UNSTABLE INTERTROCHANTERIC FRACTURE OF THE FEMUR

A PROSPECTIVE RANDOMISED STUDY COMPARING ANATOMICAL REDUCTION AND MEDIAL DISPLACEMENT OSTEOTOMY

A. L. DESJARDINS, A. ROY, G. PAIEMENT, N. NEWMAN, F. PEDLOW, D. DESLOGES, R. E. TURCOTTE

From the University of Montreal, Canada

We conducted a prospective randomised trial to compare the results of anatomical reduction and medial displacement osteotomy in 127 consecutive patients with unstable intertrochanteric fractures, of whom 109 completed the study. After an average follow-up of 11 months, we found no significant differences in walking ability, social status or failure of fixation in the two groups. Postoperative complication rates and the early mortality rate were not significantly different, but operating time and blood loss were significantly higher in the osteotomy group. With the use of modern sliding hip screws, medial displacement osteotomy is rarely indicated for unstable intertrochanteric fractures.

Received 7 July 1992; Accepted 20 October 1992

Intertrochanteric fractures of the femur are best treated by internal fixation to allow early mobilisation (Crenshaw 1992) but about half of them are comminuted and unstable (Jensen 1980). Early attempts at anatomical reduction and internal fixation with the Jewett device gave a high incidence of complications and led to the suggestion that a medial displacement osteotomy would provide stability and prevent collapse and protrusion of the nail (Dimon and Hughston 1967).

Other implants were developed and have been compared, including the nail plate and Ender nailing (Hall and Ainscow 1981), the Jewett nail and the sliding hip screw (Heyse-Moore, MacEachern and Jameson Evans 1983) and the Köntscher Y-nail and the sliding hip screw (Davis et al 1990). Comparison of anatomical reduction with medial displacement osteotomy has been reported, but only in retrospective and non-randomised studies (Rao et al 1983; Hopkins, Nugent and Dimon 1989). Clark and Ribbands (1990) have compared anatomical reduction with valgus osteotomy (Sarmiento and Williams 1970) in a prospective study. We aimed to compare anatomical reduction with medial displacement osteotomy.

PATIENTS AND METHODS
From March 1987 to November 1990, all patients over 60 years old admitted with non-pathological unstable intertrochanteric fractures were randomised on the day of admission. For patients who were fit for surgical treatment, a computer-generated list was used to decide treatment either by anatomical reduction or by medial displacement osteotomy. Instability was defined by Jensen’s modification of the Evans classification (Jensen 1980). Patients were treated at one of three teaching hospitals affiliated to the University of Montreal. All patients gave their informed consent.

Of the 127 patients initially entered into the trial, 18 were subsequently lost to follow-up, leaving 109 for late review. There were 57 (41 women and 16 men) in the anatomical group and 52 (43 women and 9 men) in the medial osteotomy group. The average age in the anatomical group was 80 years (63 to 99) compared with 81 years (60 to 99) in the osteotomy group. The average length of follow-up was 12 months in the anatomical group and 11 months in the osteotomy group.

Record was made of previous medical conditions, mental and social status and walking ability before injury. Radiographs were studied to determine fracture valgus osteotomy.
type according to Evans modified classification (Jensen 1980), and degree of osteoporosis by the Singh index
(Singh, Nagrath and Maini 1970). Postoperatively, social status, walking ability, complications, clinical outcome and radiographs were evaluated by an independent observer (ALD) at two months, six months and at the latest follow-up.

Management. In the anatomical group, reduction was performed on the fracture table under image-intensifier control by traction and internal rotation. The fracture was then fixed with a compression hip screw and a four-hole side plate. In the osteotomy group, patients were positioned supine on the fracture table and, through a lateral approach, a transverse osteotomy of the greater trochanter was performed. We did the transverse osteotomy 1.5 cm below the inferior prominence of the trochanter using an osteotome or an oscillating power saw. The compression screw was inserted into the centre of the neck, under image-intensifier control, and secured to a short-barrelled, four-hole side plate. The medial displacement was then achieved by inserting the spike of the femoral neck into the medullary canal of the distal femur.

All patients had perioperative antibiotic prophylaxis with first-generation cephalosporins, and oral warfarin was given. The patients were mobilised using crutches or a frame; full weight-bearing was allowed according to pain and the surgeon’s preference.

RESULTS

Before injury 61% of the anatomical group were ‘socially independent’, living alone or with their family (Table I), 70% walked without aids, 25% with aids and 5% were bedridden (Table II). In the osteotomy group 60% of the patients were socially independent, 56% walked without aids, 38% with aids and 6% were bedridden. There were significant medical conditions in 68% of the patients of the anatomical group and 71% of the osteotomy group. The Singh index averaged 2.73 (SD 0.92) in the anatomical group and 2.64 (SD 1.13) in the osteotomy group.

