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Older Patient Preferences for Internal Fixation After a Distal Radius Fracture: A Qualitative Study from the Wrist and Radial Injury Surgical Trial (WRIST)

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Abstract

Background—Distal radius fracture (DRF) treatments provide similar functional outcomes. It has been hypothesized that the use of internal fixation is increasing because of physician preferences. The multi-site randomized Wrist and Radius Surgical Trial (WRIST) provides a unique opportunity to examine patient preferences in the absence of surgeon influence. Our objective was to investigate patient preference for internal fixation even after being informed of the equipoise among treatment.

Methods—We performed 30 semi-structured interviews with older individuals, all over the age of 60, approached at our institution for WRIST. Our sample included three groups: those with a preference for internal fixation (N=11), those with preference for non-surgical treatment (N=6), and those without a preference who consented to surgical randomization (N=13). We used grounded theory for data collection and analysis.

Results—All participants indicated their chief concern was regaining full function. Patients based their preferences for internal fixation on multiple values, including obstacles of recovery, autonomy, aesthetics, and pain relief. Some patients who did not select internal fixation reflected on their experiences, questioning if they would have had a potentially different outcome with internal fixation treatment.

Conclusion—Without evidence for a superior treatment, patients focus on factors that pertain to recovery rather than outcomes, with most preferring the volar locking plating system. To best align with patient values, physicians should focus their discussion with patients on aspects of the

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Note: Qualitative research is not commonly used in surgical research. These appendices are intended to provide readers with a comprehensive understanding of the methodology used in the study.

recovery period rather than functional outcomes. Evidence from WRIST will provide high-level information about patient-reported, functional, and radiographic outcomes.

Keywords

Distal radius fractures; qualitative; decision-making; treatment decisions; older patients; falls; fractures

Distal radius fractures (DRFs) are one of the most common fractures among older individuals, accounting for 18% of all fractures in those 65 years of age and older.[1-4,5] Both surgical and non-surgical treatment options result in similar functional outcomes,[6-10] yet the use of internal fixation has been increasing.[11] For example, between 1996-2005 the rate of internal fixation among Medicare beneficiaries increased from 3% to 16%.[12] These trends persist without high-level evidence to indicate the best treatment option.[13,14]

The Wrist and Radius Injury Surgical Trial (WRIST) is a multisite, international, randomized controlled trial coordinated by our institution. WRIST was designed to evaluate differences in patient-reported, functional, and radiographic outcomes for DRF treatment among individuals 60 years of age or older. Participants were randomized to receive one of three surgical treatments (external fixation, percutaneous pinning, or internal fixation using volar locking plates (VLPS)). Subjects who opted out of surgery were followed as a control group.[15] Study-wide, 60% of eligible patients refused to enroll. The most common refusal reason (35%) was patient preference for a specific treatment. The vast majority (91%) of this preference was for internal fixation using VLPS. In other words, despite their providers emphasizing that no surgical treatment option has demonstrated superior functional outcomes, 32% of eligible patients chose VLPS anyway.

Previous studies have attributed the persistent increase of internal fixation to physician specialty preferences and experience.[16,17] Patients who are seen by members of the American Society for Surgery of the Hand (ASSH), for example, are significantly more likely to receive open reduction and internal fixation, as are patients seen by surgeons who are less than 10 years out of residency.[15] Patient preference may be a factor as well. Some have hypothesized that patients choose internal fixation because of the early postoperative function VLPS affords.[18-20] The ability to perform activities of daily living soon after surgery is certainly appealing, but internal fixation is the most invasive of the surgical DRF treatments and leaves the largest scar. Furthermore, tendon rupture occurs in up to 14% of cases and hardware removal, requiring another operation, is necessary in up to 10% of cases.[21-25]

DRF treatment decisions are rarely made individually by surgeons or patients; most often it is a cooperative process. It is unknown though how older patients weigh the risks and benefits of various treatment options and how the preferences of the surgeon influence the selection process. WRIST provides a unique opportunity to examine patient decision-making about DRF treatment because the protocol instructed surgeons to emphasize that no DRF treatment has been found to be superior to another. This removes any effect of surgeon preferences. We gathered various perspectives of older patients with DRFs who both enrolled and declined participation in WRIST to learn how individuals develop a preference

for VLPS treatment, or remain neutral, in the absences of evidence of superiority or surgeon opinion.

