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AAOS/ASSH Clinical Practice Guideline Summary Management of Distal Radius Fractures

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Abstract

Management of Distal Radius Fractures Evidence-Based Clinical Practice Guideline is based on a systematic review of published studies for the treatment of distal radius fractures in adults over eighteen years of age.[1] The scope of this guideline is limited to the treatment of acute distal radius fractures and does not address distal radius malunion. This guideline contains seven recommendations to assist orthopaedic surgeons and all qualified physicians managing patients with acute distal radius fractures based on the best current available evidence. It is also intended to serve as an information resource for professional healthcare practitioners and developers of practice guidelines and recommendations. In addition to providing pragmatic practice recommendations, this guideline also highlights gaps in the literature and informs areas for future research and quality measure development.

Overview and Rationale

The American Academy of Orthopaedic Surgeons (AAOS) and the American Society for Surgery of the Hand (ASSH), with input from representatives from the Hand Surgery Quality Consortium, the Orthopaedic Trauma Association, the American College of Surgeons, the American Society of Plastic Surgeons, and the American Society of Hand Therapists, recently published their clinical practice guideline (CPG), Management of Distal

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Criteria: Distal Radius Fractures

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This clinical practice guideline was approved by the American Academy of Orthopaedic Surgeons Board of Directors on December 5, 2020, and was adopted by the American Society for Surgery of the Hand Council on May 22, 2021.

The complete document, *Management of Distal Radius Fractures Evidence-Based Clinical Practice Guideline,* includes all tables, and figures, and is available at www.aaos.org/drfcpg.

Radius Fractures.[1] This CPG was approved by the AAOS Board of Directors in December 2020 was adopted by the American Society for Surgery of the Hand Council in May 2021.

Distal radius fractures are one of the most commonly occurring fractures – accounting for approximately 25% of fractures in the pediatric population and approximately 18% of fractures in the elderly [1,2]. Distal radius fractures demonstrate a bimodal distribution, with relatively greater fracture rates occurring in the younger (<18 years of age) and older (>65 years of age) populations[2,3]. With an annual incidence of over 640,000 cases in the United States [4] and a cost of $170 million from 2007 Medicare claims alone [5], distal radius fractures pose a great burden to society and are a frequently encountered condition for orthopaedic surgeons and other healthcare professionals. Furthermore, evidence demonstrates that the incidence of distal radius fractures continues to rise for all age groups [2]. While the exact cause of this increase is elusive, many cite the influence of lifestyle and environmental factors (e.g. more active population, increasing life expectancy, obesity, osteoporosis, dietary factors) [2,6–8].

Distal radius fractures include a broad spectrum of injuries – from simple isolated fractures of the distal aspect of the radius to comminuted fractures of the distal radius with associated injuries. The fracture pattern and extent of injury is typically predicated upon the mechanism of injury, the energy imparted, and the quality of the patient's bone. Younger, more active patients are more likely to sustain a distal radius fracture while participating in sports, or in vehicular accidents [2,7,9]. Older, less active patients are more likely to sustain fractures by falling onto their outstretched hand from the ground level [10,11].

Several decision points exist for the patient and physician across the care continuum of a distal radius fracture. For example, both conservative and surgical options exist for the treatment of distal radius fractures. While conservative management in the form of immobilization with or without closed reduction remains the most prevalent form of treatment in the older population (>65 years of age), surgical management (particularly open reduction and internal fixation) is on the rise [12–14] As each treatment option and the general care of distal radius fractures carry their own risk/benefit profile, synthesizing and understanding the evidence behind various treatment decision points is fundamental for discussions between patients and surgeons on treatment decisions.

Therefore, the American Academy of Orthopaedic Surgeons (AAOS) along with the American Society for Surgery of the Hand (ASSH) developed an evidence-based, Clinical Practice Guideline (CPG) to aid practitioners in the treatment of patients with distal radius fractures.[1] Furthermore, the CPG represents a resource demonstrating areas that need additional investigation to provide improved evidence-based guidelines for the treatment of distal radius fractures.

In summary, the distal radius fractures guideline involved reviewing over 7,100 abstracts and more than 830 full-text articles to develop 6 recommendations supported by 82 research articles meeting stringent inclusion criteria. Each recommendation is based on a systematic review of the research related topic which resulted in two recommendations classified as high, two recommendations classified as moderate, and two as limited. Strength of

recommendation is assigned based on the quality of the supporting evidence. The strength of recommendation also takes into account the quality, quantity, and the trade-offs between the benefits and harms of a treatment, the magnitude of a treatment's effect, and whether there is data on critical outcomes.

