Letter to the Editor

Fractional flow reserve: a reliable tool in bypass strategy

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I read with interest the article by Kawamura et al. entitled 'Patency rate of the internal thoracic artery to the left anterior descending artery bypass is reduced by competitive flow from the concomitant saphenous vein graft in the left coronary artery' [1]. The authors proved that long-term patency of the internal thoracic artery (ITA) left anterior descending (LAD) coronary bypass was affected by the presence of the patent saphenous vein graft (SVG) to the left coronary artery, particularly when the native coronary stenosis between the two anastomotic sites was not severe.

I agree that the greater diameter of the SVG as compared with the in situ ITA graft can be associated with lower flow resistance. It was proved by pressure wire measurements by Glineur et al. who found significantly higher resistance in left ITA compared to venous grafts [2].

However this lower resistance could cause significant competitive flow only in case of non-significant flow limitation between the two distal anastomoses. Kawamura et al. drew attention to the anticipated flow demand of the second target branch in the left coronary artery, but they doubted that this factor could be quantified by reliable methods. Here I would like to argue for the intracoronary pressure wire measurement during induced maximal hyperemia as a practical tool for reliable assessment of the functional severity of coronary stenoses. Botman et al. evaluated the patency of bypass grafts in relation to the preoperative angiographic and functional severity of the coronary lesions assessed by fractional flow reserve (FFR) determination. They found 21.4% occlusion rate of the bypass grafts on functionally non-significant lesions (FFR \( \leq 0.75 \)) in contrast to 8.9% among those on functionally significant lesions (FFR > 0.75) [3].

In our institute we plan the surgical revascularization strategy on the basis of extensive consultation with the invasive cardiologists. In our routine the FFR measurements give valuable information in the decision about grafting vessels with intermediate lesions [4]. Integrating these functional data into bypass strategy helps to avoid the inappropriate use of grafts [5]. In my opinion, careful evaluation of functional consequences of coronary lesions can contribute to find the right strategy in multiple coronary grafting.

References


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Reply to the Letter to the Editor

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We thank Dr Maros [1] for his meaningful comments, and agree with the importance of fractional flow reserve (FFR) in coronary revascularization strategy. FFR is calculated as the ratio of blood pressure in the proximal and distal sites of the coronary stenosis after induced hyperemia [2], and has been generally accepted as a reliable method for detecting myocardial ischemia and assessing functional severity of coronary stenosis. Particularly, FFR is considered useful for decision making of bypass grafting to the intermediate stenosis lesion to avoid creating non-functioning bypass, which will be occluded in association with flow insufficiency [2].

One of the major issues regarding selecting graft material is that the situations, which truly necessitate the saphenous vein graft, have not been fully delineated. The venous graft as the aorto-coronary bypass has higher intraluminal pressure and lower resistance of the conduit itself than the in-situ internal thoracic artery (ITA) graft [3]. It is widely considered that ITA grafting can give rise to hypoperfusion syndrome and residual myocardial ischemia in spite of graft patency when its flow capacity is insufficient for huge flow demand of the myocardium. We, therefore, believe that assessment of peripheral vascular resistance and flow demands in the myocardium would be valuable for appropriate usage of the venous graft.

Most of previous studies about FFR focused on management of the intermediate stenosis, not on predicting shortage of flow capacity of the ITA graft, nor necessity of the venous graft. In addition, we suggested complicated mechanism of competitive flow, which was found in the ITA to left anterior...