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Relationship Between Patient Expectations and Clinical Measures in Patients Undergoing Rheumatoid Hand Surgery from the Silicone Arthroplasty in Rheumatoid Arthritis (SARA) Study

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Abstract

Background—The purpose of this study is to evaluate the relationship between preoperative patient expectations and clinical measures in patients undergoing rheumatoid hand surgery.

Methods—Patients were recruited as a part of a larger prospective multicenter study to evaluate outcomes of silicone metacarpophalangeal joint arthroplasty (SMPA). Patients in the surgical cohort completed a baseline expectation questionnaire asking about expectations for function, work, pain, and aesthetics after SMPA. Responses were categorized into low, middle, and high expectations groups for each domain and for cumulative expectations across all domains. Other study measurements were taken at baseline and 1-year, including the Michigan Hand Outcomes Questionnaire (MHQ) and objective clinical measurements (grip strength, pinch strength, the Jebson-Taylor Hand Function Test, ulnar drift, and extensor lag).

Results—Preoperative expectations and clinical measures were complete for 59 patients at baseline and 45 patients at 1-year follow-up. Preoperative expectation level was related to baseline patient-reported domains of ADL and hand satisfaction measured by MHQ (P=0.04 and P=0.07 respectively). Patients had relatively similar satisfaction with hand function postoperatively regardless of preoperative expectation level. No consistent relationship was seen between preoperative expectations and objective measures at baseline and 1-year follow-up.

Conclusions—High preoperative expectations were not a risk factor for dissatisfaction postoperatively. Preoperative expectation level may be considered to stratify baseline patient-reported hand function in patients with similar objective hand function.

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Level of Evidence—Level II Prognostic

Keywords

Patient expectations; rheumatoid arthritis; rheumatoid hand surgery; patient-reported outcomes; Michigan Hand Outcomes Questionnaire

INTRODUCTION

Evaluation of outcomes from the patient perspective, including patient satisfaction, has become increasingly important to determine the effectiveness of health care (1, 2). This is particularly true in a specialty such as hand surgery, in which the purpose of many interventions is to improve patient quality of life. Fulfillment of expectations is thought to be an instrumental factor to achieve patient satisfaction (2–6), and assessment of patient expectations is a key component of the patient encounter in clinical teaching. However, despite the theoretical importance of expectations, little research has been devoted to systematically evaluate patient expectations.

It is widely accepted that patient expectations have some degree of influence on the patient's perception of health outcomes. Positive outcomes after a variety of surgical procedures have been linked to high preoperative expectations (7–13), whereas other studies have linked positive outcomes to fulfillment of expectations (14, 15). A systematic review of expectations in surgical disciplines noted an inconsistent link between patient expectations and patient reported outcomes (16). It is unclear whether the influence of expectations on outcomes is procedure specific, because no single study to our knowledge has evaluated expectations across a spectrum of procedure types. In addition, comparisons of the impact of expectations across surgical procedures and subspecialties are difficult because of considerable variability in measuring expectations (2, 16).

The study of expectations in hand surgery has received little attention compared to other surgical specialties such as orthopedic joint surgery (9–11, 13, 14, 17, 18) and cardiac surgery (7, 8, 12). The evaluation of patient expectations in rheumatoid hand surgery is important given the subjective nature of the definition of a successful outcome. Objective clinical measures after rheumatoid hand surgery, such as grip strength and arc of motion, are likely to have small improvements compared to changes in patient-reported outcomes, such as function and appearance (19). These patient perceptions may be influenced by initial expectations. The purpose of this study is to evaluate the relationship between preoperative patient expectations and patient-reported and objective clinical measures, both before and after treatment, in patients undergoing rheumatoid hand surgery. We hypothesize that patients with higher preoperative expectations will have better post-operative patient-reported measures, including satisfaction, compared to patients with low initial expectations.

