

EARLY REHABILITATION FOLLOWING OSTEOSYNTHESIS WITH THE SLIDING HIP SCREW FOR TROCHANTERIC FRACTURES

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ABSTRACT. A prospective study of 104 patients with trochanteric hip fractures was undertaken with particular regard to postoperative complications and rehabilitation at the follow-up 3 months later. The mortality was 20 %, depended more on the social function prior to the fracture than on the patient's age. Osteosynthesis was performed with the Richards sliding screw-plate system. The most frequent clinical complications were of a cardiovascular and pulmonary nature. Technical failure was encountered in 10 %. Hip function was excellent or good in 69 %. In 40 % the ability to walk remained unchanged after the operation. Seventy-five per cent of the patients returned to their own homes, although 51 % were more dependent on the social welfare system than before the fracture. The social function prior to the fracture determined the social function after the fracture to a greater extent than did the patient's age.

Key words: Rehabilitation, trochanteric fractures, hip fractures, internal fixation, mortality

Among the devices available for internal fixation of trochanteric hip fractures, the sliding screw-plate has gained considerable acceptance in the treatment of both stable and unstable fractures (6, 9, 11).

The literature concerning the treatment of extra-capsular hip fractures is comprehensive. However, few studies have dealt with the early postoperative complications and social rehabilitation, and when the present study was designed, no prospective study had been published concerning the sliding screw method.

The purpose of this paper was to elucidate the technical failures and the clinical complications as well as the social rehabilitation within the first 3 months postoperatively in patients treated with the Richards sliding screw-plate system for trochanteric hip fractures.

MATERIAL AND METHODS

The series included 104 consecutive patients with trochanteric hip fractures admitted to the hospital during the period January 1st 1981 to December 1st 1982. Seventy-four were women with a mean age of 78 years (range

30-96) and 29 men with a mean age of 73 years (range 30-96).

The fractures were divided into stable and unstable according to Jensen (14).

Postoperatively, early weight-bearing within 5 days was emphasized unless the fracture was severely comminuted. The patients were followed radiographically and clinically for 3 months. All X-rays were evaluated by the authors.

Technical failure was defined as any complicating fracture, bending, breakage of the implant or dislocation of the implant in relation to the bone. Telescoping of the screw was recorded.

On admission to the hospital and after 3 months the patients were assessed and classified into four social function groups according to their dependence on the social welfare system (21).

The ability to walk prior to the fracture and at the follow-up at 3 months was recorded as well as the pain and postoperative movement of the hip. The results were classified into four groups using the Stinchfield hip fracture classification (20).

RESULTS

Associated diseases at the admission were common (Table I) and associated fractures occurred in 10% (10/104) of the patients.

Twenty-one of the patients died within 3 months after the operation; causes of death are listed in Table II. Thus 83 patients (83 fractures) were followed for 3 months. Of these, 26 fractures were classified as stable and 57 as unstable.

The clinical postoperative complications are listed in Table III, the most frequent being of a cardiovascular or pulmonary nature. Deep infection occurred in 2 patients (2%). However, the implant was not removed and the fractures healed.

Technical failures were encountered in 8 cases (10%), all among unstable fractures. Varus dislocation, being the most frequent (5 cases), was always combined with cutting of the screw in an osteoporotic femoral head. In 3 cases the telescoping action of the sliding screw failed, and was followed by a slight penetration of the femoral head, but without

Table I. Associated diseases and fractures in 46 patients on admission to the hospital

Diseases	No. of cases	Fractures	No. of cases
Senility, psychosis, neurosis	18	Radius	2
Dizziness	12	Tibia condyle	1
Neurologic disease	11	Olecranon	1
Cardiovascular insufficiency	7	Humerus	1
Previous hip fracture	6	Rib	1
Pulmonary obstructive disease	6	Pelvis	1
Rheumatoid arthritis	3	Total	10
Chronic alcoholism	2		
Below-knee amputation	2		
Total	67		

clinical symptoms. Altogether, telescoping of the screw occurred in 63 cases (76%). There were no cases of primary penetration of the femoral head, and no fracture dislocation due to telescoping of the screw was observed. One patient developed necrosis of the femoral head.

