

CARDIOVASCULAR SURGERY UPDATE

Left Main Disease: Percutaneous Coronary Intervention (PCI) or Coronary Artery Bypass Grafting (CABG)? That is the Question

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LEFT MAIN CORONARY ARTERY DISEASE

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Left main (LM) coronary artery disease, arbitrarily defined as >50% diameter stenosis of the LM coronary artery, has long been a topic of intense diagnostic and therapeutic investigation, due to its poor prognosis. As the majority of the left ventricular myocardium is supplied by the LM stem, any ischemic insult may lead to hemodynamic compromise, significant ventricular arrhythmias or death. Previous studies that randomized patients with LM disease to medical treatment or coronary artery bypass grafting (CABG) demonstrated a survival advantage with CABG in most patient groups, especially when significant (>75%) LM disease or left ventricular dysfunction was present. Conservative management resulted in overall 3-year survival of 60%-85%, but as low as 34% in high risk individuals.¹⁻³ Contemporary medical treatment has undoubtedly evolved since that era, but nowadays comparative data with CABG are not available.

The decision to treat LM disease may be challenging in certain cases with equivocal stenosis. In these patients intravascular ultrasound (IVUS) can accurately measure LM diameters and minimal luminal area (MLA), and LM disease with MLA >6.0 mm² can be safely managed conservatively.⁴ The use of fractional flow reserve (FFR) seems to be a more physiologic method to assess the hemodynamic impact of LM disease, with an FFR value >0.80 appropriate to safely defer LM disease intervention.⁵ Caution must be addressed to avoid cases with significant proximal left anterior descending and circumflex coronary artery stenosis.⁶

ABBREVIATIONS

CABG = coronary artery bypass grafting
DES = drug-eluting stent(s)
FFR = fractional flow reserve
IVUS = intravascular ultrasound
LM = left main (coronary artery)
MACCE = major adverse cardiac and cerebrovascular events
MLA = minimal luminal area

**PERCUTANEOUS CORONARY INTERVENTION (PCI)
VS CORONARY ARTERY BYPASS GRAFTING (CABG)**

There are certain small subgroups of patients with LM disease, in whom percutaneous coronary intervention (PCI) may be more appropriate. These include: a) patients presenting with acute coronary syndromes due to LM occlusion and hemodynamic compromise, who may benefit from expeditious percutaneous treatment, b) poor surgical candidates, usually with multiple severe comorbidities and c) patients with LM disease, but with coronary circulation protected by previous patent grafts (protected LM disease).⁷

The decision to recommend PCI or CABG for significant LM disease should take

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into account several important factors, among which are the location of LM disease (ostial, shaft, distal bifurcation), the coronary artery disease complexity, the anticipated complexity of PCI and the presence of diabetes. Ostial or shaft LM disease is less common (20%-40% of LM disease) and PCI is associated with a generally favorable outcome, with a 3-year survival of 95%.⁸

Two randomized trials,^{9,10} several observational studies and metaanalyses have examined the effect of PCI or CABG in LM disease. As expected, CABG compared to PCI, is associated with higher in-hospital major adverse cardiac and cerebrovascular events (MACCEs).

In the long term and in the total patient cohort analyzed, the composite endpoint of death/myocardial infarction/stroke is similar between PCI and CABG, however PCI is associated with a 2-fold higher rate of new revascularization (25.9% vs 13.7% at 5 years).¹¹ In experienced centers post PCI restenosis (usually after complex LM bifurcation PCI leading to ostial left circumflex restenosis) is dealt with repeat PCI,¹² but in low volume centers repeat revascularization should probably be treated with CABG.

It is clear that as complexity of coronary artery disease increases, the benefit of CABG vs PCI becomes more apparent. High risk patients who are more suitable for CABG vs PCI are those with high SYNTAX score ≥ 33 , diabetics, patients with chronic total occlusions or other reasons for incomplete PCI revascularization, or those with poor left ventricular function. Patients with LM disease and SYNTAX scores 0-22 and 23-32 have similar 5-year outcomes.¹¹ In low risk patients, PCI may be a reasonable treatment strategy, with the following prerequisites: avoidance of adhoc PCI, thorough discussion with the cardiac team on the benefit/risk of each treatment, acceptance of the anticipated long term dual antiplatelet therapy and the use of drug-eluting stents (DES), preferably the second generation stents.¹³ Finally, comparing PCI (with use of DES) versus CABG in women with LM disease in the Women-Drug-Eluting stent for Left main coronary Artery disease Registry, there was an advantage of CABG in MACCEs (odds ratio 0.429, $p=0.001$), driven exclusively by target vessel revascularization (odds ratio 0.185, $p<0.001$), but there was no difference observed after PCI or CABG in death, myocardial infarction, and stroke at long-term follow-up.¹⁴

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