PRIMARY TOTAL HIP REPLACEMENT FOR DISPLACED SUBCAPITAL FRACTURES OF THE FEMUR

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The management of displaced subcapital fracture of the hip is still controversial because of the high incidence of complications after internal fixation or hemiarthroplasty. To avoid some of these complications we have used primary total hip replacement for independently mobile patients over 65 years of age.

A total of 163 cases, operated on over four years, have been reviewed. There were relatively more dislocations after operation for fracture than after total replacement for arthritis, and these were associated with a posterior approach to the hip. Only seven revision operations have been required.

Of 57 patients who were interviewed an average of 42 months after replacement, 62% had excellent or good results as assessed by the Harris hip score. All the others had major systemic disease which affected their assessment. This inadequacy of current systems of hip assessment is discussed.

It is concluded that total hip replacement is the best management for a selected group of patients with this injury, and that further prospective studies are indicated.

Fractured neck of femur is an important problem. Over 2400 cases occurred in New Zealand in 1981, this being 7% of the admissions to hospital for injury or poisoning (New Zealand Health Statistics Report 1981). The injury is commonest in elderly white women (Lewinnek et al. 1980; Stott and Gray 1980), and has significant morbidity and mortality, which continue for at least six months after injury (Barnes et al. 1976; Soreide and Lillestøl 1980). Its management is a considerable financial and material cost to the community.

The result of treatment by closed reduction and internal fixation is influenced by many factors, including the age of the patient, displacement of the head, delay in reduction, the quality of reduction, the type of fixation device, and its final position. This method of treatment for displaced fractures gives a significant incidence of non-union and avascular necrosis, so that revision is often needed (Barnes et al. 1976; Calandruccio and Anderson 1980; Sikorski and Barrington 1981). Nearly 50 years ago Speed (1935) stated that the uncertainty of the fate of the femoral head made this fracture an unsolved problem. This remains true: reduction and internal fixation of displaced fractures gives uncertain results.

Hemiarthroplasty avoids those complications which stem from inadequate blood supply to the femoral head, but there remain problems such as infection, loosening and dislocation (Chan and Hoskinson 1975; Sikorski and Barrington 1981). Moreover, acetabular erosion has been reported to occur in 11% of cases, and the incidence is even higher in young and active patients (D’Arcy and Devas 1976). Overall, revision is needed in 7–12% within a few years (Beckenbaugh, Tressler and Johnson 1977; Sikorski and Barrington 1981).

In the light of these reports and the high revision rate, it was thought that total hip replacement was indicated in some patients with displaced subcapital fractures. Elective total hip replacement is now well established, with a known incidence of complications (Salvati et al. 1981; Stauffer 1982). It was not certain whether replacement performed for subcapital fracture would have a similar incidence and spectrum of complications. This case review and follow-up study was performed to determine the safety, the complications, and the results of primary total replacement for fracture.

MATERIAL AND METHODS

We reviewed 160 patients with 163 hip fractures all treated by primary total hip replacement during the four-year period from 1978 to 1981. Only patients over 65 years of age with displaced subcapital fractures, who had been living an independently mobile life, were included in this review. Contra-indications included infection or neuromuscular disease, while patients with rheumatoid arthritis or pathological fractures were also excluded.
The clinical features were recorded, together with operative details, early complications, morbidity and mortality, as well as the social fitness of the patient on discharge from hospital.

All available patients were interviewed and their result assessed according to the Harris hip score (Harris 1969). A record was kept of major illnesses or disabilities affecting function, as was the reason for the non-attendance of some patients.

RESULTS

Of the 163 fractures, 85% occurred in women. The average age of the patients was 78 years (range 65 to 95 years). The average delay between admission and operation was 2.8 days, 78% being operated on within 3 days. A Müller curved-stem prosthesis was used in 80% of hips, and a Charnley prosthesis in 20%. Pre-operative antibiotics were used in all cases, but anticoagulants were not used routinely. General anaesthesia was used in 77% of the patients and spinal anaesthesia in the remainder. An anterolateral (Watson-Jones) approach was used in 73%, and a posterior approach in 27%.