Guideline Summary

The developed recommendations are meant to aid in the clinical decision-making process for the treatment of patients presenting with a distal radius fracture. Use of these guidelines helps treating physicians determine the appropriate intervention/s that are likely to provide the greatest predictable benefit. This CPG set offers a substantially updated perspective from the previously published 2009 iteration. The 2009 CPG offered 29 statements, five of which were supported by moderate evidence, the rest of which were inconclusive, limited evidence, or consensus based. Subsequent literature, of improved quality, has allowed for more definitive CPG statements. The updated 2020 CPG consisted of seven statements, two of which provide strong evidence and two of which provide moderate evidence.

The recommendation for use of arthroscopic assistance for evaluation of the articular surface during operative treatment of distal radius fractures has been updated from limited evidence in support of its use to moderate evidence not in support of its use. This update is primarily guided by three studies. The strongest of the three studies is a randomized controlled trial evaluating the functional and radiographic outcomes after distal radius fractures randomized to fluoroscopically-guided or arthroscopically-guided reduction[15]. This study demonstrated that in combination with a volar locked plate, there was no difference in outcomes at 48 months in the cohorts receiving fluoroscopic guidance or arthroscopic guidance. Two moderate quality studies have also been conducted. Selles et al conducted a randomized controlled trial of 50 patients aimed to evaluate the functional outcomes after open reduction and internal fixation (ORIF) with and without arthroscopic debridement[16]. The authors found no difference in outcomes between each cohort. In contrast, Varitimidis et al conducted a randomized prospective study of 40 patients undergoing external fixation with percutaneous pinning with either arthroscopic- and fluoroscopic-assisted reduction or fluoroscopic-assisted reduction alone[17]. In this study, more associated injuries (ie: ligamentous injuries) were diagnosed and treated in the arthroscopic-assisted cohort. This cohort was found to have improved range of motion yet similar DASH scores at 24 months. Notably, modified Mayo wrist scores for the arthroscopically assisted group were better at 24 months. While comparative studies have been conducted, the studies themselves, the surgical and/or arthroscopic indications, fracture classifications, and implants utilized render literature interpretation difficult. Comprehensive evaluation of these studies, however, does not demonstrate evidence to support the use of wrist arthroscopy during distal radius fracture fixation.

The use of a home exercise program and supervised therapy following the treatment of distal radius fractures has been unchanged from the prior CPG iteration. The evidence to support its use remains inconsistent. Initially, few studies met inclusion criteria. Those that did, had important shortcomings and when inclusion criteria were expanded upon, issues regarding bias, injury heterogeneity, patient characteristics arose. Overall, one high quality

study and six moderate quality studies were included. Of these, two studies demonstrated a benefit of supervised therapy in non-operatively treated distal radius fractures (Oken et al at 3 weeks post-injury and Gutierrez Espinoza at 6 weeks and 6 months post-injury)[18,19]. This is contrasted by five studies that showed no benefit. One study by Krischak et al demonstrated improved outcomes after an unassisted home exercise program as opposed to those randomized to treatment by a physical therapist[20], while four studies demonstrated no difference in outcomes between either supervised or independent exercises[21–24]. Overall, evidence is inconsistent in its ability to support the use of routine supervised hand therapy for improving outcomes. It is possible however, that specific subsets of patients may benefit from supervised hand therapy and as such, we advocate for more investigation into this topic.

The indication for fixation of distal radius fractures statement has been updated to reflect patients under the age of 65. The prior iteration of CPG utilized a cut off of age 55 and previously reported inconclusive evidence for operative treatment of those above age 55 and moderate evidence for operative fixation in those with post-reduction radial shortening >3mm, dorsal tilt >10 degrees, or intra-articular displacement or step-off >2mm without a specified age. This updated iteration provides moderates support for operative fixation in the non-geriatric (less than 65 years of age) population in those with post reduction radial shortening >3mm, dorsal tilt >10 degrees, or intraarticular displacement or step off >2 mm and strong evidence that demonstrates surgical fixation in those above 65 years of age does not lead to improved outcomes. The guideline indicating moderate evidence to support treatment of non-geriatric patients is derived from one high quality and 26 moderate quality studies. The guideline indicating strong evidence that operative fixation does not lead to improved long-term patient reported outcomes relative to non-operative treatment in geriatric patients is based upon two high quality studies and 11 moderate quality studies with most consistently demonstrating that while radiographic parameters are improved after surgical treatment, there is no difference in patient reported outcomes.

