Assessment of coronary lesions by optical coherence tomography: An attempt to improve results of coronary artery bypass surgery

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Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication May 31, 2018; revisions received May 31, 2018; accepted for publication June 1, 2018; available ahead of print July 14, 2018.

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J Thorac Cardiovasc Surg 2018;156:1001-2

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2018.06.016>

In this issue of the *Journal*, Fracassi and coworkers¹ present a pilot study introducing optical coherence tomography (OCT) for the assessment of intermediate coronary artery lesions at fractional flow reserve (FFR) in patients undergoing coronary artery bypass surgery. The OCT looks at several coronary plaques components and their arrangements.² Features like thin-cap fibroatheroma and microvessels are predictive of rapid plaque progression and consequent increased stenosis.^{1,2} Of the 4 patients with negative FFR lesions, OCT concordance was found in 2 cases. With this in mind, the authors propose a flow chart that considers grafting a coronary artery with negative FFR lesion (FFR >0.80) and OCT characteristics of rapid plaque progression.¹ This is the first time that the indication to graft a coronary vessel would be given in the light of coronary plaque histologic features and their development over time, in addition to the degree of stenosis assessed by FFR. However, using thin-cap fibroatheroma and microvessels as the only markers of a high-risk plaque is not adequate.³ Factors such as lipid content, plaque burden, and inflammation are important in evaluating the risk of plaque rupture.³ OCT is only able to evaluate the surface of the plaque, and thus not the whole plaque morphology.³ Virtual histology by intravascular ultrasound, near-infrared spectroscopy, inflammation markers, and even multislice computed tomography might be necessary for a complete assessment of the vulnerability of a plaque. Even if a correct identification of a high-risk plaque is possible, lessons from interventional cardiology teach us that a procedure of sealing the plaque creates its own problems.

Although few observations support the authors' policy,¹ it opens a new window on exciting developments, but one must consider several aspects. First, there are discordant findings and opinions on the predictivity of bypass failure by a negative FFR.^{4,5} Second, the degree of a stenosis is dependent not only on the type of lesion but also on the

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Central Message

This study does not support the policy of grafting a coronary artery with an intermediate lesion at FFR caused by a plaque rated vulnerable and ready to rupture at OCT.

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diameter of the vessel.^{4,6} Moreover, several concomitant causes generate competitive flow in a coronary artery; some of them are not fully investigated yet.⁷ The rapid phase progression pattern of a plaque takes place over several months,² and one wonders if the graft will still be patent by the time the plaque progression matures to the point of determining a significant obstruction of the vessel. In other words, will the graft remain patent but scarcely functional in the presence of competitive coronary flow? Will the graft be ready to increase its flow when the intracoronary flow abates because of an increased lesion? Although venous graft patency rates are more resistant to the effects of competitive flow, they are also associated with accelerated native coronary artery disease in comparison with arterial conduits.⁴ The risk of occlusion of an internal thoracic artery graft to a coronary artery with 50% stenosis is approximately 4 times the risk of occlusion to an equivalent vessel with 100% proximal occlusion.⁴ It has further been demonstrated that the radial artery has an increased sensitivity to the effects of competitive flow resulting in an increased graft occlusion relative to that of the internal thoracic artery.⁴

The policy proposed by Fracassi and coworkers¹ leads the way to a "prophylactic" grafting of a vessel with negative FFR, assuming the graft becomes functional when the stenosis turns severe. Will this new approach be effective? Will the outcome of coronary artery bypass grafting in the midterm and long-term improve even more by adopting this approach?

These questions provide a lot of food for thought and require a long clinical observation before they receive an evidence-based answer. We will be delighted to read the results of further studies by Fracassi and coworkers¹ confirming their policy. In the mean time, we will carry on grafting coronary arteries with significant lesions only.

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