Is femoral head osteonecrosis a relative contraindication to metal-on-metal hip resurfacing? Five to 15-year results.

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INTRODUCTION:

Joint sparing procedures are effective in the management of osteonecrosis of the femoral head before the development of contour change. After the development of contour change joint reconstruction procedures are often needed. Since this disease often affects young patients, a conservative procedure such as a hip resurfacing is desirable.

Femoral head osteonecrosis (ON) is primarily a bone ‘substance’ disease which extends to the surface, in contrast to degenerative (OA) and inflammatory arthritides which are primarily joint ‘surface’ diseases, which may then secondarily involve the substance of the articulating bones. Is metal-on-metal hip resurfacing as effective in osteonecrosis as it is in other forms of joint disease?

MATERIALS and METHODS

This is a single-surgeon retrospective consecutive case-series of 95 patients (104 hips) with Ficat-Arlet stage III/IV osteonecrosis treated with hip resurfacing between April 1994 and August 2003 followed up at a minimum 5-year review. All operations were carried out by the senior author through a posterior approach. Mean age of patients at operation is 43 years (18 - 68 years) and mean follow-up is 9.5 years.

The device used was a hybrid fixed metal-on-metal resurfacing with a cemented femoral component and a hydroxyapatite coated uncemented acetabular component. Two successive designs were included the first one used between 1994 and 1996 had a hydroxyapatite (HA) coated cup with a central peg and a smooth surface with macro-texturing above the rim and the second design has a HA coated porous surface cup and has been used since 1997.

Revision of either component for any reason was the end-point. Patients were assessed clinically and with hip function scores and anteroposterior, horizontal beam cross-table lateral radiographs.

The Oxford Hip Score was used to assess pain, mobility and function. The activity levels of patients were rated using the University of California Los Angeles (UCLA) Activity Level Scale.

Osteolysis, peri-prosthetic radiolucent lines, component loosening and femoral fixation scores were assessed according to published definitions, zones and criteria as described by Johnston et al. De Lee and Charnley and Amstutz et al. Patients with femoral fixation scores > grade 7, i.e. complete radiolucent lines in all 3 zones with or without migration were considered loose. Data were collected and analysed using Excel and Medcalc.

RESULTS

Two patients died 1.7 and 7 years following the operation due to unrelated causes. There were ten failures (1 fracture, 6 femoral head collapse, 2 infections, 1 cup loosening with metallosis) giving a failure rate of 9.6%. All the above have been converted to total hip arthroplasty. Two of these failures were in patients who had idiopathic ON, two in post-traumatic ON and six in patients with steroid-induced ON. With revision of either component for any reason as the end-point implant survival at 15 years is 89%. In one further patient with alcohol-induced ON the femoral component has tilted into varus in the first two years. He does not feel it is sufficiently symptomatic to need a revision although knows that he will need a revision if symptoms develop. The femoral component has stabilized in that position and there has been no further change in position between 2 and 7 years follow-up. In another patient the cup has tilted into a slightly more open position.

The mean Oxford hip score in the surviving hips is 17 (range 12 to 46) and median is 14 (interquartile range 12 to 18). The best possible Oxford score is 12 and the worst 60.

In addition to the two patients who showed change of component position described above, the following radiological adverse features were seen in this cohort. Four hips showed neck thinning of 10%, but none of them shows progressive thinning. Around the femoral stem, one hip had a 1-2mm lucent line in all 3 zones. Around the cup, 3 patients had 1mm lucent lines in all 3 zones but none of them showed migration or a change in inclination. One patient has a 1.5 cm lucency in zones 2 and 3 of the cup. Five patients had Brooker grade I or II heterotopic ossification, two had grade III and none had grade IV.

DISCUSSION

Some authors have found that the results of total hip arthroplasty are worse in ON compared to primary osteoarthritis due to higher failure rates, dislocations and infections. Others have argued that all of these can be explained on the basis of patient demographics or the underlying diagnosis for the ON rather than ON per se being responsible for the higher failure rates. Others have found no such increased risk with ON patients.

The results in the present series are not as good as the results of resurfacings for osteoarthritis in young patients (currently 99% survival) or for all diagnoses in all ages (currently 90% survival). Is there a reason for this poor outcome of resurfacing in patients with ON?

Further collapse of the femoral head is the most common reason for failure in this series and it occurred between 3 and 9 years after implantation. There is a 4% further collapse rate in this series compared to 0.35% in our all diagnoses consecutive series. One reason for the collapse is the fact that the etiopathological factors that caused non-traumatic ON (steroids etc) are known to continue to cause further femoral head collapse.

Hip resurfacing was originally an option for hip joint ‘surface disease’ such as osteoarthritis. Osteonecrosis in contrast is a substance problem of the femoral head. Having to place the femoral component on relatively avascular bone in the femoral head which is prone to progressive further collapse may be the reason why hip resurfacing is prone to a higher failure rate in osteonecrosis. In view of these poor results, we now use an uncemented short stemmed hip replacement in young patients with ON. In patients with extensive ON involvement, especially if the quality of the residual bone is suspect, we prefer to use a large diameter total hip arthroplasty (THA).

In conclusion, the higher 15-year cumulative failure rate of hip resurfacing in this series makes resurfacing a relative contraindication in patients with a diagnosis of severe arthritis secondary to osteonecrosis.