

Epidemiology of hip fractures in Norway

During the 2-year period 1978-1979, a total of 2109 hip fractures (of the proximal end of the femur) occurred in Oslo. The age- and sex-specific annual incidence was the highest ever reported. A previous hip fracture had occurred in 13 per cent of the women and 6.8 per cent of the men. In 1979, a total of 5920 hip fractures was reported in Norway. Compared with Oslo, all other counties had a lower incidence. The number of fractures in Oslo was five times greater in 1982 compared with 1950. This increase cannot be explained only by the increasing number of elderly persons.

**Jan A. Falch
Arnfinn Ilebek¹
Ulf Slungaard¹**

Medical Department B and
¹Orthopedic Surgical Department, Aker Hospital, Oslo, Norway

Hip fracture in the elderly places a major burden on the medical services (Gallanaugh et al. 1976, Nilsson & Obrant 1978, Evans et al. 1979, Gallagher et al. 1980, Jensen 1980). As significant geographical differences in incidence have been found (Alffram 1964, Gallagher et al. 1980), and the incidence seems to increase dramatically (Mårtensson 1962, Alffram 1964, Nilsson & Obrant 1978, Baker 1980, Lewis 1981, Baldwin 1982), local studies should be carried out to evaluate the magnitude of the health problem constituted by hip fractures. Since a very high incidence of fractures of the distal end of the forearm has been reported from Oslo (Falch 1983), a study of the incidence of hip fracture in the same population would be of interest, particularly because the data may be compared with earlier data and with data from other parts of Norway.

Patients and methods

In Oslo there are six hospitals to which a resident patient suspected of fracture would be referred. Using the diagnosis register of the hospitals, the medical records were found for all patients admitted with a new hip fracture in Oslo from Jan. 1, 1978 to Dec. 31, 1979. All fractures proximal to the lesser trochanter, except those only intersecting the greater trochanter, were included and divided into cervical or trochanteric. Using the population of Oslo on Dec. 31, 1978 (Central Bureau of Statistics of Norway 1979) as the population at risk, the age- and sex-specific annual incidences were calculated. For each patient, information from the records about previous and concomitant medical conditions was obtained.

All 67 Norwegian hospitals outside Oslo treating patients with hip fractures were asked to report the number treated in 1979. Norway is divided into 19

counties, and patients are preferentially admitted to a hospital in their county of residence. The age- and sex distribution of the counties in 1979 is known (Central Bureau of Statistics of Norway 1980).

The annual age- and sex-specific incidences in Oslo 1978/1979 were used to calculate the expected number of fractures for each county, the sum being the total number of fractures expected in the county.

The annual numbers of hip fractures in Oslo from 1950 to 1982 were recorded. From 1950 to 1975 numbers were available only from the two largest hospitals. However, in these two hospitals 88 per cent of all patients with hip fracture were treated in 1978 and 1979. For 1976-1982 annual numbers were available from all six hospitals. Two small hospitals were not included for the periods 1976-1977 and 1980-1982 since their registers did not separate admissions for new fracture - in 1978 and 1979 only 2.8 per cent were treated in those two hospitals.

Results

During the period of observation, a total of 2109 patients residing in Oslo were admitted to hospital with a hip fracture, of whom 78 per cent were women. Thirty-one women and two men sustained two fractures within the period - both have been recorded. Four men and one woman had cancer metastases at the fracture site.

There was an exponential increase with age in the incidence of both sexes (Table 1). In women, the ratio cervical to trochanteric fractures (C/T) decreased with age (Figure 1); in men, it remained more constant.

