Metacarpophalangeal Arthroplasty in Rheumatoid Arthritis: What Determines Satisfaction with Surgery?

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ABSTRACT. ***Objective.*** In patients with rheumatoid arthritis (RA), it is unclear what determines satisfaction with metacarpophalangeal (MCP) joint replacement surgery. Previous studies have focused primarily on objective outcomes, such as range of motion (ROM) or strength, although some subjective measures have been examined. We investigate which outcomes most strongly correlate with patient satisfaction.

Methods. We assembled a retrospective cohort of 26 RA patients who received a total of 160 MCP silastic spacer implants. Patients answered a telephone survey, and 18/26 patients were examined. The strength of association between specific outcome variables and patient satisfaction with surgery was measured using Spearman correlations.

Results. Patients had a mean age of 64.8 years and 77% were female. The mean time since surgery was 5.5 years. The strongest determinant of patient satisfaction was postoperative hand appearance (Spearman $r \geq 0.60$). Pain was also highly correlated with satisfaction with surgery (Spearman $r \geq 0.46$). Ability to perform activities of daily living and portions of the Jebsen Hand Function Test were moderately correlated with patient satisfaction. Most other measures of hand strength and ROM showed only minimal correlation with patients' overall satisfaction with surgery.

Conclusion. Overall satisfaction with silastic spacer surgery in this cohort of RA patients was most influenced by postoperative hand appearance and by pain. While objective measures of surgical outcomes are valuable reflections of technical success, they are not important determinants of patient satisfaction. The criteria used to assess MCP arthroplasty results should be revised to better capture the outcomes that appear to matter most to patients. (J Rheumatol 2002;29:2488–91)

Key Indexing Terms:
METACARPOPHALANGEAL JOINT
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Rheumatoid arthritis (RA) is a chronic systemic rheumatic disease, affecting 1% of the US population. Ongoing inflammation results in joint destruction, and leads to deformity, pain, and disability. Of the many joints typically affected, the metacarpophalangeals (MCP) are the most frequently involved. For the past 30 years, silastic spacer implants have been used for MCP joint reconstruction in patients with RA. Despite widespread acceptance that silastic implants are the best surgical option for RA patients with severe pain or poor hand function due to MCP involvement, relatively few studies have comprehensively assessed outcomes of MCP arthroplasty. Most of the studies focus on biomechanical measures, such as range of motion (ROM), MCP deviation, grip strength, or postoperative complications[1]. While these objective measures may be important in assessing surgical proficiency, it is unknown how strongly biomechanical measures influence patient satisfaction, or whether other outcomes, such as pain relief, ability to perform specific tasks, or even hand appearance, are more important. For elective procedures, such as MCP arthroplasty, patient satisfaction with surgery provides critical information on patients' global response to surgery. We performed a cross-sectional analysis to identify which outcome measures used in MCP arthroplasty surgery are most strongly correlated with patient satisfaction.

MATERIALS AND METHODS

We assembled a retrospective cohort of RA patients with MCP Swanson silastic implants. To avoid confounding by variation in surgical proficiency, we limited our cohort to all patients operated on by a single surgeon between 1990 and 1999. Postoperatively, all patients received hand therapy. Protocols differed depending on date of surgery and location of the reha-

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bilitation clinic. Protocols included strengthening, with either protected active and passive motion and dynamic splinting, or immobilizing the fingers in a cast for 4 weeks followed by active and passive motion without dynamic splinting. We do not have data on which protocol each patient received postoperatively. However, previous reports have shown that different rehabilitation techniques result in only small differences in objective outcomes after MCP arthroplasty[2].

Of 63 patients identified through hospital billing records, 21 could not be contacted, five had died, and six refused to participate. Of the 32 patients consenting to participate in the study, one did not have RA, 2 had carpometacarpal surgery without MCP arthroplasty, one withdrew consent, one could not be contacted after initial contact, and one patient's surgery was too recent to ascertain postoperative satisfaction data. Twenty-six patients with a total of 160 MCP joint arthroplasties were available for analysis. Sixteen patients had bilateral surgery.