METHODS

Study Sample and Recruitment

Patients were recruited as a part of a larger prospective multicenter NIH-funded study, the Silicone Arthroplasty in Rheumatoid Arthritis (SARA) study, to evaluate the outcome of

silicone metacarpophalangeal joint arthroplasty (SMPA) compared to patients treated with medical management alone (19). All study sites received institutional review board approval from their respective institutions and patients gave written informed consent to participate in the study. Patients with rheumatoid arthritis were referred by their rheumatologist for consideration of SMPA for treatment of severe hand deformities. Patients were treated at one of three centers where the hand surgeon and rheumatologists at each institution had a close working relationship. The inclusion and exclusion criteria for study enrollment are outlined in Table 1. Data collected from patients enrolled in the surgical cohort were used for this study. One surgeon from each site was involved in the study (three total), and the surgeons had an average of 30 years of experience treating the rheumatoid hand. The study coordinators and surgeons followed a standard protocol to ensure consistency in enrollment and technique. During the office visit, all patients first met with a hand surgeon to discuss surgical options. Following the consultation, the study coordinator communicated details of the study, the informed consent was signed, and preoperative measures were taken. SMPA was performed on the index, middle, ring, and small fingers of the study hand, and patients selected which hand would have surgery.

Clinical Measures

All patients were asked to complete a baseline expectation questionnaire that consisted of questions addressing function, work, pain, and aesthetic outcomes that patients expected to achieve 1 year after SMPA. For the function, work, and appearance domains patients were instructed to choose from responses ranging from high to low expectations on a 5-point Likert scale. Pain expectations were represented by a 6-point Likert scale. The expectation questionnaire was designed for the study and underwent rigorous testing prior to its use, including pilot testing for face validity (clinical relevance), clarity, and length (20). Other study measurements included a patient-reported outcome instrument (Michigan Hand Outcomes Questionnaire (MHQ)) and objective clinical measurements (grip strength, pinch strength, the Jebson-Taylor Hand Function Test (JTT), ulnar drift, and extensor lag). Measures were taken in person by the study coordinator and a certified hand therapist at each site. All study measurements were taken without patients or hand therapists being aware of the categorization of individual patient expectations. Clinical measures at baseline and 1-year were evaluated for comparison to baseline expectations.

Data Analysis

The preoperative expectations responses were categorized into low, middle, and high expectations groups for each domain (function, work, appearance, and pain) (Table 2). For example, the highest expectation group expected to be able to do “anything I want” with respect to function or work, expected no pain, and expected their hands to look almost perfect postoperatively in the function, work, pain, and appearance domains respectively. In addition, cumulative expectations across the four domains were divided into low, middle, and high expectations groups based on the number of domains that patients expressed the highest expectation. Patients with the highest cumulative expectations had high expectations in at least three domains, the middle cumulative expectations group had high expectations in 1–2 domains, and patients with the lowest cumulative expectations did not express high expectations in any domain. Clinical measures were compared across cumulative

preoperative low, middle, and high expectations groups using the Kruskal-Wallis rank test at the baseline and 1-year follow-up time periods. Differences in group means with P value <0.1 were defined as statistically significant given relatively small group sample sizes.

RESULTS

Preoperative Expectations Trends

Preoperative expectations and clinical measures were complete for 59 patients at baseline and 45 patients at one-year follow-up. Table 3 illustrates the baseline demographic and clinical measures of the surgical cohort. Patients had the highest expectations in the pain and work domains, with 44% (n=26) expecting no pain and 32% (n=19) expecting to be able to do “everything I need to do” related to work one year after SMPA (Table 4). A small number of patients were categorized into the highest cumulative expectations group, meaning they expressed high expectations across 3 or all 4 domains (n=7, 12%). Nearly half of patients exhibited a mid-level of cumulative expectations, meaning they expressed high expectations in 1 or 2 domains (n=28, 47%) (Table 5).

