Incidence of hip fractures in the elderly

Uppsala County 1980–1987

Lars Rehnberg and Claes Olerud

The age-, sex-, and fracture-type-specific annual incidence of hip fracture in patients over 55 years of age in Uppsala County were computed for the years 1980 to 1987. The number of fractures increased by less than 2 percent annually. The increase was mainly due to age changes in the population. The overall increase in specific incidence rates was approximately 1 percent; and most age, sex, and fracture-type groups demonstrated an unaltered incidence. Cervical fractures in women 55 to 64 and 75 to 84 years of age decreased in specific incidence.

We report the age- and sex- specific incidence of cervical and trochanteric hip fracture in persons over 55 years of age from 1980 to 1987 in Uppsala County. The development of the incidence rates over the years in question has been analyzed with regression analysis. The figures have been used to make a forecast for the year 2000.

Patients and methods

In Uppsala County, only two hospitals admit patients with hip fracture. The number of cervical and trochanteric hip fractures in patients over 55 years of age sustained in the county during the years 1980 to 1987 was established from admission records and patient charts. The data were checked by examining the operation notes and all the operation lists during the years in question. Patients from our catchment area operated on outside the area were included in the study, whereas residents of other counties operated on in one of our hospitals were excluded. Demographic data concerning the population was obtained from the official statistics of the County Administration (16).

In 1980, our catchment area had 59,654 inhabitants over 55 years of age. In 1987, the corresponding figure was 60,905.

The patients were divided into groups based on age (10-year strata), sex, and fracture type (cervical or trochanteric). For both cervical and trochanteric fractures, the age- and sex-specific incidences were computed for each year of the study.

To estimate if a change in specific incidence had occurred from 1980 to 1987, a linear regression analysis was performed for each group. The groups where the slope of the fitted line differed from zero were considered to have a change in specific incidence. Groups without such a difference were considered to have an unaltered incidence over the years. This unaltered incidence was calculated as the average incidence over the years 1980 to 1987.

A forecast for the year 2000 was established by multiplying the calculated incidence for each age, sex, and fracture-type group for the year 2000 with the corresponding forecast of the population at risk. The population forecast was the official demographic statistics issued by the County Administration based on both the shift in the population caused by deaths and births and the expected migration of people into and out of the catchment area (3). By the year 2000, the background population over 55 years of age in the catchment area was estimated to increase to 74,123.

Department of Orthopedics, University Hospital, S-751 85 Uppsala, Sweden

For the groups with changing incidence, the incidence for the year 2000 was computed by extrapolation of the fitted line for the development of the specific incidence. However, negative values were not considered; the group with a forecast of less than zero was assigned zero. For the groups with unaltered incidence during the years 1980 to 1987, the average incidence during these years was used.

Results

In 1980, there were 349 hip fractures and in 1987, 392 hip fractures (Table 1), i.e., an increase by 12 percent. The annual increase in total number of fractures was less than 2 percent. During the same period, the total incidence of hip fracture in inhabitants at risk increased from 5.9 per 1,000 to 6.4 per 1,000 (Table 2). The specific incidence was constant in most age, sex, and fracture type groups. However, the incidence of cervical hip fracture in women between 55 and 64 years of age, as well as 75 and 84 years of age, dropped.

The estimated forecast for the year 2000 was 404 fractures, based on the average incidence of the groups with unaltered incidence and extrapolation of the incidence of the groups with changing incidence of hip fractures (Table 1).

For the convenience of readers with a special interest in the field, all the basic data appear in Table 3.

Table 1. The change in the number of fractures treated in Uppsala County from 1980 to 1987. A forecast for the year 2000 is also included

	Cervical		Trochanteric		
Year	Men	Women	Men	Women	Total
1980	46	161	31	111	349
1	57	182	39	109	387
2	65	184	29	100	378
3	66	174	34	115	389
4	72	181	24	116	393
5	74	153	41	117	385
6	33	150	42	109	334
7	63	172	40	117	392
2000	72	143	42	147	404

Discussion

The number of hip fractures in the elderly has increased dramatically during the last 30–40 years, owing to an increase in the population at risk and a change in specific incidence in various age and sex groups (1, 7, 8, 14, 20). The number of fractures have been estimated to double in the next 15–20 years (1, 2, 4, 12, 15). The same trend was reported from our catchment area for the years 1965 to 1980 by Zain Elabdien et al. (19).

