

External Fixation Versus Open Reduction With Locked Volar Plating for Geriatric Distal Radius Fractures

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Daniel J. Lee, BA¹ and John C. Elfar, MD¹

Abstract

The optimal management of displaced dorsal radius fractures (DRFs) in older patients remains an issue of debate. Bridging external fixation is a well-accepted treatment modality for severely comminuted DRFs, while open reduction and internal fixation with locked volar plating has emerged as a promising alternative in recent years. The current body of randomized trials supports the trend toward locked volar plating, as it allows for quicker improvement in subjective and functional outcomes. There is no clear evidence to suggest that one technique carries significantly less complications than the other. Locked volar plating should be considered in patients for whom an accelerated functional recovery would be advantageous. Otherwise, both external fixation and locked volar plating provide good long-term clinical outcomes.

Keywords

distal radius fracture, external fixation, open reduction and internal fixation, locked volar plating, complications

Introduction

Distal radius fractures (DRFs) are among the most common fragility fractures in elderly individuals.^{1,2} The optimal management of displaced DRFs in older patients remains an issue of debate. Stable fractures can be treated nonoperatively with closed reduction and cast immobilization with good outcomes.³ However, conservative management fails to maintain reduction in patients with unstable fracture patterns, underlining the need for supplemental fixation.⁴⁻⁶

Internal fixation itself represents a ladder of techniques starting with simple Kirshner wire (K-wire) fixation and including various forms of more invasive techniques.⁷⁻⁹ Among the techniques employed in the most severe fractures are external fixation with or without K-wires and open reduction and internal fixation (ORIF) with dorsal or volar plating. Bridging external fixation is a well-accepted treatment modality for severely comminuted DRFs, relying on ligamentotaxis to realign fracture fragments.^{7,10,11} Recently, ORIF with locked volar plates has emerged as an attractive alternative given its potential for direct fracture reduction and earlier wrist mobilization.^{1,12-14} Although plate fixation has increased in popularity, evidence has yet to demonstrate clear superiority. Recent randomized trials, however, may better inform the choice of fixation.^{15,16}

The purpose of this review is to examine the comparative literature on unstable DRFs in elderly patients to determine the relative efficacy of external fixation versus plate fixation with regard to subjective, functional, and radiographic outcomes.

Subjective Outcomes

Randomized controlled trials in younger patients demonstrate that locked volar plating leads to quicker improvement in patient-reported outcomes.^{1,12-14,17} The same benefit appears to hold true for older populations. Wei et al¹⁵ conducted a prospective randomized study that assigned 22 patients with a mean age of 55 to external fixation with additional K-wires and 12 patients with a mean age of 61 to treatment with a volar plate. The volar plate group showed significantly better outcomes based on Disabilities of the Arm, Shoulder, and Hand (DASH) scores at 6 and 12 weeks. However, at 6 months, there were no significant differences between the groups. Jeudy et al¹⁶ published a prospective multicenter evaluation comparing external fixation versus ORIF with a locked volar plate. Both cohorts had a mean age of 65 with 39 patients receiving external fixation and 36 patients receiving ORIF with a volar plate. The authors found significantly better clinical outcomes according to the modified Green and O'Brien criteria at 6 weeks in the volar plate group; moreover, this difference persisted over the 6-month follow-up period with 53% reporting good

¹Department of Orthopaedic Surgery, University of Rochester Medical Center, Rochester, NY, USA

Corresponding Author:

John C. Elfar, Department of Orthopaedic Surgery, University of Rochester Medical Center, 601 Elmwood Avenue, Box 665, Rochester, NY 14642, USA.
Email: john_elfar@urmc.rochester.edu

to excellent results in the volar plate group compared to only 28% in the external fixation group at final follow-up. Schmelzer-Schmied et al¹⁸ performed a retrospective matched analysis on 45 patients with a mean age of 60 years and reported improved subjective outcomes for the locked plate group based on DASH, Martini, and Visual Analogue Scale for subjective pain scores.

