Epidemiology of distal forearm fractures in Danish children

Morten Kramhøft[1] and Søren Bødtker[2]

We recorded all the distal forearm fractures in inhabitants under 20 years of age in Frederiksborg County, Denmark, throughout 1985. The population at risk was 97,791 persons, and fractures occurred in 269 boys and 205 girls. The peak incidence in girls occurred at ages 10–12 (105 per 10,000) and in boys at ages 12–14 (100 per 10,000). Fractures occurred more often in the autumn than in the spring.

Apart from mortality, fractures are probably one of the most reliable parameters of danger threatening the lives of children. Wong (1965), Kärrholm et al. (1982), and Landin (1983) have calculated the incidence of fractures in children, and the latter two specified forearm fractures.

We report the age- and sex-specific incidence and type of distal forearm fractures in a Danish county.

Patients and methods

In 1985, Frederiksborg County in Denmark was served by four hospitals; 97,791 inhabitants were less than 20 years old on January 1; 474 residents under aged 20 years (269 boys and 205 girls) were treated for 482 distal forearm fractures, including fractures primarily treated elsewhere. The age- and sex-specific incidences were calculated on the basis of census data (Danish Statistical Bureau) on January 1, 1985. The date of injury, age, sex, side, type of fracture, mechanism of injury, and method of treatment were recorded.

All the available radiographs were reviewed, and the fractures were classified as torus, greenstick, epiphyseal, or complete. If the radiographs were not available, the fracture type was classified from the medical record.

The chi-square test with Yates' correction was used.

Departments of Surgery[1], Helsingør Hospital, and Orthopedics[2], DK-3400 Hillerød, Denmark

Correspondence: Dr. Morten Kramhøft, Søgårdsvej 6 B, DK-2820 Gentofte, Denmark

Results

The left forearm was fractured in 282 and the right in 200 cases; 8 had bilateral fractures. Most patients had been treated as outpatients, but 73 had to be admitted for reduction under general anesthesia, and 12 owing to other injuries, mainly cerebral concussions.

The fracture risk rose to a peak in the age-group 10–12 in girls and 12–14 in boys (Figure 1). After the age of 14, fractures were 3.5 times more frequent in boys than in girls ($P < 0.0001$).

Forearm fractures occurred more often in January and in the autumn than in the spring ($P < 0.0005$). Totally, 174 fractures were recorded as playing accidents. Of these, 26 were due to a fall from trees and slides, but usually no specific factor was recorded. Thirty-six were caused by winter sports (sledding, ice-skating, hockey, and skiing), 49 during ball games, 11 during riding, and 8 during gymnastics.

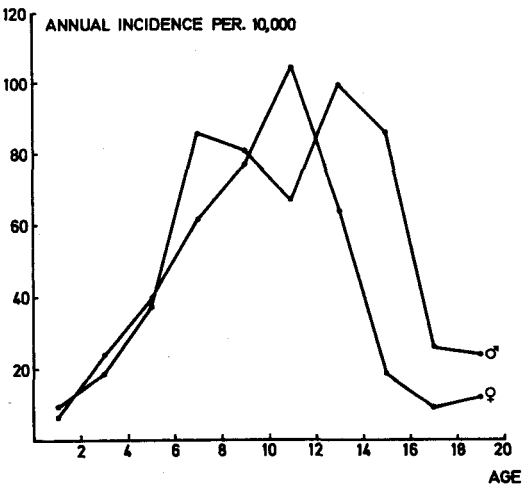
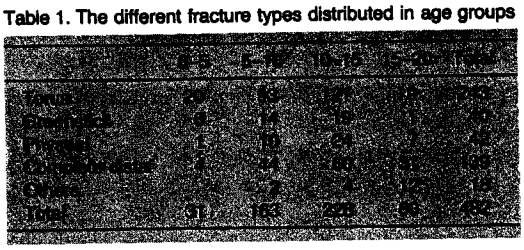


Figure 1. Incidence of forearm fractures in children.

