



The Effect of Providing Audiovisual Surgical Information on Decisional Conflict in Patients Undergoing Plate Fixation for Distal Radius Fractures

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Background: Patients experiencing acute trauma have limited time for their involvement in shared decision making, which may lead to decisional conflict. The purpose of this study was to evaluate whether providing audiovisual surgical information can reduce decisional conflict when deciding between surgical and nonsurgical treatment in patients with distal radius fractures (DRFs) and to evaluate factors that may affect decisional conflict.

Methods: We prospectively enrolled 50 consecutive patients who presented with acute DRFs and chose to undergo surgery, for which volar plate fixation was recommended. We randomized these patients into 2 groups. The test group was given a video clip of audiovisual surgical information in addition to regular information while the control group was only given regular information. The video clip consisted of the purpose, procedure, and effect of the surgery, precautions and complications after the operation, and other treatment options that could be performed if operation was not performed. At 2 weeks after the surgery, we evaluated patients' decisional conflict using a decisional conflict scale (DCS). In addition, we evaluated factors that might affect decisional conflict, such as age, dominant hand, comorbidities, history of previous operations, perceived disability, and provision of the video clip.

Results: The test group showed significantly lower DCS scores than the control group (19.6 vs. 32.1, $p = 0.001$). In multivariate analysis, younger age and provision of the video clip were associated with lower DCS scores.

Conclusions: This study has demonstrated that providing information through audiovisual media such as video clips could reduce decisional conflict in patients who chose to undergo plate fixation for DRFs. This study also suggests that older patients may need more careful doctor-patient communication as they have more decisional conflict than younger patients.

Keywords: *Distal radius fracture, Plate fixation, Decisional conflict, Decision aid*

Distal radius fractures (DRFs) are one of the most common fractures in the upper extremity.^{1,2)} Nonoperative treatment for DRFs can be satisfactory in terms of long-term results regardless of some degrees of malunion. However, some

studies have reported that internal fixation is more efficient than conservative treatment as it can restore normal anatomy and promote early functional return.^{3,4)} If the fracture is initially well reduced but unstable, decision making for surgery can be difficult as some fractures will heal well with conservative treatment while some will collapse later.⁵⁾

Decision making to select the optimal treatment depends on the outcome of each treatment method, as well as the patient's preference for the treatment method.^{6,7)} In this sense, shared decision making is a growing expectation for patients.⁸⁾ Decisional conflict, which is defined as personal uncertainty about which course of action to take when a choice among competing options involves a risk,

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regret, or challenge to personal life values,⁹⁾ can occur in this shared decision-making process when patients have limited information about details of the treatment.^{10,11)} Decisional conflict may be greater under acute traumatic conditions than under chronic conditions, because patients are experiencing an unexpected event and they do not have enough time to make treatment decisions.

Decision aids are defined as a means of helping patients make informed choices about healthcare that take into account their personal values and preferences.¹²⁾ Decision aids take a variety of forms such as detailed leaflets, audiovisual information, or interactive websites.¹³⁾ Previous studies suggest that audiovisual information aids can be helpful for patient's comprehension and information recall in obtaining informed consent.^{14,15)} Several studies reported that a decision aid can provide relevant information to patients and can reduce decisional conflict in several conditions.^{16,17)} However, no study has investigated the effect of decision aids in acute traumatic conditions such as DRFs. In this study, we wanted to know how much decisional conflict patients experience when a decision for surgery was made after shared decision making. We also wanted to know whether additional audiovisual surgical information, such as a virtual reality experience, can make the patients confident about their decisions. We hypothesized that a decision aid would help patients make decisions about their treatment with reduced decisional conflict in an acute traumatic setting. Therefore, the purpose of this study was to evaluate whether providing audiovisual surgical information could reduce decisional conflict when deciding between surgical and nonsurgical treatment in patients with DRFs and to investigate factors that may affect decisional conflict.

METHODS

Participants

We conducted this study in compliance with the principles of the Declaration of Helsinki. The protocol of this study was reviewed and approved by the Institutional Review Board of Seoul National University Bundang Hospital (IRB No. B-1510-317-003). Written informed consents were obtained. We prospectively recruited patients presenting with acute DRFs at an outpatient clinic in a tertiary referral hospital. All patients had been treated with closed reduction and splinting at the emergency room of the same hospital within 1 week prior to the visit. We included patients with DRFs, which were well reduced but potentially unstable, thus may need operative treatment. We defined well-reduced fractures as fractures with a joint step-off of

less than 2 mm, radial inclination difference of less than 5°, and loss of palmar tilt less than 10° compared to the uninvolved side.¹⁸⁾ We defined potentially unstable fractures based on the criteria of Lafontaine et al.,¹⁹⁾ which include dorsal angulation of more than 20°, dorsal comminution, intra-articular radiocarpal fracture, and associated ulnar fracture. If the patient's age is over 60 years and 1 or more criteria is met, or if the patient is under 60 years and 2 or more criteria are met, the patient is potentially unstable.¹⁹⁾

For this study, we included those who were recommended for volar plating for the surgical method and excluded those who may need closed pinning or external fixation and thus need different audiovisual information. We excluded patients for whom paternalistic or consumeristic decision making can be dominant rather than shared decision making, such as those for whom we strongly recommended surgery for the treatment of unreduced fractures, severe injuries, open fractures, or multiple fractures. We also excluded those who strongly refused surgery and accepted potential complications of malunion or the need for a later corrective surgery and those for whom we did not consider surgery due to risks associated with comorbidities.

