CHARNLEY LOW FRICTION ARTHROPLASTY IN TUBERCULOSIS OF THE HIP

AN EIGHT TO 13-YEAR FOLLOW-UP

YOUNG YONG KIM, CHUL UN KO, JAE YONG AHN, YONG SAN YOON, BYUNG MAN KWAK

From Kyung Hee University, Seoul, Korea

We report 60 patients with tuberculosis of the hip treated by Charnley low friction arthroplasty and followed for eight to 13 years. Eight of them had active tuberculosis of the hip at the time of operation, and all were covered by relatively short courses of antituberculous drugs. Our study suggests that arthroplasty can be recommended for these patients provided that adequate chemotherapy is given both before and after operation.

The reported long-term results of total hip replacement at different centres vary considerably with the reasons for operation, and the prostheses used. Operation for the sequelae of a tuberculous hip requires variation from accepted techniques, and the anatomical distortion of the hip poses additional problems. Eftekhar (1978) reported several successful hip replacements on patients treated with antituberculous drugs in childhood or adolescence with no subsequent re-infection. Johnson, Barnes and Owen (1979), however, criticised this type of surgery even after a lengthy period of quiescence.

We now report 60 Charnley low friction arthroplasties in patients with confirmed diagnoses of tuberculosis of the hip, including eight with active disease. The results of the first 20 cases have been reported previously (Kim et al. 1979), but our follow-up now extends from eight to 13 years.

PATIENTS AND METHODS

From July 1973 to December 1978, Charnley low friction arthroplasties were performed on 62 patients with clinical and radiographic evidence of old or active tuberculosis of the hip. Two patients were lost to follow-up. Of the 60 patients studied, 23 women and 37 men ranged in age from 20 to 60 years, with an average of 38 years. The hip disease was often accompanied by degenerative changes in the lower back or knee, even in the absence of spontaneous hip fusion. Nine knees required corrective surgery, and five patients had a high tibial osteotomy at some stage.

The 60 cases were considered in three groups. Group A of 29 patients had disease which had been quiescent for at least 10 years. Group B of 23 patients had conversions after either surgical or spontaneous fusion, and included 13 women and 10 men. Spontaneous fusion had occurred in the youngest at eight years of age and in the oldest at 29 years. Seven patients had had an operative fusion, and one had had a subtrochanteric varus osteotomy for malposition of spontaneous fusion.

Group C of eight patients had short histories of active tuberculosis of the hip, with a high ESR, and caseous pus at the site of operation which grew Mycobacterium tuberculosis. In these cases, nine months of antituberculous chemotherapy was given, and we performed a one-stage operation in four cases and two-stage procedures in the other four. In these four a temporary Girdlestone procedure was performed under chemotherapy three months before the Charnley arthroplasty.

Surgical technique was an important feature. Many patients had contracted scar tissue, which required extensive release to obtain adequate exposure for correct placement of both components of the prosthesis (Fig. 1). In reconstruction it was important to place the acetabular component at the original site of the triradiate cartilage to attain satisfactory containment. Femoral shortening was combined with the required soft-tissue release and a 35 mm offset bore acetabular socket was usually employed (Fig. 2).
Ectopic bone formation on the medial femur was often seen six to 12 months after operation; this may have been caused by periosteal stripping but gave no functional disability (Fig. 2). Some defective wound healing seemed to be related to impaired circulation, but study of pre- and postoperative arteriograms showed no significant changes.

The natural history of tuberculosis of the hip is important. The age of the patient, the site of the lesion within the joint, its duration and the treatment given all influence the final outcome, especially in a child (Shanmugasundaram 1983). Shanmugasundaram’s clinico-radiological classification helped with prognosis and, more importantly, with management. Within his classification we found that the travelling (wandering) acetabulum, Perthes’ type, atrophic type and mortar-and-pestle type of disease could be operated on without osteotomy of the greater trochanter. Our surgical approach to the hip was based on Charnley’s lateral approach but avoiding trochanteric osteotomy if possible and was modified to provide maximum exposure of both the anterior and posterior capsules with the patient supine (Kim et al. 1986). We did not attempt to remove separate areas of calcification (Fig. 3). Wide reaming of the upper medullary cavity facilitated the neutral insertion of the femoral prosthesis; the femoral canal is often narrowed in old tuberculous hips. This was especially needed when first generation Charnley prostheses were used.

Our previous two-dimensional study of the optimal cement thickness (Kwak et al. 1979) and new three-dimensional finite element stress analysis indicated that
the shape of the third generation Charnley cobra stem would probably provide better long-term results.

Drug treatment consisted of rifampicin, isoniazid, and ethambutol for three weeks before surgery and for six to nine months after operation, a modification of the short course chemotherapy investigated by the Medical Research Council (Kim et al. 1986).

