DISLOCATION AFTER PRIMARY ARTHROPLASTY FOR SUBCAPITAL FRACTURE OF THE HIP

WIDE RANGE OF MOVEMENT IS A RISK FACTOR

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Dislocation is the most frequent serious complication following total hip replacement for subcapital femoral fracture. We report a prospective study, using matched groups, which compared the range of hip movement following hip replacement for arthritis and for fracture. The range of movement was significantly greater in the fracture group. We suggest that this is a predisposing factor for dislocation.

Primary total hip replacement has been advocated for treatment of displaced subcapital fracture of the femur. Although initial results were encouraging, dislocation of the prosthetic hip, which occurs in about 10% of cases, is a significant problem in the early postoperative period (Table I). In contrast, the incidence of dislocation following hip replacement for arthritis is only 1.5% (Charnley 1972).

Coates and Armour (1980) postulated that an increased range of postoperative hip movement might predispose to dislocation. We have undertaken a comparative study to establish whether there is a difference between hip movement following replacement for fracture and replacement for arthritis.

PATIENTS AND METHOD

Fifty patients underwent total hip replacement using either a Charnley or a Wrightington prosthesis. A lateral or anterolateral approach was used, without trochanteric osteotomy. The primary pathology was osteoarthritis in 25 patients (average age 70.5 years), and displaced subcapital fracture in 25 patients (average age 69.0 years). No patient in the fracture group had evidence of arthritis of the affected hip. These patients were all active

prior to injury and had a mental test score greater than 8/13 (Ions and Stevens 1987). The two groups were matched for age and sex. No patient had significant heterotopic bone formation.

Table I. The incidence of dislocation following primary total hip replacement for subcapital fracture

Authors	Patients (number)	Incidence (per cent)
Coates and Armour (1980)	85	8
Sim and Stauffer (1980)	112	10.7
Cartlidge (1982)	48	14.6
Taine and Armour (1985)	160	12.3
Dorr et al (1986)	39	18
Pun et al (1987)	46	8.7
Greenough and Jones (1988)	37	8

Table II. Scoring system for hip movement (Harris 1969)

	Movement (degrees)	Harris index	Maximum* possible score
Flexion	0 to 45	1.0	45
	46 to 90	0.6	27
	91 to 110	0.3	6
Abduction	0 to 15	0.8	12
	16 to 20	0.3	1.5
Adduction	0 to 15	0.2	3
External rotation	0 to 15	0.4	6
Internal rotation		No score	

* Maximum = 100.5

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Ideally all patients would have been assessed in the early postoperative period but full examination at this time is contra-indicated as it is painful and there is a significant risk of dislocating the hip. Therefore, to assess persisting differences in range of movement, all patients were examined at one year by the same examiner (RJHG), who had performed none of the operations.

The range of hip movement was measured using the method recommended by the American Academy of Orthopaedic Surgeons (1965). A range of movement score (Table II) was calculated using the method described by Harris (1969). Non-parametric statistical analysis was performed using the Wilcoxon two-sample test.

RESULTS

Movements in all directions, except external rotation, were greater in the fracture group (Table III). The average Harris point score of the osteoarthritic group was 93.0 (95.5 to 100.5), and of the fracture group 97.6 (79 to 100.5). The difference between the two groups is highly significant ($p < 0.02$).

DISCUSSION

We have demonstrated that primary hip replacement for subcapital fracture results in a greater range of movement than when the operation is performed for arthritis of the hip. The capsule and other soft tissues surrounding the hip are major factors in determining the range of movement of this joint. Patients with arthritic hips have restricted movements and develop secondary soft tissue contractures. Subcapital fractures are rarely associated with arthritis in the affected hip (Colhoun, Johnson and Fairclough 1987) and these patients have normal soft tissues and a normal range of movement.

A highly significant difference in the range of movement between the two groups was found one year after hip replacement. It is likely that this difference was even greater in the early postoperative period. In the fracture group the hip would have had maximum movement immediately postoperatively, and would have gradually stiffened as fibrosis developed around the prosthesis. In contrast, the range of movement of the arthritic hip increases during the first year after operation (Woolson, Maloney and Schurman 1985).

Table III. Average range of movement (degrees)

	Flexion	Abduction	Adduction	Internal rotation	External rotation
Arthritis	95	28	22	4	27
Fracture	111	29	25	12	25
	$p < 0.005$	NS	NS	$p < 0.001$	NS

The fracture patients had 16° more flexion than the osteoarthritic patients. Flexion is an important factor in the mechanism of hip dislocation (Khan, Brakenbury and Reynolds 1981) and we believe that this is the cause of the high risk of dislocation.

Loss of the abductor mechanism, shortening of the limb, and malorientation of the components are also important causes of dislocation (Fraser and Wroblewski 1981). If one of these other risk factors is present, the greater range of movement will increase the hazard. For example, the greater the range of movement the less the degree of component malalignment needed to cause dislocation. The relative increase in hip movement therefore decreases the margin for surgical error.

If these technical problems are to be minimised, hip replacement after subcapital fracture should always be performed by an experienced surgeon.

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