Expectations and Patient-Reported Outcome Measures

Cumulative preoperative expectations were most closely related to the activities of daily living (ADL, P=0.04) and satisfaction (P=0.07) MHQ domains at the baseline assessment (Table 6). The lowest expectations group had the lowest mean scores in the two domains, and the highest expectations group had the highest mean scores in both domains at the preoperative measurement. The difference in mean scores between the highest and lowest expectations groups was 31 points in the ADL domain and 25 points in the satisfaction domain at baseline. Trends in the relationship between expectations level and MHQ scores did not reach statistical significance in other domains. However, a similar non-significant trend was seen in all other MHQ domains except for aesthetics (a lower numerical score represents worse outcome in all domains except for pain) at both the baseline and 1-year postoperative time points. There was no significant difference noted between expectations groups and change in MHQ scores in each domain. Patients in each expectations group had relatively similar improvement in total MHQ scores. Final MHQ satisfaction scores were relatively similar among expectations groups, with patients in the highest expectations group having a mean score of 70 compared to a mean score of 61 in the lowest expectations group (P=0.64).

Expectations and Objective Measures

Mean preoperative and postoperative objective clinical measures had an inconsistent relationship with the level of preoperative expectations. Unlike several baseline MHQ domain scores, objective measurements were relatively similar at baseline despite differences in preoperative expectations (Table 6). The level of expectations was inversely related to JTT time (lower expectations had longest mean time and highest expectations had shortest mean time). However, this trend was not significant and unlike the patient-reported domains, the trend did not continue at the postoperative measurement.

DISCUSSION

In this study, we found that preoperative expectations related to self-reported function prior to surgery, rather than having a strong influence on outcome after surgery. Self-reported preoperative ability to perform ADLs and preoperative satisfaction with hand function significantly correlated to the level of preoperative expectation. Patients with the highest expectations had the best scores, and patients with lowest expectations had the worst scores in these two domains preoperatively. This similar non-significant trend was seen in all MHQ domains except for aesthetics. No consistent pattern was seen in the relationship between preoperative expectations and objective clinical measures in either the preoperative and postoperative time periods. Although patient-reported MHQ measurements differed across expectations groups preoperatively, the groups had relatively similar objective measures at baseline.

Clinically meaningful differences in the MHQ differ based on the domain and the patient population being studied. The minimal clinically important difference (MCID) for the MHQ has been previously reported for three domains in patients with rheumatoid arthritis (21). Function, ADL, and pain domains have previously showed discriminative ability related to patient satisfaction with an MCID of 13 points for function, 11 points for ADL, and 3 points for pain domains. Although MCID values have not been reported for the other domains, available estimates for the three domains can be used to interpret clinically meaningful differences between expectations groups. Differences between the mean ADL score in the highest and lowest expectations groups at baseline is 31 points and between the middle and highest expectations groups at baseline is 24 points, both beyond the MCID for the ADL domain. However, difference between the low and middle expectations groups is 7 points in the ADL domain and would not be clinically significant.

Our data support the theory that preoperative expectations relate to patient perception of health. There are studies in the literature across several health care disciplines, including psychology, hematology, cardiac surgery, and orthopedic surgery in which a relationship was found between high expectations and positive health outcomes (7–11, 13, 22-27). Specifically, high expectations have been linked to greater adherence to complex medical regimens (12), improved survival (7), greater satisfaction (9), and greater quality of life measures (11, 24). It is unknown whether the link between expectations and improved outcomes in these studies is due to better self-reported health of the patients prior to the intervention or whether the higher expectations themselves influence the post-treatment health status more directly. Based on the results of this study, we propose the theory that the level of preoperative expectation is directly related to patient-reported health status prior to surgery, which in turn influences the postoperative patient-reported outcome. In other words, patients with the highest self-reported hand function have the highest expectations. Give n high preoperative function, these patients will have better postoperative function.

The results of this study are contradictory to the theory that patients with the highest expectations may be at higher risk for dissatisfaction. Treating physicians would likely think that patients had unrealistic expectations if they expressed the highest expectations in three or four domains (the highest expectations group in this study). However, these patients were

just as satisfied as patients in the mid- and lowest expectations groups based on their MHQ satisfaction scores. The change in satisfaction scores from baseline to 1-year follow-up was not significant between the expectations groups.

