Operative Treatment of Intra-articular Distal Radius Fractures Using the Small AO External Fixation Device

Teng-Le Huang[1,2]*, Ching-Kuei Huang[2,3], Jung-Kuang Yu[2,3], Fang-Yao Chiu[2,3], Hsing-Torng Liu[4], Chien-Lin Liu[2,3], Tain-Hsiung Chen[2,3]

[1]Department of Orthopedics, China Medical University and University Hospital, [2]Department of Surgery, National Yang-Ming University School of Medicine, [3]Department of Orthopedics and Traumatology, Taipei Veterans General Hospital, Taipei, and [4]Department of Orthopedics, Chia-Yi Veterans Hospital, Chia-Yi, Taiwan, R.O.C.

Background: A retrospective group study was done to evaluate the effect of the small AO external fixator in the management of acute intra-articular fractures of the distal radius.

Methods: Between January 1995 and December 1996, 70 consecutive patients with articular fractures of the distal radius were treated by closed reduction and external fixation with small AO external fixators. The mean age at the time of surgery was 58.9 years (range, 14–87 years). There were 58 Colles' Barton's fractures and 12 Smith's Barton's fractures. The follow-up period was 104 months (range, 92–118 months).

Results: All fractures united in a mean of 5.8 weeks (range, 4–10 weeks). At the final follow-up, the average range of motion was 56.3 ± 11.6° in flexion, 58.6 ± 10.7° in extension, 21.5 ± 4.2° in ulnar deviation, 9.1 ± 2.9° in radial deviation, 71.5 ± 8.5° in pronation, and 67.3 ± 9.2° in supination. Compared with the normal side, the average grip force was 87 ± 6%. The overall clinical and functional outcomes, according to the scoring system of Gartland and Werley, showed that 22 patients (31.4%) had excellent results, 36 (51.4%) had good results, 9 (12.9%) had fair results, and 3 (4.3%) had poor results.

Conclusion: Closed reduction and external fixation with the small AO external fixator is useful and effective in the management of displaced comminuted articular fractures of the distal radius. [*J Chin Med Assoc* 2005; 68(10):474–478]

Key Words: AO external fixator, articular fracture, distal radius

Introduction

Fractures of the distal radius are very common injuries, estimated to account for up to 1-sixth of all fractures.[1–3] Treatment of such injuries can be problematic and demanding, particularly when the fracture is severely comminuted or has intra-articular involvement. The incidence of complications, including stiffness and loss of reduction, has been reported to be as high as 31%.[4]

There are diverse options for the management of these fractures, including closed reduction with plaster-cast immobilization, pins and plaster,[5] open reduction and internal fixation,[6] closed reduction and, more recently, augmented external fixation.[7–10] However, the reports of treatment methods and results are still conflicting. If the distal radius fracture is severely comminuted intra-articularly, the treatment will be more challenging. Restoration of congruity of the articular surface is the most critical factor for a good functional result. If 3 or more cortices show comminution on the anteroposterior and lateral films

*Correspondence to: Dr. Teng-Le Huang, Department of Orthopedics, China Medical University and University Hospital, 2, Yuh-Der Road, Taichung 404, Taiwan, R.O.C.
E-mail: tenglehuang@yahoo.com.tw • Received: January 5, 2004 • Accepted: May 12, 2005

in conjunction with radial shortening of more than 5 mm and/or intra-articular involvement in the radiocarpal or radioulnar joint, Pennig and Gausepohl[9] have recommended that external fixation be used to restore the radial anatomy. Attention must be paid to prevent possible complications such as re-displacement, pin-tract infection, and late collapse.

We performed this retrospective study to elucidate the effect of the small AO external fixation device in the management of intra-articular fractures of the distal radius.

Methods

Between January 1995 and December 1996, 83 consecutive patients with intra-articular distal radius fractures were treated with closed reduction and external fixation using small AO external fixators in our institute. We use small AO external fixators routinely if there is intra-articular involvement in a distal radius fracture. The only contraindication is poor general health that makes the surgery too risky (American Society of Anesthesiologists status IV or V). Six patients died and 7 cases were lost to follow-up. Data for the 70 patients with complete records were collected for final evaluation.

