Composite and sequential grafting was considered useful and reliable, exclusively in appropriately selected situations. In creation of bypass grafts, durable completeness of revascularization and function of the ITA to the LAD bypass should not be compromised. We would suggest that the balanced bypass flow toward the LAD and the RCA is noticeably important to achieve an entire patency of the Y-graft for three-vessel regions. This study is not conclusive. Interactions between the target coronary branches and bypass grafts on the flow distribution and graft patency may be the next concerns.

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REFERENCES


Competitive flow and arterial graft a word of caution

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Competitive flow is a common finding in arterial grafting. Flow competition results from an equilibrium between the residual flow through the native coronary artery and the flow provided by the bypass graft at the anastomosis. This situation occurs when conductance of the graft closely matches that of the native circulation and is mainly dependent on stenosis severity and on graft...
diameter and length. The phenomenon is nearly inexist with the saphenous vein graft (SVG) whose large conduit generally opposes very few resistance to blood flow; consequently, the pressure at the ostium of SVG is nearly equivalent to that provided at the distal anastomosis even in conditions of high myocardial flow demand [1]. Conversely, the conductance of arterial grafts is generally lower due to smaller diameter and greater length, resulting in some pressure drop along the graft [2]. The longer the arterial assembly, the lower the pressure at the distal anastomosis, a phenomenon aggravated by the anatomic distal tapering of arteries. Therefore competitive flow is more frequent at the right coronary anastomosis of composite Y grafts due to the lower pressure in the distal portion of the Y branch [3].

Another important parameter in the phenomenon of flow competition well described in this issue by Nakajima et al. [4] is the sequential grafting versus single grafting. The mechanism of competitive flow is more complex than in the individual graft in which the interaction is only between the proximal inflow and the distal anastomosis outflow. In sequential composite bypass, the interaction is also between all the anastomosed branches within the composite graft. This leads to a phasic delay between the pressure wave in the grafts, and in the coronary arteries, especially in the more distal ones such as the right coronary artery [5].

The success of the CABG has been assessed by the ‘patency’ of grafts, predominantly using the Fizgabon classification [6]. This system was appropriate for a period when the predominant bypass conduit was the SVG. SVGs are minimally reactive and as such can be classified as either patent or not. The increasing use of arterial conduits represents a paradigm shift in bypass surgery. In contrast to SVG, arterial grafts are dynamic and may adapt their luminal diameter both at short interval through vasmotion and at long-term through anatomic adaptation.

As such, Nakajima as [4] well as others [7] sought to define a classification system more representative of the functional status rather than the anatomical patency of the graft. A graft is defined ‘not functional’ when occluded, when the flow from the native coronary artery is dominant or when flow supply from the native coronary and from the graft is balanced. A graft is defined ‘functional’ when the native coronary is fully opacified by the graft or when the native coronary is fully opacified by the graft only (occluded or sub-occluded coronary native vessel).

On the other hand, Nakajima et al. [4] have used the classic methodology for assessing the severity of target vessel stenosis, namely percentage stenosis by visual inspection, which may be inappropriate when considering the use of arterial conduits. We have demonstrated that the minimal luminal diameter correlates far better with arterial graft functionality than the percent stenosis [3–6]. We belived that this measure is a more relevant predictor of the degree of competitive flow, which is known to be a critical determinant in long-term arterial graft functionality.

Studies designed to select the most appropriate graft configuration for each individual case will certainly contribute to optimize myocardial revascularization in the future. More accurate assessments of graft function and of the pre-operative status with the help of new objective evaluation tools such as quantitative angiography or fractional flow reserve could contribute to reach this objective.

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