Total hip replacement in active advanced tuberculous arthritis

A. S. Sidhu, A. P. Singh, A. P. Singh
From Government Medical College and Rajindra Hospital Patiala, Punjab, India

We describe the results of cemented total hip replacement in 23 patients (23 hips) with active tuberculous arthritis of the hip with a mean follow-up of 4.7 years (4 to 7). In two patients the diagnosis was proved by pre-operative biopsy, whereas all others were diagnosed on a clinicoradiological basis with confirmation obtained by histopathological examination and polymerase chain reaction of tissue samples taken at the time of surgery. All patients received chemotherapy for at least three months before surgery and treatment was continued for a total of 18 months. Post-operative dislocation occurred in one patient and was managed successfully by closed reduction. No reactivation of the infection or loosening of the implant was recorded and function of the hip improved in all patients.

Total hip replacement in the presence of active tuberculous arthritis of the hip is a safe procedure when pre-operative chemotherapy is commenced and continued for an extended period after operation.

There is controversy regarding the appropriate treatment of patients with advanced arthritis of the hip with an associated tuberculous infection. The surgical options are excision arthroplasty, arthrodesis and total hip replacement (THR). Excision arthroplasty allows control of infection, pain relief and an increased range of movement, but produces shortening of the limb, an unstable joint, an abnormal gait and the general requirement to use walking aids. Excision arthroplasty and arthrodesis produce a painless, stable and immobile joint with poor function associated with back pain, knee pain, and a slow, asymmetrical and arrhythmic gait. Tuberculosis may be reactivated after THR. However, there are some reports of a good outcome following THR in these patients.

We describe our experience with THR in 23 patients who had active tuberculous arthritis of the hip.

Patients and Methods
We undertook a retrospective review of 23 consecutive patients (23 hips) who underwent THR for active tuberculous arthritis of the hip between July 1999 and October 2004. Patients with active or healed sinuses were not offered THR. There were 17 men and six women, with a mean age of 52 years (38 to 64). There was a mean interval from the onset of symptoms to diagnosis of 3.7 months (0.9 to 4.1). Nine patients were operated on the left and 14 on the right side. In two patients a biopsy was needed pre-operatively to confirm the diagnosis. The others were diagnosed on a clinicoradiological basis. All patients received antituberculous chemotherapy pre-operatively for at least three months and treatment was continued for 18 months. This comprised rifampicin, isoniazid, ethambutol and pyrazinamide for two months, followed by rifampicin, isoniazid and ethambutol for another seven months, and rifampicin and isoniazid for the rest of the period. The range of movement, deformity, limb-length discrepancy and Harris hip score (HHS) were documented pre-operatively. Anteroposterior (AP) radiographs of the hip and pelvis and lateral radiographs of the hip only were evaluated for the extent of bone destruction and osteoporosis. A full blood count, ESR and CRP, were undertaken in all patients. Chest radiography was also carried out to look for concomitant pulmonary tuberculosis.

All patients underwent cemented THR using Charnley components (Endopro-C, Ormed medical technologies, Freiberg, Germany). Fluid and tissue samples harvested at operation were sent for Gram staining, acid-fast bacilli staining, polymerase chain reaction and culture for mycobacteria.
Surgical technique. Before surgery, aspiration of joint fluid was attempted in all hips. Patients were operated on under spinal or general anaesthesia by the same team of surgeons. Intravenous cefuroxime was used for antibiotic prophylaxis. We used a lateral approach in all cases. All necrotic tissue and caseous material was removed. After osteotomy of the femoral neck, the acetabulum was prepared and a cemented polyethylene acetabular component with a 22 mm, internal diameter and long posterior wall (Ormed) was implanted. A Charnley 316 L stainless steel femoral component (Ormed) was inserted with a manual cementing technique. The wound was closed over a vacuum suction drain.

Mobilisation started on the first post-operative day within the limits of comfort. The patients were discharged after two weeks, during which time physiotherapy and gait training exercises were undertaken. All patients were advised to use a walking stick in the contralateral hand for at least three months.

The mean follow-up was for 4.7 years (4 to 7). At each follow-up visit, the ESR and CRP were measured until they normalised. Walking distance, limb-length discrepancy and HHS were recorded. Radiographic evaluation was undertaken on AP and lateral views of the hip (Figs 1 and 2).

Results
The pre-operative findings included hypotrophy of the affected limb in all cases. There was an ankylosis of the hip in 17 patients and six retained a functional but painful range of movement. The mean limb-length discrepancy was 3.8 cm (3 to 5.5) The mean maximum walking distance was 530 m (200 to 900) and the mean pre-operative HHS was 38 (27 to 56).

A previous history of treated tuberculosis of the chest as shown by scarring on the chest radiograph was present in five patients. Three patients had active tuberculosis found on chest radiography, and two of these had positive acid-fast bacilli in their sputum. One patient had old tuberculosis of the wrist. None of the patients was HIV positive.

The mean pre-operative ESR was 69 mm/h (26 to 88) and the mean CRP was 10.8 mg/l (7 to 12). The normal reference ranges for ESR and CRP in our hospital were 0 mm/h to 11 mm/h and < 5 mg/l, respectively. Polymerase chain reaction was positive for *Mycobacterium tuberculosis* in all cases, and histopathology suggested features of tubercular infection. Bacteria were successfully cultured in only 13 cases (56.5%). Five patients had undergone a previous surgical procedure, a biopsy in two and an arthrotomy in three. The mean duration of surgery was 117 minutes (96 to 194), with a mean blood loss of 800 ml (600 to 1200).

