Acta Orthop Scand 55, 284–289, 1984

Rising incidence of hip fracture in Uppsala, 1965–1980

The frequency and incidence of hip fracture in persons aged 55 years and older in the county of Uppsala during the years 1965, 1970, 1975 and 1980 are reported. For every 5-year interval, the number of hip fractures increased by 21–25 per cent. The ratio of women to men changed from 3.8 in 1965 to 3.1 in 1980. Trochanteric fractures were more common during the later years. The ratio of femoral neck fractures to trochanteric fractures decreased from 1.8 to 1.1 between 1965 and 1980. The incidence of hip fracture in the investigated part of the population increased from 43 per 10 000 in 1965 to 65 in 1980. The age-specific incidence increased especially in the group aged 85 years and older, in which fractures of the femoral neck were three times and trochanteric fractures four times more common in 1980 than in 1965. This investigation shows that the incidence of hip fracture has increased, particularly in the higher age groups. If the age-specific incidences continue to rise in the higher age groups, the frequency of hip fractures will be doubled within a 20-year period.

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The incidence of hip fracture, i.e. fractures of the neck of the femur and trochanteric fractures, among elderly persons has been dealt with in several epidemiological investigations (Stewart 1955, Mårtensson 1962, Alffram 1964, Nilsson & Obrant 1978, Jensen 1980, Fenton 1981, Zetterberg & Andersson 1982). In studies published in recent years (Jensen 1980, Fenton 1981, Zetterberg & Andersson 1982, Frandsen & Kruse 1983), the observed incidence of hip fracture among the elderly has been found to exceed the predicted figure calculated about 20 years ago by Mårtensson (1962) and Alffram (1964).

Furthermore, the mean age of patients sustaining hip fractures has risen during the last decades. In 1950–1969 it varied between 64 and 75 years in different materials (Evans 1951, Clawson 1957, Alffram 1964, Johnson et al. 1968, Öhman et al. 1968). In studies in the seventies, this mean age was found to vary from 74 to 78 years (Friedenberg et al. 1972, Riska 1970, Dahl 1980, Jensen 1980).

In addition to those studies in which it has been demonstrated in general that the risk of hip fractures increases with age (Mårtensson 1962, Alffram 1964, Gallanaugh et al. 1976, Nilsson & Obrant 1978, Jensen 1980), attempts have been made to elucidate more specifically the influence of age on the increased incidence of hip fractures. In their investigation of a Gothenburg series, Zetterberg & Andersson (1982) found that the incidence of hip fractures had increased by about 40 per cent from 1965 to 1979. They also found that the observed increase in incidence greatly exceeded the increase predicted from previous figures. On the basis of these data, it may be forecast that the present incidence will probably be doubled by about the year 2000.

Nilsson & Obrant (1978) and Jensen (1980), on the other hand, found no increase in the fracture incidence in studies of certain decades in Malmö and Gentofte, respectively. Later investigations, however, have pointed to an increase of about 30 per cent in the incidence of hip fracture in Malmö (Nilsson, personal communication).

Thus, there may be a reason for the rising fracture incidence in addition to the increased number of elderly persons. The aim of the present study was to supplement previous epidemiologic investigations in order to ascertain how the incidence of hip fracture has changed during the last 15 years.

Material and methods

In the county of Uppsala, patients with hip fractures were treated in two hospitals only – the University Hospital in Uppsala and the County Hospital in Enköping during the years 1965, 1970, 1975 and 1980, i.e. 1-year series with 5-year intervals. Information on the number of hip fractures that occurred in the county during these 5 years was obtained from the admission registers, operation records, patient's medical records including roentgen referral notes, and statistics from the patient records of the above-mentioned hospitals.

Patients from other counties with hip fractures who had been treated primarily in one of the hospitals in the county of Uppsala were not included in the study. On the other hand, patients from the county of Uppsala who had received primary treatment in another county but had then been transferred to the University Hospital in Uppsala or the County Hospital in Enköping for aftercare were included. It is possible that a few residents of the county of Uppsala with hip fractures may have been treated in outside hospitals and escaped being recorded in their home county. Such cases are rare, however, and were therefore not considered to have any practical influence on the results of this study.