The average duration of anaesthesia was 83 minutes (SD 24) in the anatomical group and 103 minutes (SD 35) in the osteotomy group (p = 0.0016, Student's t-test). The average blood loss in the anatomical group was 340 ml (SD 160) compared with 460 ml (SD 230) in the osteotomy group (p = 0.0011; Student's t-test). The average length of hospital stay was 17 days (SD 12) in the anatomical group and 18 days (SD 13) in the osteotomy group. This difference is not significant.

The social status was reduced in many patients in both groups at six months and at the latest follow-up (Table I). At six months 32% of the surviving patients in the anatomical group had deteriorated, as against 39% in the osteotomy group. This difference is not significant (likelihood ratio test). Walking capacity at six months was reduced in 61% of the anatomical reduction group and 56% of the osteotomy group (Table II). Again, the difference is not significant.

The incidence of complications and the death rate were similar in each group (Table III), and the likelihood ratio test showed no significant differences.

Radiological complications were found in six patients in the anatomical group and eight in the osteotomy group (Table IV). Again, the difference between the groups was not significant (likelihood ratio test). We found no statistically significant correlation between these complications and the position of the nail in the

Table I. The social status of the patients in both groups

<table>
<thead>
<tr>
<th></th>
<th>Before injury</th>
<th>6 months</th>
<th>Latest follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anatomical</td>
<td>Osteotomy</td>
<td>Anatomical</td>
</tr>
<tr>
<td>Lives alone</td>
<td>22</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Lives with family</td>
<td>13</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Nursing home (independent)</td>
<td>6</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Nursing home (dependent)</td>
<td>16</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Died</td>
<td>–</td>
<td>–</td>
<td>9</td>
</tr>
</tbody>
</table>

Table II. The walking ability of the patients in both groups

<table>
<thead>
<tr>
<th></th>
<th>Before injury</th>
<th>6 months</th>
<th>Latest follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anatomical</td>
<td>Osteotomy</td>
<td>Anatomical</td>
</tr>
<tr>
<td>Without aid</td>
<td>40</td>
<td>29</td>
<td>7</td>
</tr>
<tr>
<td>One stick</td>
<td>6</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Two sticks or frame</td>
<td>8</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Unable to walk</td>
<td>3</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>
femoral neck, or with the Singh index (Kendall tau-b test). In the anatomical group, one patient needed implant removal for painful trochanteric bursitis caused by a protruding nail. In the osteotomy group, two patients needed revision surgery, one because of a loss of reduction, the other because the implant cut through the bone. There were no mechanical failures of the implants.

**DISCUSSION**

The earlier methods of surgical treatment for unstable intertrochanteric fractures were reported to give many complications (Dimon and Hughston 1967; Rao et al 1983), and this led to the development of numerous modifications of the technique. Medial displacement osteotomy was initially described for use with a fixed nail-plate device and appeared to be advantageous (Dimon and Hughston 1967). The sliding compression screw was designed to allow controlled collapse of the fracture and was found to reduce significantly the incidence of orthopaedic complications (Heyse-Moore et al 1983; Hopkins et al 1989). The results of combining medial displacement osteotomy with a sliding compression screw have been reported (Harrington and Johnston 1973; Hunter and Krajbich 1978; Harper 1982), but we were unable to find a prospective randomised study published in the English literature.

The evaluation of the results of treatment of intertrochanteric fractures must include systematic evaluation of the social status and walking ability of the patients. Our two groups, both before injury and in the postoperative evaluation, showed no significant differences in their functional results. These findings differ from those of Clark and Ribbans (1990) who found better functional results in the anatomical group than in their valgus osteotomy group.

We found statistically significant differences in blood loss and anaesthetic time, both in favour of the anatomical group, but these factors did not appear to influence the final result or the mortality rate. The incidences of radiological and mechanical failure were similar in both groups, but we had two cases of nonunion in the osteotomy group, although evaluation of union in this group was sometimes difficult. Both of the patients involved were initially non-ambulant and institutionalised, and the functional impact of nonunion therefore could not be evaluated. We were unable to find any significant correlation between the complications and the severity of osteoporosis or the position of the nail in the femoral head.

**Conclusion.** With the use of modern sliding hip screws, the medialisation osteotomy described by Dimon and Hughston (1967) offers no advantage over anatomical reduction, and we do not recommend its use for the treatment of unstable intertrochanteric fractures.

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**