Of the 2109 fractures recorded, there were incomplete records in nine, and 33 patients sustained two fractures during the period of observation, leaving a total of 2067 patients

Table 1. Hip fractures in Oslo

Sex	Age group	Population Dec 31 1978	Number of fractures		Annual incidence of fractures per 10 000		
			1978	1979	Cervical	Trochanteric	Both
F	30-	29 611	4	1	0.2	0.7	0.9
	40-	21 814	10	4	2.5	0.7	3.2
	50-	14 023	13	9	4.6	3.2	7.8
	55-	17 477	30	32	13	4.6	18
	60-	17 205	54	46	22	7.3	29
	65-	16 994	78	53	25	14	39
	70-	15 043	109	118	50	25	76
	75-	12 753	195	166	91	50	142
	80-	7 738	193	187	152	94	246
	85-	3 296	132	102	185	170	355
90-	1 065	60	42	216	263	479	
M	0-	49 366	0	1	0	0.1	0.1
	20-	36 879	4	2	0.4	0.4	0.8
	30-	32 060	1	6	0.5	0.6	1.1
	40-	21 108	9	13	2.1	3.1	5.2
	50-	12 856	7	6	2.3	2.7	5.0
	55-	14 889	13	9	3.7	3.7	7.4
	60-	13 513	24	20	7.4	8.9	16
	65-	11 742	25	37	12	14	26
	70-	8 791	37	29	25	13	38
	75-	6 112	39	40	38	27	65
	80-	3 181	44	43	96	41	137
	85-	1 219	16	24	86	78	164
90-	356	13	9	184	126	309	

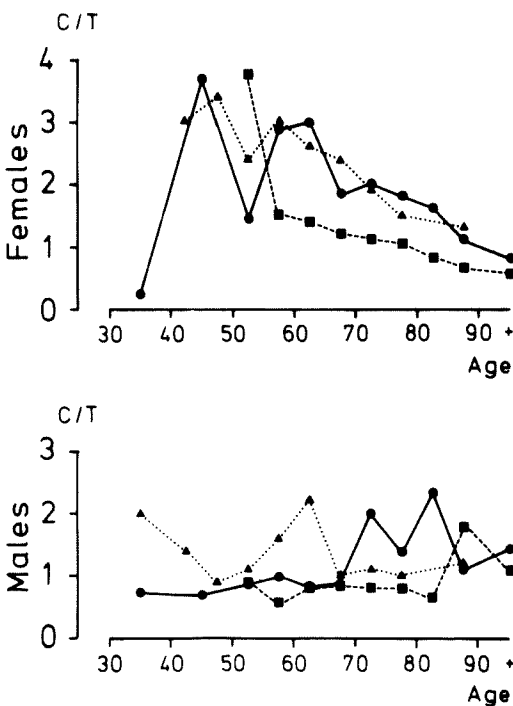


Figure 1. Ratio of cervical to trochanteric fractures in age- and sex groups. Data also calculated for the urban populations of Malmö (Alffram 1964) and Copenhagen (Jensen 1980). ●—● Oslo, ▲—▲ Malmö, ■—■ Copenhagen.

whose records could be researched for coinciding medical conditions (Table 2).

In patients with more than one hip fracture, there was a history of alcoholism in 37 per cent of the men and 4 per cent of the women, and of gastric resection in 19 and 7 per cent, respectively.

All 67 hospitals questioned about the number of fractures treated in 1979 replied. In one hospital (in Nordland county) the data may not be reliable but an estimate was made. Including Oslo, 5920 fractures were reported. With a population of 2 855 018 over the age of 20 years, the annual incidence for the whole country was 20.7 per 10 000. All counties had a lower incidence than Oslo (Figure 2), and eight

Table 2. Medical conditions coinciding with hip fracture (per cent)

	Women	Men
Diabetes	5.0	2.1
Chronic respiratory disease	6.0	11.9
Anti-convulsive drugs	1.8	4.3
Alcoholism	2.2	16.6
Previous hip fracture	13.1	6.8

had less than 85 per cent of the Oslo incidence. Although there was no clear relationship between incidence and latitude, the three most Northern counties all had a relatively low incidence. Two counties had less than 50 per cent incidence, and their medical officers of health were asked how hip fractures were handled. Even after correction for patients possibly treated outside hospital or in other counties, the ratio did not exceed 50 per cent.