Thirty-one patients were male and 39 were female. The mean age at the time of surgery was 58.9 years (range, 14–87 years). The mechanism of injury was fall in 47 and motor vehicle crash in 23. Forty-one fractures involved the right wrist and 21 involved the left. In three cases (4.3%), the fractures were open. There were 12 associated injuries, including 5 humerus fractures, 1 scaphoid fracture, 2 ankle fractures, and 1 each of talus fracture, Jones' fracture, femoral neck fracture, and brachial plexus injury. All were managed as needed and would not interfere with the evaluation of the results. All intra-articular fractures were referred to as Colles' Barton's or Smith's Barton's, depending on the pattern of involvement of the distal radioulnar and radiocarpal joint surface and the displacement. There were 58 Colles' Barton's fractures and 12 Smith's Barton's fractures. Fifty-six of our patients underwent surgery on the day of injury, 14 within 1–3 days after injury, and none more than 3 days after injury. All 3 open fractures were managed appropriately within 8 hours after injury.

The aim of treatment was to restore anatomy by application of the fixator in the frontal plane. All fractures were characterized by bone loss and shortening of the affected radius, with dorsal or volar tilt and lateral displacement of the distal fragment. Fractures were reduced under regional anesthesia. After reduction and restoration of radial length and wrist congruity, fractures were fixed and stabilized with the aid of a small AO external fixator. This is a rigid device consisting of 4 threaded pins (2.5 × 150 mm), clamps and connecting bars. After small skin incisions were made and the bones were drilled with a 2-mm drill bit, the pins were inserted manually with a universal chuck, two proximally to the fracture in the distal radius and two in the shaft of the second metacarpal bone. These pins were inserted at an angle of 60° to the horizontal plane. After manipulation and distraction, the fracture was reduced and the connecting bars were applied and secured firmly to the threaded pins with clamps. Anteroposterior and lateral roentgenograms were obtained after the fixator was applied to ensure proper positioning of fractured bone ends (Figure 1).

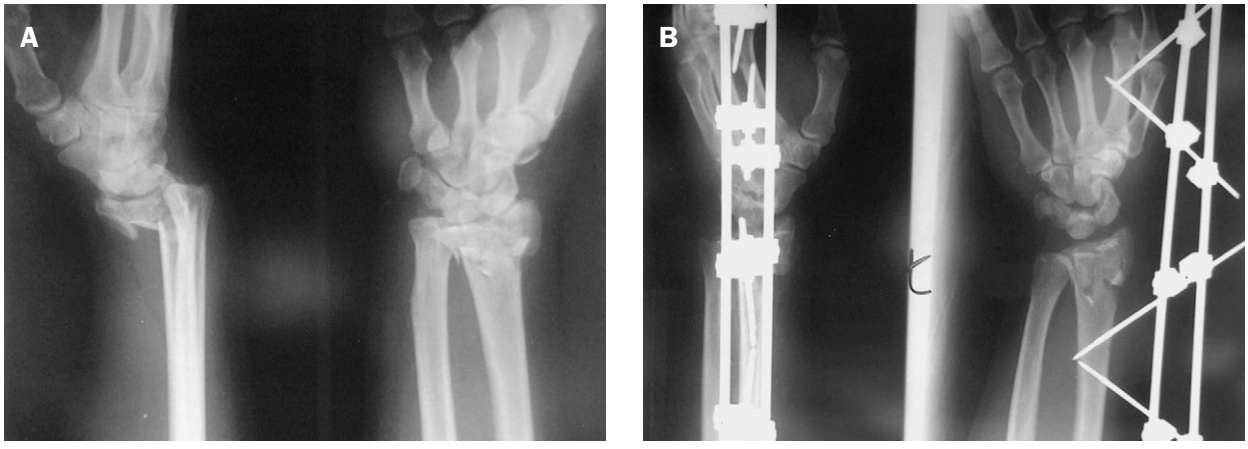

Figure 1. (A) Preoperative X-ray of a 73-year-old man with comminuted Smith's Barton's fracture of the left wrist. (B) Immediate postoperative X-ray showing good alignment after use of the small AO external fixator.