Materials and Methods

We used qualitative methodology to offer insight into what factors contribute to the treatment decision-making process. Grounded theory was selected for data collection and analysis. Using the grounded theory, the answer to the research question will present itself as data are analyzed and no hypothesis is necessary.[26] The grounded theory permits a researcher identify a hypothesis that can later be verified quantitatively. Grounded theory is useful in the field of medicine because it can help study the various perspectives of a complex process, such as patient treatment decision-making, which other theories do not permit as effectively.

Study Sample

Patients were selected from our WRIST screening logs. Briefly, patients were eligible for WRIST if they had a unilateral, closed displaced distal radius fracture that was amenable to all 3 surgical treatments. We excluded patients with nondisplaced or type C3 intra-articular fractures. We also excluded individuals with declining cognitive function from diseases such as dementia, those who did not speak English, and individuals with a primary address in another state. Our sample was selected purposively to include both those who displayed a treatment preference and those who did not. [27] In other words, subjects were not invited to participate based on the type of treatment they received, but rather on their preferences for self-directed or physician-directed treatment decisions, as depicted by their willingness to be randomized. The sample was comprised of three cohorts: participants who had a preference for non-surgical treatment (enrolled as WRIST observation subjects (N=2) or ineligible for WRIST (but had fractures amenable to the 3 randomized procedures) and still chose casting over surgical intervention, N=4), participants with preference for a specific surgical treatment (refused WRIST, N=11), and participants displaying no particular treatment preference (enrolled as WRIST randomized subjects, N=13). Monetary compensation was provided to participants upon completion of the interview. This study was approved by our university's Institutional Review Board.

Data Collection

We used a semi-structured technique to guide the interview process. An interview guide was developed before interviews were conducted. The guide was formed using established interview guides in similar qualitative studies that investigated decision-making, and it was modified as new themes arose (See Appendix 1, Supplemental Digital Content 1, which shows Semi-Structured Interview Questions, INSERT HYPER LINK.).[28-31] Two members of the research team (JSN and HEH) individually conducted interviews. Most interviews (N=29) were conducted at our research center; however, one was conducted by phone because of transportation restrictions. When present, family members were invited to contribute. We audio recorded and transcribed each interview verbatim.

After each interview, two members of the research team (JSN and HEH) met to read and discuss the transcripts. The research team agreed, after initial interviews were completed, that interviews would be conducted beyond the point of saturation to permit member checking. Saturation is the point at which collecting more data does not contribute any further insight to the research findings.[32] We reached saturation with the 27th interview. However, three additional interviews were conducted, followed by a member-checking session to assess the data interpretation. Member checking presents common themes to participants so that they can confirm, deny, or further explain the investigators' interpretations.[33] As an additional measure of verification, we offered subjects a copy of the transcript upon request to confirm that their perspective was appropriately reflected in the data. Only one participant accepted this offer and did not submit any corrections.

Data Analysis

Analysis of the transcripts began with three members of the research team (JSN, HEH, and MJS) open coding the first five interviews. Open coding is a process in which members of a research team individually identify passages in the transcript that they believe are important and discuss together to identify overarching themes.[26] We created a code chart to organize recurrent themes (See Appendix 2, Supplemental Digital Content 2, which shows a Code Chart, INSERT HYPER LINK). We assigned codes to one of the following categories: Fracture Experience, Medical Encounters, Treatment Options, WRIST, Decision-Making, Experience with Recovery, and Outcomes. Afterwards, two members of the research team (JSN and HEH) completed the focused coding stage, in which appropriate codes were assigned to each transcript based on the code chart,[26] then discussed their coding schemes to develop the final master code set.

Results

Participant demographic data and fracture characteristics are outlined in Table 1. Interviews averaged 24:23 minutes (range: 12:50 to 66:14 minutes). The majority (N=26) of interviews were conducted solely between the interviewer and the participant. Four were conducted in the presence of a family member (3 spouses and 1 adult child).

