

Editorial

Angioplasty and stenting in patients with renal disease

Cardiac disease remains the leading cause of mortality among patients with end stage renal disease on haemodialysis. Disappointing results have been obtained with coronary angioplasty in these patients. Few data on angioplasty and stenting are available in this high risk population.

Coronary artery disease in dialysis patients

Among all patients in the United States in whom dialysis was initiated in 1987, the five year mortality rate was 73%.¹ Cardiovascular disease accounted for half the total mortality,¹ and myocardial infarction for half the cardiac deaths.² The overall mortality after myocardial infarction among 34 189 patients on long term dialysis identified from the US Renal Data System database was 59% at one year and 90% at five years.³ Atherogenesis seems to be accelerated in haemodialysis patients,⁴ but does not seem to be secondary to the dialysis itself. Half of all dialysis patients have evidence of coronary artery disease before the initiation of haemodialysis,⁵ and no correlation has been found between cardiac events and the duration of dialysis.⁶ The high prevalence of coronary artery disease in these patients seems to be related to numerous risk factors for atherosclerosis, including lipid abnormalities, hypertension, diabetes, hypercoagulation, coronary calcification related to secondary hyperparathyroidism, and hyperhomocysteinaemia.⁷

Coronary revascularisation in dialysis patients

Many studies have shown an unfavourable outcome of coronary balloon angioplasty compared with coronary artery bypass grafting in dialysis patients.⁸⁻¹⁵ Herzog identified 6798 patients undergoing coronary artery bypass surgery and 5473 patients undergoing balloon angioplasty from 1978 to 1994, in the US Renal Data System database⁸: despite a higher in-hospital mortality rate after surgery than after angioplasty (14.5% *v* 5.1%), the two year mortality rate was similar in the two groups (46.5% *v* 47.2%), and the two year cardiac event rate was higher for angioplasty than for surgery (83.7% *v* 70%, *p* < 0.0001). Similar unfavourable results of balloon angioplasty have been reported in many single centre series.⁹⁻¹⁵ The main reason was the high rate of repeat revascularisation for restenosis, which occurs after balloon angioplasty in two thirds (41-80%) of dialysis patients. Restenosis in dialysis patients could be explained by the smaller size of the dilated vessels³; however, the reference diameter could be underestimated, because of diffuse coronary artery disease. Other reasons for the high rate of restenosis in dialysis patients are more severe vessel injury and greater residual stenosis related to extensive coronary calcification. Finally, there is an increased prothrombotic risk in dialysis patients, with increased fibrin and platelet deposition.⁹ Hypercoagulation contributes to coronary restenosis after balloon angioplasty.¹⁶ An independent relation has been reported between raised fibrinogen concentrations during follow up and the degree of intraluminal narrowing.¹⁷ Therefore, balloon angioplasty is associated with a high incidence of short and long term complications, and has been reported to be ineffective in dialysis patients.^{6 12 13} According to many studies, coronary bypass surgery should be the preferred

treatment in dialysis patients with severe angina and extensive coronary artery disease.^{6 10-13} However, dialysis patients have a high perioperative morbidity and mortality and there are no data to prove that surgery improves survival in this high risk population. Moreover, the benefit of stents over balloon angioplasty in dialysis patients has not been fully evaluated.

Coronary stenting in dialysis patients

Coronary stenting has been shown to reduce acute closure and six month restenosis.^{18 19} In many centres, stents are used in more than 60% of cases. In our centre, only lesions located after extensive tortuosities, lesions in small vessels (reference diameter < 2.5 mm), and lesions with residual stenosis (< 30%) after balloon angioplasty are not stented. We have recently reported immediate and long term results after coronary angioplasty in 63 dialysis patients and 268 non-dialysis patients.^{20 21} The primary success rate of coronary stenting in dialysis patients was 96%. The rate of repeat revascularisation for restenosis after stenting was similar in 21 dialysis and 187 non-dialysis patients (30% *v* 25%).²⁰ The rate of target vessel revascularisation after balloon angioplasty with residual stenosis < 30% (stent-like results) was also similar in 42 dialysis and 81 non-dialysis patients (32% *v* 33%).²¹ These results suggest that dialysis does not affect the restenosis rate when coronary stents are used, or when stent-like results are obtained after angioplasty. The similar rate of clinical restenosis in patients with coronary stenting and in patients with stent-like results is in accordance with previous studies.^{22 23} There are no data to prove that stenting decreases the risk of restenosis in patients with optimal results after balloon angioplasty. At two years, the rate of repeat revascularisation for disease progression was the same in the two groups but cardiac deaths were more frequent in dialysis patients (15% *v* 5%). This higher rate of cardiac mortality in dialysis patients could be related to cardiac disease linked to renal failure, including left ventricular hypertrophy, interstitial myocardial fibrosis, reduced myocardial perfusion reserve, and abnormalities of myocardial metabolism.²⁴ However, our results after coronary stenting in dialysis patients are encouraging relative to the previously reported rates of complications after balloon angioplasty and bypass surgery.

The benefit of stenting in this high risk population was also suggested in a recent report on patients identified from the US Renal Data System database.²⁵ In this report, dialysis patients had a better one year survival rate after coronary stenting than after bypass surgery or balloon angioplasty performed before stenting facilities (80.1%, 68.7%, and 69.4%, respectively).

Conclusions

Dialysis for end stage renal disease does not increase the risk of restenosis when coronary stents are used, or when a stent-like result is obtained after balloon angioplasty. Morbidity and mortality in dialysis patients seem lower after coronary stenting than after bypass surgery. Coronary angioplasty should be the preferred revascularisation procedure in dialysis patients with lesions accessible to stenting. Conversely, surgery should be reserved for

patients with severe angina, extensive coronary artery disease inaccessible to stenting, and an acceptable surgical risk. The long term prognosis after revascularisation can be improved by intensive treatment of coronary risk factors, and routine non-invasive testing to detect restenosis and disease progression.

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