Ability to walk prior to and after the fracture is illustrated in Table IV. Of the 83 patients reviewed, 47 (57%) had a reduced ability to walk prior to the injury. In 33 cases (40%), ability to walk remained unchanged after the operation, in 23 cases (28%) it deteriorated by one grade and in 27 cases (33%) by two grades or more.

According to the Stinchfield classification of hip function 3 months postoperatively (20), 81% (21/26) of the stable fractures and 63% (36/57) of the unstable fractures were classified as excellent or good (Table V). However, this difference was not statis-

Table II. Causes of postoperative death

	No. of patients
Cardiovascular failure	11
Pulmonary embolism	3
Pneumonia	3
Cerebravascular accident	1
Renal failure	1
Gastrointestinal bleeding	1
Strangulation of the bowel	1
Total	21

Table III. The postoperative complications in 83 patients

	No. of patients
Cardiac disease	6
Pneumonia/atelectasis	6
Deep thrombophlebitis	5
Decubitus ulcer	4
Deep infection	2
Below-knee amputation	2
Pulmonary embolism	1
Cerebral disease	1
Superficial infection	1
Haematoma	1
Necrosis of the femoral head	1
Total	30

tically significant ($0.2 < p < 0.1$, χ^2 -test). The assignment to pre-fracture social function is shown in Table VI. Dependence on the social welfare system was found to increase with age ($p < 0.01$, χ^2 -test). Among patients admitted from home, 68 survived for 3 months. Seventeen (25%) were discharged to nursing homes and were living there at the follow-up. Seventy-five per cent of the patients (51/68) were back in their homes after 3 months, although 51% (26/51) were more dependent on the social welfare system than before the fracture (Table VII). A multiple logistic regression analysis revealed that the pre-fracture social function group determined the postoperative social function groups to a greater extent than did the age of the patients ($p < 0.05$).

The mortality rate among patients who came from their own homes was only 14% (11/79) com-

Table IV. Ability to walk prior and after the operation

Before operation	n	After operation			
		I	II	III	IV
Grade I	36	5	18	6	7
Grade II	32		14	4	14
Grade III	3			2	1
Grade IV	12				12
Total	83	5	32	12	34

Grade I: Walk without support.

Grade II: Walk with one cane.

Grade III: Walk with two canes, crutches, walker, or living support.

Grade IV: Confined to bed or wheelchair.

Table V. Function of the affected hip 3 months postoperatively in relation to the type of fracture

	Stable	Unstable	Total
Excellent	1	6	7
Good	20	30	50
Fair	4	17	21
Poor	1	4	5
Total	26	57	83

Table VI. Assignment to social function groups on admission to hospital

Social function groups	I	II	III	IV
Number	32	23	24	25
Median age	67	77	80	82

- I. Independent: manages everything; capable of working.
 II. Slightly dependent: manages household chores; meals-on-wheels; home-help ≤ 4 hours/week; manages personal needs.
 III. Moderately dependent: Home-help ≥ 5 hours/week; possibly needs district nurse.
 IV. Totally dependent: living in nursing home or long-term nursing at home.

pared with 40% (10/25) of those patients who came from institutions (Table VII). This difference was statistical significant ($p < 0.05$, χ^2 -test).

As shown in Table VII the risk of death or deterioration among patients admitted from home was 58% (54/79) and 62% for all patients admitted to the hospital.

The hospital mortality rate was 6% (6/104), but at the follow-up, mortality had increased to 20% (21/104). As seen in Table VII, the mortality rate increased with increasing social dependence as classified on admission, although the median age in the group also increased (Table VI). By applying a

multiple logistic regression analysis, mortality was found to depend more on pre-fracture social function than on the age of the patient ($p < 0.05$).

DISCUSSION

The distribution of sex and age in the present study are comparable with other studies (9, 11, 19). Also the frequency of stable and unstable fractures follows the pattern of other series (13), but in contrast to this, Wolfgang et al. (22) reported a high incidence of stable fractures (79%).

