Outlook for hip replacement

Total replacement of the hip is a major operation with well-documented immediate risks. No more than 2%, of patients should develop infection, and fatal pulmonary embolism may be expected in perhaps 0.5%. Early mechanical problems such as fractures of the femoral shaft, nerve palsy, or dislocation of the hip are usually the result of technical difficulty or error at operation, and though troublesome these complications are not necessarily disastrous. In a few hips the outcome will be spilt by massive formation of ectopic bone.

For the large majority of patients who survive these early hazards, total hip replacement has proved one of the outstanding surgical successes of the past 20 years, dramatically relieving pain and disability. Reports from several centres are now showing how well the success of the early implants may be expected to endure. With neither the metal-on-metal nor the metal-on-plastic designs has simple wear proved any real problem. The high-molecular-weight polyethylene used for the Charnley cups wears, on average, only 0.07 mm a year, the rate of wear decreasing a little with time. Only exceptionally is wear much above this figure, and repairation for simple wear of the joint is practically unknown. The only serious late problem has been loosening and fracture of the prosthesis, especially with the metal-on-metal and uncemented models, of which up to 30% have failed within eight years. Metal-on-polyethylene prostheses are now used almost universally and have had a much better record. Of Charnley's own cases, now counted in their thousands and some followed up for as long as 15 years, well under 1%, a year have needed revision for loosening. Elsewhere a review of 100 Charnley hips after 10 years showed that 88% of the 67 survivors still rated their condition clinically as excellent or good. Again, of 301 hips four to seven years later, eight (3%) had needed revision for loosening. Mueller, with a similar prosthesis, reported a 17% revision rate for loosening in 81 hips followed up for 10 to 12 years. The Stanmore prosthesis, which also resembles the Charnley, has shown 88% survival after eight years.

These results are encouraging, but radiographic evidence of loosening has been quite common yet often without symptoms or progression. Bone resorption in the medial femoral neck has been a constant finding in patients examined after nine or 10 years, while a gap between metal and cement lateral to the upper part of the femoral prosthesis has been less common, appearing in under 10%. A line of demarcation developed around the high-molecular-weight polyethylene cup within a few years in two out of three hips.

It is again to Charnley that we are indebted for important studies on necropsy material from clinically successful hip replacements up to 12 years old. In the femoral shaft there was complete acceptance of the acrylic cement by the tissues with direct bone-to-cement contact at load-bearing spots and no more than a thin layer of histiocytes against the cement elsewhere. There were no histological grounds for expecting other than continuing firm union of bone and prosthesis. In the acetabulum appearances were not quite so pleasing, with a thin layer of fibrous tissue and amorphous debris between bone and cement, perhaps implying a need to re-examine cementing techniques for the cup.

Where does this accumulating experience leave us? The prophylaxis of infection and pulmonary embolism should remain a major preoccupation for the surgeon. Technique clearly matters and may be refined with, for example, more thorough preparation of bone surfaces and the insertion of cement under pressure when still quite fluid. We now know that an efficiently performed primary hip replacement in the older patient—even with early methods and implants—may have a better than 90%, chance of lasting 12 to 15 years, and the evidence suggests that it will continue to give pain-free service for many more. Most of the long-term studies have been done on the Charnley hip; the durability of other designs, though not in serious doubt, has yet to be shown. Revision operations are difficult and their results often less than pleasing. With unanswerable but unattractive logic the double-cup designs of arthroplasty have been introduced to conserve bone in the femur and make revision easier. Their value has yet to be seen. At present and with increasing confidence the standard low-friction arthroplasty may be recommended to otherwise fit patients over 50 with severe hip disease. The problem of the bad hip in younger people calls for much judgment. They must be expected to use their prostheses not only longer but harder, and simple extrapolation from experience with older patients is not justified. Indeed, there is a reported failure rate for arthroplasties done in patients less than 30 years old of 54% over five years.

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Specific heart disease in diabetes mellitus

Heart disease is a major cause of death in patients with diabetes mellitus, and the risk of atherosclerotic coronary artery disease is substantially increased in patients with both overt diabetes and asymptomatic hyperglycaemia. Recent epidemiological evidence from the Framingham study has confirmed the increased incidence of angina and myocardial infarction, especially in women, but has also suggested that the frequency of congestive heart failure is greater than that predicted from atherosclerotic risk factors. While most diabetics have more-than-average atherosclerosis, indistinguishable from that in non-diabetics, two separate theories have been advanced to explain the increased risk of cardiovascular disease: the presence of atherosclerosis or small vessel disease. Necropsy material from diabetics dying of unexplained congestive heart failure or myocardial infarction and angiographic studies of diabetics with chronic renal or heart failure have shown severe and widespread occlusive atherosclerosis of the coronary arteries. Other studies suggest, however, that heart failure may be attributed to small vessel disease of the coronary circulation—alogous to that found in the retina and kidney—with relatively normal coronary arteries at necropsy or on angiography. Histological examination of the heart in diabetics shows abnormalities of the small vessels with intimal proliferation and thickened walls, perivascular and interstitial fibrosis, and accumulation of glycoproteins and lipids. Thickening of the capillary basement membrane, an ultrastructural hallmark of diabetes, has been found in a myocardium. A recent elegant study by Factor and co-workers showed capillary microaneurysms in necropsy specimens injected with silicone rubber, emphasizing that diabetic microangiography is widespread and that many tissues may be affected.

Non-invasive methods of assessing left ventricular function have confirmed that it is frequently impaired in young, asymptomatic diabetics, in maturity onset diabetics, and in those with retinopathy and nephropathy. A relation appears to exist between the extent of clinical microangiography and the degree of impairment of left ventricular function; diabetics with proliferative retinopathy and nephropathy have the most severe ventricular dysfunction. In diabetics the left ventricle is not dilated or hypertrophied, and abnormalities of function are predominantly in diastole, with delayed opening of the mitral valve and prolongation of the isovolumic relaxation time. Reduced ejection and abnormal systolic time intervals are probably late events. These diastolic abnormalities may be differentiated from those found in occlusive coronary artery disease, where incoordinate ventricular relaxation is the principal feature.

Furthermore, in addition to large and small vessel disease, diabetics have other reasons for their impaired left ventricular function: tissue perfusion and oxygenation are compromised by platelet and coagulation abnormalities, increased blood viscosity, and reduced erythrocyte deformability.

What are the prospects for prevention and treatment? Non-specific measures directed at reducing the risk of microangiopathy, such as close control of blood glucose, the vigorous treatment of hypertension (which may further impair left ventricular function directly), and discouragement of cigarette smoking, are unlikely to be of benefit. Agents which modify the abnormal rheological features in diabetes are also being evaluated. Drugs and dietary manoeuvres that lower plasma lipid concentrations would be unlikely to influence the microvascular component of the disease, and in the absence of angina due to coronary artery disease coronary artery bypass grafting has no value in impaired left ventricular function. Non-specific treatment exists, indeed, for severe left ventricular disease. Isolated reports that continuous subcutaneous infusion of insulin may reverse or prevent the progression of retinopathy suggest that the technique may have a similar protective effect on the small coronary arteries. Whether specific heart disease due to diabetic microangiopathy occurs in addition to or independently of coronary artery atherosclerosis remains uncertain, but left ventricular function is frequently found to be impaired in the absence of angina or myocardial infarction. Simple non-invasive techniques for detecting abnormal left ventricular function may help differentiate those diabetics who are at low risk—and may look forward to a long period free from vascular complications—from those at high risk while clinically free from vascular disease.

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