Editorials

The fatal attraction of saphenous venous bypass grafts

See page 747 for the article to which this Editorial refers

Coronary artery disease is the most important cause of mortality and morbidity in the industrialized west and coronary artery bypass grafting (CABG) has been and still is one of the mainstays of treatment.

In the late 1960s Favaloro et al. were the first to report on the outcome of CABG in patients in which an autologous saphenous vein was used[1]. This surgical technique was accepted worldwide and soon became an invaluable treatment modality for patients with obstructive coronary artery disease. The main reasons for CABG are: to relieve medical treatment resistant ischaemia, to prevent the progression to myocardial infarction and to improve prognosis. Although bypass surgery has achieved these goals, it turned out that the degeneration of the venous bypass graft with time is a major problem. There is a 15% to 20% early closure rate (within 1 year) due to thrombosis. Between 1 and 6 years after operation there is a 2% per year attrition rate followed by a 5% per year attrition rate from 6 to 10 years. At 10 years, only 35% to 45% of the venous bypass grafts are open[2–7].

However, recurrent ischaemia occurs not only because of degeneration of the saphenous vein grafts, but also because of progression of disease in the native coronary arteries, which occurs in approximately 5% of the patients per year after operation[8].

It has been estimated that 10% to 15% of the patients will require a reoperation within 10 years after the initial procedure. The pathology underlying graft closure or deterioration is different with time. Graft occlusion early after operation is associated with acute thrombosis often because of failure of the surgical technique. Fibro-intimal hyperplasia develops between 1 month and 1 year after operation and atherosclerosis ranging from initial accumulation of subintimal foam cells to a full-blown complex atherosclerotic plaque are late features[9].

Repeat surgical revascularization is technically more difficult and associated with a high 3% to 6.5% mortality rate and a high 3.5% to 10% peri-operative myocardial infarction rate. Percutaneous intervention techniques to treat severe, extensive disease in the venous bypass grafts are associated with a 1% mortality and 4% Q-wave myocardial infarction rate and the restenosis rate is extremely high even after stent implantation. The 3 to 5 years adverse event-free survival rate is as low as 30% to 40% after these percutaneous techniques[9].

Overall, there are few long-term (10 years or more) follow-up studies available because of the inherent problems associated with follow-up of patients for such a long-time. Thus, there are a few reports of patients who have been followed for 10 years after surgery and only very few data are available beyond that period. In this issue Veldkamp et al.[10] report the 20 year follow-up data of patients who underwent venous bypass operation between 1971 and 1980. The investigators are to be commended for their effort and perseverance, because obtaining these data is tedious, time-consuming and not intellectually stimulating. Yet, the data are extremely important. The gloomy outcome reported in this study are in keeping with the outcome of three earlier reports (Table 1)[11–13].

The mortality increases from 3% to 7% after 1 year, to 23% to 34% after 10 years to as high as 59% to 71% 20 years after bypass surgery. At 20-year follow-up the revascularization free survival rate was only 20%. There are relatively few adverse events during the first 5 to 7 years after bypass operation, which is commensurate with the fact that the vein graft attrition rate during that period is relatively low. After 7 years there is an increase in the occurrence of mortality and re-interventions which reflects the higher vein graft deterioration rate 7 years after bypass operation. The post-operative (late) mortality can be predicted with the classical three variables: old age, extent of coronary artery disease and left ventricular dysfunction.

<table>
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<th>Table 1 Twenty year outcome after coronary bypass graft surgery</th>
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<td><strong>Number of patients</strong></td>
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Unfortunately, no data are available on the presence of diabetes mellitus, cholesterol levels, hypertension or smoking and only relatively low numbers of women were included into these studies.

The data once again indicate that the long-term outcome of venous bypass grafts is poor and that one should strive to use alternative methods such as arterial bypass conduits which have a much better long-term outcome. The ten-year actuarial survival of patients with an internal mammary artery graft to the left anterior descending artery alone or in combination with other saphenous vein grafts was 88.6% vs 75.9% in those receiving only saphenous vein grafts\[14\].

One could regard the data from this long-term study as of historical interest only, because nowadays the use of arterial conduits is much more common. However, these data are of value because, even today, saphenous veins are still being used as bypass grafts. Aspirin has significantly reduced the deterioration of vein grafts and progression of disease both in the venous bypass grafts and native coronary arteries can be slowed by treatment of risk factors. Therefore, it is sad to find that only 15% to 25% of patients with PTCA or CABG undergo risk factor management\[15\].

In a recent survey in Europe in patients 6 months after an intervention (PTCA or CABG), a myocardial infarction or an episode with acute ischaemia, it was shown that 19% continued to smoke, 53% had an elevated blood pressure, 44% had high levels of cholesterol and 25% were obese\[16\].

Saphenous venous bypass graft surgery, as first introduced by Favaloro, has been a tremendous step forward in the treatment of coronary artery disease. We now have data available up to 20 years after the technique, which is unique. These data all show that venous bypass grafts deteriorate with time, which is associated with decreased survival and increases the necessity of repeat revascularization procedures. The initial gratifying results in the use of a saphenous vein graft has understandably initiated an almost ‘fatal’ attraction, for saphenous veins to be used as bypass grafts which, however, should be resisted. Instead arterial bypass conduits should be used. The search for artificial grafts, or ways to genetically manipulate venous grafts to make them resistant to thrombosis and atherosclerosis, must be stimulated. This may take several years before it is achieved and in the meantime we must, whatever graft we use, be it venous or arterial, increase our efforts to treat all risk factors in every patient undergoing surgical revascularization.

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References