Randomization

Randomization was performed after the usual doctor-patient discussion and the decision for surgery was made. We explained the surgical procedure of volar plate fixation of DRFs and likely functional outcomes. We also explained the option of conservative treatment with the potential of later surgery. We enrolled 50 patients who decided to undergo surgery after consultation and agreed to participate in this study. We randomized them using a program (Microsoft Excel 2016; Microsoft, Redmond, WA, USA), which generated random numbers to either the test group (n = 25) or the control group (n = 25). One patient from the control group later refused to participate and dropped out of this study. Finally, 25 patients from the test group and 24 from the control group were included in the final analysis.

Intervention

Patients in the test group were asked to watch a video clip of audiovisual surgical information before signing informed consent for surgery. The 5-minute-long video clip include cartoons on the purpose, procedure, and effect of the surgery, precautions and complications after the operation, and alternative treatment options that could be performed instead of surgery (Supplementary Material 1). The information in this video clip was the same as the one provided in usual doctor-patient discussion. The authors

designed the content of the video clip in accordance with the checklist of the International Patient Decision Aids Standards (IPDAS). The IPDAS checklist for users suggests that decision aids should (1) provide information about options in sufficient detail for decision making, (2) present probabilities of outcomes in an unbiased and understandable way, (3) include methods for clarifying and expressing patients' values, and (4) include structured guidance in deliberation and communication.²⁰⁾

Evaluation

A research assistant (JC) who had been blinded to the allocation evaluated these patients at their first visit to the clinic at 2 weeks after the operation. In this study design, we thought that the 2-week period is appropriate for the patients to recall their experience about their decision regarding surgery. The primary outcome was decisional conflict in decision making for the surgery. It was assessed by using the decisional conflict scale (DCS).^{21,22)} The DCS has 16 items to assess patients' uncertainty in making a given health-related decision (Table 1). Scores range from 0 (no decisional conflict) to 100 (severe decisional conflict). The research assistant also recorded patients' underlying

diseases, previous surgical history, and perceived disability before surgery, which was measured by the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire.²³⁾

Statistical Analysis

We determined the sample size by referring to other previous studies using DCS scores as the primary outcome.²⁴⁾ We set the standard deviation to 15 points and assumed a significant difference between the 2 groups to be 15 points of DCS with a range of 100 points (effect size of 1.0). The 2 groups of 22 samples provided 80% statistical power to detect differences at a significance level of 0.05 for the Student *t*-test. We compared DCS and other variables between the 2 groups. A Student *t*-test was used to compare continuous variables while chi-square or Fisher exact test was used to compare categorical variables.

In addition, we performed multivariate analysis for factors that might affect DCS. We considered DCS as a dependent variable. Independent variables were age, dominant hand (yes/no), comorbidities (yes/no), history of previous surgery (yes/no), perceived disability in terms of DASH scores, and provision of the video clip (yes/no). For comorbidities, we included diseases such as heart disease,

Table 1. Decisional Conflict Scale—Statement Format: 16 Item 5 Response Categories

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. I know which options are available to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I know the benefits of each option.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I know the risks and side effects of each option.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I am clear about which benefits matter most to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I am clear about which risks and side effects matter most to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I am clear about which is more important to me (the benefits or the risks and side effects).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I have enough support from others to make a choice.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I am choosing without pressure from others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I have enough advice to make a choice.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I am clear about the best choice for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. I feel sure about what to choose.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. This decision is easy for me to make.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I feel I have made an informed choice.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. My decision shows what is important to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. I expect to stick with my decision.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. I am satisfied with my decision.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

lung disease, diabetes mellitus, thyroid disease, and chronic renal disease. Pearson correlation test was performed to analyze associations between variables. Multivariate analysis was used to identify explanatory variables that independently affected DCS. Variables with p -values ≤ 0.1 by univariate analysis were included in the multivariate analysis using a backward elimination procedure. Goodness-of-fit is presented as adjusted R^2 values to reflect the percentage of overall variability in the dependent variable explained by explanatory (independent) variables. All statistical analyses were performed using IBM SPSS ver. 21.0 (IBM Corp., Armonk, NY, USA).

RESULTS

Comparison of Groups

The test group showed significantly lower DCS scores than

the control group (19.6 vs. 32.1, $p = 0.001$). There were no significant differences in baseline characteristics between the 2 groups (Table 2).

Factors Affecting Decisional Conflict

In the univariate analysis, provision of a video clip was significantly correlated with lower DCS scores ($p = 0.001$). However, there was no correlation between decisional conflict and other variables such as age, dominant hand, comorbidities, history of a previous surgery, and perceived disability before surgery (Table 3).