For the year 1980, there is a discrepancy between the figures reported by Zain Elabdien et al. (19) and ours in spite of the two reports coming from the same region. Zain Elabdien et al. reported a total of

Table 2. Number of fractures per 1,000 inhabitants at risk in the various groups

	Aged 55–64				Aged 65–74				Aged 75–84				Aged > 84				
A	B	C	D	E	B	C	D	E	B	C	D	E	B	C	D	E	F
1980	0.5	1.3	0.3	0.6	0.9	2.7	0.4	1.4	3.9	10.2	2.3	7.9	11.7	21.3	12.6	16.5	5.9
1981	0.6	1.3	0.3	0.6	1.2	2.9	0.8	2.0	6.2	11.3	3.8	5.9	6.8	25.4	7.7	17.8	6.5
1982	0.4	0.8	0.3	0.7	1.9	3.4	0.6	1.3	5.1	11.9	2.9	6.0	14.8	22.9	4.6	15.7	6.3
1983	0.8	1.1	0.2	0.5	1.4	2.4	1.4	1.4	5.3	10.4	2.5	7.0	14.7	24.5	5.5	18.4	6.4
1984	0.3	1.1	0.2	0.2	2.1	2.7	0.6	1.5	5.0	10.0	2.1	6.8	19.4	28.4	4.4	18.7	6.4
1985	0.4	0.8	0.4	0.5	1.7	3.0	0.8	1.7	6.5	8.6	3.8	6.9	15.0	17.7	6.2	16.0	6.3
1986	0.1	0.8	0.5	0.2	0.6	2.7	0.9	1.2	2.7	9.1	2.8	6.3	9.4	15.4	9.4	17.4	5.4
1987	0.8	0.7	0.4	0.5	1.2	2.7	0.9	1.8	3.9	8.7	2.8	5.3	16.5	23.8	8.6	17.9	6.4
2000	0.5	-0.4*	0.3	0.5	1.4	2.8	0.8	1.5	4.8	3.6*	2.9	6.5	13.5	22.2	7.4	17.3	6.2

A Year; B Cervical, men; C Cervical, women; D Trochanteric, men; E Trochanteric, women; F Total.

The asterisk indicates where the incidence for the year 2000 is based on an extrapolation of a significantly changing incidence ($P < 0.05$). The incidences for the year 2000 for the other groups are based on the average incidence over the years 1980 to 1987.

Table 3. Population at risk in Uppsala county from 1980 to 1987, and the number of hip fractures. The official demographic prognosis for the year 2000 and our prognosis for the number of hip fractures for the this year is included

Year	Population at risk > 55 years ($x10^3$)								Number of fractures													
	Aged 55–64		Aged 65–74		Aged 75–84		Aged > 84		Aged 55–64				Aged 65–74				Aged 75–84				Aged > 84			
	M	F	M	F	M	F	M	F	C		T		C		T		C		T		C		T	
									M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1980	11.7	12.5	9.7	10.9	4.9	6.9	1.0	2.1	6	16	3	7	9	30	4	15	19	71	11	55	12	44	13	34
1981	11.6	12.4	9.7	10.9	5.0	7.1	1.0	2.1	7	16	4	7	12	32	8	22	31	80	19	42	7	54	8	38
1982	11.5	12.3	9.7	11.0	5.1	7.2	1.1	2.2	5	10	3	8	18	37	6	14	26	86	15	43	16	51	5	35
1983	11.6	12.2	9.6	11.0	5.2	7.4	1.1	2.3	9	14	2	6	13	27	13	15	28	77	13	52	16	56	6	42
1984	11.6	12.2	9.6	11.1	5.4	7.6	1.1	2.3	3	13	2	3	20	30	6	17	27	76	11	52	22	62	5	44
1985	11.3	12.0	9.7	11.4	5.5	7.7	1.1	2.4	4	10	5	6	17	34	8	19	36	66	21	53	17	43	7	39
1986	11.3	11.9	9.9	11.5	5.6	7.8	1.2	2.5	1	9	6	2	6	31	9	14	15	71	16	49	11	39	11	44
1987	10.1	11.7	9.9	11.6	5.6	8.0	1.3	2.7	8	8	4	6	12	31	9	21	22	69	16	42	21	64	11	48
2000	16.4	16.4	9.6	11.0	6.3	9.4	1.5	3.5	8	0	5	8	13	31	8	16	30	34	18	61	20	79	11	61

C Cervical fracture; T Trochanteric fracture.

389 fractures, 95 men and 294 women, whereas we report a total of 349 cases, 77 men and 272 women. We have not had access to the data used by Zain Elabdien et al., and thus have not been able to exactly establish the cause of this discrepancy. However, some speculations are possible. The figures reported in the publication by Zain Elabdien et al. may have been gathered mainly from the official medical records at the two hospitals in question. These figures are based on the recorded diagnosis for each admission at the time of discharge from the hospital. Apart from simple errors in the official records, other explanations must be considered, such as readmittance related to the initial injury and discrepancy in the classification of the fractures between the two research groups. Especially the distinction between pertrochanteric and subtrochanteric fractures can differ between the reports, and some of the cases that we have classified as subtrochanteric, and consequently excluded from our series, may have been included in the report by Zain Elabdien et al.

Our report, on the other hand, is based on admission reports, patient charts, and operation notes. In an attempt to avoid the above-mentioned sources of error, we have not used the official hospital records. Therefore, we believe that our figures are reliable.

In our series, we had a high incidence of fractures, but we had a much more moderate development with time. The incidence of hip fracture in Uppsala County seems to have reached a plateau, as most age, sex, and fracture type groups in this study reveal an unaltered incidence, and some even a decline, from 1980 to 1987.

