Relationship between Preoperative Patient Characteristics and Expectations in Candidates for Total Knee Arthroplasty

Helen Razmjou, Joel A. Finkelstein, Albert Yee, Richard Holtby, Marjan Vidmar, Michael Ford

ABSTRACT

Purpose: The purpose of this study was to determine the relationship between patient expectations for improvement following primary total knee arthroplasty (TKA) and patient preoperative characteristics.

Methods: This was a cross-sectional analysis of preoperative expectations. Expectations for improvement were evaluated in six distinct domains. The baseline factors used as independent variables were age, gender, presence of comorbidity, sub-domains of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC; pain, stiffness, physical limitation related to lower extremity), and SF-36 physical and mental health component scores. Stepwise logistic regression analysis was applied to examine the relationships between dependent and independent variables.

Results: The study cohort consisted of 236 candidates for TKA (154 women and 82 men, mean age 67, SD = 9.98). Expectations were high on average. Presence of comorbidity was associated with expectations of pain relief. Preoperative mental health was related to expectations for a return to activities of daily living; age, gender, physical health, and mental health were related to expectations for improved leisure, recreational, and sports activities. Preoperative physical health was related to expectations for potential return to full recovery. No baseline factors were associated with expectations for improved range of motion or for providing care to and interacting with others.

Conclusion: Expectations related to recovery from surgery appeared to have distinct dimensions and were associated with patient baseline characteristics.

Key Words: osteoarthritis, preoperative expectations, total knee arthroplasty

Razmjou H, Finkelstein JA, Yee A, Holtby R, Vidmar M, Ford M. Relationship between preoperative patient characteristics and expectations in candidates for total knee arthroplasty. *Physiother Can.* 2009;61:38-45.

RÉSUMÉ

Objectif : Cette étude avait pour objectif de déterminer le lien entre les caractéristiques initiales des candidats à une arthroplastie totale primaire du genou et leurs attentes à l'égard de leur amélioration suivant celle-ci.

Méthode : Il s'agissait d'une analyse en coupe des attentes préopératoires. L'amélioration attendue a été évaluée en fonction de 6 domaines distincts. Les facteurs de départ utilisés comme variables indépendantes étaient l'âge, le sexe, la présence d'affections concomitantes, les sous-domaines de l'échelle WOMAC (douleur, raideur, limitation physique intéressant les membres inférieurs) et les scores obtenus au questionnaire SF-36 relativement à la santé physique et mentale. Une analyse de régression logistique par degrés a permis d'examiner les liens entre les variables dépendantes et indépendantes.

Résultats : La cohorte évaluée dans le cadre de cette étude se composait de 236 candidats à une arthroplastie totale du genou (154 femmes et 82 hommes, dont l'âge moyen était de 67 ans [écart type = 9,98]). En moyenne, les attentes étaient élevées. La présence d'affections concomitantes était associée avec une attente à un soulagement de la douleur. La santé mentale préopératoire s'est vue liée à l'attente de reprendre les activités de la vie quotidienne. Les attentes liées à l'âge, au sexe ainsi qu'à la santé physique et mentale avaient trait à une participation accrue aux activités de loisirs et de sports. La santé physique était liée à l'attente du potentiel d'un rétablissement complet. Aucun des facteurs de départ n'était associé à l'attente de recouvrir une plus grande amplitude de mouvement, de prodiguer des soins à autrui ou d'interagir avec les autres.

This study received ethics approval from the Human Ethics Research Board of the Sunnybrook Health Sciences Centre, Toronto, Ontario.

This study was funded in part by a Musculoskeletal grant from the Sunnybrook Health Sciences Centre. Helen Razmjou is supported by a doctoral fellowship award from the Canadian Institutes of Health Research.

Helen Razmjou, MSc, PhD(C): Holland Orthopaedic & Arthritic Centre, Sunnybrook Health Sciences Centre; Department of Physical Therapy, University of Toronto, Toronto, Ontario.

Joel A. Finkelstein, MD, FRCS(C): Sunnybrook Spine Program, Division of Orthopaedic Surgery, Sunnybrook Health Sciences Centre; Department of Surgery, University of Toronto, Toronto, Ontario.

Albert Yee, MD, MSc, FRCS(C): Sunnybrook Spine Program, Division of Orthopaedic Surgery, Sunnybrook Health Sciences Centre; Department of Surgery, University of Toronto, Toronto, Ontario.

Richard Holtby, MB, BS, FRCS(C): Holland Orthopaedic & Arthritic Centre, Sunnybrook Health Sciences Centre; Department of Surgery, University of Toronto, Toronto, Ontario.

Marjan Vidmar, MSc: Institute for Work and Health, Toronto, Ontario.

Michael Ford, MD, FRCS(C): Sunnybrook Spine Program, Division of Orthopaedic Surgery, Sunnybrook Health Sciences Centre; Department of Surgery, University of Toronto, Toronto, Ontario.

Address correspondence to *Helen Razmjou*, Department of Rehabilitation, Holland Orthopaedic and Arthritic Centre, 43 Wellesley Street East, Toronto, ON M1Y 1H1 Canada; Tel.: (416) 967-8654; E-mail: helen.razmjou@sunnybrook.ca.