Each of the 26 patients answered a detailed telephone based survey. This consisted of pre-existing questions drawn from the Michigan Hand Questionnaire[3], covering the domain activities of daily living, pain, appearance, satisfaction with hand function, and work. We also included other questions covering a broad range of areas including mental health, quality of life, and demographics. The questionnaire used in our study is available from the authors on request. Satisfaction was assessed by a single question, "Overall, how satisfied are you with the results of your knuckle replacement surgery?," scored on a 4 point Likert scale. This simple, single item question correlates highly with the Michigan Hand Questionnaire (MHQ) multi-item question on satisfaction (Spearman correlation $r = 0.76$ and $r = 0.75$ for dominant and non-dominant hands, respectively, $p < 0.0001$ for both). Unlike the MHQ multi-item scale, it does not explicitly include items on pain, sensation, strength, or motion, and therefore provides an unbiased endpoint for this analysis of which outcomes influence satisfaction. Eighteen of the 26 patients also agreed to participate in a detailed on site hand examination by one of 2 certified hand therapists. Grip strength, 3 point pinch, key pinch, and hand alignment, as measured by the sum of ulnar deviation of all 4 MCP, were measured. All 18 patients also completed the Jebsen Hand Function test[4]. This is a test of 7 specific tasks, and is reliable, with validated age and sex adjusted norms.

To check accuracy and inter-rater reliability of the physical examination measurements, 6/18 (33%) of the patients were examined by both hand therapists. To ensure intra-rater reliability, each therapist examined the second digit of 6 patients twice, one hour apart.

All data were analyzed using SAS software (SAS Institute, Cary, North Carolina, USA). The strength of association between outcome variables and overall patient satisfaction with surgery was measured using Spearman correlations. Correlations ≥ 0.7 are considered excellent, 0.5–0.7 good, 0.35–0.5 moderate, and < 0.35 minimal[5]. Associations were computed separately for dominant and non-dominant hands, and only hands on which MCP arthroplasties were performed were included in analyses. Intra- and inter-rater reliability were assessed using Spearman correlations.

RESULTS

Cohort. Average patient age at time of evaluation was 64.8 years (range 39.6–83.4), 77% were female, 96% were Caucasian, and the mean time since MCP surgery was 5.5 years (range 10 mo to 11.1 yrs). There was no difference in age, time elapsed since surgery, or sex between the questionnaire responders and non-responders; the latter group included those who refused to participate, were lost to follow up, withdrew consent, or died. Fifteen patients were very satisfied with their surgery, 3 were somewhat satisfied, 4 were somewhat dissatisfied, and 4 were very dissatisfied. Of those who were very dissatisfied, the reasons were no improvement in hand appearance (1 patient), constant pain and poor hand appearance (1), extremely poor hand function (1), and iatrogenic nerve damage (1). When asked if they could go back in time and decide to have the MCP surgery again, 23 patients said they would. Whether or not a patient would have surgery again was highly correlated with satisfaction with surgery (Spearman $r = 0.79$, $p < 0.0001$). Interestingly, 5 of the 8 patients who were either somewhat or very dissatisfied with their surgery would have the surgery again if given the option; only one of these patients would not and 2 were unsure.

Reproducibility. Inter-rater reliability between the 2 certified hand therapists performing the physical examination was excellent, with Spearman correlations between $r = 0.80$ and $r = 1.0$ for almost all comparison measurements of strength and passive and active motion (the median Spearman correlation between the 2 therapists for these measures was $r = 0.92$). The only measures with less than excellent correlation between therapists were 3 point pinch in the right hand (Spearman $r = 0.55$) and the sum of MCP deviation for all 4 digits of the right hand (Spearman $r = 0.50$). Intra-rater reliability for each therapist's repeated measurements was also excellent, with most Spearman correlations being between $r = 0.7$ and $r = 1.0$ (median Spearman $r = 0.94$). MCP passive extension was the least reproducible measurement, with only moderate correlation between each therapist's 2 repeated measurements (Spearman $r = 0.29$ for therapist 1 and Spearman $r = 0.54$ for therapist 2).

