Fixation of closed metacarpal shaft fractures

Transverse K-wires in 22 cases

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22 patients who had closed displaced metacarpal shaft fractures, treated by transverse percutaneous K-wire fixation were reviewed. In 11 cases, 1 distal and 1 proximal wire were inserted and in the rest, 2 distal and 1 proximal wire were used. The results in patients treated with a single distal wire were unsatisfactory due to pivoting of the distal fragment on the wire with consequent angulation and cosmetic deformity. In those who had 2 wires inserted distally, the reduction position was maintained throughout.

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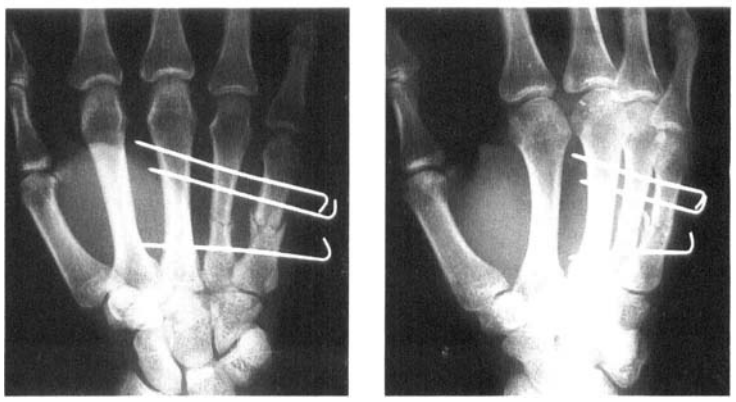
Patients and methods

22 patients with closed displaced metacarpal shaft fractures were divided into 2 groups. Following closed reduction, the established method of transverse K-wire fixation under low drill speed was used. 11 patients (Group 1) had 1 proximal and 1 distal wire inserted, and 11 (Group 2) had 1 proxi-

Group 1 with one distal fixation pin. Note the angular deformity.



Group 2 with two distal fixation pins. Reduction maintained without deformity.

Table 1. Distribution of fractures and angular deformity in the two groups

	Metacarpal					Angular deformity		
	II	III	IV	V	Total	Pre-op	Post-op	Final
Distal wires 1	1	2	4	4	11	35° ± 3.9	< 5°	18° ± 11
2	3	–	4	4	11	36° ± 4.6	< 5°	6° ± 4.7

mal and 2 distal wires. The commonest fractures affected the fourth and fifth metacarpals (Table 1). All K-wires were removed at the end of the third week and repeat radiographs were taken. All patients were followed-up until full union was verified clinically and radiographically. An angular deformity of more than 10 degrees was ascribed to failure to maintain reduction.

Results

There were 8 pin tract infections, 4 in each group. 1 patient in Group 2 had a positive culture treated successfully with erythromycin, while the other 7 were diagnosed as erythema and discharge at the pin sites with a negative culture that resolved following removal of the K-wires.

Functionally, all patients had good results, except for the loss of 10 degrees of extension in 1 patient in Group 2. 8 patients in Group 1 had cosmetic deformity compared to only 2 in Group 2, P 0.02. These deformities were severest in the fifth metacarpals and particularly in the dominant hand. The final mean angular deformity was 18° with 1 pin and 6° with 2, $P < 0.01$.

Discussion

A vast majority of metacarpal shaft fractures are stable and do not require operative treatment. Unstable metacarpal fractures constitute 8 percent of all metacarpal injuries (Lamb et al. 1973). Several methods of fixing these fractures have been described. Percutaneous longitudinal K-wire fixation was recommended by Milford (1971). This is technically more demanding than the transverse fixation described by Berkman and Miles (1943) and by James (1966). Namba et al. (1987) reported that for immediate and sustained strong fixation in bone, trochar tipped K-wires should be inserted at low drill speeds. Lamb et al. (1973) recommended the use of 1 proximal and 1 distal K-wire with power drills, and suggested the use of 2 wires in 1 or the other fragment in very unstable fractures. However, Gould et al. (1984) stated that tension band wiring provided more stability than cross K-wire fixation, and Lister (1984) described the use of an interosseous wire loop with an oblique K-wire. Black et al. (1985) reported that open reduction and internal fixation with plates and screws dorsally also provided secure fixation with better results, while Diwaker et al. (1986) recommended the same but using the AO system. The interosseous wire loop technique and the plate and screw system require substantially more soft tissue dissection with subsequent increase in the risk of infection and scar formation.

Moutet and Frére (1987) pointed out that active and immediate mobilization was a crucial factor in determining the end result of surgery on the hand. Rigid internal fixation would allow early mobilization, albeit at the cost of a scar and the increased risk of infection. K-wire fixation fell into some disrepute when Jupiter et al. (1985), studying delayed and non-union of metacarpal fractures, stated that most patients with this complication had an inadequate or improper percutaneous K-wiring technique.

Our study demonstrated that to control pivoting in the axis of the distal wire fully it is essential to obtain 2 point fixation in both fragments. This is achieved proximally by the intact carpometacarpal joint and the wire, and distally by the use of 2 wires.

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