Treatment for unstable intertrochanteric fractures in elderly patients: internal fixation versus cone hemiarthroplasty

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ABSTRACT

Purpose. To evaluate the effectiveness of internal fixation versus cone hemiarthroplasty for the treatment of unstable intertrochanteric fractures in elderly patients.

Methods. The choice of treatment was based on the year of admission: between 2001 and 2003, 42 patients (mean age, 73 years) underwent cone hemiarthroplasty using a cementless press fit through a posterior approach, whereas between 1999 and 2001, 45 patients (mean age, 75 years) underwent internal fixation using a dynamic hip screw through a lateral approach in a supine position. Patients with stable fractures with intact lesser trochanter, immobility before injury, age younger than 60 years, or with associated injuries (such as another fracture) were excluded. Patients were encouraged active rehabilitation in bed. Bony union was determined by clinical and radiological examinations. Patients were followed up at 6-week intervals in the first sixth months and every 3 months thereafter until bony union was achieved. In the final follow-up, 32 cone hemiarthroplasty patients and 38 internal fixation patients were available for evaluation according to Merle d’Aubigne and Postel criteria.

Results. There were no significant differences between the 2 groups in terms of sex, age, fracture type, Singh index, follow-up period, hospital stay, operating time, and receipt of blood transfusions. Clinical results of both groups were similar. Hemiarthroplasty patients were allowed full weight bearing significantly earlier than the internal fixation patients.

Conclusion. Cone hemiarthroplasty can be an alternative treatment for unstable intertrochanteric fractures in elderly patients so as to achieve earlier mobilisation.

Key words: fracture fixation, internal; hip fractures; hip prosthesis; joint instability

INTRODUCTION

For several decades, the treatment of choice for unstable intertrochanteric fractures in elderly patients has been open reduction and internal fixation. The Jewett plate was initially used, then the dynamic hip
Internal fixation was performed under C-arm fluoroscopy in a supine position. Suction drains were removed after 48 hours. Patients were encouraged to rehabilitate actively in bed. The postoperative hospital stay was about 12 days and the time to full weight bearing was about 10 weeks.

Bony union was determined by clinical and radiological examinations in an outpatient clinic. Low-molecular-weight heparin was injected to avoid deep venous thrombosis before the operation and continued for 7 to 10 days. The first generation cephalosporin (cefazolin) and an aminoglycoside (gentamicin) were given just before anaesthesia and continued for 48 hours postoperatively. Non-steroidal anti-inflammatory medication was administered unless there was a contraindication. Patients were followed up at 6-week intervals in the first sixth months and then every 3 months until bony union was achieved. At final follow-up, patients were evaluated functionally according to Merle d’Aubigne and Postel criteria. Patients with more than 14 points were considered to have achieved a satisfactory operative result.

Fisher’s exact test and the t test were used for statistical analysis. A p value of <0.05 was considered significant.

RESULTS

There were no significant differences between the 2 groups in terms of demographic data (age, sex), fracture type, preoperative Singh index, hospital stay, operating time, receipt of blood transfusion, metabolic disease, and associated diseases (Table). The time to full weight bearing was significantly earlier in patients who underwent hemiarthroplasty (p<0.0001). Patients who underwent internal fixation had more early complications than those having cone hemiarthroplasty (though the difference was not significant); late complications and clinical results were similar in the 2 groups.

The mean follow-up period for the hemiarthroplasty group was 24 months (range, 12–40 months). Ten (24%) of the 42 patients died in the first half year. Among them, one developed deep infection on day 15 and did not respond to postoperative antibiotics. One had a pulmonary infection and one sustained a cerebral haemorrhage (associated with hypertension) both within one month. The remaining 7 patients died from causes unrelated to the primary injury. Among the 32 patients still surviving, early complications included one with a superficial wound infection and 4 with bed sores. At their last follow-up, the

**MATERIALS AND METHODS**

Between 2001 and 2003, 42 patients with unstable intertrochanteric fractures (30 women) aged 60 to 103 years (mean, 73 years) underwent hemiarthroplasty involving a cone prosthesis. 21 patients had the A21 fracture type, 10 the A22, 5 the A23, 4 the A31, and 2 the A33 (according to the Association for Osteosynthesis/Orthopaedic Trauma Association [AO/OTA] classification). In 16 patients the right hip was affected and in 26 the left hip.

