

# THE CURRENT STATE OF HIP AND KNEE JOINT REPLACEMENT

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## HIP REPLACEMENT

Experience over the past 30 years has shown that hip replacement is now established as a reliable procedure for treatment of painful osteoarthritis in the middle-aged and elderly individual. Despite many studies of different types of hips there have been very few prospective randomised studies which have truly compared different methods. As a result different hips have been designed and used clinically and many of them have failed with considerable consequences to the patients. Because of this a prospective randomised study was set up in 1982 in this department and the results of the first five years patients have been assessed by an independent observer.

The trial was a comparative study of the Charnley hip (22 mm diameter femoral head) with the Stanmore hip (32 mm diameter femoral head). There were 415 patients in the trial and the numbers were approximately equal in each group. The review showed that at an interval of six to ten years after operation the post-operative Harris hip score was 92 compared with the preoperative score of 46. There was no significant difference between the two prostheses. There was a 4% failure rate for which revision was carried out and there were a number of important factors which were responsible for failure. The first was the seniority of the surgeon. It became apparent that the more experienced surgeon had better results and this fact had never been demonstrated before.

It was also found that technical errors such as valgus or varus positioning of the femoral stem, or inadequate medial placement of the acetabular cup, predisposed to loosening and failure. A further technical fact of importance was the use of a cement restrictor. The use of a cement restrictor significantly lowered the loosening rate.

Following on from this study a prospective randomised study of the cemented Charnley hip compared with an uncemented new hip was carried out. After two years the patients were assessed on a standard protocol and it was found that 13% of the new uncemented hips had failed at two years. 84% of the patients had thigh pain and 90% had evidence of radiological loosening or platform formation.

It is obvious that the choice of a new prosthesis can be made within a two year period by a prospective randomised study such as this and this method is recommended in future trials of any new prosthesis.

A particular problem is the problem of predicting how long a prosthesis will last. This is particularly so when considering hip replacement for younger patients. A technique has been developed at Stanmore for assessing migration of femoral prostheses using standard X-rays and a computer programme. This technique shows that within three years of the operation it is possible to assess whether the prosthesis is going to fail. If the prosthesis has migrated more than 3mm in three years then it can be expected to continue to migrate and to loosen giving pain and disability to the patient and requiring revision.

This is obviously a very important assessment method since it can be carried out on standard X-rays

Revision hip replacement is important since it is becoming more common. There are various estimates of the requirement for revision which range between 5% and 20% at ten years from the original operation. For this reason studies have been carried out in this unit with a new computer designed hip replacement. This CAD CAM (computer aided design, computer aided manufacture) type of hip has been developed to produce fit and fill of the proximal femur and at the same time to be bioactive so that it will become firmly embedded in the bone. Over 100 CAD CAM hips have now been inserted for revision purposes and 70 of these have been reviewed. The results show that the pain relief achieved is not as excellent as with a primary hip, but is very satisfactory. Migration studies suggest that this prosthesis is as

stable at two years as a primary hip although long-term study is required to verify this point. The particular advantage of the hip appears to be not only its design but also the coating of its surface with hydroxyapatite and rapid bone incorporation appears to occur.

In summary there are certain rules to be observed in achieving a good result in hip replacement. The first is the correct selection of the patient, the second is the technique of the operation and the third is a suitably designed and cemented prosthesis. At this time cemented prostheses appear to give better results than any uncemented design reported.

If revision is required then the use of uncemented HA coated hips appears to be superior to that of revision cemented hips.

In future the aim is to produce a hip that will last for fifty years in a young person and the question of new materials which wear much less is obviously central to this. In this regard the use of polyethylene articulating against ceramic has given good early results and this may well hold the future answer.

## **TOTAL KNEE REPLACEMENT**

Since the first implantation of a total knee replacement by Freeman in 1970, it has become apparent that good results can be achieved for ten years in patients of middle age and older patients by the use of a standard condylar prosthesis with a metal femoral component and a tibial metal component with a polyethylene tray. Freeman emphasised the importance of placing the prosthesis on the biomechanical axis of the knee and also of ligament balancing before the operation.

There have been numerous reports of different knee replacements but almost no prospective clinical trials. In particular the controversy as to whether or not the posterior cruciate ligament should be retained in knee replacement or whether the patella should be resurfaced has not been resolved.

Because of this controversy, a prospective randomised study was set up in this unit and the early results have been reported. The posterior cruciate retaining Kinemax knee was compared with the PFC (press fit condylar) cruciate sacrificing knee in a prospective study. The first 200 patients are reported.

A number of interesting side results occurred which were valuable. One of these was that in 20 patients who had undergone osteotomy prior to the total knee replacement the results were just as good as those in the primary group. This is contrary to the generally accepted view that osteotomy is a bad operation to perform before total knee

replacement because the results are worse in the subsequent knee replacement.

Another observation was that where lateral release was performed, then the incidence of problems with the primary wound were lowered. This is not a conclusive finding but emphasises the importance of avoiding tightness in the patello-femoral structures at the operation in order to attain good healing.

A study was carried out of the results in patients who had had patello-femoral joint resurfacing compared with those that had not been resurfaced. Once again it appeared that the results with regard to pain relief and function were better in those that had patello-femoral joint replacement but the results were not statistically significant.

The question of unicompartement prosthetic replacement is a controversial one. We have carried out a small number of unicompartement knee replacements in patients with predominantly unicompartement disease and the results have been good for approximately five years. We consider that the indications for a unicompartement knee replacement are: 1) an elderly patient, 2) a low demand patient, 3) a patient with normal patello-femoral and opposite compartment joint, 4) a patient with intact cruciate ligaments. We consider this operation to be useful but the results are suggesting that after a period of five or six years such prostheses tend to wear or to loosen making total joint replacement necessary.

Proprioception or joint position sense is obviously important in all joints, and in particular in the knee. We have developed a method in this unit of assessing proprioception by a method which will be described.

The results of the assessment of patients of different ages show that proprioception becomes worse with age and also is worse in patients with osteoarthritis. It is however improved in patients who wear a support bandage on the knee. In patients who have had joint replacement, the proprioception is better after total joint replacement than before. It is of interest that in a small series total joint replacement with cruciate sparing gave better results than with cruciate sacrificing. Also total joint replacement with patellar resurfacing appeared to give better proprioception than when the patella was not resurfaced. These results are however preliminary.

In future the focus will be on better materials to avoid polyethylene wear in the knee. One way of avoiding polyethylene wear or

reducing it is to use the meniscal knee where there is much less point contact on the polyethylene and therefore less chance of fatigue failure and breakdown of the surface. The alternative is, of course, to develop a better material for the standard condylar knee in order to reduce wear and thus late failure and loosening.