

The Epidemiology of Fractures of the Proximal Humerus

T. Lind¹, K. Krøner², and J. Jensen¹

¹Department of Orthopedic Surgery, Aarhus County Hospital, Aarhus, Denmark

²Department of Orthopedic Surgery, Aarhus Municipal Hospital, Aarhus, Denmark

Summary. Sevenhundred and thirty proximal humeral fractures, taken from a 5-year period, were entered in this study. We found a higher total incidence rate than that previously seen: 73/100 000 population. Twenty-nine percent of the patients required hospitalization; 75% of these were over 60 years old. Only 21% of these were operated on, the majority of admissions being for social reasons. A total of 583 bed-days were used each year in the Aarhus City area (250 000 inhabitants). The majority of fractures resulted from falls on level ground. The elderly fell at home, while the younger people fell in public areas. Traffic accidents and work accidents were seldom seen. The accidents occurred typically around midday and before midnight, and mostly in December and January. Half of the fractures were two-part fractures of the surgical neck, while fractures of the greater tubercle and three-part fractures accounted for 21% and 17%, respectively. Based on current developments in the population average life span, it can be expected that proximal fractures will increase the hospital workload significantly in the future.

Fractures of the neck of the humerus are a common type of fracture, which to a considerable degree affects older patients. About 5% of all fractures are localized to the proximal end of the humerus [1, 8].

The aim of this study was to examine the epidemiology of fractures of the humeral neck, including possible developments in comparison to previous studies. Furthermore, it was desirable to determine hospital workload, presently and in the future, caused by this

type of fracture in relation to population development.

Patients and Methods

The municipality of Aarhus is a typical cross section of the Danish population, although the 20–30 year age-group is slightly larger than average. The total number of inhabitants of Aarhus is 253 700. The Aarhus borough area is covered by the Aarhus County Hospital, the Aarhus Municipal Hospital and the Odder Hospital. The period covered by this study ran from January 1980 until December 1984; patients over 18 years old and resident in the borough were included. Fractures with associated dislocation were excluded, as these are dealt with in a separate study. The medical notes of all patients with humeral neck fractures were examined and the following registered: age, sex, occupation, civil status, location and time of accident, accident type, treatment given, length of hospitalization, number of outpatient visits, fracture location, and fracture classification according to Neer [11].

Results

This study was based on a total of 730 fractures, 553 of which (75.8%) occurred in women and 177 (24.2%) in men. Five hundred and fifteen fractures (71%) occurred in persons over 60 years old (mean age total 65.6 years, range 18–97 years). The incidence of fractures (Fig. 1) according to age-group and sex shows no significant differences among patients up to 50 years of age, although a small increase was seen in men 31–40 years old. Thereafter, the figures for women increase exponentially, reaching a maximum of 409/100 000. The rate of incidence for the total sample population was 73/100 000. Of the 210 patients (28.8%) who were hospitalized, 75% were over 60 years old. Of the hospitalized patients 75% were also women. In only 44

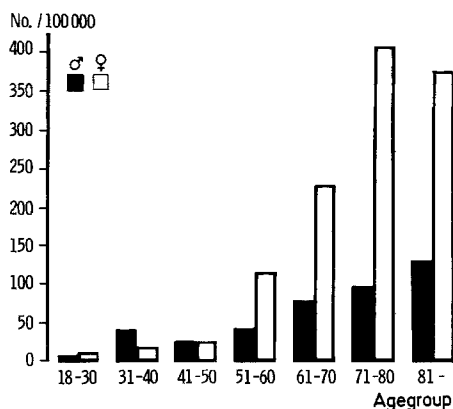


Fig. 1. Age- and sex-specific incidence rates

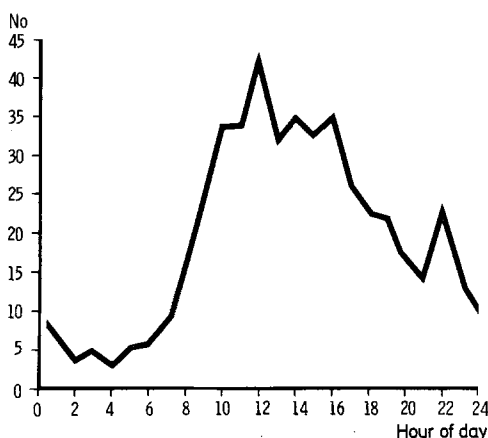


Fig. 2. Time of accident (time)

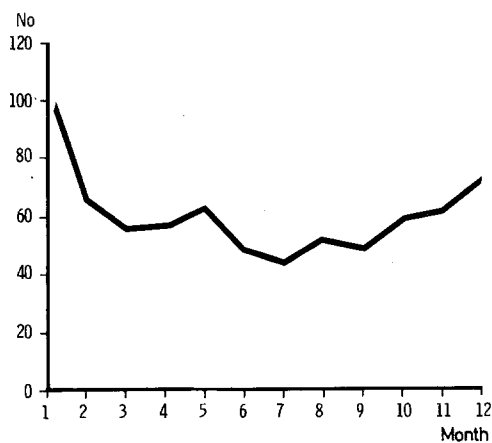


Fig. 3. Time of accident (month)

(21%) of the hospitalized patients was reduction or internal fixation deemed necessary. The average length of hospitalization was 13.8 days per patient; i.e., 583 bed-days were used every year.