Critically, the work group acknowledges that the age of 65 year is derived from the cited literature and serves as a proxy for functional demand. As no two patients are the same, we advocate for a patient-centered discussion to better understand an individual patient's values, preferences, and functional demand to inform appropriate decision-making (aligned with functional demands more so than age).

The statement designed to guide serial radiographic imaging for patients treated for distal radius fractures has been updated. The prior iteration was a consensus-based statement recommending that distal radius fractures treated non-operatively be followed by ongoing radiographic evaluation for three weeks and at cessation of immobilization. This has been updated to reflect that no difference exists in outcomes based on frequency of radiographic evaluation for patients treated for distal radius fractures. This statement is based off of one moderate quality study by van Gerven et al[25]. In this multicenter, prospective, randomized controlled trial, patients treated operatively and non-operatively for a distal radius fracture were randomized to a routine care cohort (radiographs at 1, 2, 6, and 12 weeks) or to reduced radiograph cohort (no further imaging after initial images during the first two weeks unless clinically indicated (ie: a new trauma, pain score >6 on the VAS scale, loss of range

of motion, or the presence of neurovascular symptoms). At one-year follow-up, the routine radiograph cohort demonstrated minimally statistically significant improvement in range of motion, however no differences were noted in any patient reported outcome measures or the number of complications. This study is limited by its low adherence to study protocols (58% of those assigned to the routine care regimen received the correct follow-up regimen and those assigned to the reduced radiograph cohort received a median of 3 radiographs compared to 4 in the routine care cohort). While reducing the number of radiographs obtained in follow-up of a distal radius fracture may reduce cost and radiation without an increase in complication rate, there may be value in obtaining radiographs after two-weeks in some patients.

With regard to operative fixation method for distal radius fractures, the new guidelines provide strong evidence that no difference exists in outcomes between fixation techniques for complete articular or unstable distal radius fractures. Prior guidelines were inconclusive and therefore unable to recommend for or against any one specific operative fixation method. This updated CPG does, however note that volar locked plates lead to earlier recovery of function in the short term (3 months). This guideline is based off of six high quality studies. Three of these studies evaluate various fixation techniques for complete intra-articular fractures and three compare various fixation techniques for unstable distal radius fractures. Jakubietz et al evaluated dorsal and volar plates[26], Yazdanshenas et al evaluated external fixation to a ‘pins and plaster’ technique[27], and Hammer et al evaluated volar locked plating to external fixation augmented with Kirschner wires[28]. The two studies evaluating volar locked plating demonstrated improvement in function in the earlier follow-up period but no difference at final follow up[26,28]. Three other studies compared volar locked plating to closed reduction and percutaneous fixation for both intra- and extra-articular fractures – each demonstrating earlier functional return in the volar locked plating cohort[29–31]. Two studies that followed patients up to a year demonstrated no differences in patient reported outcomes at the one year point[30,31]. This updated literature provides strong guidance that there is no difference in fixation techniques for complete articular or unstable distal radius fractures, aside from the observation that volar locked plating leads to earlier, short term functional improvement.

New to the CPG this year is a statement regarding opioid use. In the face of rising opioid use disorders and a trend toward higher-frequency use and higher prescription opioid-related mortality, the AAOS sought to evaluate the evidence related to opioid use for distal radius fractures[32–34]. Despite this, little high-quality evidence exists to inform guidelines. As such, and given the evidence of opioid sparing and/or opioid-free pain management options for other musculoskeletal conditions, the committee, by consensus, recommends consideration of multimodal and opioid sparing protocols when possible.

The updated strength of recommendations from the 2009 to 2020 CPG demonstrates that evidence (particularly in quality) continues to grow which provides more definitive guidance for the treatment of distal radius fractures. Importantly, however, the evidence regarding use of a supervised therapy program, serial radiography, and pain control remains limited. These represent opportunity areas for future investigation. Two recurring themes, that are of increasing importance with the emergence of patient-centered and value-based care,

are those of understanding and incorporating the values and preferences of patients and the evaluation of cost effectiveness. Future studies assessing how aligning treatment with the values and preferences of patients should lead to improved patient outcomes (e.g. using a volar plate for a distal radius fracture in a manual laborer preferring to return to function faster, or utilizing supervised therapy after surgery in a patient with low activation/engagement and finger arthritis).