Between 1999 and 2001, 45 patients (24 women) aged 62 to 82 years (mean, 75 years) underwent hemiarthroplasty such as the Leinbach and bipolar hip arthroplasties were then used. For unstable osteoporotic trochanteric fractures, hemiarthroplasty using a cone prosthesis can transfer the axial load from the hip to the middle femur. This study aimed to compare the functional results of patients with unstable intertrochanteric fractures treated with internal fixation or cone hemiarthroplasty.

Patients with stable fractures with an intact lesser trochanter, immobility before injury, associated injuries (such as another fracture) or who were <60 years old were excluded.

The hemiarthroplasty was performed using the posterior Osborne incision in a lateral decubitus position. The femoral neck was removed and the greater trochanter preserved after meticulous capsulotomy. The femoral medulla was then reamed and the stem length measured. The stem was inserted into the femoral canal in a press fit manner to improve osseointegration. The lesser trochanter was not removed. Patients were encouraged active rehabilitation in the bed on postoperative day 1, but avoided extensive adduction and rotation. Moderate flexion of both hips and knees, with a pillow between the legs, was recommended in positioning the patient. Partial weight bearing was allowed in hospital and the patients were discharged on about postoperative day 13. The time to full weight bearing, as tolerated, was about 4 weeks.

Internal fixation was performed under C-arm fluoroscopy with a chin, and the stem length measured. The stem was inserted into the femoral canal in a press fit manner to improve osseointegration. The lesser trochanter was not removed. Patients were encouraged active rehabilitation in the bed on postoperative day 1, but avoided extensive adduction and rotation. Moderate flexion of both hips and knees, with a pillow between the legs, was recommended in positioning the patient. Partial weight bearing was allowed in hospital and the patients were discharged on about postoperative day 13. The time to full weight bearing, as tolerated, was about 4 weeks.
outcome of 8 patients was deemed unsatisfactory (6 fair, 2 poor). One of the patients with a fair result had 3 cm of shortening. Five patients had various degrees of restriction in range of movement. Two patients were unable to walk because of unrelated conditions. In 8 patients, the clinical results were excellent and in 16 they were good. The mean stem migration at the final follow-up was 10.7 mm (range, 0–32 mm). There was no dislocation, apparent acetabular protrusion or aseptic loosening of the stem.

The internal fixation group fitted with a DHS was followed up for a mean of 29 months (range, 12–52 months). Seven (16%) of the 45 patients died in the first half year; one sustained a cerebral infarct from thromboembolism after 2 months. The remaining 6 deaths were attributed to pre-existing systemic disease. Six months after surgery, 38 (85%) of the 45 patients in this group were surviving and underwent functional and radiological assessment. Among them, 11 developed early complications (bed sores in 5, urinary tract infection in 3, and one each had thrombophlebitis, superficial infection, and haematoma). At the final follow-up, the clinical results in 12 patients were unsatisfactory (9 fair, 3 poor) due to: shortening in 3, femoral head avascular necrosis in one, and implant cut-out in 6 (who underwent revision surgery with arthroplasty or implant removal). Two patients were unable to walk due to neurological disorder and dementia. Clinical results were deemed excellent in 11 patients and good in 15.

**DISCUSSION**

Unsatisfactory surgical outcome is common in elderly patients with intertrochanteric fractures; medical illness, osteoporosis, and fracture instability are contributing factors. Early mobilisation may decrease the risk of mortality and morbidity, although most older patients are unable to walk well and only capable of partial weight bearing in the postoperative period.\(^5\)\(^7\)

In patients with osteoporotic fractures, maintenance of reduction can be a major problem during the healing period. To reduce the healing time, dynamic devices are replaced with the static ones. Biomechanical studies show that dynamic implants have more weight-bearing capacity than static implants.\(^3\)\(^5\)\(^6\) Furthermore, partial weight bearing creates a micro-movement in the dynamic systems which increases union rate. However, cut-out is the main complication