Correlates of satisfaction. For both the dominant and non-dominant hand, hand appearance and pain were the outcome measures most highly correlated with overall patient satisfaction. (Spearman $r = 0.46$–0.70, Table 1). In both hands, less MCP ulnar deviation showed good correlation with better self-reported hand appearance (Spearman $r = 0.66$, $p = 0.001$ in the dominant hand and 0.52, $p = 0.09$ in the non-dominant hand). However, the degree of ulnar deviation showed only moderate correlation with overall satisfaction with surgery in the dominant hand, (Spearman $r = 0.50$) and poor correlation in the non-dominant hand (Spearman $r = 0.30$, Table 2). The more recent the surgery, the more satisfied the patient, although the correlation was not strong and not statistically significant (Spearman $r = 0.37$, $p = 0.07$). Some measures of hand function, such as ability to perform activities of daily living (ADL) in the dominant hand and

Table 1. Spearman correlations between subjective measures and patient satisfaction.

	Dominant Hand	Non-Dominant Hand
Appearance	0.60**	0.70**
Pain	0.46*	0.67**
Ability to perform ADL	0.37	0.30

* $p \leq 0.05$; ** $p \leq 0.01$.
ADL: activities of daily living.

Table 2. Spearman correlations between objective measures and patient satisfaction.

	Dominant Hand	Non-Dominant Hand
Ulnar deviation	0.50	0.30
Grip strength	0.29	0.15
Key grip	0.18	0.37
Sum of active MCP motion	0.24	0.20
3 point pinch	0.03	0.19

key grip in the non-dominant hand, were moderately correlated with satisfaction, although these were not statistically significant (Spearman r = 0.37 for each). Ability to perform specific tasks measured on the Jebsen Hand Function Test were poorly to moderately correlated with patient satisfaction with MCP arthroplasty surgery (Spearman r = 0.12–0.56, Table 3).

DISCUSSION

The goal of MCP arthroplasty surgery has primarily been to optimize hand function, ameliorate pain, and improve joint alignment. Previous studies of silastic spacer implants for reconstruction of MCP joints in RA have focused primarily on objective criteria, with limited investigation of subjective patient based measures[6,7]. While measuring ROM and strength is important in evaluating prosthesis function, we are aware of no data showing that these outcome measures are necessarily considered important by patients. In fact, studies have shown that patients are satisfied with this surgery despite only poor to moderate improvement in objective measures[8,9], suggesting RA patients may not value improvements in hand biomechanics as highly as physicians or researchers. Accurate measurement of the determinants of patient satisfaction, especially in elective procedures, is increasingly vital as medicine becomes more consumer driven. Patient satisfaction may also provide a more meaningful global assessment of how much patients themselves value the procedure. Questionnaires are an important way of assessing patient satisfaction, and can be more sensitive than biomechanical measures in measuring patients' global function[10]. Surgical proficiency likely influences postoperative hand appearance, pain relief, joint biomechanics, and patient satisfaction. In this cross-sectional study we included only patients operated on by a single surgeon to eliminate variation due to surgical proficiency.

Table 3. Correlations with patient satisfaction; Jebsen Hand Function Test.

	Dominant Hand	Non-Dominant Hand
Ability to:		
Hold large light objects	0.56*	0.31
Feed oneself	0.40	0.56
Play cards	0.45	0.40
Hold small objects	0.31	0.49
Hold large heavy objects	0.42	0.31
Play checkers	0.12	0.49
Write	0.25	0.13

* $p \leq 0.05$.