In the city of Oslo there was a nearly linear increase from 233 fractures in 1950 to 815 fractures in 1975. From 1976 to 1982, patients

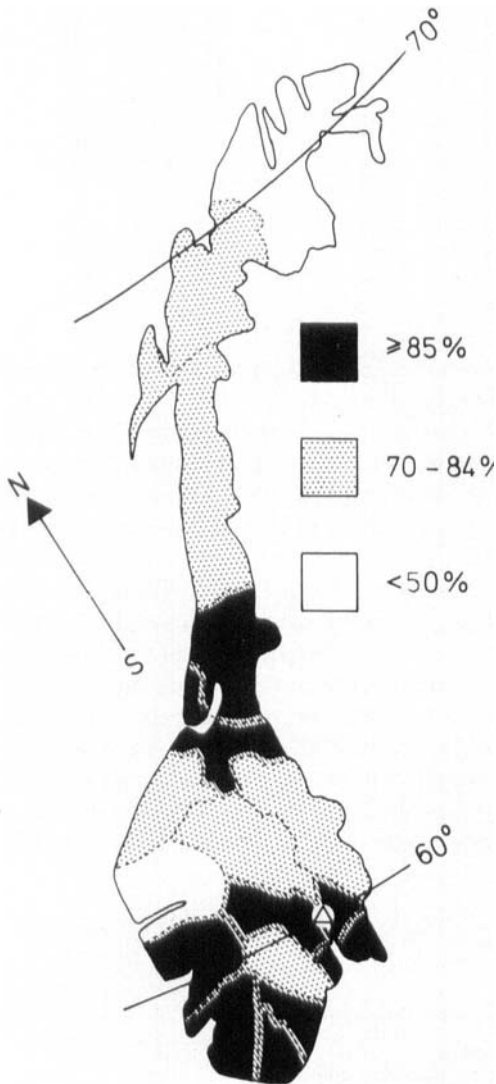


Figure 2. The geographical variation of the incidence of hip fractures in Norway 1979 compared to Oslo (100%). Δ : Geographical location of Oslo.

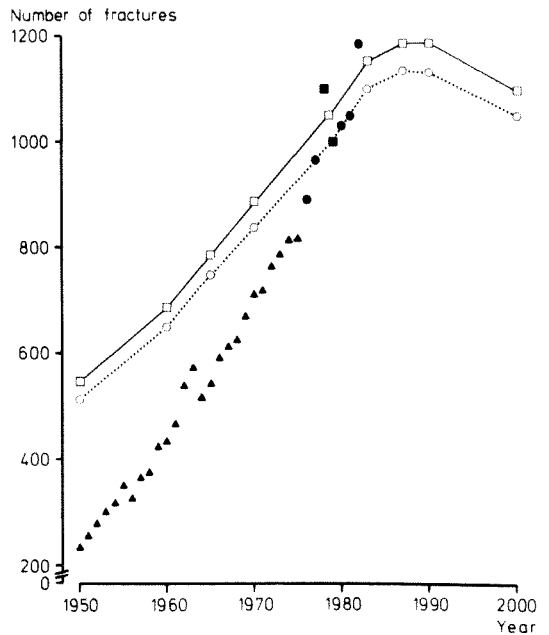


Figure 3. Observed and expected hip fractures in Oslo, 1950-2000. \blacktriangle 2 hospitals observed; \bullet 4 hospitals observed; \blacksquare all hospitals observed; \square — \square expected fractures calculated from the incidence 1978/1979; \circ — \circ expected fractures calculated from the incidence 1979.

from two more hospitals were included. In the period from 1976 to 1982, the number increased from 892 to 1187. Assuming the annual incidence from 1978/1979 had remained unchanged from 1950, the expected number of fractures based on the population censuses of 1950, 1960, 1965 and 1970 showed a nearly linear increase from 542 fractures in 1950 to the number observed in 1978/1979 (Figure 3).

Using the population projections made by the Central Bureau of Statistics of Norway (1979), the expected number of fractures until the year 2000 was calculated using the annual incidence 1978/1979. A maximum of 1186 should be attained in 1987, but thereafter an annual decrease is expected. However, by 1982 the observed number equalled the maximum expected in 1987 (Figure 3).

Discussion

In Oslo, each year more than 1000 patients are admitted to hospital with a fracture of the proximal end of the femur. Because of the distinct clinical symptoms, probably all fractures

come to medical attention; only some patients with impacted fractures may have remained unknown. No attempts were made to search for patients from Oslo admitted to hospitals outside the city, since the policy is to transfer such patients back to a hospital near their place of residence.