Table 1. The different fracture types distributed in age groups



Traffic accidents accounted for 71 fractures: 56 were bicycle and 12 moped and motorcycle accidents.

Torus fractures occurred in 243 children (Table 1), and 42 had greenstick fractures.

Physeal injuries in the distal forearm occurred in 40 children; 15 of these injuries had to be reduced. Complete fracture of the distal end of the forearm was seen in 139 cases, and in 43 cases both the radius and the ulna were fractured. Nineteen patients had a Colles and 5 a Smith fracture. The complete distal fractures were most often seen in children above 8 years of age. The rest of the fractures (18 patients) included fractures of the radial (9 patients) and the ulnar styloid processes (6 patients).

Plaster casts without reduction were used in 379 fractures. Reduction of the fractures with a plaster cast was performed in 90 cases. Five fractures were treated with internal fixation, and eight were treated with a sling or some other kind of bandage. The necessity of closed or open reduction was not increased in fractures occurring after a fall from a height.

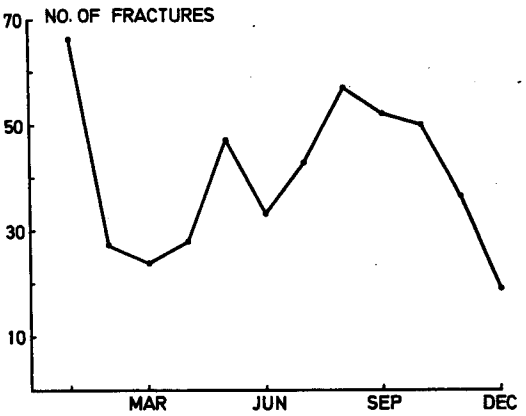


Figure 2. Number of distal forearm fractures per month.

Discussion

Our investigation was performed in an area served by four emergency hospitals, and all the medical records were checked. The only exceptions were fractures primarily treated elsewhere, but seen later by the general physicians, e.g., torus fractures. This implies that our incidences are very close to the real ones, because very few patients were missed.

We have compared our investigation with Alffram and Bauer (1962) and Landin (1983) because the population at risk and the weather are alike in the areas. Alffram and Bauer (1962) investigated a Swedish urban population in 1955, and Landin investigated the same population in 1950–1979. Alffram and Bauer (1962) found a peak incidence of distal forearm fractures in children of about half the incidence in our study. Landin also found an increasing incidence over the years from 1950 to 1979. Comparing our results with those of Landin (1983), we found that this increase in incidence had continued for both girls and boys. From 1975–1979 (Landin) to 1985 (our study), the incidence of distal forearm fractures for boys had increased by 5 percent (NS); but for girls the incidence had increased by 33 percent ($P < 0.001$). Landin (1983) found the peak incidence at 9 to 10 years of age, and it was 30 percent lower than ours ($P < 0.05$). This might be due to the fact that the activities of boys and girls are becoming more alike and that girls participate more actively in athletics and ball games than previously. Buhr and Cooke (1959) found that forearm fractures were twice as frequent in boys compared with our ratio of 1.3.

Compared with Landin (1983), the incidence of distal fractures was 22 percent higher ($P < 0.001$) and physeal injuries 13 percent higher (NS).

The monthly variation (Figure 2) could be explained by the fact that the fractures often occurred while playing and during sports, and a great number were due to winter activities, such as sledding and ice-skating.

Also, Iqbal (1974) found that the trauma usually was low energetic: 71 percent was caused by a fall at ground level compared with our 62 percent. Iqbal (1974) found the same percentage of sports injuries as we did.

Torus and greenstick fractures dominated up to 12 years. This might be due to the relatively strong periosteum in this age-group. Landin (1983), Peterson and Peterson (1972) and Lichtenberg (1954) also found that physeal injuries predominated in older children. Lichtenberg (1954) suggested that the physis might be more vulnerable as it approaches fusion. A simpler explanation is that the physis becomes the weakest area as the bone increases in strength.

In conclusion, we found the incidence of distal forearm fractures to be increasing mainly due to a greater number of fractures among girls.

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