As expected, there were more patients with technical problems in the unstable fracture group. In these, a primary stable fixation is difficult to achieve, and a failure rate of 10% was encountered. Failure rates as low as 4-7%, depending on the fracture classification system, have been reported by Mulholland et al. (17), Jensen et al. (11) and Heyse-Moore et al. (9). However Friedenberget al. (7) encountered failures in 18% and Wolfgang et al. (22) in 19%.

The telescoping effect of the sliding screw allows the fracture ends to impact during weight-bearing until bony support is established across the fracture line. Jensen et al. (11) using the same fracture classification system as the present study, reported a telescoping of the screw in 49% compared with 76% in this study. However, no secondary fracture dislocation due to telescoping was observed.

In 2 patients, deep infection occurred. However, both fractures healed in accordance with the observation that fractures will heal in spite of infection if the osteosynthesis is stable (18).

At 3 months, 40% of the patients had recovered the walking ability they had before the operation. Similar figures have been reported by Clawson (4) and Sahlstrand (19). Of the 27 patients (Table IV) whose ability to walk deteriorated two grades or

Table VII. Deterioration of social function and mortality 3 months after trochanteric fracture

Pre-fracture assessment into social function groups	n	Deaths n(%)	Social function groups at 3-month follow-up				Risk of death or deterioration of social function
			I	II	III	IV	
Group I	32	3 (9.4%)	11	6	9	3	21/32 = 65.6%
Group II	23	3 (13%)		6	11	3	17/23 = 73.9%
Group III	24	5 (20.8%)			8	11	16/24 = 66.7%
Group IV	25	10 (40%)				15	10/25 = 40.0%
Total	104	21 (20.2%)	11	12	28	32	64/104 = 61.5%

more, 2 patients underwent below-knee amputation during the postoperative course, because of arteriosclerotic gangrene of the foot, 8 had complicating fractures of the extremities (Table I) and 14 suffered from pain due to telescoping of the screw. Two patients had severe contracture of the hip and were unable to walk, while one patient developed necrosis of the femoral head followed by pain, reduced ability to walk and reduced movement of the hip.

Lund et al. (16) compared the Ender nailing with the McLaughlin osteosynthesis using the Stinchfield hip assessment chart one year after the operation and found 70% excellent or good results in the Ender group and 84% in the McLaughlin group. In the present study, 69% of the patients were classified as excellent or good after only 3 months, suggesting that the sliding screw-plate method seems to fulfil the purpose of recovering an excellent or good hip function as least as early as other devices. In agreement with Lund et al. (16) we found that patients with primary stable fractures had a significantly lower number of failures.

Very little has been published about the effect of hip fracture on social function. Like Jensen et al. (12) we found that the social function groups, as classified on admission to the hospital, determined the postoperative social function groups to a greater extent than did the patient's age at the time of the fracture. Seventy-five per cent of the surviving patients coming from home were back there 3 months after the fracture. Previous reports state that 10–20% of patients admitted from home are discharged to nursing homes after a hip fracture (1, 3, 8). In our series this applied to 25%. Of the remaining 75% of the patients living in their homes 3 months after the operation, 5% were more dependent on the social welfare system than before the fracture. This figure is higher than that reported by Jensen et al. (12), who stated that only 29% had deteriorated socially after their return home. This difference might be explained by the longer follow-up period in the study by Jensen et al. (12).

As also stated in other studies, the patients coming from their own homes had a better prognosis (2, 12, 16) and, in agreement with other publications, we found that the pre-fracture social function groups influenced the mortality to a greater extent than did age (12).

The mortality rate of patients with trochanteric hip fractures has been reported to be about 25%

during the first year after the operation (2, 19). We found a similar figure after 3 months, as also reported by Heyse-Moore et al. (9), suggesting that mortality is greatest during the first 3 months post-operatively, which is in agreement with Jensen et al. (12).

As mentioned by Jansson (10) the purpose of our treatment should be to return patients to their pre-fracture level. The assessment systems used in this study show that this objective was attained in 38% seen from a social point of view, in 40% with respect to ability to walk, and in 69% when using the Stinchfield hip assessment system (21). These figures are comparable with those of Cobey et al. (5) and Katz et al. (15), who stated that 25–50 of the patients maintained their function after a hip fracture.

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