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Practical Application of the 2020 Distal Radius Fracture AAOS/ ASSH Clinical Practice Guideline: A Clinical Case

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Abstract

The Clinical Practice Guideline (CPG) “Management of Distal Radius Fractures” released by the American Academy of Orthopaedic Surgeons (AAOS) and the American Society for Surgery of the Hand (ASSH) is a summary of the available evidence designed to guide surgeons and other qualified physicians in the management of distal radius fractures. According to this guideline, age of 65 is used as a proxy for functional activity and can serve as a threshold under which patients are likely to benefit from surgical fixation and over which patients are less likely to benefit from surgical fixation as compared to non-operative management. Supervised therapy and arthroscopic assistance should be utilized sparingly and, on a case-by-case basis. Routine radiographs should also be utilized on a case-by-case basis. As strong evidence suggests there is no difference in clinical or radiographic outcomes by fixation technique utilized after three months; fixation technique should be driven by fracture pattern. These guidelines serve to guide physicians in the care of patients with distal radius fractures.

Introduction:

Distal radius fractures are a commonly occurring condition, with an annual incidence of >64,000 in the United States[1] and representing approximately 18% of fractures in the elderly population[2,3]. These fractures cost an estimated $170 million a year in Medicare claims alone[4]. Additionally, as evidence demonstrates that the incidence of distal radius fractures continues to rise for all age groups[3], such fractures will continue to pose a great burden to society.

The American Academy of Orthopaedic Surgeons (AAOS) and the American Society for Surgery of the Hand (ASSH) released an updated Clinical Practice Guidelines (CPG)

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in 2020 based upon available literature designed to guide surgeons and other qualified physicians on the evaluation and treatment of acute, adult distal radius fractures. The case presented illustrates how these guidelines can be helpful to clinicians when evaluating a patient with a distal radius fracture and creating a treatment plan.

Case:

History:

A 69-year-old female patient who is left-hand-dominant engineer presented to the emergency room after having fallen onto her left hand while playing pickleball. The patient's past medical history was notable for hypertension and hyperlipidemia; however, she was otherwise healthy and took no medications. Injury radiographs demonstrated a comminuted, intra-articular distal radius fracture (Figure 1). The patient underwent a closed reduction and placement of a sugar tong splint in the emergency room upon presentation. Post-reduction radiographs demonstrated similar overall alignment of the distal radius, with the radiographs demonstrated radial shortening >3mm and intra-articular displacement >2mm (Figure 2).

Physical Examination:

The patient was 5'5" and 140 pounds with a body mass index of 24 kg/m^2. Upon presentation to clinic, the patient was in a well-fitting splint. She denied an open injury or any symptoms of carpal tunnel syndrome. She demonstrated the ability to flex and extend the interphalangeal joint of her thumb, extend her digits to neutral, and cross her index and middle digits. She noted normal sensation. Her digits were mildly swollen. She had well perfused digits with capillary refill <2 seconds.

Shared-decision Making:

During the clinic visit, the surgeon engaged in a process of shared decision-making with the patient using the SHARE approach laid forth by the Agency for Healthcare Research and Quality[5]. This five-step process includes: 1) Seeking the patient's participation, 2) Helping the patient explore and compare treatment options, 3) Assessing the patients values and preferences, 4) Reaching a decision with the patient, and 5) Evaluating the patient's decision. Several other shared decision-making frameworks and tools exist that can be employed[6,7]. As literature demonstrates that patients prefer taking an active role in decision-making[8–10], a concept that remains true even with elderly patients with distal radius fractures[8,10], we seek each patient's participation in the decision-making process. We discuss the evidence behind various treatment options[11] as well as other meaningful aspects of care – grip strength, radiographic alignment, cost, complication rate, immobilization time, cosmetic appearance, etc[7]. These attributes of care are discussed in the context of the patient's values and preferences (e.g. if a patient strongly favors return to full grip strength, surgical fixation may be best aligned with their preferences, however it a patient prefers a lower cost option, non-operative treatment may be best aligned with their preferences).

