Acta orthop. scand. 54, 622–626, 1983

INCIDENCE AND STABILITY OF TROCHANTERIC FEMORAL FRACTURES

ANDERS WALLÖE, SVERKER ANDERSSON, KRISTIAN HERRLIN* & LARS LIDGREN

Departments of Orthopaedic Surgery and *Diagnostic Radiology, University Hospital of Lund, Lund, Sweden

Sex, age and stability were recorded in 376 cases of trochanteric femoral fractures. In 168 cases the age and sex specific incidence was determined. When comparing our results with those in previous studies from the same region there was no increase that could not be related to age. This is in contrast to other reports from Scandinavia where investigators have found an increase in fracture incidence that could not be explained by the increasing number of old people. We, as others, have found a high proportion of unstable fractures. The unstable fractures did not occur more frequently in the oldest age groups.

Key words: epidemiology; femoral neck fractures

Accepted 5.ii.83

The number of old people in Western Europe has increased during the last decades. In the fifties the incidence of hip fractures increased more than could be expected from the change in population. Alffram (1964) attributed this to an increase in the incidence of trochanteric fractures whereas the incidence of cervical fractures remained unchanged. This unexplained increase in the fifties could not be found in the seventies according to a new investigation in Malmö (Nilsson & Obrant 1978). Others have, however, found an age specific increase in the incidence of hip fractures in the seventies (Falch & Ilebekk 1978, Jensen 1980a, Zetterberg & Andersson 1982).

In order to compare different methods of internal fixation of trochanteric fractures one must take into account the degree of stability of the fractures, as fixation failure is more frequent in the unstable group (Dimon & Hughston 1967, Jensen et al. 1980).

The purpose of this investigation was to study the age specific incidence and the stability of trochanteric fractures of the femur in two well-defined populations.

PATIENTS

The radiographs of 368 consecutive patients with 376 trochanteric femoral fractures admitted from March 1976 to March 1979 were studied. In 30 patients the radiographs were missing or inadequate. Three patients died before operation, one patient was operated with a hemi-arthroplasty and one patient was treated in traction, leaving 341 fractures to be classified.

These 341 fractures included 86 fractures treated from March 1976 through March 1977 in three other hospitals in the same county (26 fractures from Landskrona, 29 fractures from Ystad and 31 fractures from Trelleborg). Another 82 fractures were treated in Lund during the same year, giving 168 fractures to be used for the study of age specific incidence.

Grants: Swedish Medical Research Council, (Project number B82-17X-4776-08) and Stiftelsen för Bistånd åt Vanföra i Skåne.

METHODS

Radiographs of the hip in antero-posterior and lateral projections were taken immediately after admittance. During operation a second radiological examination was carried out immediately after the operative fixation. A third radiological examination was performed at 1 week. The patient was then mobilized.

The classification of stability was made according to Evans (1949) with one modification; Evans' study was based upon a group of fractures treated in traction with adjustment for the result of reduction. Our study is based on fractures treated surgically and adjusts for the result of operative fixation as demonstrated on the first postoperative radiographic examination.

There are five groups of trochanteric fractures:

I a. Undisplaced fractures as demonstrated by the pre- and postoperative examination.
I b. Preoperatively displaced fractures, successfully reduced to near anatomical position with medial cortical support at the fracture site, as demonstrated by the postoperative examination.
I c. Preoperatively displaced fractures well-suited for reduction but where reduction failed to restore medial cortical apposition.
I d. Displaced fractures with poor medial cortical support due to fragmentation. In this type reduction is not likely to restore stability since perfect medial cortical support cannot be achieved.
II. Subtrochanteric fractures.

Fractures belonging to the I a and I b groups are considered stable and the others unstable.

The incidence of trochanteric fractures was calculated for the period of March 1976 to March 1977. The age and sex distribution of the population was known from statistical data and all fractures (168) referred during that year were recorded (Table 1). This data was compared with the findings of Alffram (Malmö, Sweden), Nilsson & Obrant (Malmö, Sweden) and Falch (Oslo, Norway).

Statistical methods

The mean age and stability were compared using a *t*-test.

When comparing the incidences from Malmö (240000 inhabitants), Malmöhus county with exclusion of the cities of Malmö and Helsingborg (355272 inhabitants) and Oslo (460000 inhabitants), chi-square tests according to Miettinen (1974) were used to find any significant differences in relative risks (RR) between the groups. To make groups comparable, the age intervals in some of the materials had to be increased.