This investigation focuses primarily on codes that pertain to Decision-Making and Treatment Options because we were most interested in how the participants developed treatment preferences, specifically for VLPS. In our sample, participants with a preference for VLPS focused their decision-making process around five core themes: Function, Autonomy, Obstacles to Recovery, Aesthetics, and Pain. Herein, we will refer to these themes as values to distinguish them from other recurrent concepts in our findings. Additionally, some participants who received a treatment other than VLPS and discussed that although they were satisfied, they were curious if VLPS would have provided better outcome.

Values

Function—Initial analysis revealed that when deciding on a particular treatment, participants unanimously expressed a primary concern of regaining function. When asked

what they hoped to gain from treatment, all participants, regardless of treatment preference, noted that regaining function was their foremost concern (Table 2). This finding was consistent among all three groups, as well as between those who fractured their dominant wrist and those who fractured their non-dominant wrist. Many subjects revealed that they preferred a treatment that would enable them to promptly recovery for an important upcoming event, like a wedding or vacation. Though each participant expressed a similar primary goal, their ideas on which treatment was best suited for them varied predominantly between casting and the VLPS.

Autonomy—The most common value discussed by participants with preference for VLPS was the level of autonomy that they could retain throughout recovery (Table 3a). These participants indicated that having the ability to return to daily activities quickly and independently was important to them. The subjects who brought up autonomy expressed concerns about receiving a treatment that required another individual to help clean the wound site, prevent infection, or assist with daily activities. A few subjects who participated in WRIST and happened to be randomized to VLPS indicated that if they had been randomized to percutaneous pinning or external fixation, they would have most likely withdrawn from the trial because they did not want to be dependent on another individual for helping clean the pins or perform basic activities. Finally, one subject, a participant randomized in WRIST, advised that older individuals must consider whether or not they would have help with restricted activities during recovery when making a treatment decision. However, this subject indicated that she had her husband to assist with daily activities, thus she did not need to take this value into account.

Obstacles During Recovery—Some participants who displayed a preference for VLPS discussed potential obstacles during the recovery process as influential decision-making factors (Table 3b). These participants discussed the complications that may arise because of age, general concerns about surgery, and fear of infection. Some participants stated that their age might make it harder for the surgical site to heal properly. Of the participants who decided to undergo casting, some (N=3) expressed concerns about the increased risks of anesthesia associated with older individuals. The subjects who explicitly expressed this fear of surgery elected conservative treatment because the perceived risks outweighed the potential benefits from surgery. Some who expressed similar concerns ranked the perceived benefits of an operation higher than their fears, electing VLPS as treatment. Other participants indicated that they had fear of infection related to the external fixator and percutaneous pinning options, both of which require frequent cleaning of wound site.

Aesthetic—Aesthetic of the injury site as a driving factor for a particular treatment option was seldom discussed in the interviews (Table 3c). In fact, participants mentioned aesthetics more often to indicate that it was *not* a value used in the decision-making process. These subjects explained that they were not concerned with aesthetics because they believed it was not as important as other values. Only three participants discussed aesthetics of the injury site as a value in the decision-making process. Each elected VLPS as the preferred treatment. We were surprised that the treatment that leaves the largest scar was also perceived as most aesthetically appealing. However, the simplicity and convenience of

VLPS may have outweighed the downside of a permanent scar. For instance, one participant explained that she has seen others who had received conservative DRF treatment and now have a “crooked arm”. She chose VLPS because she believed it would ensure a different, more appealing outcome.

Pain Relief—Only a few subjects with a surgical treatment preference discussed the role of pain relief as an important value (Table 3d). Initially, we expected pain control to be an important factor in the decision-making process, but these results suggest that most participants assume that all options will provide adequate pain relief. Of these subjects who considered pain relief a value, half elected VLPS. Only one of those participants subsequently indicated that the decision she made regarding a treatment plan, selecting casting, did in fact relive her of the pain.

Satisfaction and Reflection

Every patient who chose VLPS as their treatment expressed that they were satisfied with their decision. Representative quotes are outlined in Table 4. Nine subjects in our sample had sustained more than one DRF in their lifetime and had received a different treatment for their previous fracture. Two of these participants explained that if VLPS had been presented to them as a treatment option at the time of their previous fracture, they would have elected VLPS as treatment. Moreover, two participants who elected casting were curious if choosing VLPS or being randomized would have provided a better outcome. These subjects did not, however, express any displeasure with their casting experiences. One subject who was randomized to pinning commented that she would have felt more “secure” moving around the house after VLPS or with a cast. This participant also stated that be she was concerned when her pins unexpectedly fell out. When participants displayed curiosity about other treatment outcomes, it was specific to VLPS outcomes. No participants wondered about the outcomes of percutaneous pinning, external fixators, or casting. Although individuals who received percutaneous pinning, external fixation, and casting questioned the potential outcomes of VLPS, they still indicated that they were satisfied.