Variables with p -values ≤ 0.1 by the univariate analysis were age and provision of a video clip. These variables were included in the multivariate analysis. The multivariate analysis showed that younger age and provision of a video clip were independently associated with lower DCS scores. A model including age and provision of a decision

Table 2. Baseline Characteristics and Outcomes in Both Groups

Characteristic	Test group (n = 25)	Control group (n = 24)	p -value
Age (yr)	58.6 \pm 8.4	55.7 \pm 14.9	0.413
Age over 60 years	9 (36)	10 (41.7)	0.773
Male sex	1 (4)	4 (16.7)	0.189
Dominant hand	18 (72)	16 (66.7)	0.762
Comorbidity	13 (52)	9 (37.5)	0.393
Previous operation history	6 (24)	3 (12.5)	0.299
DASH	71.0 \pm 13.9	69.1 \pm 16.1	0.654
DCS	19.6 \pm 11.2	32.1 \pm 4.5	0.001*

Values are presented as mean \pm standard deviation or number (%).

DASH: Disabilities of the Arm, Shoulder and Hand, DCS: decisional conflict scale.

*A statistically significant value.

Table 3. Factors Affecting Decisional Conflict Scale

Variable	Coding	Univariate analysis		Multivariate analysis		
		r	p -value	β	t	p -value
Age		0.241	0.095	0.298	2.369	0.022*
Dominant hand	Yes/no (1/0)	-0.013	0.927			
Comorbidity	Yes/no (1/0)	0.107	0.465			
Previous operation history	Yes/no (1/0)	0.162	0.265			
DASH		0.098	0.508			
Decision aid	Yes/no (1/0)	0.442	0.001*	-0.477	-3.794	< 0.001*

DASH: Disabilities of the Arm, Shoulder and Hand.

*A statistically significant value.

aid accounted for 25% of DCS variability (adjusted $R^2 = 0.251$, $p < 0.001$).

DISCUSSION

Although a shared decision-making model is recommended for patient-centered care, patients with an acute fracture experience an unexpected event for which they may not have thought about treatment before, compared to patients with chronic conditions who are familiar with their treatment. In addition, the window of time for proper operative treatment can be shorter than that for most elective orthopedic operations. Thus, they may encounter decisional conflict in deciding between surgical and nonsurgical treatment. This study supports the idea that providing audiovisual information using video clips can reduce decisional conflict in such patients. This study also suggests that older patients have more decisional conflict in decision making for surgery than younger patients.

Our findings in patients with acute trauma are in accordance with those of most previous studies performed in nontraumatic conditions.¹⁰ The reason that decisional conflict has not been studied much in acute traumatic conditions might be that treatment decisions in acute setting have been considered to be largely determined by the treating physicians in a so-called paternalistic decision-making model rather than by shared decision making. Patients with acute trauma are probably in a stressful state and they are not familiar with the medical information. This study shows encouraging results towards that providing information through audiovisual media such as video clips is an effective way to help patients be confident about their decision making for surgery. Previous studies have reported that low decisional conflict was associated with a decrease in patient's anxiety and an increase in satisfaction with decision making.¹⁰

In this study, younger age was associated with lower DCS scores, suggesting that older patients tend to experience more decisional conflict during decision making for surgery. Different factors may be important in elderly patients compared to younger adults. Elderly patients might have a low demand for early return to occupation or sports activities. Thus, they may feel more conflict in selecting surgical treatment. Previous studies have shown that older people are more passive in decision making than younger people.²⁵ Therefore, the surgeon may need to be careful in the shared decision-making process for elderly patients when they have high decisional conflict. As used in our study, providing audiovisual information in a form of video clip may be helpful for elderly patients because it is

easier to watch than to read small letters and there is no concern about illiteracy.

This study has several limitations. First, we provided the audiovisual surgical information and assessed decisional conflict in patients who had already chose to undergo surgery after shared decision making. This was because we did not want the video clip to oversell the advantages or disadvantages of the surgery, which may result in more patients choosing or declining surgery. A different study setting is needed to determine whether a decision aid such as a video clip will lead patients to choose or decline surgery. Second, this study was performed in a tertiary referral setting. Some patients had been referred by other physicians. Therefore, information or advice previously provided might have affected these patients in this study. Third, we used only 1 form of video clip in this study although patients have different responses to different circumstances. In addition, we did not ask which specific part of the information was most useful for their decision or decisional conflict. Further studies may investigate which information is most useful for the patients' decision and thus find a more appropriate form of decision aids to specific individuals.

In conclusion, this study demonstrates that providing information through audiovisual media such as video clips can reduce decisional conflict in patients who chose to undergo plate fixation for DRFs. This study also suggests that older patients may need more careful doctor-patient communication as they have more decisional conflict than younger patients.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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SUPPLEMENTARY MATERIAL

Supplementary material is available in the electronic version of this paper at the CiOS website, www.ecios.org.

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