RESULTS

There were 107 (31%) men with a mean age of 72 years and 235 (69%) women with a mean age of 79 years (Table 2). There were 150 stable

*Table 1. Incidence of trochanteric femoral fractures in Malmöhus county with exclusion of the cities of Malmö and Helsingborg**

Age, years	Population			Incidence in promille		
	Men	Women	Total	Men	Women	Total
30–39	45042	42570	87612	0.04 (2)	(0)	(2)
40–49	33975	33519	67494	0.05 (2)	0.03 (1)	0.04 (3)
50–54	17761	18590	36351	0.11 (2)	0.11 (2)	0.11 (4)
55–59	17818	18522	36340	0.16 (3)	0.16 (3)	0.16 (6)
60–64	16208	17888	34096	0.12 (2)	0.33 (6)	0.23 (8)
65–69	14847	17354	32201	0.40 (6)	0.29 (5)	0.34 (11)
70–74	11103	14558	25661	0.63 .7)	0.76 (11)	0.70 (18)
75–79	7086	10648	17734	1.27 (9)	2.72 (29)	2.14 (38)
80–84	3846	6873	10719	2.34 (9)	3.76 (26)	3.26 (35)
85–89	1730	3309	5039	5.20 (9)	5.74 (19)	5.56 (28)
90–94	525	1201	1726	7.62 (4)	7.49 (9)	7.53 (13)
95–	92	207	299	(0)	9.66 (2)	(2)
	170033	185239	355272	0.32 (55)	0.61 (113)	0.47 (168)

The figures in parentheses are numbers of fractures.
* The age and sex distribution in the area is known from the statistical yearbook.

Table 2. Sex, age and stability in trochanteric femoral fractures

Type of fracture	Men No. of patients	Men Mean age	Women No. of patients	Women Mean age
1 a, 1 b stable	25	72±17	29	74±11
	19	74±11	77	80± 9
1 c, 1 d, 2 unstable	40	75±11	76	79± 9
	13	69±14	26	80±12
	10	66±15	26	79±12
All types	107	72±14	234	79±10

Table 3. Sex, age and stability in patients over 65 years *of age with trochanteric femoral fractures*

Type of fracture	Men No. of patients	Men Mean age	Women No. of patients	Women Mean age
Stable	34	79±8	94	81±7
Unstable	46	78±7	118	81±8

Table 4. Relative risks (RR) for sustaining a trochanteric femoral fracture in Malmö, Oslo and Malmöhus (present study) with 95* confidence limits*

Oslo 1978/79–Malmöhus 1976*
Male RR = 2.36 (1.77–3.16)
Female RR = 2.67 (2.20–3.23)

Malmö 1950–Malmöhus 1976*
Male RR = 1.13 (0.83–1.54) (not significant)
Female RR = 1.51 (1.22–1.86)

The age distribution in the different populations is compensated for when computing the relative risks. The relative risk is the theoretical value found when the risks for all age groups are integrated.
* Malmöhus county with exclusion of the cities of Malmö and Helsingborg.

fractures (44%) and 191 unstable fractures (56%). There was no age difference with regard to stability in the female group. However, when we split the unstable fracture group of men into its subgroups, we found a small, not significant, increased number of unstable fractures in younger men.

The age difference between men and women was more pronounced in the unstable than in the stable group. The age difference between the sexes was negligible when patients under 66 years

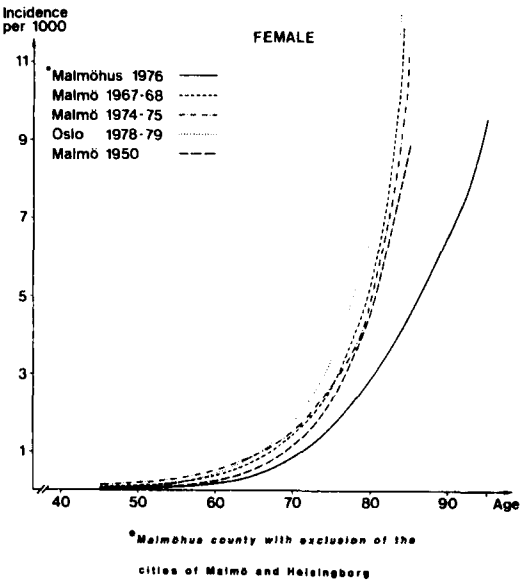

Figure 1. The age specific incidence of trochanteric femoral fracture for women.

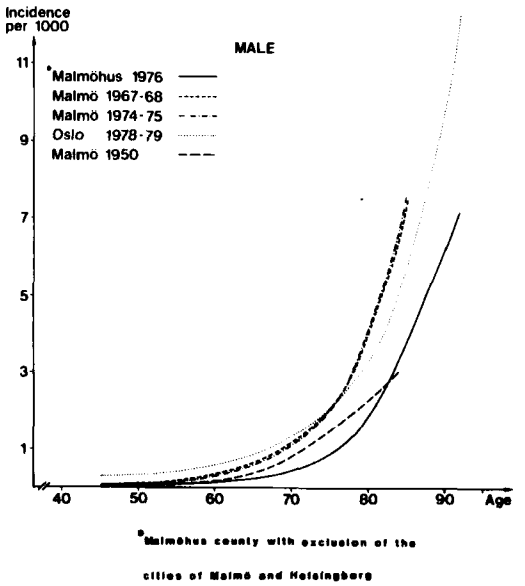

Figure 2. The age specific incidence of trochanteric femoral fracture for men.

of age were excluded (Table 3). Relative risks (RR) according to Miettinen were used to demonstrate age specific differences in incidence (Table 4). There was no difference between Alffram's population and the population in this study, whereas all the other studies showed significant differences. The age specific incidence of trochanteric femoral fractures in this and earlier studies is presented for women (Figure 1) and men (Figure 2).

