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CORR Insights®: What is the Relative Effectiveness of the Various Surgical Treatment Options for Distal Radius Fractures? A Systematic Review and Network Meta-analysis of Randomized Controlled Trials

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Where Are We Now?

Distal radius fractures remain one of the most common fractures treated by orthopaedic surgeons [7]. The cost of treatment for distal radius fractures in patients covered by Medicare reached USD 170 million in 2007, with costs expected to rise with the aging population in the United States and the growing popularity of internal fixation [13]. Determining the best treatment is therefore an important topic that should include a critical assessment of functional outcomes, risks, and the costs incurred by each option. Volar plates are now the dominant choice for internal fixation, although a recent study failed to demonstrate any difference in the ultimate outcome of patient function based on the type of fracture fixation [12]. Persistent intraarticular step-offs increase the risk of late degenerative arthritis, but such arthritis is unlikely to produce substantial symptoms [5, 8].

The most contentious aspect of distal radius care remains the treatment of adults older than 60 years. Despite an increase in the open treatment of distal radius fractures among older adults, published randomized trials have often failed to demonstrate any benefit of operative treatment after 1 year [1, 3, 4]. In older patients, nonoperative treatment of displaced fractures results in a high incidence of malunion, but the impact of malunion is mitigated by advancing patient age [2, 6].

In their systematic review, Woolnough et al. [14] effectively evaluated studies comparing multiple treatment options for distal radius fractures. Elegant statistics were used to contrast the 1-year DASH scores and frequency of complications (overall and those resulting in surgery). I commend the authors for also considering the clinical relevance of their statistical findings. Their analysis indicated that there is no clinically important difference favoring any particular surgical treatment at 1 year, although volar plating was associated with fewer complications and nonoperative treatment may be preferred in patients older than 60 years.

Where Do We Need To Go?

Although the study [14] was extremely thorough, several questions remain. First, in clinical practice, the use of dorsal bridging plates has supplanted external fixation for most distal radius fractures that are not amenable to direct internal fixation. Bridge-plate fixation was not examined in this meta-analysis and will need evaluation in the future. Although bridge plating has largely replaced external fixation, the treatment outcomes can't be presumed to be the same. Bridge plates reduce the risk of some complications (such as pin tract infections) but

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they may increase the risk of others (for example, extensor tendon adhesions), and bridge plates are routinely left in place much longer than external fixators are. Therefore, it may still be important to consider whether direct fixation or bridge plate fixation of AO Type C3 distal radius fractures is associated with fewer complications and which treatment results in superior patient function at 1 to 2 years after injury.

Second, although the ultimate functional outcomes may be comparable, future studies may want to consider the early benefits of stable internal fixation constructs. For some patients, internal fixation allows them to transition to a removable brace with light use of the hand as early as 1 week postoperatively. At times, this may impart substantial benefit, allowing earlier return to work or greater independence with activities of daily living. These considerations may be critical when considering the value of operative intervention, even if no change in the ultimate function is expected.

Third, it is debatable whether patients older than 60 years are a single group of patients who should be treated similarly or if treatment should be stratified by patient activity level. Future high-level studies are needed to determine whether highly active adults older than 60 years should be treated surgically to avoid malunion. My impression is that surgeons feel that more-active older adults should be treated more aggressively with internal fixation. Whether that truly changes the ultimate outcomes is unclear.

How Do We Get There?

I believe that registry-type data will be the most likely to advance our understanding of the outcomes of bridge-plate fixation. The latest effort at a randomized trial for distal radius fractures involved multiple centers under the coordination of Dr. Kevin Chung [3]. That study took more than a decade of effort, and enrollment was challenging because many patients did not want to undergo external fixation. Knowing that bridge-plate fixation is not typically applied to fractures that can be fixed directly while preserving wrist motion would prevent most randomized trials from effectively enrolling patients. A well-maintained registry with purposeful data collection could produce valuable data that could be generalized across practices and avoid the common drawbacks of retrospective administrative data analytics. Distal radius fractures are a potential focus of a registry that could be pursued by the American Academy of Orthopaedic Surgeons.

To assess early functional improvement and the importance of surgical fixation for individual patients, I believe that smaller-scale studies will be necessary. Detailed data are necessary to capture the impressions and life experiences of individuals. To this end, a study could be conducted using qualitative research methods with focus groups and structured interviews for thematic coding. Such qualitative research has been highlighted recently in *CORR*®; the editors have emphasized the power of this type of research to provide clinicians with a "deeper understanding of why their patients feel as they do" [9, 10]. The routine use of patient-reported outcomes at early intervals could also shed light on the benefits of internal fixation and early mobilization. Admittedly, standardized outcome measures may not truly capture the subtle-but-important nuances of life, such as being able to type more effectively at work or not needing to burden family members to assist with many daily tasks.

Determining whether treatment of the distal radius should be provided to an older adult according to chronologic or physiologic age will be difficult. An older patient with multiple medical comorbidities and very low activity level is most frequently treated nonoperatively. The question is whether an older active adult would benefit from operative fixation to avoid malunion of the distal radius or if that individual would also continue to function at a high level regardless of malunion. I am biased by my participation in a retrospective study in which we could not demonstrate any differential impact of malunion on function in the highly active older adult [11]. I believe that a randomized trial specifically examining displaced distal radius fractures in active older adults would be beneficial, but I suspect it would prove extremely difficult to enroll patients. Any trial will require dedicated surgeons who truly believe in the clinical equipoise of this situation and can take extended periods of time to explain the merits of such a study to eligible patients.

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