Patients below 55 were excluded from the study, as hip fractures in these patients are usually caused by high-energy trauma and must therefore be regarded as completely different from ordinary hip fractures in the elderly, which are generally caused by a simple fall.

Information on the number of inhabitants and the age distribution in the county of Uppsala from 1940 onwards was obtained from the Central Bureau of Statistics (SCB). Through changes of the county boundaries on 1 January 1971, about 5 000 persons were added to the county population – an increase of 2 per cent. This change is negligible, as regards the present comparisons. The hip fractures in the four 1-year-series studied were related to the population statistics for the corresponding years (SCB 1967, 1971, 1976, 1981).

Results

Number of hip fractures

The number of hip fractures in the county of Uppsala increased from 210 in 1965 to 389 in 1980 (Table 1). In the three 5-year intervals, the increases amounted to 22, 21 and 25 per cent, for a total increase during this 15-year period of 85 per cent.

Table 1. Hip fractures, by type, year and sex, in the county of Uppsala.

Fracture (type and year)	Men	Women	Both
Femoral neck			
1965	23	112	135
1970	37	113	150
1975	41	129	170
1980	48	158	206
Trochanteric			
1965	21	54	75
1970	21	86	107
1975	32	110	142
1980	47	136	183
Both			
1965	44	166	210
1970	58	199	257
1975	73	239	312
1980	95	294	389

The women/men ratio gradually decreased from 3.8 in 1965 to 3.1 in 1980.

The relation between the two types of fracture also changed over the years. In 1965, fractures of the femoral neck were almost twice as frequent as trochanteric fractures, whereas in 1980 the two types were almost equally common.

The mean age of the patients increased successively during the 15-year period (Table 2). The mean age of patients with fractures of the femoral neck was 72 years in 1965 and 76

Table 2. Mean age of patients 55 and over with hip fractures, by type, year and sex, in the county of Uppsala

Fracture (type and year)	Men	Women	Both
Femoral neck			
1965	66	73	72
1970	70	76	74
1975	73	76	75
1980	74	77	76
Trochanteric			
1965	71	74	73
1970	72	77	76
1975	73	78	77
1980	75	80	79
Both			
1965	68	73	72
1970	71	76	75
1975	73	77	76
1980	74	78	77

Table 3. Population development from 1965 to 1980 in the county of Uppsala

Year	No. of individuals (index) in different age groups					
	55–64	65–74	75–84	85–	55 years and older	Whole population
1965	20 418 (100)	15 504 (100)	7 578 (100)	1 415 (100)	44 915 (100)	183 701 (100)
1970	23 372 (114)	18 459 (119)	9 786 (129)	1 929 (136)	53 546 (119)	217 730 (119)
1975	23 747 (116)	19 907 (128)	10 811 (143)	2 313 (163)	56 778 (126)	230 028 (125)
1980	24 170 (118)	20 577 (133)	11 813 (159)	3 094 (219)	59 654 (133)	243 585 (133)

years in 1980, and that of patients with trochanteric fractures 73 and 79 years. The most pronounced increase in mean age was found for men with femoral neck fractures, namely from 66 years in 1965 to 74 years in 1980.

Over the years, a shift took place from younger to older patients. In 1965, patients under 80 constituted 72 per cent of the fractures. In 1980, patients over 80 constituted a narrow majority with 52 per cent.

Population development

The Uppsala County Government (1980) has estimated that by 1990 the population of the county will have reached 255 200, and that by the year 2000 the population will be 263 400. (Table 3).

The proportion of the age groups 75–84 years and over 85 years is increasing in the population.

Incidence

The incidence of hip fractures, i.e. the number of fractures per 10 000 inhabitants of ages 55 years and older, rose from 43 in 1965 to 65 in 1980 (Table 4).

