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Distal Radius Fracture: What Does the Patient Want?

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Abstract

Distal radius fractures are common and while historically most have been treated nonoperatively the frequency with which distal radius fractures are treated surgically is increasing. Criteria for considering surgical treatment are often based on radiographic appearance of the fracture. Less often discussed is patient preference: what do patients want. We investigated responses of a general population when presented with various treatment options following a hypothetical distal radius fracture. Many respondents chose nonoperative treatment even when told that surgery might result in a better outcome. This information can help during the shared decision-making process when discussing treatment options with a patient who presents with a distal radius fracture.

Keywords

Distal Radius Fracture, Colles Fracture, Wrist Surgery, Open Reduction and Internal Fixation, Wrist Radiographs

1. Introduction

Distal radius fractures are one of the most common orthopaedic injuries, usually the result of a fall on the outstretched upper extremity and account for approximately 18% of all fractures seen by orthopaedic surgeons [1]. Many are treated non-operatively, typically with cast or splint immobilization for 6 weeks, often followed by a program of supervised hand therapy. Surgical treatment has its advocates; the goal of surgical intervention is to improve outcomes as compared to non-operative treatment [2] [3]. However, there is a lack of unanimity of opinion about which fractures are best treated surgically and which fractures do not require surgical treatment. One factor which is often not addressed when reporting on treatment of distal radius fractures is patient preference. In the clini-

cal setting patients often ask whether they "should" have surgery, whether they can "get away with" not having surgery. Patient attitudes should be considered in addition to the radiographic findings when deciding how to treat a distal radius fracture. The purpose of this study is to investigate responses of a general population when presented with various treatment options following a hypothetical distal radius fracture.

2. Methods

An online, survey based, study was performed through the use of a crowdsourcing website, Amazon Mechanical Turk (AMT). Participants for this study were randomly recruited through AMT. Studies have shown that AMT produces results similar to conventional surveying techniques and the population surveyed is representative of the U.S. internet population [4] [5] [6].

AMT workers must be older than 18 years of age to participate on the platform. Survey participants are screened through AMT to ensure that the same individual cannot complete multiple responses. AMT screens participants to ensure quality responses. Additionally, an attention check question was included to verify the quality of the responses. If a survey participant failed the attention check, their response was excluded. Finally, in the prompt on the AMT website, participants were asked to refrain from participating if they had previously suffered a broken wrist.

If a participant completed the survey and adequately responded to the attention check, they were compensated ($0.20 per unique response) through the AMT platform for their time.

Survey Questions

The authors devised the survey in an effort to simulate a clinical scenario, with questions as follows:

Scenario I: Imagine that you fell while walking. You landed on your hand and had immediate pain in your wrist. You see a doctor who treats this sort of injury. X-rays are taken and you are told you have a fracture (broken bone) near the end of the radius (a bone in your wrist). These photographs only demonstrate the location of the fracture (no actual fractures can be seen in these photographs) (**Figure 1**).

You are told that the fracture (broken bone) is in good position ("alignment" of the fracture is "acceptable") and that the injury (broken bone) can be treated with a splint/cast for 6 weeks… OR you could have a surgery that would reduce the amount of time in a splint/cast from 6 weeks to 2 weeks. The surgery would involve an operation to expose the bone followed by placing a metal plate and screws at the fracture to hold the bones in place.

Question 1: Which of the following would you choose for your treatment?

- Splint/cast for 6 weeks with x-rays to check the alignment.
- Surgery—an operation to expose the broken bone and place a metal plate and screws on the bone to keep it in place, followed by a cast for 2 weeks.

Figure 1. Fracture location.

You are told if you are treated with a splint/cast, the broken bone can sometimes change position (move out of place) which can lead the doctor to recommend surgery later. When this occurs it usually happens within two weeks of the original injury. There is an estimated 1 in 3 chances of this happening.

Question 2: With this additional information, which option would you choose?

- Splint/cast for 6 weeks with x-rays to check the alignment.
- Surgery—an operation to expose the broken bone and place a metal plate and screws on the bone to keep it in place, followed by a cast for 2 weeks.

Scenario 2: This time when you fall the pieces of bone (fracture fragments) are displaced (not in a normal position). In the emergency room the doctor provides pain relief and moves the broken bone back into place (there is no cutting the skin, this is not surgery). The fracture is "set" and a splint/cast is applied. You see a doctor the next day. X-rays are taken and you are told that the fracture pieces (broken bone) are in good position.

You are given the following information to consider. The fracture (broken bone) will heal regardless of whether you are treated with a splint/cast or surgery but are told that people who choose surgery may have a better outcome than people who are treated with a splint/cast.

Question 3: Which of the following would you choose for your treatment?