Mortality. At one month the mortality was 3%, and at six months it was 10%. The causes of death included pneumonia, cerebrovascular accident, myocardial infarction, and pulmonary embolus. Of deaths in the first month only one, due to pulmonary embolus 16 days after operation, was directly related to the operation. There was no correlation between mortality and either surgical approach or type of anaesthesia. The average age of those who died (86 years), was higher than that of the whole series (78 years).

Morbidity. Medical conditions requiring treatment developed in 30% of the patients. These conditions included urinary tract and chest infections, cerebrovascular accidents, heart failure or myocardial infarction, and acute abdominal problems. Six patients were treated for thrombo-embolic disease, which was diagnosed on clinical evidence. There was no correlation between morbidity and either surgical approach or type of anaesthesia.

Wound problems. Five patients had superficial infections, which did not progress to involve the prosthesis. There was one deep infection. Of three wound haematomas, one required evacuation under anaesthesia and there was one wound dehiscence.

Dislocation. Dislocation of the prosthetic hip occurred in 20 patients. Most patients who dislocated did so only once, in the first week after operation, and there was no recurrence after one to three weeks of traction. Only three patients suffered repeated dislocation, which required revision operation, between one and four months after replacement. There was no correlation with the type of anaesthesia, or the type of prosthesis, and the dislocations were evenly distributed over the four years of the study.

Over half the dislocations occurred in patients who had replacement by a posterior approach. This figure gave a highly significant correlation of dislocation with the posterior approach ($P < 0.01$).

Rehabilitation. The average stay in hospital was 40 days. Nearly 70% of patients were discharged within one month, and 90% were able to return to the same type of accommodation as before the fracture; the other 10% required a higher level of care than previously.

Follow-up. Of the initial group of 160 patients, 57 were interviewed; the average follow-up was 42 months (range 18 to 66 months). They were evenly distributed across the four years of the study.

The considerable loss to follow-up included 38 patients from other areas, to which they had returned. Of the remaining 122 patients, 55 had died. Three patients who were living locally declined to be interviewed. Three patients had had revision for recurrent dislocation, and a further four had had revision for symptoms of femoral loosening, on average 30 months after primary operation, and all after implantation of a curved-stem Müller prosthesis. In patients with a known result there was a 3% incidence of loosening.

Each of the 57 patients interviewed was assessed using the Harris hip scoring method, and the results were grouped into the four categories listed in Table I.

| Table I. Harris hip score: distribution of points and the scoring for the four grades |
|---------------------------------|---------------------------------|
| Qualities                      | Percentage points |
| Pain                           | 44 |
| Function                       | 47 |
| Activities of daily living     | 14 |
| Gait                           | 33 |
| Range of movement              | 5 |
| Absence of deformity           | 4 |
|                                 | 100 |
| Grade                          |                               |
| Excellent                      | 90 to 100                      |
| Good                           | 80 to 89                       |
| Fair                           | 70 to 79                       |
| Poor                           | Less than 70                   |

There were 14 excellent and 21 good results; together these constituted 61% of the total. Ten patients had fair results and 12 were graded as poor. Most of those graded poor were institutionalised and had major systemic disease such as hemiplegia or senile dementia, which was the main reason for their poor rating. Exclusion of these cases gave 70% excellent or good results.
Thirty-six patients (63%) had continued to live in their own home, while 14 (25%) were in residential homes, with 7 (12%) in nursing homes. The correlation of grade of result and type of accommodation is shown in Table II.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Own home</th>
<th>Residential home</th>
<th>Nursing home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>10</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Good</td>
<td>15</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Fair</td>
<td>8</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Poor</td>
<td>3</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

The reasons for the loss of points in the rating system were studied. Only one patient had pain that was more than an occasional ache. The most common reason for loss of points was the use of walking aids. Function was affected in many patients by conditions unrelated to the replaced hip, and some poor results were in patients who had no complaints about their hip. Only one patient was more limited by his hip than by other conditions.

DISCUSSION

This study aimed to show the results of our current policy of treating displaced subcapital fractures of the femur by primary total hip replacement. While the operation has been well documented in its elective role, its place in fracture management is ill-defined. The consideration of replacement for fracture reflects dissatisfaction with the existing alternatives of internal fixation or hemiarthroplasty. The development of bipolar hemiarthroplasties also reflects this dissatisfaction (Long and Knight 1980; Franklin and Gallannaugh 1983).

