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# Distal Radius Fractures in the Elderly: Factors Affecting Treatment Decisions

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 OPEN ACCESS

**PUBLISHED**

30 November 2024

**CITATION**

Kalimian, T., Wollstein, R., 2024. Distal Radius Fractures in the Elderly: Factors Affecting Treatment Decisions. Medical Research Archives, [online] 12(11).

<https://doi.org/10.18103/mra.v12i11.6145>

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**DOI**

<https://doi.org/10.18103/mra.v12i11.6145>

**ISSN**

2375-1924

## ABSTRACT

Fractures of the distal radius are common and are becoming more so with population ageing. The choice of treatment depends on the specific characteristics of the fracture and the patient's functional level. Due to a large number of variables contributing to the outcomes of treatment, and our limited ability to account for many of these factors, decision-making remains controversial and differs by geographical area as well as functional and other considerations. We aim to present the current literature regarding some of the elements affecting treatment decisions for distal radius fractures in the ageing population. By better identifying and evaluating patient-specific factors (including occupation, function, social support system etc.) the indications for treatment and ultimate outcomes can improve.

## Introduction

The World Health Organization predicts that by 2050, the global population aged 60 years and older will double<sup>1</sup>. As life expectancy increases, so does our quality of life, with the elderly population expecting to preserve function into older age. Still, with advancing age and increasing osteoporosis, comes a higher risk of fragility fractures, with fractures of the distal radius being among the most common<sup>2</sup>.

Lower extremity fractures often necessitate surgical fixation due to their potential to decrease mobility, thereby causing health deterioration and reducing life expectancy<sup>3</sup>. Injury to the upper extremity however, impacts quality of life more than life expectancy, rendering the treatment decision-process more complex. There therefore remains considerable debate regarding the optimal treatment approach for distal radius fractures in the elderly.

Treatment options can grossly be divided into surgical versus “conservative” or nonsurgical. When faced with a distal radius fracture in an elderly patient, the treating physician together with the patient decide on a treatment plan. The choice of treatment generally depends on the specific characteristics of the fracture and the patient’s functional level. Over time, our treatment options and criteria for decision-making have evolved with the changes in our health care systems and life expectancy. This remains a controversial topic and differs from country to country. This review aims to present the current literature regarding some of the factors affecting these decisions.

## Patient characteristics:

### AGE:

While individuals over the chronological age of 65 are classified as elderly, aging is a highly individual process<sup>4</sup>. Many people in this age group remain active, engaged in work, sports, and hobbies that require fine motor skills and place high functional demands on their hands. Chronological age alone therefore seems to be a poor indicator of patient needs. That being said, multiple studies evaluate the effect of age on the treatment of distal radius

fractures and in some countries such as the United States, age remains the major criteria for suggested decision-making<sup>5</sup>. The results of multiple large studies remain debatable.

Recent 2020 American Academy of Orthopaedic Surgeons (AAOS) and American Society for Surgery of the Hand (ASSH) guidelines state that there is strong evidence that surgical treatment does not lead to improved long-term patient reported outcomes compared to non-operative treatment in geriatric patients<sup>6</sup>. In this update they changed the definition of elderly from 55 years of age to 65 years of age.

A meta-analysis by H. Gutierrez-Espinoza et al. looking at randomized clinical trials and 2000 patients, compared volar locking plate fixation to cast immobilization in adults older than 60 years. They found that while wrist function and grip strength were statistically improved with surgical fixation, these differences were not necessarily clinically relevant<sup>7</sup>. Another meta-analysis by Hui Ju et al. evaluated 889 elderly patients from 59 studies and showed no significant differences between surgery and casting in terms of pain (visual analogue score), functional scores, grip strength, or wrist motion. Recently, using the Swedish registries, Sagerfors et al. defined a subgroup termed the “super elderly” consisting of patients above the age of 80 years old. In this group a comparison of surgery to cast treatment found no difference in wrist motion among those over 80 and another more recent study found that life expectancy was increased in super elderly patients with a distal radius fracture as opposed to the younger elderly group<sup>8,9</sup>.

Chung et al. evaluated distal radius fractures in patients over 60 years old using the Michigan Hand Outcomes Questionnaire and found no variation in outcomes based on treatment type for patients over 60. Bony alignment on post reduction radiographs also did not correlate with functional outcome. Zhang et al. in another metaanalysis, also compared operative fixation with a volar locking plate to cast treatment in the elderly and

demonstrated that although surgical fixation leads to better grip strength it does not improve the disabilities of the arm shoulder and hand (DASH) score or wrist range of motion<sup>10,11</sup>.

