



Original Article

Treatment of extra-articular distal radius fractures using an intramedullary nail

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ABSTRACT

Background: Distal radius fractures are a common fracture type, but an optimal surgical recommendation remains elusive. Intramedullary fixation is a novel technique for treatment of distal radius fractures. The present study aimed to evaluate the clinical results in the management of extra-articular fractures of the distal radius using the intramedullary nail device.

Methods: From June 2009 to July 2010, 12 patients with extra-articular fractures of the distal radius were included. Surgical reduction and internal fixation with an intramedullary nail, the Micronail, was performed primarily for treatment of five AO Type A2 and seven AO Type A3 distal radius fractures. All patients were followed up radiographically and clinically for an average of 48.5 weeks.

Results: All fractures achieved bone union without major complication. The functional results according to the Mayo wrist scoring system were excellent in six patients, good in two patients, and fair in four patients (4/12). The mean score was 84, and the satisfactory functional result was 75%.

Conclusion: Surgical reduction and internal fixation with the intramedullary nail is a useful and effective technique in the management of extra-articular fractures of the distal radius.

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1. Introduction

Distal radius fractures are among the most common types of skeletal trauma, accounting for about 20% of all acute fractures and 75% of all forearm fractures. Patients affected by these fractures have a bimodal age distribution, and the incidence increases in the 4th decade of life.¹ The injury is typically caused either by low-energy trauma, such as a fall onto an outstretched hand, or by a high-energy trauma, such as that from a motor vehicle accident. Treatment options for these fractures that are reported to yield satisfactory results include closed reduction and casting, percutaneous pin fixation, open reduction and internal fixation with a plate, bone-grafting, or external fixation.² Recently, there has been increasing interest in the use of intramedullary (IM) fixation devices for treatment of distal radius fractures. The benefits of treatment with these devices include a limited requirement for soft tissue dissection, a low-profile implant with low risk of post-operative soft tissue dissection, divergent subchondral screw placement, and locked fixed-angle fixation.³ In this retrospective study, we report the surgical results and evaluate the potential

advantages of IM nail devices used for the management of extra-articular distal radius fractures in 12 patients.

2. Materials and methods

Between June 2009 and July 2010, a single surgeon treated 12 patients with unstable distal radius fractures (Table 1) using an IM fixation device (Micronail; Wright Medical Technologies, Arlington, TN, USA). Included in the study were four men and eight women with an average age of 64 years (range 50–85 years). There were two patients with right wrist fractures and 10 patients with left wrist fractures. There were five AO Type A2 and seven AO Type A3 fractures, according to the AO fracture classification.⁴ All fractures resulted either from simple falls onto outstretched hands or from traffic accidents. The mean time between injury and surgery was 5.5 weeks (range 0–22 weeks). The average follow-up period was 48.5 weeks (range 16–65 weeks).

2.1. Surgical procedure

Under general anesthesia, the patient lay in a supine position with aseptic draping and a pneumatic tourniquet were applied. All surgeries were performed with fluoroscopic assistance. Prior to insertion of the Micronail, manual reduction was performed and confirmed with c-arm fluoroscopy. After anatomic reduction, the fracture site was provisionally fixed with percutaneous Kirschner

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Table 1
Demographic data of 12 patients with fractures of the distal radius treated with intramedullary nails.

Patient no.	Age (y)	Sex	Wrist	AO fracture classification	Time to surgery (wk)	Bone union (wk)	Follow-up (wk)
1	73	F	Left	A3	1	6	45
2	66	F	Left	A3	3	12	65
3	65	M	Left	A3	22	6	48
4	70	F	Left	A3	2	6	60
5	82	M	Left	A2	6	6	60
6	59	F	Left	A2	4	12	52
7	50	F	Right	A3	2	12	48
8	60	F	Left	A2	6	12	52
9	50	M	Right	A2	2	10	48
10	58	F	Left	A2	10	12	40
11	71	F	Left	A3	7	12	48
12	67	M	Left	A3	1	9	16
Mean	64 years	4 M; 8 F	2 R; 10 L	5 A2; 7 A3	5.5 weeks	9 weeks	48.5 weeks

wires (Fig. 1). If satisfactory realignment could not be achieved by simple closed manipulation, a small dorsal incision was made between the third and fourth dorsal extensor compartments and a Kirschner wire or periosteum freer was applied to joystick the fracture site. Once the fracture was properly reduced and stabilized, a 2-cm dorso-radial skin incision over the radial styloid process area was made with meticulous protection of superficial radial sensory nerve. Dissection through the interval of the first and second dorsal extensor compartments was made using a starter awl in order to create a cortical bone window. After sizing and trialing by tapping sequential broaches into the IM canal, a Micronail of the measured size was gently inserted through the pretaped track into the medullary canal of the distal radius. Three distal fixed-angle

locking screws and two proximal interlocking screws were then applied. C-arm fluoroscopy was used to confirm implant position and to avoid screw penetration into the radiocarpal or distal radioulnar joint. Then all provisionally transfixed Kirschner wires were removed and the guide system was dissembled from the IM nail.

2.2. Postoperative evaluation and follow-up

All patients were fitted with a short arm splint for temporary protection postoperatively. Postoperative rehabilitation with active finger motion training was started immediately. At 10–14 days after surgery, the splint and sutures were removed. Posterior–anterior and lateral radiographs of the injured wrist were



Fig. 1. Radiographs of a 73-year-old woman (Case 1) with AO Type A3 distal radius fracture with ulnar head fracture. (A) Preoperative radiograph, (B) intraoperative C-arm fluoroscopy showing provisional pinning after manipulated reduction, and (C) sequential broach tapering.

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