The patients treated were representative of the condition in respect of sex distribution and age, but our criteria selected those in better general condition than the average patient with a displaced subcapital fracture. We excluded patients under 65 years of age since we felt that they should be given a chance to retain the femoral head. Patients who were already institutionalised with limited mobility, and therefore at less risk of loosening and acetabular erosion, usually had a hemiarthroplasty.

Our mortality figures at one and six months are low compared to other reports (Barnes et al. 1976; D'Arcy and Devas 1976). In the New Zealand population there is a 5% mortality rate over a six-month period in people of 75 or older (New Zealand Health Statistics Report 1981). In our study a figure of 10% was documented over the same time interval, confirming the findings of Søreide and Lillestøl (1980). Our follow-up shows that after this time the mortality rate returns towards that of the normal elderly population.

The main early complication was dislocation; it was more common than in elective hip replacement, and there was a significant correlation with the posterior approach. The explanation probably lies in the very free range of flexion obtained soon after operation, which is not seen after elective replacement for arthritis. The lax nature of the tissues in comparison with those of an arthritic hip is frequently remarked upon at operation. However, if this complication is avoided in the first week, few hips dislocate. It is now our practice to use the anterolateral approach.

The revision rate for femoral loosening of 3% in over three years needs discussion. Two factors may be important. All loosenings were in cases in which the Müller curved-stem prosthesis had been used. This is known to have a high incidence of loosening compared with other designs of implant, and our revision rate compares favourably with other results using this prosthesis (Sutherland et al. 1982). In addition, no femoral canal cement restrictor was used at the time when these operations were done, and no pressure was applied to the cement. Better prostheses and better cementing techniques should give less loosening in the future.

The difficulty in following up elderly patients is confirmed by our being able to interview only 57 of the 160 patients. This proportion is, however, similar to that in other studies involving elderly populations (D'Arcy and Devas 1976). The assessment of the result in an individual elderly patient is also difficult, as any rating system is inevitably influenced by other conditions. Many of our patients would not have reached a rating of excellent even before their fracture; they often felt no desire to undertake the activities required for the assessment of hip function.

The Harris hip rating system was used because of its precise definitions and its emphasis on pain. It compares well in these respects with other hip assessment systems (Larson 1963; Salvati and Wilson 1973), but it fails to make allowance for disabilities other than those of the hip, and therefore the results do not reflect only the state of the hip. The observation that only one of the 57 patients had limited mobility caused by their hip is more telling than the ratio of good to fair results. A fair result is compatible with a good quality of life; 8 of 10 patients rated fair were able to live independently in their own homes. No doubt the results were influenced by the selection of independently mobile patients for total hip replacement, but no patient has become less independent as a result of the operation.

The difference in cost between internal fixation and total hip replacement is not significant, being less than the cost of one day in our hospitals.

A different approach to the problem of acetabular erosion has been the development of bipolar hemiarthroplasties, but the retention of movement at the
prosthetic articulation is debatable (Verberne 1983), as is the advantage over standard hemiarthroplasties (Long and Knight 1980).

The insertion of an acetabular component completely solves the problem of erosion. The femoral components of total hip replacements now have stems with the required biomechanical features to minimise loosening, when compared with those of standard hemiarthroplasty components or bipolar prostheses. If a hemiarthroplasty needs cementing, then the addition of a cemented cup provides no extra risk to the patient and great benefit to the result.

A total hip replacement operation for fracture differs from the usual operation for arthritis in that, in the absence of abnormal soft tissue, it is easy to lengthen the limb. Adequate resection of the calcar, allowing easy reduction of the implant, is essential. If there has been limb lengthening, the patient will complain of pain after operation and be very aware of the inequality in leg length when beginning to stand and walk.

We consider that total hip replacement for fracture is a safe procedure, attended by a higher short-term risk of dislocation, but without the risk of acetabular erosion that may follow hemiarthroplasty. Our study was retrospective and selective but has shown that a controlled prospective trial is warranted. This could determine the proper place of total replacement in the management of the "unsolved fracture".

REFERENCES


