

Techniques in coronary artery grafting

Septal artery revascularization and graft patency in jump grafts

F. E. E. Vermeulen, M.D.
H. Huysmans, M.D.
P. Knaepen, M. D.
R. de Geest, M.D.
J. Ernst, M.D.
Albert V. G. Bruschke, M.D.

Utrecht, The Netherlands

Between January 1971 and August 1977 we operated on 1775 patients for ischemic heart disease. Since 1976 the mortality rate in pure revascularization surgery decreased to 2.1%, although we placed a considerably higher number of distal anastomoses than previously.

Inclusion of small arteries, and such as multiple diagonal and posterolateral branches, has not been accompanied by an increase in perioperative infarction rate by electrocardiographic criteria (about 5% in the total series).

In reviewing all data recently, it appears that 57 (3.2%) late deaths have occurred. The 1332 patients who were followed for 1 to 6.5 years were divided into three subgroups having (A) normal or moderately impaired left ventricular contractions, (B) left ventricular aneurysms, and (C) generalized poor left ventricular con-

tractions. Survival curves for various subgroups are presented in the *Figure*. Cases with impending (recurring) infarctions or combined procedures, other than aneurysmectomies, were excluded. Late mortality in patients with single grafts was mainly due to noncardiac causes (6 of 7 cases).

Techniques

Since 1971 for distal anastomosis we have used a suspended running suture technique with 6-0 Prolene, starting at the base of the arteriotomy,¹ often called "parachute-technique." A similar technique was used for transverse, longitudinal or diamond shape side-to-side graft-coronary anastomoses. A running 5-0 Prolene suture has been used for the aortic anastomosis, using a nasal septal punch for making the aortic hole since 1973. We have used the lower leg veins when suitable, taking care to use sufficiently large veins (≥ 3.5 mm internal diameter) if side-to-side anastomoses are to be made. Most

patients have been receiving oral anticoagulants postoperatively, many having had such treatment prior to operation. Most patients are given antiplatelet drugs postoperatively.

Arguments for revascularization of every graftable and significant lesion have been (1) The relatively high progression rate of moderate lesions in nonoperative patients.^{2,3} (2) Personal observations in a series of 50 patients which demonstrated that the flow in each graft was almost independent of the flow in other grafts regardless of the presence or absence of stenotic or occlusive coronary lesions or collaterals. Even when three of four direct aortocoronary grafts were being occluded, flow hardly changed in the residual graft. We noticed one exception, namely in double grafts for isolated left main coronary lesions, where marked compensatory flow increase was noted when one of the grafts was occluded.⁴ (3) Our relatively poor results with instrumental coronary endarterectomies in over 100 cases controlled by angiography. The 1-year graft patency rate was 75%; however, outflow was unobstructed in only 43%.

Two aspects of "complete" revascularization were further analyzed.

1. Direct revascularization of the major septal arteries was performed in 35 patients (6.3% of 555 patients operated on within the last 15 months),⁵ representing all patients with a large stenotic septal artery operated on in that period, with exception of a few high risk patients in whom incomplete revascularization was elected. Some patients with documented antero-septal infarctions or small apical aneurysms, but still acceptable septal contractions, were included. The artery was approached

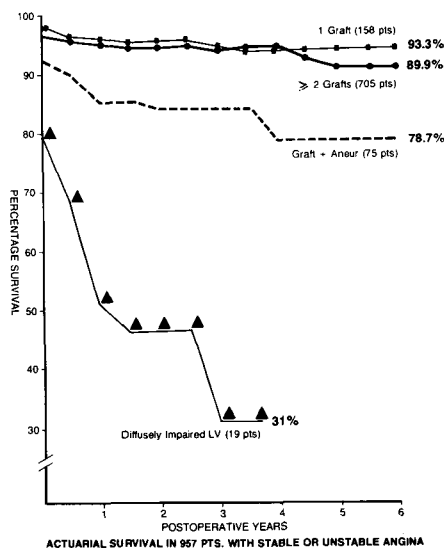


Figure. Survival curves of subgroups.

Table. Early* anastomotic patency in jump grafts versus early graft patency in direct grafts

	No. of patients	Open/total	Patency rate
Jump grafts			
Side-to-side anastomoses	54	93/94	98.9%
End-to-side anastomoses	54	68/68	100%
Total	54	161/162	99.4%
Direct grafts			
Jump grafts to other arteries	32	44/47	93.6%
Coronary endarterectomies	16		
a. Grafts to endarterectomized vessel		13/16	81.2%
b. Grafts to nonendarterectomized vessel		28/29	96.6%
All other patients with direct grafts	49	81/88	92.0%
Total	97	166/180	92.2%

≤2 months postoperative.

from the right side, and the left anterior descending artery was lifted with silastic slings. No right ventricular perforations occurred. In all cases a vein graft was anastomosed end-to-side to the proximal part of the septal artery itself. The average number of distal anastomoses in this group was 4.9 per. patient. An 8.6% hospital mortality occurred, which was due to septicemia in three patients; respiratory failure and postoperative low output, probably related to the duration of the extracorporeal bypass, occurred in eight patients. Routine use of corticosteroids and membrane oxygenators may conceivably improve both morbidity and mortality in this group of operations. The early 84% (16/19) patency of septal grafts was considered acceptable although being 14% lower than in other grafts in these patients.

2. Early patency rates in jump grafts were high regardless of the number of side-to-side anastomoses. In 54 patients only 1 of 94 side-to-side and 0/68 end-to-side anastomoses was occluded at about 2.5 weeks postoperatively. Patencies were better than our average early patency in direct

aortocoronary grafts as documented in previous studies⁶⁻⁸ (Table).

Late patency rates were available in only 22 patients and results were biased by selection, as recurrent angina was the indication for restudy in 12 patients. An average anastomotic patency of 85% at 1 year was not different from direct aortocoronary graft patency rates in previous studies.⁶⁻⁸ However, occlusions of anastomoses or grafts were noted exclusively in the 12 patients with recurrent angina. To assess late patency rate accurately a randomized recatheterization study would be required. However, high early patency rates, the large number of small arteries revascularized, and the occurrence of only one late myocardial infarction in 105 patients with jump grafts followed for at least 1.5 years corroborate our confidence in the outcome of this extensive surgical approach.

References

1. Vermeulen FE, Huysmans HA, Schaepens AL, et al: Ervaringen met de directe coronaïrchirurgie voor myocard revascularisatie met prae- en postoperatieve functionele en angiografische evaluatie. Acta

- Chir Belg (suppl) **2**: 53-66, 1971.
2. Bruschke A, et al: (at this conference).
 3. Kolsters W: Prognosis and progression in coronary atherosclerosis, thesis. Utrecht, 1977.
 4. Vermeulen F: (unpublished data).
 5. Knaepen P, et al: Ann Chir Thorac Cardio-vasc (in press).
 6. Bommel Fv, et al: Ned T Geneesk **121**: 277-282, 1977.
 7. Ernst J, et al: Late Results of Valvular Replacement and Coronary Surgery. Stalpaert G, Suy R, Vermeulen F, eds. Ghent, Belgium, European Press, 1976, pp 130-134.
 8. Vermeulen F, et al: Late Results of Valvular Replacement and Coronary Surgery. Stalpaert G, Suy R, Vermeulen F, eds. Ghent, Belgium, European Press, 1976.