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Epidemiology of proximal humeral fractures

In an urban population of half a million, all proximal humeral fractures were recorded in 1983. A total of 565 fractures, of which 77 per cent occurred in women, were seen. The overall incidence per 100,000 was 48 in men and 142 in women, with an exponential increase from the 5th decade of age. This rise was due to a higher incidence of minimally displaced fractures associated with moderate trauma, and thus of fractures associated with osteoporosis.

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The emphasis in epidemiological studies on osteoporosis-related fractures has been on fractures of the proximal femur (Bauer 1960, Alffram 1964, Jensen 1980, Frandsen & Kruse 1983, Falch et al. 1985, Lüthje 1985), whereas other fractures, such as the proximal humeral fractures, have only been described in a few surveys (Buhr & Cooke, 1959, Horak & Nilsson 1975, Rose et al. 1982).

We have studied epidemiologic aspects of proximal humeral fractures in an urban population.

Patients and methods

The data collection was made in a prospective fashion. Included in the study were all citizens of the municipalities of Copenhagen and Frederiksberg who during 1983 attended one of the emergency hospitals in the city (Rigshospitalet, the Municipal Hospital, Bispebjerg Hospital, Hvidovre Hospital, Sundby Hospital, and Frederiksberg Hospital) with a proximal humeral fracture.

In the area studied, there was a total of 575,002 residents on January 1, 1983, of whom 56.6 per cent were women. The patients were subdivided into 10-year age groups.

For every patient the site of accident and degree of injury was recorded. Moderate trauma was classified according to Alffram (1964) as equivalent to or less than falling to the ground from a standing position; severe trauma included all other injuries, e.g., caused by vehicles or falling down stairs.

All the fractures through or proximal to the surgical neck of the humerus were classified as proximal humeral fractures, and were further subdivided according to the following modification of the Neer (1970) classification, used also by Horak & Nilsson (1975) and Rose et al. (1982).

Group 1. Fractures with less than 1 cm of displacement or 45 degrees of angulation of any fragment, which did not include fracture of the greater tuberosity.

Group 2. Fractures displaced more than in Group 1 and not including a fracture of the greater tuberosity.

Group 3. Fractures that included a fracture of the greater tuberosity.

Finally, the methods of treatment in the various departments were recorded.

For statistical analysis, the chi square test and multiple regression analysis (Cox 1970) were used.

Results

There was a total of 565 proximal humeral fractures, 77 per cent occurred in women. Above the age of 60, the fractures were more common in women than in men; the total incidence was 142 per 100,000 in women and 48 per 100,000 in men. The incidence in women increased exponentially with age from the 5th decade (Table 1).

In 48 per cent of the cases the fracture occurred at home, in 43 per cent in the street, and in the remaining cases the circumstances were not recorded. The fracture was caused by a moderate trauma in 89 per cent of the cases.

