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Commentary: Minimally invasive coronary bypass or percutaneous coronary intervention for complex left anterior descending artery stenosis: A never-ending battle

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CENTRAL MESSAGE

Revascularization of complex LAD disease with minimally invasive direct coronary artery bypass provides excellent mid-term survival, with a low incidence of repeat vessel revascularization.

Percutaneous coronary intervention (PCI) and minimally invasive direct coronary artery bypass grafting (MIDCAB) are both well-established revascularization strategies (Class of Recommendation: I; Level of Evidence: A) for single-vessel disease of the left anterior descending artery (LAD).¹ Beyond the patient's preference, the choice of the optimal revascularization strategy by the Heart Team should be based on various other factors, including the patient's individual risk profile, coronary anatomy, institutional experience with both procedures, and, ultimately, long-term prognosis.¹ Consequently, the 2018 Joint Guidelines on Myocardial Revascularization of the European Society of Cardiology and European Association for Cardio-Thoracic Surgery advocate the formation of a "Coronary Heart Team" for patients with suitable coronary anatomy for both procedures (Class of Recommendation: I; Level of Evidence: C).¹

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Observational and randomized-controlled trials comparing early- and mid-term clinical results of MIDCAB versus PCI with drug-eluting stents (DES) for isolated proximal LAD disease uniformly suggest comparable clinical outcomes in terms of mortality, stroke, or myocardial infarction.²⁻⁴ Hannan and colleagues² reported in 715 propensity score-matched patients undergoing CABG/PCI-DES pairs a comparable 3-year mortality (5.5% vs 4.8%) and major adverse cardiocerebral event rate (7.8% vs 6.4%), respectively. Periprocedural and 12-month mortality was zero for both groups, whereas 7-year mortality did not differ between MIDCAB or sirolimus-eluting stent in isolated LAD disease (17% vs 14%) in a well-controlled, small-sized randomized-controlled trials.^{3,4} Importantly, both aforementioned trials demonstrate a greater risk for repeat revascularization with DES-PCI, thereby suggesting a long-term superiority of a single left internal thoracic artery graft to the LAD. Indeed, target vessel

revascularization was required in up to 20% after PCI at 7 years compared with 1.5% after MIDCAB in the Leipzig experience ($P < .0001$).⁴ In contrast, evidence from a recent meta-analysis by our group failed to show a significant difference for the pooled end-point repeat revascularization when comparing MIDCAB with DES-PCI treatment for isolated LAD disease.⁵

In this issue of the *Journal*, Patel and colleagues⁶ aimed to further strengthen the evidence for or against the benefit of MIDCAB or DES-PCI for isolated LAD disease. The authors retrospectively compared 158 propensity score-matched patient pairs and, in contrast to previous trials, special focus was set on complex LAD disease and the use of second-generation DES to depict current PCI standards. Mid-term survival was similar after a median follow-up of 5.1 years with 96.2% and 93.0% for MIDCAB and PCI, respectively. Importantly, MIDCAB was associated with a significant lower incidence of repeat target vessel revascularization compared with DES-PCI (2.5% vs 12.7%; hazard ratio, 3.36; 95% confidence interval, 1.11-10.16; $P = .032$), a finding that persisted independently of the complexity of the LAD lesion. Of interest, cost analysis of either revascularization strategy including all reinterventions resulted into a 17% lower total cost estimate favoring MIDCAB over DES-PCI.

The results of the present study are in several ways quite unique. This is the first systematic analysis that explicitly includes only patients with complex LAD disease and confirms excellent mid-term survival for both revascularization strategies. Moreover, the clinical outcomes in terms of mortality and repeat revascularization are not compromised by the use of rather outdated PCI approaches (percutaneous

transluminal coronary angioplasty, bare-metal stents, or first-generation DES), which is one of the major strengths of this analysis. Finally, this analysis confirms previous studies²⁻⁵ and clearly underscores the superiority of MIDCAB when directly compared with current DES-PCI practice for complex LAD disease in terms of mid-term durability. Patel and colleagues can be congratulated for their excellent work and for providing further robust evidence for the optimal revascularization strategy of isolated LAD disease that should be taken into account within the decision-making of every Coronary Heart Team.

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