Discussion

Although many studies have reported an increase in the use of internal fixation using VLPS, few have examined the phenomenon from a patient decision-making perspective.[12,34,35] We found that (1) all subjects prioritized function when deciding on treatment and (2) subjects with a preference for VLPS used values about independence, potential obstacles, aesthetics of the injury site, and pain relief to formulate their own opinions regarding treatment when surgeons provided no evidence of superiority.

Much of the research describing the persistent trend in internal fixation focuses on physician preference and indicates that physicians are often tempted to use the most technologically advanced treatment methods available.[16,17,36,37] Physicians are also more likely to recommend a treatment that they have the most experience with; for younger physicians this is likely to be a newer treatment.[38] With our qualitative analysis we found that patients also have a preference for internal fixation treatment, independent of physician influence. Previously, our research team previously completed a time trade-off utility study that

indicated that adults who elect VLPS do so because they want to return to normal activity faster.[18] This study confirms that patients do indeed prefer VLPS because it permits them to be more autonomous. However, we found that autonomy is only one reason patients prefer VLPS. Patients also elect VLPS because they hope to remain independent, maintain their ability to perform activities of daily living, and care for their surgical sites without assistance. In addition, we found that some patients prefer VLPS because it is perceived to be the most aesthetically appealing.

As is the case with almost every type of fracture, the decision making process for a DRF does not always require patient input. In certain cases, specific fracture characteristics may limit the number of appropriate treatment options for a patient. For example, patients with non-displaced fractures typically require only casting. The relevant themes identified in our investigation hold little clinical significance for such cases. Nonetheless, considering that the majority of older DRF patients sustain low-energy fractures and often qualify for multiple treatment options,[5] patient input in the treatment-decision making may permit older patients to choose the most fitting recovery.

This study has limitations. Although our sample is small, it is typical for qualitative research studies.[39] We hit saturation and an increased sample size would not likely give rise to new themes. Furthermore, the goal of qualitative research is not to produce generalizable findings. Rather, it is most important to identify related concepts that can be used to formulate future research questions.[41] Another limitation is that patients can be unreliable narrators. Considering that patients may have sustained their fracture up to five years ago, factors of the decision-making process may have become skewed or exaggerated over time. To protect against this, we confirmed patient accounts with medical records as much as possible.

Despite these limitations, our study supports previous hypotheses that patients prefer VLPS because it permits them to be autonomous and, further, shows that this preference exists without provider influence. The results, however, do not support the complete abandonment of external fixation and percutaneous pinning. There are patients who prefer these treatments and training in these modalities should continue. Once participants learned that each option would provide them with the same function, they shifted the basis of their decision from outcome-related factors (i.e. function) to preferences for the recovery process.

As the incidence of DRFs among older individuals continues to grow, understanding the preferences of this group becomes imperative.[5] Using evidence from high-level randomized surgical trials, such as WRIST, in conjunction with the findings from this investigation, physicians can help provide patients with accurate and directed information about outcomes and recovery characteristics.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Participant Demographic Data and Injury Information

Participant Information		**N**	**%**
Sex			
	Female	26	87%
	Male	4	13%
Average age (range)			72 (63-93)
Injury Information			
Total distal radius fractures in adulthood			
	1	21	70%
	2+	9	30%
Time since most recent fracture			
	Average months		27.2
	0–12 months	9	30%
	13–24 months	6	20%
	25+ months	15	50%
Treatment Information			
Most recent treatment			
	Volar Locking Plate	16	53%
	Cast	6	20%
	Pinning	5	17%
	External Fixator	3	10%