For this particular patient, she highly valued a maximal return of grip strength and a shorter duration of immobilization. Despite her age, she was active and eager to return to her athletic hobbies. The CPG that demonstrates strong evidence suggesting that operative treatment for 'geriatric' (or >65 years of age) patients does not lead to improved long-term patient reported outcomes as compared to non-operative treatment leaves flexibility and recognizes that age >65 serves as a proxy for functional demand. In applying this CPG to this patient, her functional demands place her more appropriately in the higher functional demand (<65 years of age) category.

Management:

In the pre-operative holding area, the patient underwent a regional anesthetic block[12]. The patient was taken to the operating room for an open reduction and internal fixation of her distal radius fracture. We utilized a standard FCR approach to visualize, reduce, and fix the fracture. We opted to utilize a volar locking plate as this would allow for earlier return to function. We utilized multiplanar fluoroscopic views to evaluate the reduction and confirm there were no intra-articular screws[13–15]. While some surgeons may advocate for concomitant arthroscopic-assisted reduction, this practice is not consistently supported by the evidence. Historically, dorsal approaches have been used for direct visualization of the distal radial articular surface for periarticular fracture management. Based on biomechanical studies suggesting the articular surface can be visualized volarly[16,17], we employ the Volar Intraarticular Extended View (VIEW) approach (Figure 3). This involves creating a longitudinal incision between the short and long radiolunate ligaments which allows for a 'window' into the radiocarpal joint to evaluate and aid in articular reduction, confirm at risk fracture fragments are captured (e.g. the volar lunate facet), and confirm hardware is extraarticular.

Post-operative Management:

Post-operatively, the patient was placed in a removable wrist brace and digit range of motion was initiated. Upon discharge from the post-operative anesthesia care unit, the patient was given acetaminophen and naproxen to take on a scheduled basis for at least 3 days, and 20 5mg tabs of Roxicodone on an as needed basis, and ondansetron.

The patient completed three-view wrist radiographs at two-weeks, three-months, and one-year. Final radiographs are demonstrated in Figure 4. The patient demonstrated appropriate and improving range of motion and composite grip at each post-operative visit and, using a shared decision-making approach, the decision was made to conduct home exercises without supervised therapy.

Discussion:

This case illustrates the CPG recommendations for the management of acute, adult distal radius fractures. Regarding the treatment decision, the CPG recognizes that age serves as proxy for functional demand. In practice, while the CPG recommends that those patients with post-reduction radial shortening >3mm, dorsal tilt >10', or intraarticular displacement or step off >2 mm who are <65 years of age are likely to benefit from surgical treatment and those >65 years of age are less likely to benefit from surgical treatment, this may not hold true when there is a discrepancy between a patient's chronologic age and their functional age. Although the literature demonstrates no differences in patient reported outcomes between surgical treatment and conservative treatment for those patients >65 years of age[18], this evidence should be applied to and evaluated in the context of each patient. In our clinical practice, we have found that shared decision-making and decision aid tools assist in eliciting patient preferences, goals, and functional status which is then utilized to make a treatment decision with the patient that aligns with the above preferences, goals, and functional demands[6,7,19].

As strong evidence suggests that no difference in radiographic or patient reported outcomes exist based on fixation technique for complete articular or unstable distal radius fractures (after three months), we advocate for the use of a fixation technique driven by the fracture pattern and patient characteristics. In the illustrated case, we felt a volar approach and volar locking plate would allow adequate visualization, capture, and neutralize forces as a fixed angle construct by transmitting forces from the distal fragments to the radial shaft. The volar locking plate fixation technique has been demonstrated to lead to earlier recover of function in the short term (three months), yet the volar locking plate is not a panacea for distal radius fractures and there may be fracture patterns or patient characteristics that warrant other fixation techniques[20–25]. For example, we employ a bridge plate when there is substantial metaphyseal comminution and/or evidence of a radiocarpal fracture dislocation that may be difficult to treat and stabilize with plates and screws alone[25]. We employ a fragment specific technique when fracture fragments are distal and/or cannot be captured by the screws available in a volar locking plate construct[20,21]. Dorsal approaches (inclusive of fragment specific techniques) are utilized when dorsal fragments are present that are likely to contribute to stability or appropriate articular reduction that cannot be adequately captured from a volar approach and fixation[22,23]. Given the higher complication rate of external fixation, we reserve this technique for cases in which soft tissue damage does not allow for internal fixation[24].