Functional Outcomes

Mirroring its effects on subjective function, locked volar plating may promote earlier functional recovery in elderly patients compared to external fixation. Jeudy et al¹⁶ demonstrated greater mobility in the flexion-extension arc at 6 weeks with locked volar plating, although this difference was less pronounced by 6 months. Grip strength was significantly higher in the internally fixed group over all follow-up periods. The authors concluded that volar plating of the distal radius permits quicker return to regular activity. Similarly, Wei et al¹⁵ presented significant differences in wrist extension and supination at 6 weeks in favor of plate fixation. Conversely, no differences in wrist motion were found at any follow-up period thereafter.

These findings agree with those observed in patients 65 years and younger. Egol et al⁷ randomized 38 patients to treatment with external fixation (mean age 50) and 39 patients to volar plating (mean age 52). By 3 months, the volar plating group achieved superior wrist motion as measured by pronation, supination, extension, and radial deviation. However, only improved pronation and extension were maintained at 1-year follow-up. A prospective study by Rozental et al¹⁹ presented improved results in wrist motion and grip strength initially in the plate fixation group which diminished over time with both procedures providing good restoration of wrist function at 1 year postoperatively.

Radiographic Outcomes

Studies have largely failed to demonstrate differences in radiographic outcomes between external fixation and locked volar plating. One retrospective review found that anatomic restoration of palmar tilt was greater in the plate fixation group, which was associated with improved wrist function and DASH scores.¹⁸ In contrast, Wei et al¹⁵ reported no significant differences in radial inclination, volar tilt, ulnar variance, radial length, and step-offs with gaps between the 2 methods of fixation, despite improved functional and subjective outcomes with the locking volar plate. Similarly, Jeudy et al¹⁶ found that improved wrist function with ORIF did not translate into superior radiographic results compared to external fixation. These findings are part of a growing body of evidence that challenges the correlation between radiographic and clinical outcomes.^{1,20-22} For example, Grewal et al¹⁷ also reported significantly better subjective outcomes in the ORIF group as measured by the Patient-Rated Wrist Evaluation, although no differences in radiographic measurements were found. Conversely, Rizzo et al¹² demonstrated that despite improved

radiographic alignment in patients with volar plating, no differences in grip strength and wrist motion were observed at 1 year. These data suggest that radiographic parameters may not influence clinical outcomes substantially. Subjective and objective functional measures are likely to offer more reliable information on the relative efficacy of external fixation and volar plating.²³

Complications

There is no clear evidence to suggest that one technique carries significantly less complications than the other. Richard et al²⁴ retrospectively reviewed complication rates in 115 patients treated with either external fixation or volar plate fixation for comminuted DRFs. They reported significantly more overall complications in the external fixation group, particularly in regard to superficial radial neuropathy and finger stiffness. There were no differences with respect to delayed union, infection, hardware failure, median nerve irritation, or contractures. Jeudy et al¹⁶ reported significantly higher chronic pain indices based on complex regional pain syndrome scores in the external fixation group at 6 weeks but no differences by 6 months. The other complications were 1 case of superficial radial neuritis with external fixation and 2 cases of postoperative carpal tunnel syndrome with volar plating. Wei et al¹⁵ described transient neuropathy of the median nerve in 3 of 12 patients treated with external fixation and 2 of 9 patients treated with ORIF. Pin tract irritation was seen in only 1 patient managed with an external fixator, and no cases of tendon rupture, digital stiffness, radial sensory nerve injuries, or hardware failure were noted in either group. It would appear from these studies that no clear advantage exists for either technique with regard to complications other than the higher risk of pin-related complications with external fixation.

Conclusion

The most appropriate surgical management for unstable DRFs in the elderly patients continues to be debated. Although external fixation remains a popular choice of treatment, the current body of randomized trials supports the trend toward locked volar plating, as it allows for a more rapid return of function. ORIF should therefore be considered in patients for whom an accelerated functional recovery would be advantageous. Otherwise, both external fixation and locked volar plating provide good long-term clinical outcomes.

Declaration of Conflicting Interests

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