Our study had several limitations. Most notably, demonstrating statistical significance between groups with varying level of expectations is difficult owing to the sample size in the surgical cohort and in each expectation subgroup. We chose a higher than customary threshold for statistical significance to better balance the probability of both type I and type II errors in our study (28, 29). Post-hoc power calculations (30) (for tests of the difference between many means, detecting a large effect size of 20 points between the highest and lowest groups, standard deviation of 20 points, with sample size of 59) reveal a power of 0.86 for an alpha (type I error or P value threshold) of 0.1. Thus, the combined maximum probability of type I and type II error is 0.24. A lower alpha of 0.05 results in power of 0.77 and higher combined maximum probability of type I and type II error of 0.28. Identical assumptions with a sample size of 45 (postoperative follow-up sample size) revealed lower power of 0.75. The study did not have sufficient power (0.49) to detect moderate (difference in approximately 12 points) or smaller effect sizes. However, moderate effect size borders on the threshold of minimal clinically important difference for ADL and function domains for MHQ in rheumatoid arthritis patients. A higher type I error threshold can be considered in ex ploratory studies where the risk accompanied with making a type I error is relatively low. All of the patients in the study received the same treatment. Thus, conclusions drawn from comparison between low and high expectation groups carries relatively low risk, compared to higher risk conclusions from studies of treatment and nontreatment outcome comparisons. Even within these limitations of power and sample size, it is safe to conclude that higher expectations do not equate to lower outcomes or lower satisfaction rates postoperatively. Although not significant, MHQ scores were increasingly better with higher expectations level for each domain except for aesthetics. Lack of a validated instrument to measure patient expectations in hand surgery was another limitation of this study. However, the questionnaire used in this study demonstrates face validity in measuring expectations related to several domains relevant to hand surgery outcomes. Similar domains (function, work, aesthetics, and pain) are measured in validated outcomes instruments used in hand surgery, such as the MHQ.

Despite the limitations of this study, our findings help to improve the limited knowledge surrounding patient expectations. Given the increasing emphasis of patient-reported measures of health as an indicator of quality of care, an improved understanding of the relationship between patient expectations and patient-reported measures is critical. Our findings suggest that patients with high expectations did not have a tendency to be dissatisfied. Rather, mean MHQ scores increased as expectations increased. Expectations were most strongly related to baseline patient-reported hand function as it pertains to ADLs and satisfaction with hand function. Expectations did not have a strong influence on postoperative outcome. Based on the relationship between expectations and baseline patient-reported health status found in this study, a short expectations screening tool may be considered to quickly stratify baseline self-reported hand function in patients with relatively similar objective hand function. Development of a validated expectations instrument and

routine use in clinical practice and research is necessary to better understand the implications of patient expectations related to a variety of procedures.

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Table 1

Inclusion and exclusion criteria for SARA study enrollment.

Inclusion Criteria	
1	Diagnosis of rheumatoid arthritis by a rheumatologist
2	Age 18 – 80 years
3	Severe deformity at the metacarpophalangeal joints determined by combined ulnar deviation and extensor lag ≥50 degrees on average for each finger
Exclusion Criteria	
1	Severe medical conditions preventing safe elective surgery
2	Existing tendon rupture, swan-neck or boutonniere deformities requiring surgical correction
3	Prior metacarpophalangeal joint arthroplasty on the study hand
4	Addition of disease-modifying anti-rheumatic drugs within 3 months of enrollment

Table 2

Categorization of preoperative expectations into high, middle, and low expectations across function, work, pain, and appearance domains.

Domain	Question	High Expectation	Middle Expectation	Low Expectation
Function	What do you expect to be able to do with your hands one year from now (after surgery)?	"Anything I want."	"More activities than I do now."	"The same kinds of activities I do now." "A little less than I can do now." "A lot less than I can do now."
Work	What do you expect to be able to do in terms of work (including job, housework, and schoolwork) one year from now (after surgery)?	"Everything I need to do."	"More than I can do now."	"The same amount of work I do now." "A little less than I can do now." "A lot less than I can do now."
Pain	How much pain related to your knuckles do you expect to have one year from now (after surgery)?	"No pain."	"Much less pain than I have now."	"A little less pain than I have now." "The same amount of pain I have now." "A little more pain than I have now." "A lot more pain than I have now."
Appearance	What do you expect your hands to look like one year from now (after surgery)?	"Almost perfect."	"Much better than they do now."	"The same as they do now." "A little worse than they do now." "A lot worse than they do now."

