Left-side dominance of upper extremity fracture in children

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In 148 children who had sustained trauma to the upper extremities from falls, fractures were twice as common on the left as on the right side. This seemed to be due to the childrens' preferential use of the left hand to parry the fall even when both hands were free and because the left arm seemed to be more easily broken than the right arm during trauma.

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Fractures of the lateral humeral condyle occur more often in the left than in the right arm (Röhl 1952, Jakob et al. 1975, Landin and Danielsson 1986, Thönell et al. 1988). The unequal side distribution has been explained on the basis that most children are right-handed and that the dominant hand is often engaged in some activity; hence, the left hand is used for protection (Röhl 1952).

Our investigation was undertaken to determine whether or not right- or left-handed dominance and activity of the hands at the moment of the fall could explain the predominantly left-sided localization of the fractures.

Material and methods

The primary material comprised a consecutive series of 152 children who had fallen and fractured the elbow, forearm, or wrist. Four children were excluded because of bilateral trauma, ambidexterity, or uncertainty as to which hand was the dominant one. Thus, the study group included 148 children (81 boys and 67 girls). Their mean age was 10 (2–14) years. The majority of them had a fracture of the elbow (n 32), of the forearm (n 11), or of the wrist (n 103). At the initial visit to the hospital, the patients and their parents were questioned about the conditions at the accident and which hand the child used when writing or drawing; this hand was considered to be dominant. Totally, 132 children were right-handed and 16 were left-handed.

The sign test was used to analyze the significance of observed differences within a group and Fisher's test for differences between groups. The probability that the difference would occur in a random fashion was rejected for $P \leq 0.05$.

Results

Sixty-four percent of the right-handed children used their left hand to protect themselves when they fell ($P < 0.01$), whereas the left-handed children used the right or left hand equally often (Table 1). Thus, in the total material the left arm was more often exposed to trauma than the right arm ($P < 0.01$), and two out of three fractures were left-sided ($P < 0.01$). In addition, the left arm was more frequently fractured than the right arm when exposed to trauma ($P = 0.03$). This occurred irrespective of which hand was the dominant one.

Both the boys and the girls favored the left hand to parry their fall, but this phenomenon was statistically significant only in the boys ($P < 0.05$).

We obtained information for 123 children as regards the activity of the uninjured hand at the moment of the accident. This hand was "free" in 116 cases and involved in some activity or other in 7 cases; only in these 7 children (all right-handed) could the occupation of either hand have led to the use of the other hand for protection.

Table 1. Side of trauma and frequency of upper extremity fractures following falls in 148 children

Dominant hand	Side of trauma	Fracture	No fracture
Right (n 132)	Right	25	23
	Left	54	30
Left (n 16)	Right	3	5
	Left	6	2
Total		88	60

Discussion

Left-sided fractures predominated in our material, which is in agreement with previous reports (Röhl 1952, Jakob et al. 1975, Landin 1983, Landin and Danielsson 1986, Thönell et al. 1988). The greater frequency of left-sided fractures in our material resulted mainly because the children favored their left hand to protect themselves when they fell. In addition, the left arm seemed to fracture more easily than the right arm. The latter phenomenon may be due to greater skeletal fragility or to immaturity of the neuromuscular coordination, which renders the left arm less suited to manage the situation. It is, however, unclear why right-handed children preferred their left hand to parry their fall. In fact, if the right arm can manage a protective maneuver more efficiently than the left arm, then, the number of children with right-sided trauma may be underestimated in our hospital material.

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