- Splint/cast for 6 weeks with x-rays to check the alignment.
- Surgery—an operation to expose the broken bone and place a metal plate and screws on the bone to keep it in place, followed by a cast for 2 weeks.

Scenario 3: We are interested in your opinion on hand therapy. After your fracture (broken bone) has healed you are given a choice: Supervised therapy once a week for 12 weeks with a Certified Hand Therapist OR a home exercise program based on instructions given to you by the treating doctor (no hand therapist visits).

Regardless of whether you do exercises under the supervision of a hand therapist or do the exercises on your own the end result is likely to be the same.

However, you may achieve the final result sooner if you do exercises under the supervision of a hand therapist.

Question 4: Which of the following option would you choose for hand therapy?

- Seeing a Certified Hand Therapist
- Home exercise program

Data Analysis

Results from the survey were pooled and analyzed using Microsoft Excel Online (Redmond, WA).

3. Results

A total of 328 participants completed the survey via AMT. Three participants were excluded because they failed the attention check question, leaving 325 participants who were included in the study.

Following the first prompt regarding nondisplaced distal radius fractures, 132 (41%) of the participants opted for non-operative management while 193 (59%) of the participants opted for operative management. Following the additional information about potential displacement, 143 (44%) of the participants opted for non-operative management while 182 (56%) of the participants opted for operative management.

Following the prompt regarding a displaced distal radius fracture, 134 (41%) of the participants opted for non-operative management while 191 (59%) of the participants opted for operative management.

These results can collectively be seen in Table 1 below.

Finally, regarding post-healing therapy, 104 (32%) of the participants opted for a home exercise program while 221 (68%) of the participants opted for a structured hand therapy program with a Certified Hand Therapist. These results are seen in Table 2 below.

Table 1. Patient preference for nonoperative versus operative management.

	Nonoperative Management (%)	Operative (%)
Question 1	**132 (41)**	**193 (59)**
• Nondisplaced distal radius fracture • 6 weeks in cast vs. surgery to shorten immobilization to 2 weeks		
Question 2	**143 (44)**	**182 (56)**
• Nondisplaced distal radius fracture • 1 in 3 chance of displacement • Surgery vs. nonoperative treatment		
Question 3	**134 (41)**	**221 (59)**
• Displaced distal radius fracture, close reduced • Surgery vs. nonoperative treatment		

Table 2. Patient preference for therapy.

Home Exercise Program (%)	Certified Hand Therapy (%)
104 (32)	221 (68)

4. Discussion

Distal radius fractures are common [7]. According to Ludvigsen *et al.* distal radius fractures are the most common fracture in adults [8]. Mulders *et al.* reported the incidence of distal radius fractures is 20 to 32 per 10,000 person-years [9]. Despite the ubiquity of distal radius fractures (or perhaps because they are so common) there is a lack of agreement with regard to treatment. When Abraham Colles described fractures of the distal radius in his 1814 report he stated "… that the limb will at some remote period again enjoy perfect freedom in all its motions, and be completely exempt from pain…" This was for unreduced fractures although the deformity "… will remain undiminished for life" [10]. Much has changed since then.

As Selles *et al.* noted, surgical treatment for distal radius fractures has become more popular [11]. Whether this results in improved outcome is not clear. In a systematic review comparing clinical outcomes of surgical and non-surgical management of distal radius fractures (5 prospective studies and 6 retrospective studies totaling 1049 patients). He *et al.* found no significant differences in most functional parameters and concluded that non-surgical treatment should be the initially consideration [12]. Ochen *et al.* (JAMA) in a systemic review and meta-analysis involving 23 studies encompassing 2254 participants concluded that surgical treatment resulted in better DASH score and grip strength compared with nonoperative treatment for distal radius fractures [2]. According to the authors, their findings "suggest that operative treatment might be preferred for distal radius fractures". In a systematic review and meta-analysis comparing volar locking plate fixation with closed reduction for distal radius fractures Lawson *et al.* reported no clinically important difference between the two treatments with regard to patient reported pain and function when evaluated 12 months after treatment [13]. The authors did note that surgical treatment resulted in better fracture alignment. It is fracture alignment-radiographic appearance of the fracture—that often influences decision making when considering whether to perform surgery. In a guideline from the American Academy of Orthopaedic Surgeons, published in 2020 surgical treatment for distal radius fracture in the non-geriatric population (age under 65 years) is supported (by "moderate evidence") for fractures with post reduction radial shortening > 3 mm, dorsal tilt > 10 degrees or intraarticular displacement or step off > 2 mm [14]. According to this guideline, surgical treatment in this group leads to improved radiographic and patient reported outcomes.