In contrast to other reports, the major cause of the increased number of hip fractures in our area seems to be the shift in demographic distribution rather than an increase in the specific incidence. The low increase in specific incidence seems to be geographic, as the same pattern has been reported from areas adjacent to ours (6, 13), which is in contrast to the increase in specific incidence that has been reported by Johnell et al. (8) and Zetterberg et al. (20). Further, Finsen and Benum (4) and Mannius et al. (12) have pointed out the difference between urban and rural areas, a fact that may have an impact on our series, because our cachment area consists mainly of a rural population.

There may, however, also be a gross geographic pattern present. The further south and west a report comes from, the more rapid the increase in incidence seems to be. For example, Swanson and Murdoch (17) and Lewis (10) from Great Britain, and Frandsen and Kruse (5) from Denmark reported just as high increases in incidence as reported from the southern and western parts of Sweden (8, 20). On the other hand, Lüthje (11) from Finland and other authors from the eastern parts of Sweden report figures similar to ours (6, 9, 13, 14, 18). During the last 3 years, the increasing trend in incidence rates seems, however, to have been broken in the western parts of Sweden (21).

References

1. Alffram P A. An epidemiologic study of cervical and trochanteric fractures of the femur in an urban population. Acta Orthop Scand 1964: (Suppl 65): 1-109.
2. Boyce W J, Vessey M P. Rising incidence of fracture of the proximal femur. Lancet 1985; 1(8421): 150-1.
3. Den framtida befolkningen. Prognos för åren 1986-2025. (The future population. Projection for the years 1986-2025.). Statistiska centralbyrån, Stockholm, 1987.
4. Finsen V, Benum P. Changing incidence of hip fractures in rural and urban areas of central Norway. Clin Orthop 1987; (218): 104-10.
5. Frandsen P A, Kruse T. Hip fractures in the county of Funen, Denmark. Implications of demographic aging and changes in incidence rates. Acta Orthop Scand 1983; 54(5): 681-6.
6. Hedlund R, Ahlbom A, Lindgren U. Hip fracture incidence in Stockholm 1972–1981. Acta Orthop Scand 1986; 57(1): 30-4.
7. Jensen J S. Incidence of hip fractures. Acta Orthop Scand 1980; 51: 511-3.
8. Johnell O, Nilsson B, Obrant K, Sernbo I. Age and sex patterns of hip fracture changes in 30 years. Acta Orthop Scand 1984; 55(3): 290-2.
9. Larsson S, Eliasson P. Hip fractures in Northern Sweden 1973–84. In: Proceedings of the Swedish Orthopaedic Society meeting, Karlskrona 1988: 35.
10. Lewis A F. Fracture of neck of the femur: changing incidence. Br Med J (Clin Res) 1981; 283(6301): 1217-20.
11. Lüthje P. Fractures of the proximal femur in Finland in 1985 and a forecast for 2000. In: Proceedings of the Scandinavian Orthopaedic Association 44th meeting, Århus, Denmark 1988: 142.
12. Mannius S, Mellström D, Oden A, Rundgren A, Zetterberg C. Incidence of hip fracture in western Sweden 1974–1982. Comparison of rural and urban populations. Acta Orthop Scand 1987; 58(1): 38-42.
13. Naessén S, Persson I, Berglund A, Adami H O. Utvecklingen av höftfraktur incidens i Uppsala sjukvårdsregion 1965–1983: Resultat från en registerbaserad epidemiologisk undersökning (In Swedish). In: Svenska Läkaresällskapets Handlingar, Hygiea. 1987; 96: 248.
14. Nilsson M H. Trochanteric fractures. Treatment by Ender intramedullary fixation. Observed and predicted incidence in the Stockholm area. Thesis, Karolinska Institute, Stockholm, Sweden 1984.
15. Schröder H M, Andreassen M, Villadsen I, Sörensen J G, Mikkelsen M. Rising incidence of hip fraccture in Århus, 1970–1986. In: Proceedings of the Scandinavian Orthopaedic Association 44th meeting, Århus, Denmark1988: 141.
16. Statistisk årsbok för Sverige 1965, 1970, 1975, 1980–1988. (Statistical abstracts of Sweden 1965, 1970, 1980–88. Official Statistics of Sweden). Statistiska Centralbyrån, Stockholm 1965, 1970, 1975, 1980–88.
17. Swanson A J, Murdoch G. Fractured neck of femur. Pattern of incidence and implications. Acta Orthop Scand 1983; 54(3): 348-55.
18. Wallöe A, Andersson S, Herrlin K, Lidgren L. Incidence and stability of trochanteric femoral fractures. Acta Orthop Scand 1983; 54(4): 622-6.
19. Zain Elabdien B S, Olerud S, Karlström G, Smedby B. Rising incidence of hip fracture in Uppsala, 1965–1980. Acta Orthop Scand 1984; 55(3): 284-9.
20. Zetterberg C, Elmerson S, Andersson G B. Epidemiology of hip fractures in Göteborg, Sweden, 1940–1983. Clin Orthop 1984; (191): 43-52.
21. Zetterberg C, Andersson G B J, Elmerson S, Sjöstedt A. A changing incidence trend of fractures of the proximal end of the femur 1940–1987 in Göteborg, Sweden. Submitted.