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Table 3

Demographic and Clinical Characteristics of Surgical Cohort at Baseline (N=59)

Demographic Characteristics	
Age, Mean (SD)	59.4 (8.1)
Female, N (%)	49 (83)
Race, N (%)	
Black	3 (5)
White	52 (88)
Other	2 (3)
Unspecified	2 (3)
Education, N (%)	
Less than High School	17 (29)
High School Graduate	17 (29)
Vocational Training	6 (10)
Some College/Associates Degree	9 (15)
College Graduate	3 (5)
Professional or Graduate School	7 (12)
Income, N (%)	
<10K	8 (14)
10–19K	11 (19)
20–29K	13 (22)
30–39K	11 (19)
40–49K	1 (2)
50–59K	2 (3)
60–69K	3 (5)
>=70K	8 (14)
Unspecified	2 (3)
Baseline Clinical Measures, Mean (SD)	
MHQ Total	38 (18)
MHQ Function	38 (23)
MHQ ADL	35 (28)
MHQ Work	42 (23)
MHQ Pain	48 (28)
MHQ Aesthetics	32 (21)
MHQ Satisfaction	27 (27)
Grip Strength (kg)	5.4 (4.5)
Jebsen Taylor Hand Function Test (sec)	53 (22)
Two Point Pinch Strength (kg)	2.3 (1.4)
Mean MCPJ Ulnar Drift (degrees)	37 (15)
Mean MCPJ Extensor Lag (degrees)	64 (25)

Table 4

Baseline Expectations (N=59)

Hand Function Expectations*	**N (%)**
Anything I want	9 (15)
More than now	42 (71)
Same or less than now	8 (14)
*Expect to be able to do in 1 year	
Work Expectations*	**N (%)**
Everything I need	19 (32)
More than now	33 (56)
Same or less than now	7 (12)
*Expect to be able to do in terms of work in 1 year	
Pain Expectations*	**N (%)**
None	26 (44)
Less than now	19 (32)
Same or more than now	14 (24)
*How much pain expected related to knuckles in 1 year	
Appearance Expectations*	**N (%)**
Almost perfect	7 (12)
Much better	49 (83)
Same or a little worse	3 (5)
*Expect hands to look like in 1 year	

Table 5

Cumulative Expectations

Overall Expectations	Number of Domains with Highest Expectations	N (%)
Low	Zero	24 (41)
Middle	1 –2	28 (47)
High	3 –4	7 (12)

Table 6

Clinical Measures Across Preoperative Expectations Groups

	Expectations		
	Low	**Middle**	**High**
Mean Baseline Measures (n=59)	**N=24**	**N=28**	**N=7**
MHQ Total	33	38	53
MHQ Function	32	39	53
MHQ ADL *	28	35	59
MHQ Work	38	42	59
MHQ Pain	56	46	32
MHQ Aesthetics	34	29	33
MHQ Satisfaction **	19	29	44
Grip Strength (kg)	5.4	5.5	5.4
Jebsen Taylor Hand Function Test (sec)	56	53	41
Two Point Pinch Strength (kg)	2.3	2.2	2.7
Mean MCPJ Ulnar Drift (degrees)	36	39	32
Mean MCPJ Extensor Lag (degrees)	60	68	63
Mean 1 Year Measures (N=45)	**N=16**	**N=22**	**N=7**
MHQ Total	55	64	71
MHQ Function	56	66	76
MHQ ADL	45	59	73
MHQ Work	40	54	61
MHQ Pain	38	32	28
MHQ Aesthetics	68	67	71
MHQ Satisfaction	61	67	70
Grip Strength (kg)	5	6.6	10.1
Jebsen Taylor Hand Function Test (sec)	46	41	45
Two Point Pinch Strength (kg)	1.9	2.7	2.9
Mean MCPJ Ulnar Drift (degrees)	10	14	22
Mean MCPJ Extensor Lag (degrees)	28	24	37

* P<0.05

** P<0.10