<table>
<thead>
<tr>
<th>Patient characteristics*</th>
<th>Cone hemiarthroplasty group</th>
<th>Internal fixation group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>73 (9)</td>
<td>75 (6)</td>
</tr>
<tr>
<td>Female:male</td>
<td>30:12</td>
<td>24:21</td>
</tr>
<tr>
<td>AO/OTA(^†) fracture type (No. of patients)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A21</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>A22</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>A23</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>A31</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>A33</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Follow-up period (months)</td>
<td>24 (8.3)</td>
<td>29 (10.7)</td>
</tr>
<tr>
<td>Singh index</td>
<td>2.8 (0.7)</td>
<td>2.5 (0.7)</td>
</tr>
<tr>
<td>Hospital stay (days)</td>
<td>13 (3.3)</td>
<td>12 (2.9)</td>
</tr>
<tr>
<td>Operating time (minutes)</td>
<td>90 (24)</td>
<td>85 (17)</td>
</tr>
<tr>
<td>Blood transfusion (units)</td>
<td>1.28 (0.8)</td>
<td>0.89 (0.4)</td>
</tr>
<tr>
<td>Time to full weight bearing (weeks)*</td>
<td>4 (1.5)</td>
<td>10 (2)</td>
</tr>
<tr>
<td>Metabolic illness (No. of patients)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Diabetes</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Neurological disease</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Hypertension</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Pulmonary disease</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

* Values are expressed as mean and (standard deviation) unless otherwise stated
\(^†\) AO/OTA denotes Association for Osteosynthesis/Rhopaedic Trauma Association

\(^‡\) Significant difference
of internal fixation. Central positioning of the screw in the femoral neck has been recommended, which yields cut-out rate of about 13%. The strength of fixation depends on screw positioning and bone quality. The cut-out rate in the present study was 16% and the respective patients underwent revision surgery (arthroplasty or implant removal).

Many surgeons prefer arthroplasty for the treatment of unstable trochanteric fractures in the elderly in order to decrease complications: Rosenfeld et al. used arthroplasty and reported 86% satisfactory results in the early period. Stern and Angerman reported 94% good and excellent results after a mean follow-up period of 8 months. Haentjens et al. compared the clinical results of internal fixation and bipolar arthroplasty for unstable trochanteric fractures and reported 75% satisfactory results and less postoperative complications in the latter group. They insisted that early weight bearing was the major factor responsible for decreasing postoperative complications. Andress et al. showed adequate osseointegration of the implant, supporting the conclusion that an uncemented prosthesis can be used successfully to treat complex, unstable trochanteric fractures.

Cone prostheses have been used widely for total hip arthroplasty revisions, especially due to concerns about osteolysis and periprosthetic fractures. We too have been using this modality for revision of total hip replacement and for unstable intertrochanteric fractures. It is reported that cone prostheses transfer the axial load from the hip to the femoral shaft and permits refill of the proximal femoral defect. In the hemiarthroplasty group, 8 (25%) patients had unsatisfactory clinical results (early complications: infection and bed sores; late complications: shortening and restricted range of movement), but none underwent revision surgery.

One of the major complications of this cementless system is stem migration. Bohm and Bischel reported a mean of 5.9 (range, 0–45) mm migration in their group; there is a positive correlation between migration and osteoporosis as well as proximal femoral defects. Weber et al. observed migration only in the first year and none after osseointegration. In the present study, we encountered a mean of 10.7 (range, 0–32) mm of stem migration. There was no major clinical or radiological complication as a result of migration and all proximal femoral defects were refilled.

Although the clinical outcomes were similar for patients having internal fixation and hemiarthroplasty, the latter had a lower postoperative complication rate and resulted in earlier weight bearing, which was also reported by others. There was a significant difference in full weight bearing time between the 2 groups. Though more costly, cone hemiarthroplasty is a treatment option for patients with unstable intertrochanteric fractures, which can achieve earlier mobilisation.

REFERENCES