We utilize arthroscopic assistance and supervised therapy on a case-by-case basis as the evidence does not strongly support the use of either practice. Multiplanar fluoroscopy and thoughtful screw and plate placement can be employed to evaluate for and prevent intra-articular and/or aberrant screw placement[13,26,27]. Additionally, one high quality, randomized controlled trial exists that evaluated the functional and radiographic outcomes after distal radius fractures treated with a volar locked plate randomized to fluoroscopically-guided or arthroscopically-guided reduction[28]. This study demonstrated no difference in outcomes at 48 months between the cohorts. Lastly, while concomitant soft tissue injuries (e.g. scapholunate ligament) are reported with a high incidence[29,30], no high quality studies support improved outcomes with arthroscopic visualization and treatment of such injuries. In fact, a 2021 study evaluating differences in outcomes between patients with a radiographically apparent SL ligament injury (scapholunate angle >70’) and those without (scapholunate angle <70’) demonstrated no difference in outcomes[31]. This supports the concept, that while these injuries may be present, evaluating them arthroscopically and/or addressing them via repair or reconstruction at the time of distal radius fracture treatment may not impact outcomes.

We utilize supervised therapy on a case-by-case basis and employ a shared decision-making approach to this decision. As there is inconsistent evidence suggesting that there is no difference in outcomes between a home exercise program and supervised therapy, we evaluate the patient's swelling, range of motion, ability to conduct activities at home along with the patient's stated motivation and ability to go to and/or pay for supervised therapy. These care attributes are discussed in helping a patient make the decision if supervised or home therapy is the correct decision for them. Similar to other recommendations, the literature evaluates patient populations and does not necessarily account for the patient in front of you and while the spirit of this guideline is not meant to eliminate the use of supervised therapy after distal radius fractures, it instead serves to highlight that perhaps some subsets of patients may benefit from supervised hand therapy while others may not. In this particular case, the patient was motivated, working full time (and thus driving to therapy was difficult), had minimal swelling, and was making range of motion improvements on her own without the use of supervised therapy.

There is limited evidence to guide the frequency of follow-up radiographic imaging. One moderate quality study provides evidence that eliminating routine radiographs after one- and two-week follow-up radiographs results in no difference in patient reported outcomes but minimally significantly worse differences in range of motion as compared to those receiving radiographs at 1-, 2-, 6-, and 12-weeks post-injury[32]. As such, our practice as illustrated by this case is to obtain radiographs at 2 weeks, 3 months, and 1 year. Similar to prior recommendations, we advocate for a patient-centered approach and recommend discussing the risks and benefits of serial radiography with a patient as part of treatment.

The patient illustrated received a pre-operative single-shot regional block and multi-modal, opioid-sparing post-operative medications. There is little high-quality evidence to support and/or guide the use of multi-modal and opioid-sparing pain management techniques in the treatment of distal radius fractures. A recent randomized, controlled trial evaluated the use of an infra-clavicular block versus general anesthesia and demonstrated lower pain scores at 1, 2, 24, and 48 hours after surgery[12]. Morphine consumption in the post-operative anesthesia care unit was lower in the regional cohort, yet the oral analgesic consumption was similar between cohorts. Post-operative nausea and vomiting were also lower in the regional anesthesia cohort. Outside of the distal radius fracture literature, we rely upon the growing body of evidence as it relates to other musculoskeletal conditions to guide opioid stewardship and education[33–36].

This case illustrates the real-time use of the AAOS and ASSH CPG for the management of acute, adult distal radius fractures. Further investigation is needed to 1) evaluate areas of inconsistent evidence (e.g. supervised therapy for adults with arthritis) to improve these recommendations in the future, 2) assess how this new CPG changes and improves the delivery of evidence-based care over time, and 3) understand how to employ tools and decision aids to utilize these recommendations in practice in accordance with patient preferences and values.

