosis, which included 4612 patients from 5 randomized controlled trials and reported that that PCI with drug-eluting stent results in comparable mortality, stroke, and myocardial infarction compared with CABG for revascularization of LMCA stenosis, but PCI was associated with higher rates of repeat revascularization.¹¹ Compared with CABG, patients assigned to PCI had a similar rate of major adverse cardiovascular events (odds ratio [OR], 1.06; 95% CI, 0.79–1.43), all-cause mortality (OR, 1.03; 95% CI, 0.79–1.35), cardiovascular death (OR, 1.03; 95% CI, 0.73–1.45), stroke (OR, 0.81; 95% CI, 0.38–1.76), and myocardial infarction (OR, 1.47; 95% CI, 0.87–2.47).¹¹ However, the risk of any repeat revascularization was significantly greater in the PCI group than that in the CABG group (OR, 1.85; 95% CI, 1.53–2.24).¹¹

There is paucity of data on outcomes of LMCA PCI in all-comers without the strict inclusion criteria used in randomized controlled trials. In this issue of the *Journal of the American Heart Association (JAHA)*, Mohammad et al, describe nationwide trends in clinical practice and outcomes after PCI for LMCA in Sweden.¹² The authors report a 4-fold rise in LMCA PCI procedures conducted nationally, increased use of evidence-based adjunctive treatment strategies, intracoronary diagnostics, newer stents, and improved outcomes. The shift towards PCI for LMCA disease in this national registry reflects the trend of LMCA revascularization not just in Sweden but likely in most areas in the world. Although the SYNTAX score was not recorded in this registry, ~50% presented with a bifurcation lesion or multivessel disease suggestive of more complex disease excluded in most contemporary trials. Of note, a significant increase of

Table. Recommendations for Left Main Coronary Artery Stenosis From the 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization¹⁴

Class of recommendation	Level of recommendation	Recommendations
1	B	In patients with SIHD and significant LMCA stenosis, CABG is recommended to improve survival
1	B	In patients who require revascularization for significant LMCA with high-complexity coronary artery disease, it is recommended to choose CABG over PCI to improve survival
2a	B	In selected patients with SIHD and significant LMCA stenosis for whom PCI can provide equivalent revascularization to that possible with CABG, PCI is reasonable to improve survival
2b	B	In patients with diabetes who have left main stenosis and low- or intermediate-complexity CAD in the rest of the coronary anatomy, PCI may be considered an alternative to CABG to reduce major adverse cardiovascular outcomes

ACC indicates American College of Cardiology; AHA, American Heart Association; CABG indicates coronary artery bypass surgery; CAD, coronary artery disease; LMCA, left main coronary artery; PCI, percutaneous coronary intervention; SCAI, Society for Cardiovascular Angiography and Intervention; and SIHD, stable ischemic heart disease.

LMCA PCI was performed in individuals with diabetes, a subgroup that, in general, benefits more from CABG than from PCI and the observation of a 50% higher major adverse cardiovascular and cerebrovascular event in this group is concerning. In addition, patients revascularized with CABG for LMCA during the same time period were not included in the analysis and such studies could provide additional insight into a possible shift in revascularization strategy towards PCI and comparative outcomes. Such comparative real-world outcomes for patients with left main stenosis revascularized with CABG during this time period would help further define optimal revascularization modality for these patients. The outcomes of patients with LMCA stenosis treated with CABG have markedly improved over time. Reports of those who underwent CABG in the contemporary era show 30-day mortality ranges 3% to 4.2% and the survival at 2 years is ~95%.¹³ While a nearly 40% decrease in peri-procedural complications and 3-year major adverse cardiovascular and cerebrovascular events risk between 2005 and 2017 reported by the authors is reassuring,¹² it is conceivable that outcomes with CABG could have been superior in