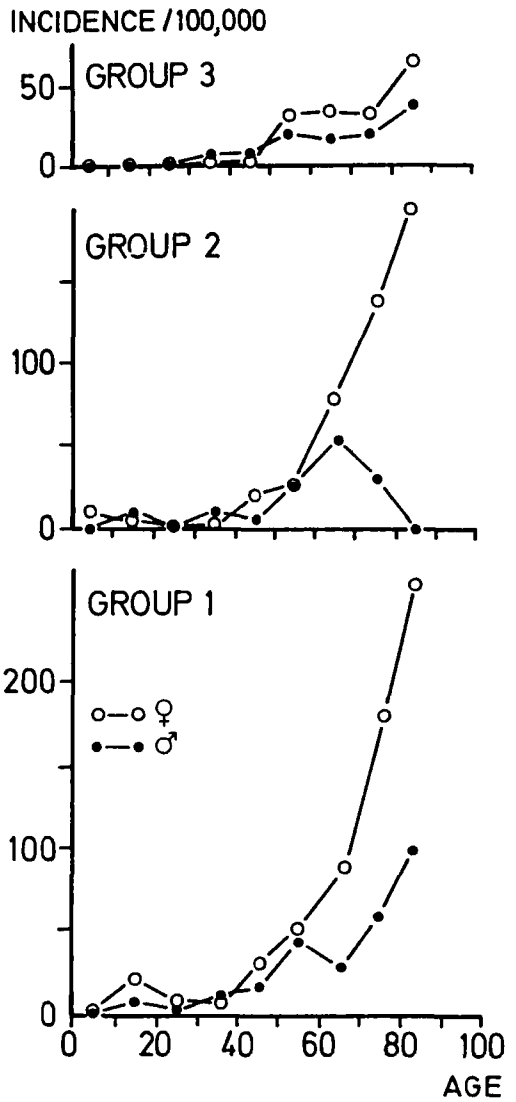

Figure 1. The age and sex-specific incidence of proximal humeral fractures in relation to fracture group.

Severe trauma most frequently consisted of vehicular accidents and falling down stairs. Convulsive seizures were the cause in two cases. In women, severe trauma was relatively more frequent in below aged 40 years ($P < 0.005$) and moderate trauma caused minimally displaced fractures only ($P = 0.01$). The rates due to a moderate trauma increased rapidly with age, in contrast to the incidence due to severe trauma, which did not increase and showed no difference between the sexes.

Of the total of 565 fractures, 48 per cent were Group 1 fractures, 36 per cent Group 2, and 16 per cent Group 3. No correlation between the fracture group and the sex or age was found. The incidence pattern of each group was similar to the total pattern (Figure 1).

The treatment of proximal humeral fractures in this series consisted of immobilization in a sling followed by functional exercises in 81 per cent of the cases, closed reduction in 16 per cent, and open reduction with or without internal fixation in 3 per cent.

Discussion

All emergency hospitals were included in the study, so that all patients from the population under study treated inside the region could be traced. A few citizens, injured and treated out-

Table 1. Incidence of proximal humeral fractures by age, sex and degree of trauma among Copenhagen-Frederiksberg residents 1983

	Men					Women				
		Mod. trauma		Total			Mod. trauma		Total	
Age group	P	N	R	N	R	P	N	R	N	R
0– 9	22.5	0	0	0	0	22.0	0	0	2	9
10–19	25.5	3	12	4	16	25.6	4	16	7	27
20–29	53.9	1	2	1	2	53.5	2	4	2	4
30–39	45.5	8	17	15	33	37.2	5	13	6	16
40–49	27.5	6	22	9	33	24.5	12	49	15	61
50–59	27.8	26	94	27	97	32.5	27	83	36	111
60–69	32.5	24	74	32	98	45.3	81	179	94	208
70–79	23.5	22	94	27	115	43.2	138	317	155	359
> 80	7.8	13	165	14	182	23.5	112	476	120	502

P Population in thousands, N Number of fractures, R Incidence per 100.000 person/years.

side the area would, however, not be included and the number of fractures thus represent a slight underestimate.

The age and sex distribution of the population in this urban area was different from studies in other countries (Buhr & Cooke 1959, Horak & Nilsson 1975). The age adjusted incidence in our study was found to accord fairly well with that reported by Horak & Nilsson (1975), whereas the incidence found by Rose et al. (1982) for their total population was only half of that in our study. Thus, geographical differences in the incidence of this type of fracture cannot be excluded.

Most fractures were due to a moderate trauma. About half of the cases were due to domestic falls; the exponential increase in these fractures in the elderly was parallel to the number of indoor injuries among elderly people (Lucht 1971). the distribution of the different groups of fractures corresponded with the series reported by Horak & Nilsson (1975).

In conclusion, our study indicates that the increasing incidence of proximal humeral fractures with age is primarily due to a higher incidence of minimally displaced fractures associated with moderate trauma among women above a aged 50 years. These epidemiologic features are characteristic of fractures associated with osteoporosis. (Buhr & Cooke 1959). Also, the prevalence of other fractures has been claimed to be higher in patients with proximal humeral fractures than without them (Horak & Nilsson 1975), and studies of the bone density have revealed age-related bone loss in the proximal humerus (Newton-John & Morgan 1970).

The overall incidence of proximal humeral fractures above the age of 50 is 3.7 per thousand, which is greater than the rate reported for hip fracture (Jensen 1980). The shoulder fracture is an important cause of morbidity that should be included in calculations of the socioeconomic costs and in the planning of the health care for the elderly.

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