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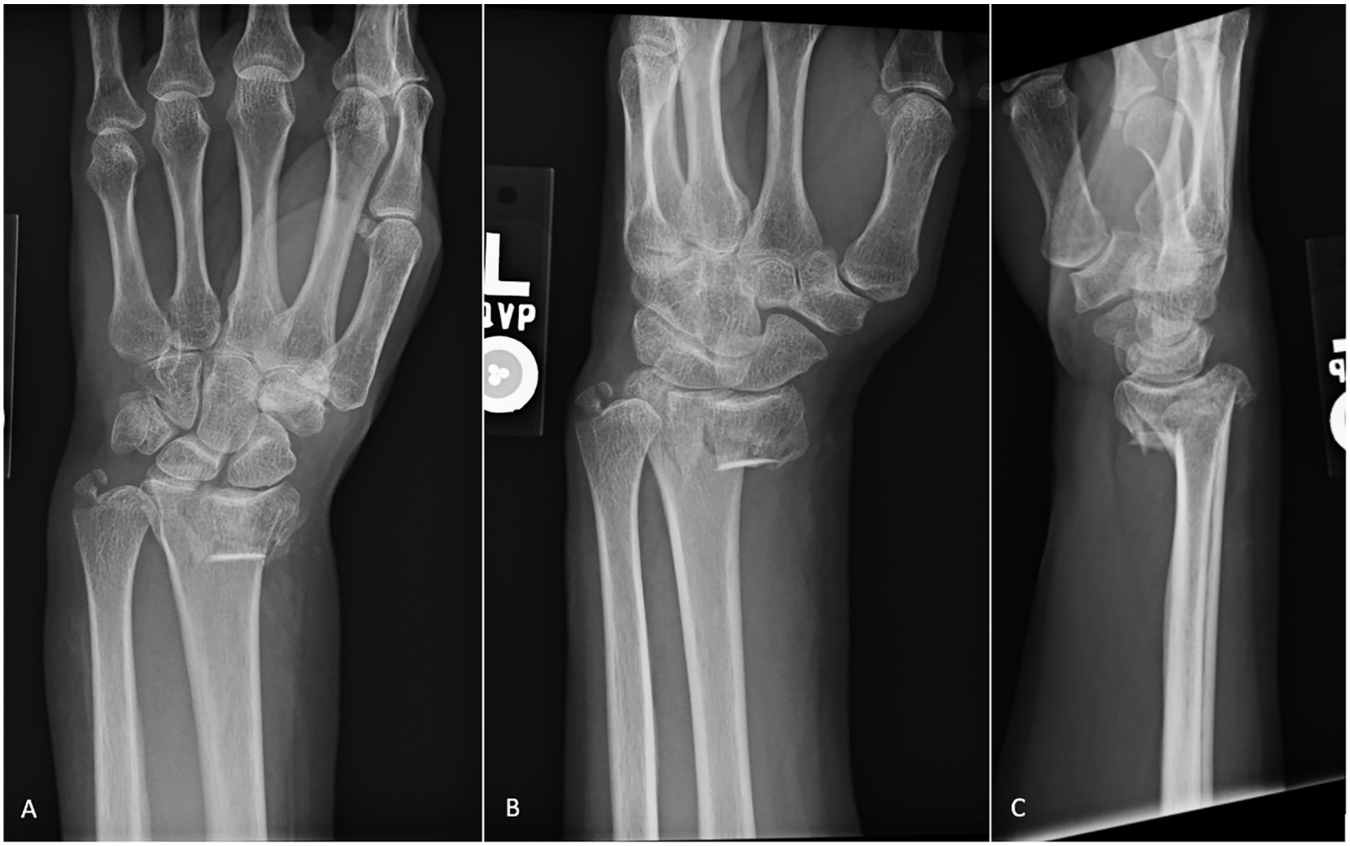

Figure 1.

Injury radiographs demonstrating a comminuted, intra-articular distal radius. A) PA, B) oblique, and C) lateral views.

Figure 2.
Post-reduction and splint placement images demonstrating stable alignment with >3mm radial shortening and >2mm intra-articular displacement. A) PA, B) oblique, and C) lateral views.