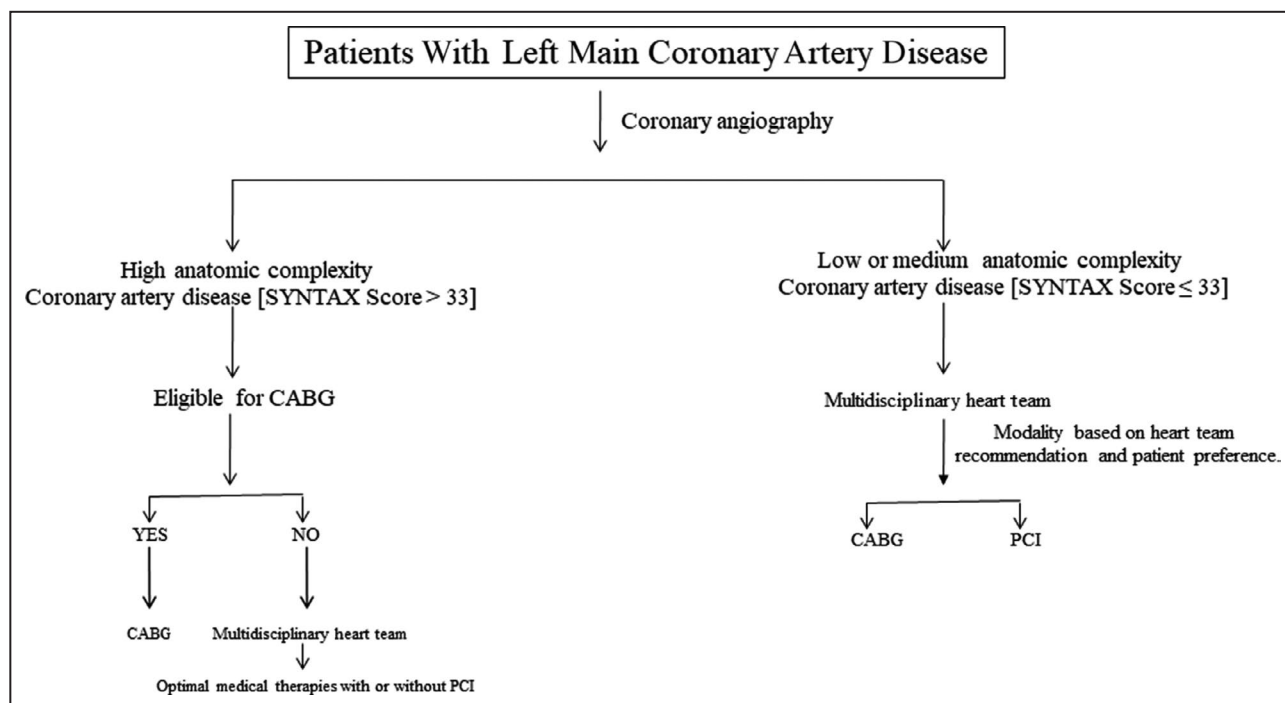


Figure. Individualized approach to the management of patients with unprotected left main coronary artery stenosis.

CABG indicates coronary artery bypass surgery; PCI, percutaneous coronary intervention; and SYNTAX, synergy between PCI with TAXUS and cardiac surgery.

some patients, especially in those with high complexity LMCA stenosis and in those with diabetes.

Disclosures

None.

GUIDANCE FOR CLINICIANS

Based on contemporary evidence and current guidelines¹⁴ (Table), it seems reasonable to state that patients with unprotected LMCA stenosis and high complexity disease benefit more with CABG. On the other hand for individuals with low-to-medium anatomic complexity LMCA coronary artery disease, PCI is a reasonable option and may in fact be preferred in many patients. Figure provides a framework for individualized approach to the management of patients with unprotected left main coronary artery stenosis. Finally, individuals with LMCA stenosis are a particularly high risk group who benefit from optimal guideline-directed medical therapies such as cessation of tobacco abuse, achieving optimal blood pressure goal (<130/80 mm Hg), lipid-lowering therapy with statins, and if needed, PCSK9 (proprotein convertase subtilisin/kexin type 9) inhibitors, physical exercise, and optimal glycemic control.¹⁵

ARTICLE INFORMATION

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