Post-operatively, two patients had a prolonged serous discharge over four and five weeks, respectively, which was found to be sterile on repeated cultures and which subsequently resolved. For these patients cefuroxime and amikacin were administered for two weeks, followed by oral cefuroxime until the discharge resolved.

No patient showed any signs of reactivation of the tuberculosis of their hip. A sharp decline in ESR and CRP was noted following surgery, with the values normalising within one year (Table I). One patient had a dislocation on the third post-operative day which was reduced closed and mobilisation was delayed for two weeks. One patient had intra-pelvic extrusion of cement (Fig. 1b). One patient developed heterotopic ossification which progressed to Brooker grade 2 within a year, but hip function was not affected (Fig. 2c). No patient had implant failure or loosening of a component.

Patients returned to their normal daily activities within a mean of 21 days (17 to 29). At the time of last follow-up the mean maximum walking distance was 1.9 km (0.85 to 3.3) and the mean HHS was 91 (86 to 95). The mean post-operative residual limb-length discrepancy was 1.3 cm (1 to 3).

Discussion
Tuberculosis is endemic in the Indian subcontinent. The emergence of the HIV, an ageing population, the large number of chronically immunosuppressed people, the ease and frequency of worldwide travel and multidrug resistant strains of tuberculosis have produced a resurgence in the disease and renewed interest in the diagnosis worldwide. Some reports estimate that 90% of tuberculous arthritis is monoarticular, with the hip and knee being the most commonly affected sites. It has also been reported that tuberculosis of the hip constitutes 15% of osteoarticular tuberculosis. If treated at an early stage with chemotherapy, tuberculous arthritis of the hip has a...
good outcome, but the disease is rarely identified early owing to its non-specific presentation. In our series, the diagnosis was delayed for at least three months after the onset of symptoms. Frequently, the disease has become advanced by the time it is diagnosed resulting in pain, residual deformity and loss of function despite subsequent chemotherapy.

When THR is indicated in patients with tuberculous arthritis of the hip a long period of quiescence has been recommended, and various intervals have been advised (immediate to 10 years). There are few reports on replacement of the hip or knee in the presence of active tuberculous arthritis. Kim et al described a series of 44 THRs in 38 patients with tuberculous arthritis with a mean follow-up of 45 months. The interval between the presence of active disease and THR ranged from three months to 45 years. No patient was given antituberculous therapy in the pre- and post-operative periods. Reactivation of the disease was reported in six patients in whom it was controlled by chemotherapy and debridement. In a similar study Kim reported total knee replacement (TKR) in patients with tuberculous arthritis of the knee within three months to five years of the disease. None of the patients received chemotherapy before or after surgery, but three developed recurrence of infection which was controlled by chemotherapy. The mean follow-up was for 33 months.

In 2001, Yoon et al reported successful arthroplasties in three patients with active tuberculous arthritis who underwent surgery between three and six months of the onset of the disease, with all patients receiving chemotherapy pre- and post-operatively. None had reactivation of the disease. The same group reported successful use of immediate cementless THR in seven patients with no reactivation of the disease when all patients received chemotherapy. Su et al in a series of 16 patients undergoing TKR for tuberculous arthritis of the knee, reported that reactivation occurred only in those who were not given chemotherapy or who were on corticosteroid therapy for a long period. A review of the literature reveals that reactivation of tuberculosis is described in patients who either had an overlooked tuberculous lesion, were not given pre-operative chemotherapy, were on long-term corticosteroids, or in whom there was a failure of compliance with chemotherapy. The reported rate of reactivation of the disease in patients who received chemotherapy before surgery is very low. Using three months of pre-operative antituberculous treatment in our patients resulted in no case of reactivation. Chemotherapy for osteoarticular tuberculosis needs to be continued for longer than for the treatment of pulmonary tuberculosis. For infants and children with miliary or bone and joint tuberculosis, treat-

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### Table I

<table>
<thead>
<tr>
<th>Time</th>
<th>ESR (mm/h)</th>
<th>CRP (mg/l)</th>
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</thead>
<tbody>
<tr>
<td>At diagnosis</td>
<td>69</td>
<td>10.8</td>
</tr>
<tr>
<td>Pre-operatively</td>
<td>54</td>
<td>9.8</td>
</tr>
<tr>
<td>Post-operatively</td>
<td></td>
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<tr>
<td>three weeks</td>
<td>21</td>
<td>6.3</td>
</tr>
<tr>
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<td>17</td>
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<tr>
<td>12 months</td>
<td>8</td>
<td>4.6</td>
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ment should last at least 12 months. The same conditions in adults require careful monitoring of the response to therapy which, if slow or inadequate, may need to be prolonged. We prolonged the treatment to reduce the risk of reactivation and were successful.

In endemic areas the diagnosis of osteoarticular tuberculosis can be made reliably on a clinicoradiological basis, but in non-endemic areas it is likely that semi-invasive investigations will be required to establish the diagnosis.18 In doubtful cases, biopsy of the lesion or draining lymph nodes is helpful in obtaining a diagnosis.16,18 Polymerase chain reaction is a very sensitive investigation and can be used to make a more precise diagnosis.21

We used cemented components in all our patients. Both cemented and uncemented THRs have been used in tuberculous hips, with equal success.10,13,23 It has been reported that there is no danger of reactivation due to any thermal reaction in cemented hips.10,23

Our series demonstrates the success of THR in advanced tuberculous arthritis of the hip. An increase in the number of cases of tuberculosis is expected because of the emergence of multiresistant strains of the bacterium and HIV infections.24 This study provides further evidence that THR is a safe procedure if undertaken in association with appropriate antituberculous therapy.

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References