RESULTS

The 60 Charnley low friction arthroplasties were evaluated eight to 13 years after operation. Defective wound healing had occurred in nine cases and all subsequently developed established open infection during follow-up, three by reactivation of tuberculosis and six by pyogenic organisms. Tuberculous infection was confirmed in the three hips by microscopic study of excised tissue (Fig. 4). However, none of the eight cases in Group C with active tuberculosis have shown reactivation at a minimum of eight years follow-up, all having excellent clinical results.

Other complications and revision operations to date are listed in Table I. Most were due to deep seated infection which required removal of the prosthetic components. To date seven hips have been revised for this by two-stage procedures and all are clinically satisfactory. Another six hips have been revised for mechanical failure, acetabular loosening being more common than stem loosening. Fatigue fracture of the femoral component was seen nine years after replacement in one patient; a revision operation is trouble free after three years.

D'Aubigné and Postel's method (1954) was used to grade the clinical state before and after arthroplasty; the results for our first 20 and subsequent 40 patients are given in Figures 5 and 6. In most instances, back pain had been relieved, but four patients still had knee pain.

Fig. 4a

Radiographs of a 28-year-old woman. Figure 4a - Deep infection and loosening is seen seven-and-a-half years after arthroplasty. There were persisting draining sinuses probably caused by discontinuation of the drug regime shortly after operation. Figure 4b - Three months after a Girdlestone procedure. The draining sinuses had healed and the ESR was within normal limits. Cement remnants are seen in the medullary cavity.

Fig. 5

Scores for pain, function and movement before and after operation for 20 patients with 10 to 13 years follow-up.
CHARNLEY LOW FRICTION ARTHROPLASTY IN TUBERCULOSIS OF THE HIP

Table I. Details of major complications and revision operations

<table>
<thead>
<tr>
<th>Complication</th>
<th>Cause</th>
<th>Timing (years)</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early: Reactivation of tuberculosis</td>
<td>–</td>
<td>–</td>
<td>3</td>
</tr>
<tr>
<td>Pyogenic infection</td>
<td>–</td>
<td>–</td>
<td>6</td>
</tr>
<tr>
<td>Late: Both components loose</td>
<td>Reactivation of tuberculosis</td>
<td>4 and 7.5</td>
<td>2*</td>
</tr>
<tr>
<td></td>
<td>Pyogenic infection</td>
<td>1 to 4</td>
<td>5*</td>
</tr>
<tr>
<td></td>
<td>Mechanical</td>
<td>5 and 8</td>
<td>2</td>
</tr>
<tr>
<td>Acetabulum loose</td>
<td>Mechanical</td>
<td>3 to 5</td>
<td>3</td>
</tr>
<tr>
<td>Fracture of femoral stem</td>
<td></td>
<td>9</td>
<td>1</td>
</tr>
</tbody>
</table>

* All seven cases had two-stage revision operations.

Fig. 6

Scores for pain, function and movement before and after operation for 40 patients with eight to 10 years follow-up.

for which operation was indicated. The arthroplasty did not result in an impressive improvement in hip function, but the mobility was considerably improved in the cases with long-term follow-up (10 to 13 years).

DISCUSSION

Reactivation of tuberculosis can largely be prevented by appropriate antituberculous chemotherapy, though some authors report recrudescence even after long periods of quiescence (Dolanc 1972; McCullough 1977; Johnson et al. 1979). We felt that our three cases of reactivation occurred because of inadequate chemotherapy, due to the patients' failure to continue to take the drugs. Our eight cases of confirmed active tuberculosis all had satisfactory results after use of the proper drug regime.

Correct antituberculous chemotherapy is critical to cover surgery on bone and joints (Griffiths 1979). Pharmacodynamic aspects of the drugs are important, since most of the drugs are effective against the mycobacterium only in its dividing phase. For example, rifampicin is ineffective against metabolically inactive organisms, but is able to kill organisms during a short period of active metabolism or growth. Rifampicin has now been used for 20 years in short-course chemotherapy and some drug resistance is inevitable. We are now planning to use new drugs: one is 27753 RP, a semisynthetic derivative of griselimycin and another is spiro-piperidyl rifamycin.

As regards pyogenic infection, we do not have a clean-air operating enclosure, and relied on local betadine and prophylactic antibiotics for most of our series. We observed a significant reduction in the infection rate after the initial 20 procedures, which had less adequate antibiotic cover (Charnley 1984).

Acetabular loosening results from the difficulty of preserving the strong load-bearing subchondral bone, and excessive deepening was inevitable in some cases. We believe that the use of the Ogee flanged socket will improve fixation in future and that mechanical impingement of the neck of the stem on the rim of the socket (one cause of acetabular loosening) will be reduced by the change in neck diameter of the Charnley prosthesis (Wroblewski 1986). With recent developments in design, surgical technique and chemotherapy we have confidence in arthroplasty for the treatment of tuberculous infection of the hip.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.
REFERENCES


Kim YY, Yoshino S. Modified lateral approach without osteotomy of the greater trochanter for total hip replacement. SICOT 87 XVII World Congress, Munich 1987:394.


