Commentary: Seeing is believing: Quality assurance with endovascular scopes

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The long-term success of coronary artery bypass grafting (CABG) is predicated on sustained graft patency. In a randomized clinical trial comparing aprotinin use with placebo, early angiography was performed at 11 days and found that more than 10% of saphenous vein grafts were occluded in 703 patients.¹ In the PREVENT IV multicenter trial of 3014 patients undergoing CABG who underwent angiographic follow-up at 1 year, up to 45% of patients had at least 1 vein graft occluded.² Graft occlusion has been shown to be associated with early perioperative myocardial infarction and late composite end point of death, myocardial infarction, or repeat revascularization.² Graft failure is multifactorial; in the perioperative period, early failure is likely related to technical factors, including the quality of the anastomosis. Standard techniques to assess graft flow and anastomosis quality include probing of the anastomosis, palpation for graft pulsatility, and abnormal hemodynamics, electrocardiogram, and transesophageal echocardiography findings. Multiple technologies have been studied to allow surgeons to more reliably assess intraoperative graft patency. The goal is to identify intraoperative graft patency, which can be revised before the patient leaves the operating room. The most commonly used technique is transit time flow measurement (TTFM). The European Society of Cardiology recommends the routine use of intraoperative graft flow measurements (recommendation: IIa, level of evidence: C).³ TTFM has been studied in a subset of 1607 patients from the Randomized On/Off Bypass trial. Low TTFM was associated with worse 1-year angiographic patency compared with normal flow, and patients with low flow were more likely to undergo intraoperative graft revision.⁴ Nonetheless, despite excellent reproducibility and ease of use, TTFM has been criticized for its low sensitivity and specificity.^{5,6} Furthermore, TTFM does not provide anatomic imaging information. Epicardial ultrasound has been proposed as an important adjunct

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Central Message

Direct visualization to assess the quality of coronary anastomoses with a semi-flexible sialendoscope is feasible. Further feasibility data and comparative data with other intraoperative graft assessment techniques would be the logical next steps.

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to TTFM.⁵ Epicardial ultrasound can be used to localize the optimal anastomosis site and assess the quality of the distal and proximal anastomosis. The addition of fluorescent indocyanine green angiography to TTFM at the time of CABG was studied in the randomized trial of 106 patients. The sensitivity and specificity of indocyanine green angiography were 83.6% and 100% compared with 25% and 98.4%, respectively, with TTFM.⁷

In this issue of the *Journal*, Hassanein and colleagues⁸ present the use of a video-assisted intraoperative direct visualization of anastomosis using a 1.3-mm semi-flexible sialendoscope introduced directly into the graft. They demonstrate that a sialendoscope can differentiate between a good-quality anastomosis and one that is compromised by comparing images of a distal anastomosis with those of an end-to-side anastomosis performed with a leftover vein with an intentional stitch placed into the backwall of the coronary artery (ie, a positive control). There were no intraoperative graft revisions or early morbidity or mortality in this small group of 17 patients. There are important limitations to this study: This was a single-arm study to examine feasibility with a small sample size that was not powered to detect early morbidity or mortality or postoperative patency. There may be feasibility issues that become apparent in larger patient samples, such as with smaller conduits, with grafts going to the back of the heart and in off-pump situations. There

was no comparison with a reference standard in this assessment; thus, the sensitivity and specificity of this diagnostic test are not known. The time horizon was limited to the early postoperative period, and thus conclusions cannot be drawn regarding any potential benefit or harm of this technology beyond the perioperative period. In addition, although this technique allows for the assessment of the anastomosis site, there is no information regarding the flow through the graft. Flow may still be poor despite a perfectly anastomosed graft as a result of competitive flow, kinking, or placing the conduit on the wrong coronary artery. Thus, this technology may be an important adjunct to TTFM to differentiate between technical and nontechnical causes of poor flow. Finally, there is controversy surrounding the utility of intraoperative assessment of graft flow. Revision of a graft with marginal flow may not necessarily improve outcomes because the anastomosis in question may have been technically challenging from the start. Thus, graft revision may have the potential for harm and highlights the importance of integrating all available information coupled with strong clinical judgment and experience. Despite these limitations, this study provides the impetus to consider a pilot randomized clinical trial to compare the use of coronary endoscopy in addition to the standard of care in both early safety and efficacy in improving outcomes after CABG

in a larger sample of patients. Seeing may be believing in coronary endoscopy.

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