No definite change in the fracture incidence was found in the 55–64-year group. In the age group 65–75 years, there was no unequivocal trend. In men the incidence tended to increase, whereas in women it tended to decline. In the 75–84-year age group, the fracture incidence varied rather irregularly, but from 1965 to 1980 it increased in men from 55 to 84 and in women from 150 to 200 per 10 000. The group

Table 4. Age-specific incidence of hip fracture by type, year and sex in the county of Uppsala

Year	Incidence per 10 000 in each age group														
	55–64			65–74			75–84			85–			>55		
	♂	♀	♂+♀	♂	♀	♂+♀	♂	♀	♂+♀	♂	♀	♂+♀	♂	♀	♀+♀
Femoral neck															
1965	5	14	10	11	49	32	21	93	62	16	73	49	10	43	27
1970	4	9	7	19	31	25	31	103	73	37	125	88	15	40	28
1975	8	7	7	18	41	30	22	77	55	58	199	147	16	43	30
1980	3	9	6	14	25	20	45	112	85	68	208	161	17	49	35
Trochanteric															
1965	3	4	3	6	17	12	34	56	46	17	85	57	9	20	15
1970	5	6	6	6	15	11	10	77	48	74	178	135	8	39	27
1975	1	2	2	11	19	16	29	85	62	70	234	173	12	36	25
1980	3	8	5	11	15	13	39	85	66	126	252	210	17	42	31
Both															
1965	8	18	13	17	66	43	55	149	108	34	159	106	19	63	43
1970	10	15	12	25	47	36	41	180	121	111	303	223	23	70	48
1975	9	9	9	30	59	46	51	163	117	128	436	320	28	78	55
1980	6	17	12	26	39	33	84	197	151	194	460	372	34	91	65

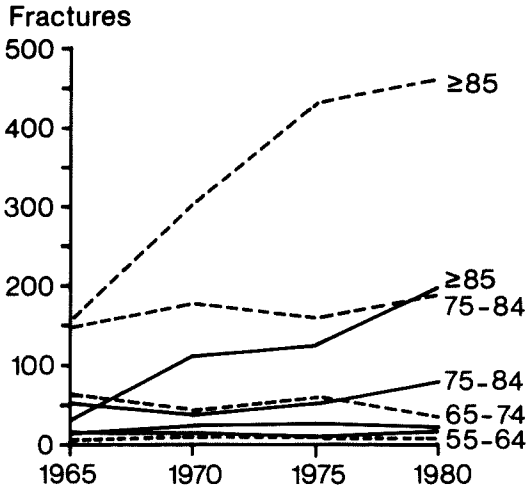

Figure 1. Hip fractures in the county of Uppsala 1965–1980. Age-specific incidence per 10 000 (—— men, - - - women).

of over 85 showed a considerable increase in fracture incidence. Among the men in this group it rose from 34 to 190 from 1965 to 1980, and among the women from 160 to 470 (Figure 1).

The relative proportion of fractures of the femoral neck and trochanteric fractures changed markedly during the period examined (Figure 2). In the lower age groups, the incidence of both types of fracture remained essentially unchanged. In the age group 75–85 years, the incidence tended to increase somewhat for both fracture types. Among persons over 85 years of age, the fracture incidence rose substantially. Among these very old persons, the frequency of femoral neck fractures increased three-fold and that of trochanteric fractures four-fold.

Discussion

This investigation has shown that the incidence of hip fractures has increased in recent years, especially among elderly and very old persons. A considerable change in age took place in the fracture materials, and the proportion of persons over 80 increased from 29 per cent in 1965 to 51 per cent in 1980.

Women are still predominant in hip fracture materials, but the sex difference is becoming less pronounced. This levelling out of the difference between men and women runs essentially parallel with a rising mean age of patients with hip fractures, perhaps reflecting that sex differences in the degree of osteoporosis tend to decrease with increasing age (Zain Elabdien et al. 1984).

From being almost twice as frequent as trochanteric fractures, the relative proportion of fractures of the femoral neck has decreased; in 1980 these two types of fractures were almost equally common. This change is more difficult to explain, as it can only have been caused to a limited extent by a larger proportion of old patients.

The rising fracture incidence in the county of Uppsala is in accordance with the results of studies in Gothenburg (Zetterberg et al. 1983a). Zetterberg & Andersson (1982) found that hip fractures in persons over 80 had increased by about 100 per cent in the last 15 years. This is in accordance with our results: in the age group 74–85 years the increase was about 50 per cent and in the group 85 years old and older, it was more than 200 per cent. Similar findings have been made in other parts of Europe (Fenton 1981). Thus, the increase in hip fractures is a reality which in itself is difficult to explain.