A recent metaanalysis by Zhu et al. found slightly better results with operative treatment of distal radius fractures looking at grip strength and motion as well as DASH scores<sup>12</sup>. Martinez-Mendez et al. in a randomized controlled trial looked specifically at intra-articular fractures in 97 elderly patients and demonstrated that volar plating scored better in pain and (DASH) scores, than closed reduction and cast treatment. They concluded that open reduction and internal fixation with a volar locking plate leads to better outcomes in the elderly<sup>13</sup>.

While age is an unambiguous factor, and easiest to evaluate and compare, due to their immense amount of variability, other factors such as function and specifically functional outcomes of treatment become very difficult to assess. Additionally, this lack of homogeneity precludes any real comparison between studies.

#### FUNCTION:

The evaluation of wrist function is divided generally divided into objective (such as grip strength and movement) and patient-rated tests. Some well-established tools for patient-rated wrist function include the patient rated wrist evaluation (PRWE), the DASH score, and the Michigan hand outcomes questionnaire<sup>14-17</sup>. These tools aim to assess wrist function from the patient's perspective and have been used widely to evaluate outcomes in distal radius fractures. Though they have all been validated, no one tool is perfect, and in general we are still striving towards the perfect method to assess actual function, and while in the process, meaningful comparisons of treatment outcomes are not possible. Therefore, all studies, specifically the large metaanalysis, that aim to compare treatment options, remain limited in their ability to provide relevant guidelines.

This is demonstrated in the studies looking at adherence with guidelines. In 2013 a study found incomplete adherence with American academy of

orthopaedic surgeons (AAOS) guidelines regarding the treatment of distal radius fractures<sup>18</sup>. Kyriakedes et al. found low agreement between actual treatment decisions and the Appropriate Use Criteria (AUC)-recommended "appropriate" treatments of distal radius fractures<sup>19</sup>. They suggested adding age and certain fracture characteristics to the decision-making<sup>19</sup>. Another study found that these guidelines "do not address activity or participation (disability), are not well linked to key concepts relevant to hand conditions"<sup>20</sup>. In 2020 a survey found a practice variation toward surgical management of geriatric DRF among Hispanic orthopedic surgeons; despite their compliance with the AAOS AUC guidelines<sup>21</sup>.

Given that as stated, the concept of "function" is complex and affected by multiple variables such as occupation and social situation, we not only evaluate functional outcomes poorly, thus limiting the ability to provide relevant guidelines, we also have limited standards against which to assess function in patients and specifically elderly patients with distal radius fractures when making treatment decision Since as stated, the concept of "function" is complex with many aspects, and affected by multiple variables such as occupation and social situation, we not only evaluate functional outcomes poorly, thus limiting the ability to provide relevant guidelines, we also have limited standards to assess function in patients and specifically elderly patients with distal radius fractures when making treatment decisions. What is considered a good functional outcome for a laborer will differ completely from the functional expectations of a musician or a high-level athlete. Similarly, it is not clear whether an older patient will have different functional demands when compared to a younger adult. There is a plethora of different objective and subjective tests for hand and wrist function beyond those already mentioned. These are used to compare surgical versus conservative treatment or different surgical techniques. A study looking at psychological aspects of distal radius fractures found that the "dominant-side distal radius fractures have a negative impact on the

psychological adjustment and quality of life, and that these patients are more susceptible to the development of psychological disorders"<sup>22</sup>. Another study evaluated resident involvement in distal radius fracture surgery and found that though it is associated with longer operative time, this involvement does not affect rates of episode-of-care adverse events<sup>23</sup>.