Recommendations

This Summary of Recommendations of the AAOS *Management of Distal Radius Fractures Evidence-Based Clinical Practice Guideline* contains a list of evidence-based prognostic and treatment recommendations. Discussions of how each recommendation was developed and the complete evidence report are contained in the full guideline at www.aaos.org/drfcpg. Readers are urged to consult the full guideline for the comprehensive evaluation of the available scientific studies. The recommendations were established using methods of evidence-based medicine that rigorously control for bias, enhance transparency, and promote reproducibility. An exhaustive literature search was conducted resulting initially in over 830 papers for full review. The papers were then graded for quality and aligned with the work group's patients, interventions and outcomes of concern. For CPG PICO (i.e. population, intervention, comparison, and outcome) questions that returned no evidence from the systematic literature review, the work group used the established AAOS CPG methodology to generate one companion consensus statement that opioid alternatives (pharmacologic [local anesthetics, nonsteroidal anti-inflammatory agents, acetaminophen) and nonpharmacologic (ice, elevation, compression, cognitive therapies) should be considered alongside opioid sparing protocols when possible.

The Summary of Recommendations is not intended to stand alone. Medical care should be based on evidence, a physician's expert judgement, and the patient's circumstances, values, preferences and rights. A patient-centered discussion understanding an individual patient's values and preferences can inform appropriate decision-making to ensure his/her age and functional demands align to appropriately apply this clinical practice guideline[35–37]. The recommendations regarding operative treatment are principally based upon literature studying distal radius fracture as an isolated injury. Mitigating circumstances may also be factors in the shared decision-making process.

A Strong recommendation means that the quality of the supporting evidence is high. A Moderate recommendation means that the benefits exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a negative recommendation), but the quality/applicability of the supporting evidence is not as strong. A Limited recommendation means that there is a lack of compelling evidence that has resulted in an unclear balance between benefits and potential harm. A Consensus recommendation means that expert opinion supports the guideline recommendation even though there is no available empirical evidence that meets the inclusion criteria of the guideline's systematic review.

Arthroscopic Assistance

Inconsistent evidence suggests no difference in outcomes between use of arthroscopic assistance and no arthroscopic assistance when treating patients for distal radius fractures.

Strength of recommendation: Moderate. ★★★☆

Implication: Practitioners should generally follow a Moderate recommendation but remain alert to new information and be sensitive to patient preferences.

Home Exercise Program

Inconsistent evidence suggests no difference in outcomes between a home exercise program and supervised therapy following treatment for distal radius fractures.

Strength of recommendation: Limited. ★★☆☆

Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

Indications for Fixation (Non-Geriatric Patients)

Moderate evidence supports that for non-geriatric patients (most commonly defined in studies as under 65 years of age), operative treatment for fractures with post reduction radial shortening >3mm, dorsal tilt >10 degrees, or intraarticular displacement or step off >2 mm leads to improved radiographic and patient reported outcomes.

Strength of recommendation: Moderate. ★★★☆

Implication: Practitioners should generally follow a Moderate recommendation but remain alert to new information and be sensitive to patient preferences.

Indications for Fixation (Geriatric Patients)

Strong evidence suggests that operative treatment for geriatric patients (most commonly defined in studies as 65 years of age and older) does not lead to improved long-term patient reported outcomes compared to non-operative treatment.

Strength of recommendation: Strong. ★★★★

Implication: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.

Serial Radiography

Limited evidence suggests no difference in outcomes based on frequency of radiographic evaluation for patients treated for distal radius fractures.

Strength of recommendation: Limited. ★★☆☆

Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

Fixation Technique

Strong evidence suggests no significant difference in radiographic or patient reported outcomes between fixation techniques for complete articular or unstable distal radius fractures, although volar locking plates lead to early recovery of function in the short term (3 months).

Strength of recommendation: Strong. ★★★★

Implication: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present

Opioid Use

In the absence of sufficient evidence specific to distal radius fractures, it is the opinion of the workgroup that opioid sparing and multimodal pain management strategies should be considered for patients undergoing treatment for distal radius fractures.

Strength of recommendation Consensus ★☆☆☆

Implication: In the absence of reliable evidence, practitioners should remain alert to new information as emerging studies may change this recommendation. Practitioners should weigh this recommendation with their clinical expertise and be sensitive to patient preferences.

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Strength of Recommendations Descriptions

Strength of Recommendation	Overall Strength Of Evidence	Description of Evidence quality	Strength Visual
Strong	**Strong**	Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention. Also requires no reasons to downgrade from the EtD framework	
Moderate	**Moderate or Strong**	Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention. Also requires no or only minor concerns addressed in the EtD framework.	
Limited	**Limited, Moderate or Strong**	Evidence from one or more “Low” quality studies with consistent findings or evidence from a single “Moderate” quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.	
Consensus	**No reliable evidence**	There is no supporting evidence, or higher quality evidence was downgraded due to major concerns addressed in the EtD framework. In the absence of reliable evidence, the guideline work group is making a recommendation based on their clinical opinion.