The number of outpatient visits was the same for hospitalized and nonhospitalized patients, i.e., 2.7

Table 1. Places of accident

	Under 60 years <i>n</i> (%)	Over 60 years <i>n</i> (%)
At home	60 (27.9)	280 (53.3)
Public areas	97 (45.1)	160 (31.1)
Place of work	10 (4.7)	1 (0.2)

visits per patient. Visits to physiotherapists are not included here, as nearly all patients were referred for rehabilitation.

The indication that humeral neck fractures affect mostly the elderly was supported, in that 67% were senior citizens, while 21% were employed and 12% unemployed or studying.

An analysis of accident locations is given in Table 1: 79% of the fractures were caused by uncomplicated falls, while 14% were traffic accidents, including pedestrian falls. Only 1.5% were industrial accidents. The timing of accidents is shown in Figs. 2 and 3. Classification according to Neer gave the following: types 1 and 3 amounted to 53.3% of the fractures. Isolated fractures of the greater tuberosity accounted for 21% and type 4, three- and four-part fractures, accounted for 16% and 3.6%, respectively.

Discussion

The exponential increase in the incidence rate pertaining to older women has been reported previously [4–7, 12]. The pattern is familiar to that of other osteoporosis-provoked fractures, for example, those of the femoral neck and to some extent Colles' fracture [3, 6].

Despite a marked similarity in population characteristics in studies from Malmö [4], Odense [5], and Aarhus, a considerable difference is found in the calculation of incidence rates. The Malmö study, covering 1965–1969, showed an overall incidence rate of 56/100000, and the Odense study, 1976–1977, showed 69/100000, which includes 5% dislocation fractures, while in this study the rate was found to be 73/100000 excluding 63 (8.6%) dislocation fractures. These figures indicate an increase in the incidence rate over the past 20 years. However, no yearly increases was seen in the 5-year period covered by this study, or in the Malmö study.

The female/male ratio here was 3:1, in accordance with other studies [4, 7, 12], although Buhr and Cooke [1] found a ratio of 0.92:1. Uncomplicated falls were the most common type of accident (79%), the majority occurring at the same level. Traffic accidents accounted for 14%, which includes uncomplicated pedestrian falls. The accidents occurred evenly throughout the year, but with a peak in January. The pattern is simi-

lar to those found earlier [9, 10]. The majority of accidents happened during the middle of the day, although again a peak was seen before midnight (Fig. 2).

Nearly a third of all patients were hospitalized, while only one fifth of these required reduction or operation. Women over 60 years accounted, once more, for the majority in this category. Only one previous study has mentioned length of hospitalization [6]. In the 1954–1958 period, 7–8 days per patient were used as against the present 13.8 days.

If the pattern of hospitalization seen in Aarhus Borough is representative for the whole country, 12100 bed-days per year will be used by patients with humeral neck fractures. The Danish Statistics Institute [2] estimates that in the years up to 2000 there will be an increase in the number of women over 60 years and a small decrease in the number of older men. This implies that, with the present pattern of hospitalization, 13600 bed-days (i.e., 37 beds per day) will be required countrywide in the year 2000. As only one fifth of the hospitalized patients required operation or reduction of the fracture, it would seem that many of the beds are occupied for social reasons.

Acknowledgement. Gratitude is expressed to The Danish Medical Research Council for datalogic assistance.

References

1. Buhr AJ, Cooke AM (1959) Fracture patterns. *Lancet* 531–536
2. The Danish Statistics Institute (1986) *Statistic information*, no. 16, pp 3–5
3. Frandsen P, Kruse T (1983) Hip fractures in the county of Funen, Denmark. *Acta Orthop Scand* 54:681–686
4. Horak J, Nilsson BE (1975) Epidemiology of fractures of the upper end of the humerus. *Clin Orthop* 112:250–253
5. Kjær T, Larsen CF, Blicher J (1986) Proximal humeral fractures. *Ugeskr Læger* 148:1894–1897
6. Knowleden J, Buhr AJ, Dunbar O (1984) Incidence of fractures in persons over 35 years. *Br J Prev Soc Med* 18:130–141
7. Kristiansen B, Barfod G, Bredesen J, Erin-Madsen J, Grum B, Horsnaes M, Aalberg J (1987) Epidemiology of proximal humeral fractures. *Acta Orthop Scand* 58:75–77
8. Leyshon RL (1984) Closed treatment of fractures of the proximal humerus. *Acta Orthop Scand* 55:48–51
9. Lucht U (1971) A prospective study of accidental falls and resulting injuries in the home among elderly people. *Acta Sociomed Scand* 2:105–120
10. Merrild U, Bak S (1983) An excess of pedestrian injuries in icy conditions. *Accid Anal Prev* 15:41–48
11. Neer CS (1970) Displaced proximal humeral fractures. *J Bone Joint Surg [Am]* 52:1077–1089
12. Rose SH, Melton LJ, Morrey BF, Ilstrup DM, Riggs BL (1982) Epidemiologic features of humeral fractures. *Clin Orthop* 168:24–30