

3.1 Radiological development of an alumina metal back cup during 5 years

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Introduction

Periprosthetic osteolysis is the most important element observed during revision surgery of total hip replacements [1, 2, 3]. It is a sign of osseous resorption and of the loss of trabecular bone in the area of the implant bed [1]. This loss of bone substance may be accompanied by periprosthetic fracture and implant loosening, which requires complex surgical revision.

Frequently, this process will not create any symptoms, and leads to major bone destruction. Symptoms will appear as late as during implant loosening [3]. At the same time, osteolytic defects will develop slowly and cannot always be detected on the radiograph during the initial postsurgical period.

Also participating in the modification of the interface between the acetabulum and the prosthetic cup is the dynamics of intraarticular fluids linked to microseparation which promotes wear as a result of the impact of foreign bodies. Microseparation in the range of a few microns may have a considerable effect on the wear and the biomechanics of the implant in the areas of contact. It was shown by studies conducted for THRs with cemented metal-on-metal bearings on polyethylene that acetabular rims were generated over the short term as a result of increased exposure of the cement/bone interface [4].

We have examined the development of bone radiologically in patients who had received metal back implants with alumina-on-alumina bearings, with regard to the aforementioned elements.

Material and method

We have investigated a consecutive series of 50 THRs which were inserted in the period between 1999 and 2000, and which used a metal back cup with alumina insert, and featured a diameter of 28 in 46 patients.

28 of the patients were male, and 22 were female patients.

The patients' median age was 44.2 with the age of the patients ranging between 22 and 62 years.

26 of the patients had primary or secondary coxarthrosis, 19 had aseptic osteonecrosis, and 5 had rheumatic diseases.

The acetabular cups used were coated with hydroxyapatite, and the alumina insert featured an inside diameter of 28 as well as a chamfer and a non-projecting flat flange. The femoral neck used was a modular uncemented stem which was completely coated with hydroxyapatite.

The cup used was a press-fit cup. 32 of the THRs used screws, while the remaining 18 did not use any screws.

3 of the patients could not be contacted. There weren't any septic complications observed. There wasn't any fracture of the insert or of the femoral

head. Examinations started at least 60 months after surgery. Reexamination was performed after 3 months and after 6 months to 1 year, and then were performed annually.

In 47 THRs, the cup was found to have centered immediately after surgery, and to rest on the dense edge. One of the THRs was subject to protrusion, and 2 were found to have shifted laterally. The results obtained were normal in 37 THRs, while lateral shifting was observed for 7 and medial shifting for 6 THRs. Fracture of the calcar occurred in 2 THRs and was remedied by way of cerclage.

Results

The functional results (HARRIS score) obtained in relation to femoral pain have been excellent or very good in all cases. The presurgical score was 41 and the postsurgical was 96 for the longest postsurgical interval. The survival rate in respect of prosthetic revision was 100 % (acetabular cup and femoral neck). The radiological analysis of the front pelvis and of the Arcelin profile did not exhibit any migration of the acetabulum. There weren't any rims or osteolysis observed in the contact area of the cup, of the roof or of the screws. There weren't any signs of densification observed in the contact area of the implant. In 8 patients, subchondral densification rims disappeared (coxarthrosis).

Discussion

The use of hard bearings will provide for longer life of the total hip replacements in active patients as a result of reduced wear which usually is at the basis of osteolysis.

It can be seen from the observation of a number of 50 consecutively inserted THRs in patients the age of whom ranged below 62 over a period of 5 years that there wasn't any periprosthetic osteolysis or densification involved. The distribution of strain provided for by the metal back and the rigidity of the hard alumina-on-alumina bearings will result in osseous remodelling without any signs of osteolysis. The reduction of subchondral densification should be investigated within the framework of a quantitative study.

On the other hand, the use of metal back cups together with hard alumina-on-alumina bearings will not result in periprosthetic rims over a period of 5 years and will not cause osteolysis which is observed regularly for bearings with polyethylene components.

This difference should be investigated within the framework of complementary study. Nevertheless, the results obtained were as good as the ones obtained from the use of conventional alumina-on-polyethylene or metal-on-polyethylene bearings.

References

References at the author.