The annual incidence of fractures in Oslo demonstrates the same exponential increase with age as in other Caucasian populations. The incidence is, however, the highest reported (Gallagher et al. 1980, Zetterberg & Andersson 1982), regardless of age and sex. Since, again regardless of age and sex, the incidence of fracture of the distal end of the forearm has also been reported to be high in Oslo (Falch 1983), this may indicate poor skeletal strength in the population of the city, which could be due to a high prevalence of metabolic bone disease.

Osteomalacia has been reported to be present in as many as 20–30 per cent of patients with fracture of the proximal end of the femur (Aaron et al. 1974, Hoikka et al. 1982, Lund et al. 1982), but there are no reports on the prevalence of this disease among patients with fracture of the distal end of the forearm.

In women, the ratio of cervical to trochanteric fractures declined steadily with age. This tendency was also found in a study from Denmark (Jensen 1980) and can be calculated from the data of Alffram (1964). Since bone mass declines with age, the decreasing ratio might signify that trochanteric fractures are more prone than cervical to occur in an osteoporotic population. However, this view is not supported by bone mineral measurements of the proximal end of the femur (Riggs et al. 1982).

The incidence of patients with gastric resection was 5 per cent, which is almost the same as that found by Gallagher (1980). In Alffram's study (1964), 8 per cent had had "earlier gastric surgery". Nilsson & Westlin (1971) reported previous gastrectomy in 10 per cent of male patients under the age of 70. For the same group, the rate in Oslo was 13 per cent. Metabolic bone disease is a well-known complication after gastric resection, osteomalacia being most frequently reported (Eddy 1971).

In Swedish observations, 19 per cent of men under 70 years with fracture of the proximal end of the femur were alcoholics (Nilsson

1970). In Oslo, the percentage was 30. The increased risk for a middle-aged male alcoholic of sustaining a fracture was also reported by Snell (1971). In addition to frequent falls, a decreased bone mass in alcoholics (Saville 1964, Nilsson & Westlin 1973) may explain their increased fracture liability.

As many as 13 per cent of the women and 7 per cent of the men had sustained a previous hip fracture. In Alffram's study (1964), 6 per cent of the women and 4 per cent of the men had sustained a previous fracture. In a combined study from Athens and Geneva (Dretakis et al. 1981), 9 per cent of the women and 4 per cent of the men had sustained a previous fracture. In a study of previous fractures among 500 hip fracture patients in England, Boston (1982) found rates of 11 and 10 per cent in women and men, respectively. Combined with the high incidence of forearm (Falch 1983) and hip fractures in Oslo, the high incidence of second fractures suggests that women in Oslo may have more osteoporosis than women in other countries, or even in other parts of Norway.

Oslo has the highest incidence of hip fractures in Norway – the lowest is found in the middle part of Southern Norway and in the three Northern counties. Although winter lasts longer in the Northern regions, the risk of falls on slippery streets is not followed by an increased number of fractures (Ráliš 1981). As osteomalacia may be a predisposing factor for these fractures, one might have expected an increase in incidence with fewer hours of sunshine in the high latitudes. However, reports from Tromsø (70°N) have shown that the vitamin D status at least among young and middle-aged persons is normal (Vik et al. 1980). A higher than average intake of vitamin D and calcium has been reported from the Northern counties, but the difference from the rest of the country is minor (Solvang 1982).

In Oslo, the number of hip fractures increased linearly by a factor of five from 1950 to 1982. The data is impaired by the fact that the study is retrospective and that all patients may not have been included. Therefore statistical analysis of the differences was not undertaken. Nevertheless, the data show a tendency to secular increase in the incidence of hip fractures

in Oslo. This is in accordance with data from other countries (Mårtensson 1962, Alffram 1964, Nilsson & Obrant 1978, Baker 1980, Lewis 1981, Baldwin 1982). However, there have also been observations with opposite results (Melton et al. 1982), and only studies in the years to come will clarify this problem in the city of Oslo.

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