Opening wedge osteotomy for malunion of the distal radius with neuropathy

13 cases followed for 6 (1–11) years

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13 patients with malunion of the distal radius after Colles' fractures and electroneurographically verified median nerve compression underwent an opening wedge osteotomy without a simultaneous release of the transverse carpal ligament. 12 patients had reduction of the typical night pain with normal or almost normal sensibility within the first 2 months. In 1 patient a release of the carpal ligament was necessary after 6 months. 6 years postoperatively all patients had acceptable wrist function with normal function of the median nerve in all but one.

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A nerve compression syndrome in patients with a Colles' fracture with a malposition of the fracture develops slowly within the first weeks and the symptoms are often misinterpreted as normal after this type of fracture. This median nerve lesion is due to traction and pressure over the volar edge of the distal radius under the transverse carpal ligament (Figure 1). A dorsal opening wedge osteotomy restores the normal anatomy, reduces the traction and decompresses the median nerve and makes an additional release of the nerve by a volar approach unnecessary (Figure 1).

Patients and methods

From 1976–1989 13 patients, 11 women and 2 men, aged 52 (38–65) years with a malunion after Colles' fracture, who developed a posttraumatic median nerve compression, were treated by a dorsal wedge opening osteotomy, without any release of the median nerve. The typical night pain occurred 7 (2–16) weeks after the injury, and sensory loss was observed after 11 (1–16) weeks.

In all patients, electroneurography revealed a delayed rapidity of median nerve conduction (Table 1). The opening wedge osteotomy was performed 3 (1–10) months after onset of the nerve symptoms without cutting the volar cortex of the distal radius. Depending on the malposition (dorsal tilt with or without radial deviation in the frontal plane), a corticocancellous bone graft from the iliac crest was shaped to fit the bone defect and was fixed intraoperatively by a Kirschner wire. After radiographic documentation for correct alignment, internal fixation was performed using a small buttress T-plate. In 3 cases, remaining shortening of the radius necessitated shortening osteotomy of the ulna. Postoperative immobilization for the first days was followed by early mobilization. In one patient a soft tissue infection necessitated removal of the plate.

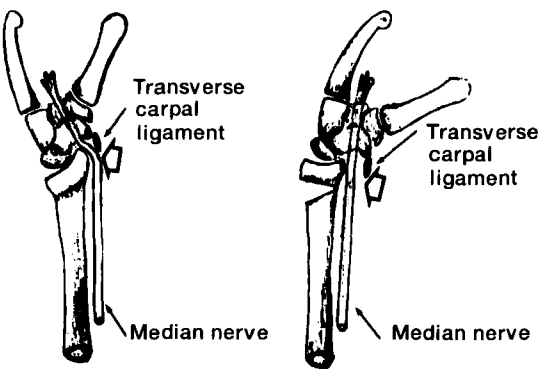

Figure 1. Median nerve compression after malunion of Colles' fracture.

Table 1. Data of 13 patients treated by opening wedge osteotomy for malunion of the distal radius and secondary median nerve compression

Case	Duration of symptoms	Preop. radiographic malalignment in degrees		Conduction velocity of the median nerve in mm/s		Follow-up	
		AP	lateral	preop.	follow-up	years	complaints
1	8	10	27	5.9	4.4	9	none
2	1	17	38	a	4.3	3	none
3	1.5	20	39	7.9	3.6	5	none
4	1	19	32	6.8	2.9	11	manual activity
5	1	14	30	5.8	3.5	8	heavy manual activity
6	1	10	21	7.2	4.8	6	none
7	2	6	17	9.8	3.2	7	none
8	2	19	33	10.3	4.7	10	manual activity
9	1.5	26	47	11.5	5.7	4	none
10	4	14	29	8.2	4.3	5	manual activity
11	5	11	30	a	5.3	7	none[b]
12	4	16	33	8.5	4.4	4	none
13	3	17	35	7.3	3.6	1	heavy manual activity

[a] no stimulation possible
[b] after reoperation with carpal tunnel release

Results (Table 1)

Night paresthesia improved within the first days after osteotomy in 11 patients within 2 months (2 weeks to 4 months). The neuropathy of the median nerve improved significantly or was restored completely (Table 1). In 1 patient the median nerve compression persisted and a carpal tunnel release had to be performed 6 weeks after osteotomy.

At re-examination 6 (1–11) years postoperatively, the function of the median nerve was normal clinically in 12 patients, although a moderate delay in nerve conduction velocity was found in 3. Only 1 patient, who was admitted to our hospital 10 months after onset of neurological symptoms, still had impairment.

Discussion

Colles' fractures that heal with a dorsal tilt of more then 20° run an increased risk of a median neuropathy. In our experience a compression syndrome combined with incongruence of the articular surface is an ideal indication for an opening wedge osteotomy. Analyzing our data, we found that the results regarding improved nerve function were closely connected to the time of the osteotomy. Delayed operation will result in a poor outcome. These observations are similar to the experience reported by Mumenthaler, Phalen and Wasmer, but contrary to Schlagenhauff and Schrader (Schlagenhauf and Glasauer 1971, Mumenthaler 1972, Phalen 1972, Schrader and Melchertsen 1983, Wasmer et al. 1986).

Although our patient material is small we recommend opening wedge osteotomy to restore normal wrist and nerve function in a single procedure. Our results are similar to those of a carpal tunnel release (Phalen 1972). The residual nerve dysfunction may be due to intraneural changes, which can hardly be treated by surgical interventions (Schlagenhauff and Glasauer 1971, Schrader and Melchertsen 1983).

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