Surgical treatment for acceptably reduced fracture has its advocates. Souza *et al.* followed 110 patients who presented with non-displaced or minimally displaced distal radius fracture [15]. No reduction had been performed. By 6 weeks,

30% were displaced beyond AAOS clinical practice guideline parameter. Dorsal comminution and age greater than 60 years were risk factors for displacement. The authors concluded that "some" patients may benefit from surgical intervention. Not addressed in this study is whether those individuals whose fractures are at high risk for displacement might benefit from surgical intervention before the fractures displaces. However, there are recent studies which conclude that distal radius fractures which are acceptably reduced do better if surgically treated as compared to nonoperative treatment [9] [16]. Mulders *et al.* compared the outcomes of open reduction and volar plate fixation with closed reduction and plaster immobilization with an acceptably reduced extra-articular distal radius fracture [9]. In their patients, aged 18 to 75 years, those who were treated surgically had better functional outcomes at 6 months, described as clinically relevant, compared with nonoperatively managed patients. At 12 months the functional outcomes were still better in the surgically managed patients, although the authors felt the differences at this time were less clinically relevant. They did report that 42% of patients treated non-operatively initially went on to require an operation for fracture re-displacement or symptomatic mal unions. The authors stated that adequately reduced extra-articular fractures had better functional outcomes after 12 months when treated surgically (open reduction internal fixation with volar plate) compared with nonoperative treatment.

In a similar study, but this time looking at intra-articular fractures of the distal radius, Selles *et al.* compared volar plate fixation with cast immobilization in acceptably reduced intra-articular distal radius fractures [16]. Patient treated surgically had significantly better function, outcome at all follow-up periods. Also 28% of patients initially treated non-operatively subsequently underwent surgery. On the basis of those findings, the authors recommended surgery for patients who had an acceptably reduced intra-articular fracture of the distal radius.

In our study, more than 40% of respondents chose nonoperative treatment even when told that surgery might result in a better outcome (question 3). A roughly similar per cent would continue nonoperative treatment after learning that there is a 1 in 3 chances of fracture displacement (question 2). About the same percent would choose 6 weeks in a cast rather than shorten the period of immobilization by undergoing surgery (question 1). One can conclude that there is likely to be an initial disinclination towards surgical treatment in a significant per cent of patients. For the benefit of our patients, we, the treating physicians, must be aware of and acknowledge the trepidation patients may experience when facing the prospect of surgery.

Following a distal radius fracture, whether treated nonoperatively or with surgical intervention, patients are not infrequently referred to a hand therapist for a supervised program of therapy, with the referral sometimes initiated by the physician and at other times by patient request. Randomized trials which compare home exercise programs with supervised hand therapy have failed to show significant long-term benefit from supervised hand therapy compared with an independent exercise program [17] [18] [19]. Therapy can accelerate recovery but

not change the ultimate outcome [17]. By a 2 to 1 margin respondents in our study would pursue a supervised program of hand therapy despite being told that the ultimate outcome was no better than a home program of exercises.

The results of this study may provide the treating physician with a very general idea of what patients may want when learning that they have a distal radius fracture. Almost half of respondents would elect nonoperative treatment even when informed surgery might result in a better outcome.

It must be stated that this information is not a substitute for a thorough discussion with the patient of the nature of the injury, the options for treatment—surgical and nonsurgical—with their risks and benefits, potential complications and expected outcomes. The shared decision-making process is just that: a process in which the patient participates in determining the treatment plan. Information about patient perception of different treatment options can facilitate the process [20]. Awareness of the attitudes patients bring with them to the examination room can be an important part of the process.

Limitations

The major limitation of this study is that no demographics were collected from the participants. It has previously been shown that the AMT worker population is representative of the general US internet population, but the internet population is unlikely to be the same as the patient population being treated for distal radius fractures [4] [5] [6].

Another limitation is that study participants did not have a distal radius fracture. They were only given a prompt and information on what a distal radius fracture is, how it often occurs, and the symptoms of it. An individual's perspective on treatment may change if they actually have the injury versus theorizing what it would be like to have the injury. Finally, participants had no opportunity to ask clarifying questions in this survey. In the participant did not understand a particular part of a prompt or question, they answered without being able to ascertain more information.

5. Conclusions

Given the lack of current consensus on ideal management of distal radius fractures, it is imperative for providers to pursue shared decision making with their patients. The results from this study may help providers better frame discussion around treatment options of distal radius fractures. This, in turn, should lead to increased patient satisfaction.

Study participants were not subject to intervention. All data was collected anonymously. Subject identities were not disclosed to researchers. Therefore, ethics approval was not sought.

Informed consent was not sought for this article because no patients or study participants were subject to any procedures, tests, surgery, or intervention.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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