Our data suggest that subjective outcome measures are most highly correlated with patient satisfaction (see Table 1). Postoperative hand appearance (Spearman r = 0.60–0.70) was highly correlated with patient satisfaction; the association was statistically significant in both the dominant and non-dominant hands. Although this procedure is known to improve the appearance of the rheumatoid hand[11], improvement in hand appearance has not been emphasized as a benefit of the procedure, and perhaps should be[8]. Interestingly, alignment, as measured by MCP deviation, was more strongly correlated with postoperative patient satisfaction in the dominant hand, suggesting patients may care more about the appearance of that hand. This procedure is also known to significantly decrease pain in RA patients[9,12], and our data show that pain correlates highly with patient satisfaction. Although silastic spacer arthroplasty has clearly been shown to improve ADL performance in RA patients[12], patients' assessment of ADL performance was only moderately correlated with satisfaction.

Almost all patients would choose to have surgery again, even if they were dissatisfied with their results. It is beyond the scope of this paper to hypothesize the reasons underpinning these choices, but these data suggest that some clinical benefit was achieved even among the least satisfied patients. There is a moderate correlation with satisfaction and time elapsed since surgery. A prospective study, controlling for time to followup, would permit us to better understand the relationship between satisfaction and the willingness to choose surgery again.

Objective measurements of joint excursion and strength were poorly correlated with patient satisfaction (see Table 2). We analyzed dominant and non-dominant hands separately, anticipating that satisfaction would correlate more highly with function in the dominant hand, but this hypothesis was not borne out. By the time patients come to surgery, they may already be so impaired, and have adjusted so well to the restricted lifestyle of chronic RA, that moderate improvements in hand function do not significantly alter their lives. These data suggest that although this surgery is known to effectively improve joint ROM, these measures may not be useful benchmarks for evaluating whether the surgery is successful from the patient's vantage point[12]. It remains unclear which objective measures best capture the subjective domain of postoperative cosmesis.

The Jebsen Hand Function Test is a timed, well validated test with established norms, which assesses patients' ability to perform 7 specific activities[4]. These objective measurements were moderately correlated with patient satisfaction (see Table 3). These contextual measures evaluate how well patients function in daily life. The ability to perform func-

tional tasks was clearly more important to patients than isolated measures of strength and ROM, and underscores the fact that excellent ROM or hand strength may not translate directly to satisfaction with surgery. Involvement of other upper extremity joints may also limit function despite good postoperative MCP strength and ROM. These data also suggest that if rehabilitation therapy focused on improving specific tasks as part of a postoperative protocol, therapy could help maximize satisfaction with surgery. Analyses such as ours, which identify measures that are highly correlated with patient satisfaction, may permit us to better understand why patients elect surgery, and which outcomes we should measure as the best indicators of a successful operation.

Our study has limitations. It is not a prospective study, so we were unable to perform pre-operative measurements. Therefore, we cannot comment on the effect of *changes* in pain, ROM, or hand function on patient satisfaction. However, it has been shown that in patients with arthritis, a retrospective assessment of pain relief and change in disability is actually more highly correlated with patient satisfaction than serial measurements, suggesting pre-operative measures may not be essential in studying post-operative patient satisfaction[13]. Our sample size was small, especially in the subset of patients who had physical examinations and completed the Jebsen Hand Function Test. As a result, the modest correlations we observed (e.g., 0.30) were not statistically significant. Our patient population was homogenous, consisting of mostly Caucasian patients at a large tertiary care center, and our results may not necessarily apply to other patient populations. The modest participation rate raises the possibility of responder bias due to other unmeasured variables. However, given that the participants did not differ in age, sex, or time elapsed since surgery from non-responders, we feel this is unlikely.

Our results suggest that most, but not all, RA patients are satisfied with MCP arthroplasty surgery and would elect the procedure again if given the opportunity. We have shown that pain and appearance are key correlates of satisfaction. These findings should be confirmed in larger studies with prospective designs.

Identifying the most important predictors of patient satisfaction with MCP arthroplasty surgery would allow rheumatologists to recognize patients most likely to perceive benefit from this procedure, and refer them for surgery in a timely manner. It would also allow postoperative rehabilitation programs, which are often limited in time and scope, to focus on the areas most relevant to good outcomes. These data suggest we should expand the criteria used to assess MCP arthroplasty results to better capture the outcomes that matter most to patients.

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