One important reason why hip fractures have become more common could be found in

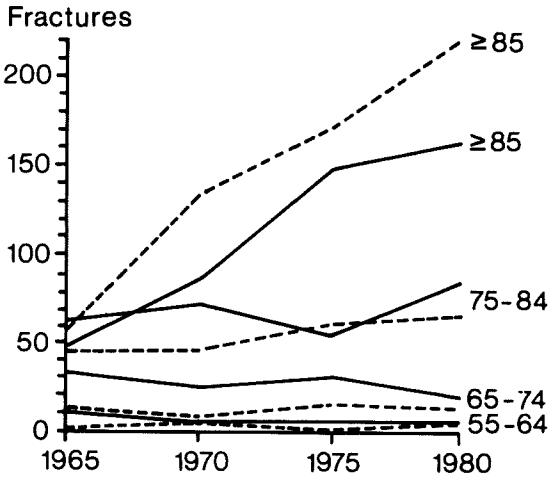

Figure 2. Hip fractures in the county of Uppsala 1965–1980. Age-specific incidence per 10 000 (—— neck, - - - trochanteric).

the occurrence of osteoporosis, which is age-related and also enhances the risk of fracture. It is conceivable that with improved medical treatment, persons with a greater tendency to osteoporosis might live to an increasingly advanced age. Moreover, it has been shown that as a group, patients with proximal femoral fractures have higher morbidity than the population at large (Smith & McLauchlan 1975, Lender et al. 1976, Hagberg & Nilsson 1977, Nilsson 1970, Stevens et al. 1962, Zetterberg et al. 1983a). Factors such as previous gastrectomy, the use of certain drugs, and osteomalacia, i.e. conditions leading to a lower mineral content in the skeleton, are more common in this patient category (Aaron et al. 1974, Bauer 1960, Nilsson 1970, Nilsson & Westlin 1971, O'Driscoll 1973). Furthermore, compared with the normal population, these patients more often have diseases that result in physical inactivity as well as an increased risk of falling, e.g. cardiovascular and neuromuscular diseases, diabetes mellitus and thyrotoxicosis (Boucher 1959, Dolk & Westerborn 1977, Alffram 1964, Ceder 1980, Gallagher et al. 1980, Zetterberg et al. 1983b). Since, however, the survival among the population at risk has not increased, and since the incidence of hip fractures has mainly risen in the highest age groups, it would rather seem more probable that, generally speaking, during recent decades, the older population has developed more pronounced osteoporosis.

Studies in recent years have indicated that excessive consumption of alcohol and smoking increase the risk of developing osteoporosis (Holló et al. 1979, Kershbaum et al. 1968, Nilsson 1970, Daniell 1972, 1976). These, however, are factors which may have a greater impact in the future (Mellström & Rundgren 1983). At present, their importance seems to lie more on the individual prophylactic level. On the other hand, alcohol and smoking would hardly have had any quantitative influence on the osteoporosity in the present material, as the majority of the patients were non-smoking women with no or minimal alcohol consumption.

A possible explanation for the increased general tendency to osteoporosis is inactivity. Elderly and old, more or less healthy people are no longer forced to be physically active, as in earlier times. It is also conceivable that improved social services, for example the introduction of transport service and home help for the elderly and disabled has reduced the demand for physical activity among older persons, and thus led to increased osteoporosis and a greater vulnerability to fractures.

Hip fractures will probably continue to be a great quantitative problem in the foreseeable future. If the incidence of hip fractures remains unchanged and the population increases as predicted, the number of fractures in the county of Uppsala will amount to just over 400 in the year 1990 and to about 420 in the year 2000. If, on the other hand, the age-specific incidences continue to rise, especially in the higher age groups, a considerably greater increase in the number of hip fractures may be expected. It is not at all improbable that the frequency of hip fractures will double within a 20-year period (Zetterberg et al. 1983a, Frandsen & Kruse 1983).

At the present time, hip fractures are placing great demands upon orthopaedic surgical resources. There is a risk that the discrepancy between the need created by the increased fracture incidence and the availability of such resources will become wider in the coming years.

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