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The interrelationship of past and present fractures of the forearm and hand

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We analyzed 366 consecutive patients treated for low-energy trauma fractures below the elbow who had a history of previous fractures below the elbow. Patients with previous metacarpal or finger fractures were liable to have subsequent hand fractures of the ipsilateral side. Healed Colles' fractures appeared to confer a relative protection against refracture. Only one fifth of subsequent Colles' fractures were ipsilateral to the previous injury.

Extremity fracture is associated with persisting local osteopenia of considerable magnitude (Nilsson 1966, Westlin 1974, Andersson & Nilsson 1979a), not only close to the fracture, but also in adjacent bone(s). This phenomenon may perhaps contribute to subsequent fracture.

We have analyzed the interrelationship of common fractures of the forearm and hand.

Patients and methods

Totally, 3,916 patients who were treated for fractures other than of the head and neck during a 25-month period were interviewed at the time of treatment with regard to previous fractures. Three hundred and sixty six patients with fractures distal to the elbow caused by moderate to low-energy trauma (Finsen & Benum 1987) and who had a history of a previous forearm or hand fracture constitute the material of our study.

In all the cases the second fracture was recorded as ipsilateral or contralateral to the first fracture. Patients were often unable to discriminate between previous forearm fractures of various types, and these fractures were therefore grouped together.

The chi-square test was used for statistical evaluation.

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Results

In all, 70/194 forearm fractures were ipsilateral and 124 were contralateral (Table 1). Ninety-two of these patients were under 40 years of age at the time of the first fracture, of whom 44 fractured the same forearm and 48 the opposite one. The patients with previous and present forearm fractures who were over the age of 40 years at the time of the first fracture comprised 89 women and 5 men. Among the women were 3 with a previous and 5 with a present bilateral Colles' fracture. The remaining 81 women had the present fracture on the same side as the original fracture in only 17 cases and on the opposite side in 64 cases ($P < 0.001$). Among the men, there was one fracture on the same side, whereas four were contralateral.

Patients with previous forearm fractures and present metacarpal or finger fractures, however, had an approximately equal distribution of the second fractures between the ipsilateral and the contralateral side.

Table 1. The interrelationship of previous and present fractures of the forearm and hand

Present fracture		Previous fracture: Forearm	Carpal	Metacarpal and phalanx
Forearm	i	70**	2	9*
	c	124	3	20
Carpal	i	3	0	1
	c	3	0	1
Metacarpal and phalanx	i	39	3	38**
	c	31	3	17

i=ipsilateral; c=contralateral.
* $P < 0.05$
** $P < 0.01$

The patients with both previous and present hand fractures had a weak predominance of right-sided fractures. Only 17 of the present fractures were on the previously uninjured side, whereas 38 were ipsilateral fractures ($P < 0.01$).

Among patients with past hand fractures and present forearm fractures the opposite relationship was found: only 9 fractures were ipsilateral while 20 were contralateral ($P < 0.05$).

Discussion

Local osteopenia during the treatment of fractures is often attributed to immobilization and may persist for years after certain types of fractures.

Nilsson (1966) studied patients with previous tibial fractures and found a deficit of bone mass of 25 per cent in the ipsilateral distal femur, even many years after the fracture. Similarly, Andersson & Nilsson (1979a) found a 25 per cent loss of bone mineral in the proximal tibia 1 year after tibial fracture. This loss was uninfluenced by early weight bearing (Andersson & Nilsson 1979b). Upon studying diaphyseal forearm fractures, Nilsson & Westlin (1977) found a 15 per cent persisting loss of bone mineral at the distal radius. Westlin (1974) demonstrated an 18 per cent reduction of bone mineral of the radial and ulnar shafts 1 year after a Colles' fracture. Persisting bone loss of the distal femur after childhood fractures of the tibia and femur has also been documented (Nilsson & Westlin 1971); those who had sustained a tibial fracture at a very early age, however, were found to have an increased bone mass of the ipsilateral distal femur.

Because of the patients' difficulty in discriminating between the various types of forearm fractures below the elbow, we have had to group these fractures together. When dealing with low- to medium energy fractures, however, the fracture types may, to a certain extent, be separated by the patients' ages. In a random sample of such patients, we found that Colles' fractures are uncommon before the age of 40 years, and conversely, radial shaft fractures rarely occur in persons above this age, particularly in women. One may therefore assume that the majority of the 92 forearm fractures that occurred before the age of 40 years in our patient material involved the radial shaft. In these patients subsequent fractures were as frequent on the ipsilateral as on the contralateral side, and posttraumatic bone loss thus does not seem to play a part in the distribution of the later fractures.

The 89 women with previous forearm fractures after the age of 40 years, on the other hand, may be assumed to have suffered almost exclusively Colles' fractures. It is surprising, however, that – far from a predominance of subsequent ipsilateral fractures – there seemed to be a protection of the fractured radius from a subsequent Colles' fracture.

It is noteworthy that we have found a pronounced protection of previously fractured hips from subsequent hip fracture (Finsen & Benum 1986a). The possibility arises that healing of a fracture may strengthen the bone and protect against a later fracture. There is thus a mean of 39 per cent increase in bone mineral of the distal radius after remodeling of Colles' fractures (Finsen & Benum 1986b).

There have been too few patients with fractures of the carpal bones and subsequent fractures below the elbow to evaluate the influence of these fractures on the laterality of later fractures. It is, however, remarkable that scaphoid fractures, which are fairly common and usually are treated with a long period in plaster, presumably leading to a concomitant development of local osteoporosis, do not seem to have led to subsquent fractures of the bones of the same forearm or hand.

It is surprising that there was a definite tendency for subsequent hand fractures to be ipsilateral. It is unlikely that this was due to posttraumatic osteopenia as there is insignificant persisting bone mineral change after such fractures (Finsen & Benum 1986b). An alternative explanation for this finding is that the previous hand fractures had been so trivial that the patients later were uncertain which side was injured. It is possible that they subconciously have assumed the same side was injured as that presently fractured. They twice as often reported present forearm fractures to be contralateral as ipsilateral, however, which makes this explanation less probable.

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