DISCUSSION

The number of old people and proximal femoral fractures has increased in Sweden during the last 30 years. Mårtensson (1962) and Alffram (1964) pointed out that the increase during the fifties was greater than could be expected from the increased number of old people. This was not confirmed by Nilsson & Obrant (1978) from the late sixties to the early seventies. Falch & Ilebekk (1978), Jensen (1980a) and Zetterberg & Andersson (1982) have, however, found an increasing incidence of non-age related fractures in the proximal femur during the seventies in various towns in Scandinavia. This increase was greatest in trochanteric fractures and in women in all reports.

In the age groups 70–74 years both men and women had an incidence for trochanteric femoral fracture of about 0.7 promille (Table 1). This is lower than in other series. The age difference in incidence was negligible in our material in all age groups whereas an increase from 70 years and upwards has been reported in other studies. This is, however, not as pronounced in the series from Malmö (Nilsson & Obrant 1978). When looking at the age group 80–84 years, it is found that incidence has increased by a factor of four (Table 1) and in other materials even more for women.

An exponential increase by age for fractures of the proximal femur has been presented in all materials. However, we could not find any unexpected age specific increase for trochanteric femoral fractures when comparing our data with that of Alffram (1964).

Hansson et al. (1982) have found a slight unexpected age specific increase in incidence for trochanteric femoral fractures when comparing data from Lund 1962 with Alffram's series.

The ethnic and geographic differences found in incidence for hip fractures have previously been discussed by Lewinnek et al. (1980). Less than half of our patients came from an urban district compared to all patients in the referred studies. The sex difference in incidence found in other studies could not be found in our patients.

The proportion of unstable fractures has increased from about 30 per cent in Evans' material (1949) to the about 60 per cent found by us and others (Chapman et al. 1981, Jensen et al. 1980). Jensen et al. (1980) claimed that the number of unstable fractures increased with the age. This could not, however, be statistically documented in this study. Old women and young men had an increased, non-significant, number of fragmented, and thus unstable, fractures.

The increasing number of old people with a high risk of sustaining an unstable trochanteric fracture increases the risk of complications and puts the utmost importance on the choice of operative treatment.

ACKNOWLEDGEMENT

Statistical adviser: Klas Svensson, Department of Statistics, University of Lund, Lund, Sweden.

REFERENCES

Alffram, P. A. (1964) An epidemiologic study of cervical and trochanteric fractures of the femur in an urban population. *Acta Orthop. Scand.*, suppl. 65.

Chapman, M. W., Bowman, W. E., Csongradi, J. J., Day, L. J., Trafton, P. G., Bowill, E. G. (1981) The use of Ender's pins in extracapsular fractures of the hip. *J. Bone Joint.* **63**-A, 14–28.

Dimon, J. H. & Hughston, J. C. (1967) Unstable intertrochanteric fractures of the hip. *J. Bone Joint Surg.* **49**-A, 440–450.

Evans, E. M. (1949) The treatment of trochanteric fractures of the femur. *J. Bone Joint Surg.* **31**-B, 190–203.

Falch, J. & Ilebekk, A. (1978) Fractures of the proximal end of the femur. Prevalence and incidence in Oslo, 1950–1975. *Tidskr. Nor. Laege-for.* **14**, 738–739.

Hansson, L. I., Ceder, L., Svensson, K. & Thorngren, K.-G. (1982) Fracture incidence of distal radius and proximal femur for patients in a mental hospital compared to the general population. *Acta Orthop. Scand.*, in press.

Jensen, J. S. (1980a) Incidence of hip fractures. *Acta Orthop. Scand.* **51**, 511–513.

Jensen, J. S., Sonne-Holm, S. & Töndevold, E. (1980) Unstable trochanteric fractures. A comparative analysis of four methods of internal fixation. *Acta Orthop. Scand.* **51**, 949–962.

Lewinnek, G. E., Kelsey, I., White, A. A. & Kreiger, N. J. (1980) The significance and a comparative analysis of the epidemiology of hip fractures. *Clin. Orthop.* **152**, 35–43.

Miettinen, O. S. (1974) Sample interval estimation of risk ratio. *Am. J. Epidemiol.* **100**, 515–516.

Mårtensson, L. (1962) Is hospital planning adequate? Statistical survey on femoral neck fractures. (In Swedish). *Läkartidningen* **59**, 3185–3200.

Nilsson, B. E. & Obrant, K. J. (1978) Secular tendencies of the incidence of fracture of the upper end of the femur. *Acta Orthop. Scand.* **49**, 389–391.

Zetterberg, C. & Andersson, G. B. J. (1982) Fractures of the proximal end of the femur in Gothenburg, Sweden, 1940–1979. *Acta Orthop. Scand.*, in press.

Correspondence to: Anders Wallöe, Department of Orthopaedic Surgery, University Hospital, S-221 85 Lund, Sweden.