Table 2

Quotes About Function

Quote	Age	Most Recent Treatment	Sex	Cohort
I hoped to gain good range of motion and strengthen my wrist. I didn't want to have any disability coming out of it.	66	Pinning	F	Randomization
I guess ideally you want the function to be same as it was.	74	Casting	F	Preference
I was just hoping that, you know, that I could get back full use of my hand. And it is my secondary hand.	67	VLPS	F	Preference

Table 3

Quotes About Values Used for Surgical Treatment Decisions

Quote	Age	Most Recent Treatment	Sex	Cohort
(a) Autonomy				
Well, if [patients] get [percutaneous pinning], they have to depend on someone else to do their daily activities for them. I'll tell you what, if I can't do what I want to do myself, then don't do it for me. Just leave it until I can. I don't want anybody coming in and doing anything for me.	85	VLPS	F	Preference
I just don't like to sit home and recuperate. I was in my last year of the judgeship and I really enjoyed that. And I didn't want to lose any time.	75	VLPS	M	Preference
I was asked if I wanted to be in a blinded study and at first I was thinking about it, but I wanted to go back to work at the library. I told them I couldn't because if I would have gotten the one with the open pin, I would have been in trouble at work.	65	VLPS	F	Preference
I would not have done the study if I had not gotten the plate. I concerned about the pins. Casting would not have healed it as well. This was the best method for me.	86	VLPS	F	Randomization
I think [autonomy] is a factor that [individuals with DRF] consider too, if you have someone to help you. I pretty much couldn't do much of anything for a while, you know, that was [my husband's] job, which [surgeon] also told [my husband] that he'll have to help me.	72	External Fixator	F	Randomization
(b) Obstacles to Recovery				
Well older people, if they are as old as I am, they need to get the plate because it heals quicker.	85	VLPS	F	Preference
I think [VLPS] is better than other types of open pins where you really just have to be at home.	65	VLPS	F	Preference
Anyway, to make a decision on which [treatment] approach [to use] you have to take into account the more invasive, the more risk there is for an infection.	65	VLPS	F	Preference
I was concerned about complications with my lymphedema, but not too much because the potential benefits trumped that. I had to have the surgery. Whatever the consequences, I was willing to deal with them.	67	VLPS	F	Preference
Old people do not do well with anesthetics. I saw no reason for [surgical intervention].	88	Casting	F	Preference
I don't think I had a lot of options at a certain point. I really think I just knew, [my husband and I] knew it had to be operated on. It was just way too messed up to be in just a cast or whatever…You know I was worried [about complications with other health conditions], but of course I was going to do the surgery.	67	VLPS	F	Randomization
(c) Aesthetics				
I didn't want a crooked arm because I've seen people after injuries like that with a crooked arm.	65	VLPS	F	Preference
I thought [choosing a treatment option] was probably just a matter of cosmetics. I am past that.	73	VLPS	F	Preference
(d) Pain				
I wanted to not be in pain. That was an important factor; the pain was horrible.	67	VLPS	F	Preference
But I think, when I had a conversation after with one of the nurses, was that I think that all of the wrist surgeries would be very painful anyways. It wouldn't matter which one we did.	75	External Fixator	F	Randomization
I was in a terrible amount of pain. And [the cast] helped relieve the pain.	90	Casting	F	Preference

Table 4

Quotes Regarding Satisfaction and Reflection

Quote	Age	Most Recent Treatment	Sex	Cohort
If I could go back in time, I believe I would still pick the plate. I had a pretty good outcome.	65	VLPS	F	Preference
Well since I didn't know the difference with the external fixator, it healed my arm so I was completely satisfied. And with the other one, it was easy. I think I would still take the plate over the external fixator.	67	VLPS	F	Preference
I had the plate put in my left wrist, so, um, it is easy to just put the short sleeves on over it. It didn't take much time. With my right wrist, they had all the pins in different place, and you have to keep them there so they don't break. And if we thought about that for the first surgery, we probably would have done the plate	88	VLPS	F	Preference
Sometimes I wonder if the surgery would have been better. I do still do sometimes wonder about the plate.	74	Casting	F	Preference
I would go for the cast or the plate. Maybe I would have felt more secure with a cast or a plate. I just would have wanted to pick…I didn't feel really feel safe with the pins. When they came out, before they were even ready to come out, I worried it was going to separate more or I was going to need more surgery now.	65	Pinning	F	Randomization