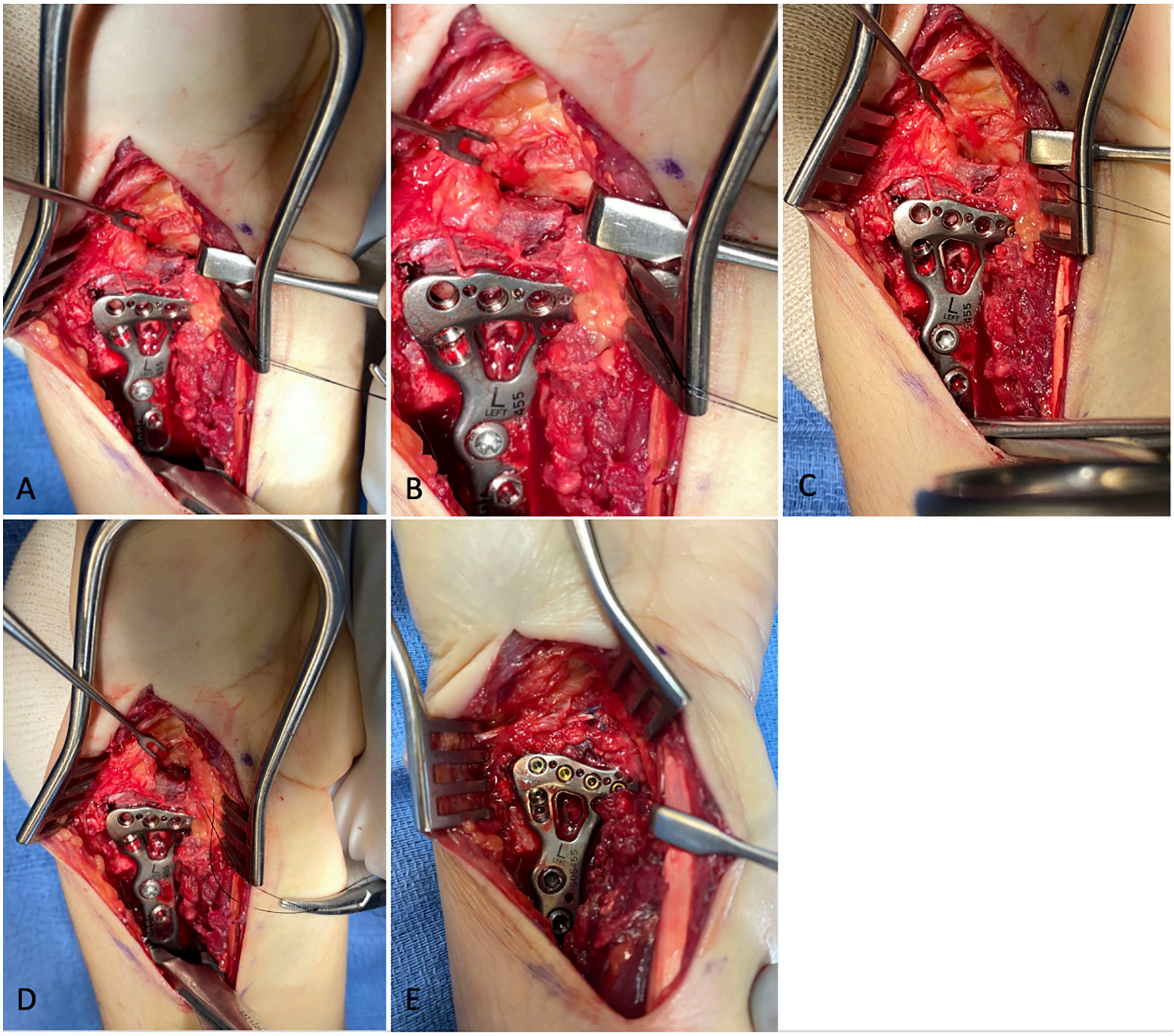

Figure 3.
Intra-operative images demonstrating the Volar Intraarticular Extended View (VIEW) approach. A and B) intra-articular displacement visualized through a longitudinal split between the long and short radiolunate ligaments, C and D) intra-articular displacement is reduced, E) longitudinal split is sutured with non-absorbable suture.

Figure 4.
Final radiographs. A) PA and B) lateral views.