#### LOCATION/CULTURE:

Another aspect of decision-making in distal radius fractures pertains to local societal values and culture. These include cost and access to treatment and are reflected in study results<sup>24</sup>. These differences are demonstrated in disparate treatment guidelines between different countries. A recent study evaluated the use of translated or culturally adapted patient-rated outcome measures. They found a lack of reporting of linguistic, racial, and ethnic data and inconsistent use of these tests, particularly those that have been translated and "culturally adapted for distal radius fractures. They concluded that "as sociocultural characteristics and patient-rated outcome measures (PROMs) are associated with outcomes, ensuring they are broadly represented in studies, may improve equity and shared decision-making"<sup>25</sup>. Another recent study concluded that "differences in management of DRFs were also observed across different demographic groups with ongoing racial disparities" suggesting inclusion of cultural /racial parameters in the decision-making <sup>26</sup>. A study looking at outcome tools for distal radius fractures among Spanish-speaking patients found that "none of the five instruments identified received a good rating on all three checklists. Only the PWRE demonstrated moderate evidence on half of the measurement domains"<sup>27</sup>. Location-specific elements affect the outcomes of our studies. For example, a study in Sweden, comparing surgical versus nonoperative treatment for distal radius fractures in patients over the age of 70 found a clear advantage for surgical treatment<sup>28</sup>. This contrasts with a study from Turkey that found that conservative treatment yields similar results to surgery<sup>29</sup>.

#### FRAILTY INDEX:

Frailty, a syndrome impacting health, energy, and function, is another factor to consider when deciding on treatment for a distal radius fracture. Frailty increases vulnerability to stress and lowers surgical tolerance, though it lacks a specific definition in the literature<sup>30</sup>. Recent research has shown a poor correlation between surgeons' assessments of frailty and patients' self-assessments, with patient self-reports being more predictive of one-year mortality rates<sup>31</sup>. A study found that "while surgical decision-making for frail patients with DRFs remains contentious, a frailty score was significantly associated with the probability of hospital readmission /reoperation, postoperative complications, and delayed hospital length of stay"<sup>32</sup>.

#### Fracture characteristics:

Specific radiographic measures have been established to guide treatment, with surgical intervention recommended when certain thresholds are exceeded. The measurement of these radiographic parameters has been validated<sup>33-35</sup>. A German study defined the radiological parameters and indications for surgery. They cite radiographic shortening, dorsal tilt and instability including shortening by over 3mm, dorsal tilt over 10 degrees, presence of a dorsal debris zone, rupture, or osseous avulsion of the radioulnar syndesmosis as clear indications for operative treatment<sup>35</sup>. Though a detailed discussion of these considerations is beyond the scope of this article, multiple studies demonstrate associations between certain radiologic measurements and clinical outcomes while others have failed to find significant correlations between radiographic parameters and clinical outcomes in the elderly. One study concluded that functional outcomes are not necessarily dependent on radiological measures<sup>36</sup>. Another study suggested that precise restoration of wrist anatomy is not associated with better patient outcomes for older adults with DRF 12 months following treatment<sup>37</sup>.

## Summary:

Our population continues to age, and our definitions of “elderly” are constantly changing. Hand in hand with this enlarging patient cohort we also see higher functional expectations in this population group. Therefore, there is an increasing need to continue to adapt our treatment approaches. Fractures in the elderly population become more prevalent and it is important to appreciate the evidence (or lack thereof) supporting treatment recommendations for elderly patients.

Because there are so many variables that predict outcomes, and because we are unable to account for many of them, a review of the literature cannot provide clear guidelines for care of a distal radius fracture in an elderly patient. However, there is consensus that multiple parameters should be accounted for when making a treatment decision. We have the advantage of being “local” while treating our patients (and this ability increases as we diversify our providers) as well as a knowledge of our local surgical abilities and support services.

Both surgery and conservative treatment carry risks and benefits, especially in older individuals with comorbidities. The potential benefits must be weighed against the risks, including complications, recovery time, and the impact on the patient’s overall health.

For patients with lower functional demands, non-surgical options should be considered despite radiographic criteria, as immobilization with physical therapy may provide adequate results

without surgery. Shared decision-making, involving patients, families, and healthcare providers, is crucial for creating personalized care plans that align with the patient’s values and lifestyle.

## Conclusions:

Treating distal radius fractures in the elderly requires moving away from a one-size-fits-all approach based on chronological age to one that considers individual functional needs and goals. By adopting a more nuanced understanding of aging, providers can better align treatment options with patient-specific factors, leading to improved outcomes and quality of life.

More research is needed to develop tools that can better assess elderly patients based on true function that can be on one hand patient specific but also be standardizable and generalizable. This will allow healthcare providers to better counsel patients, improve treatment recommendations, and facilitate shared decision-making for distal radius fractures.

## Conflict of Interest:

The authors have no conflicts to disclose.

## Funding Statement:

No funding was obtained for this review.

## Acknowledgements:

None.



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