DOI:10.3138/physio.61.1.38

Conclusion : Les attentes reliées au rétablissement suivant la chirurgie semblait avoir des dimensions distinctes, et étaient associées avec les caractéristiques de départ des patients.

Mots clés : arthrose, arthroplastie totale du genou, attentes préopératoires

INTRODUCTION

Osteoarthritis of the knee is one of the most common disabling diseases of the older population in North America. Over the last several decades, total knee arthroplasty (TKA) has provided an effective means of pain relief and improved function in patients with arthritis.^{1–7} However, the associations between patient expectations and baseline characteristics (i.e., age, pain, stiffness, comorbidity, physical and mental health) remain inconclusive.^{8–11} Expectations for recovery are important in influencing patient satisfaction.^{12–14} Associations between these expectations and baseline patient characteristics could suggest modifiable targets that can be realigned toward realistic goals and improved patient satisfaction.¹⁵ Therefore, prior to examining the impact of expectations on patient satisfaction, potential baseline factors that may be associated with these expectations need to be identified. The limited literature^{8–11} reveals an incomplete understanding of the relationship between patients' characteristics before surgery and their expectations of primary or revision TKA surgery. Longitudinal studies^{8,10} have used postoperative subjective scores as the dependent variable and baseline or follow-up expectations and baseline characteristics as independent variables. Cross-sectional studies^{9,11} have used expectations as the dependent variable and baseline characteristics as independent variables. While most of these studies have examined expectations of pain relief or of returning to normal daily activities,^{8–11} other expectation constructs such as return to sports or recreational activities,^{9,10} postoperative complications,^{8,11} ability to walk or negotiate stairs,^{9,10} improved sexual activity,⁹ psychological well-being,⁹ and global benefit of surgery⁸ have also been investigated. The approach to quantifying these expectations has varied, and most authors^{8–11} have analyzed each expectation as a separate outcome. Venkataramanan et al.¹¹ suggested that expectations of revision TKA form a multidimensional construct. Accordingly, uncertainty exists concerning the definition and measurement of expectations for primary TKA surgery.

Associations between various expectations and age,^{9–11} sex,^{9,10} concerns about surgery,¹¹ comorbidity,^{8,10} preoperative pain,^{8,9} or preoperative function⁸ have been reported. Others have identified body mass index¹⁰ and physical function status¹⁰ as important predictors of expectations of surgery. These findings have been identified for recipients of primary TKA;¹⁰ patients awaiting revision TKA;¹¹ a combined sample of patients

receiving either total hip arthroplasty (THA) or TKA;⁸ and a heterogeneous sample of patients awaiting meniscal surgery, TKA, repair of the anterior or posterior cruciate or other ligament, repair of knee dislocation, treatment of patellofemoral chondromalacia, and osteoarthritis and debridement procedures.⁹ This heterogeneity in study samples makes generalization to primary TKA candidates difficult.

Apart from the use of populations with heterogeneous pathologies (i.e., primary TKA, revision TKA, ligament or meniscus repairs), it appears that the structure of the questions and answers has also contributed to inconsistency among these studies. One study,⁹ for example, explored the *importance* of specific expectations as opposed to the *presence* of these expectations. The authors⁹ used one main question (“How important are these expectations in the treatment of your knee?”) and, following this question, named a number of symptoms and disabilities (e.g., “relieve night-time pain”). In this format, “expectations” and “symptoms or disability” overlap as a single concept, which may complicate the question and affect the accuracy of the answer. Furthermore, the concepts of “hope” and “realistic anticipation” are not easily separated when examining the importance of expectations. A simple question such as “Do you expect your surgery to help with a certain symptom/disability?” would identify a potential existing problem (symptom/disability) and further explore what expectations exist with respect to recovery from that problem. In another study,⁸ the authors asked one question related to pain (“How painful do you expect your hip/knee to be?”) and one question related to disability (“How limited do you expect to be in your usual activities?”). This use of the terms “painful” and “limited” suggests a potential negative response to surgery. In addition, recovery is a complex phenomenon involving many aspects of well-being; it should not be oversimplified or limited to improvement of pain or to limits on usual activities.

Controversy is not limited to quantitative research; qualitative studies using semi-structured interviews have also reported problematic results.^{6,16} Some authors⁶ reported that patients have difficulty identifying and articulating their expectations. Woolhead et al.⁶ indicated that most candidates for TKA were unable or unwilling to express their expectations and were generally vague in their replies.

Unfortunately, establishing a full understanding of the relationship between expectations and preoperative

characteristics among patients awaiting primary TKA has been difficult because of variation in patient cohorts, methods of defining expectations, and analytic strategies. Therefore, the relationship between patients' expectations and their baseline (preoperative) characteristics warrants further investigation. The purpose of the present study was to determine the relationship between patients' expectations for improvement and preoperative characteristics among candidates for primary TKA. Baseline factors of interest were age; gender; presence of comorbidity; preoperative levels of pain, stiffness, and function as defined by sub-domains of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC);¹⁷ and physical and mental health as defined by summary scores of the SF-36.¹⁸ Expectations for improvement were evaluated with respect to pain; range of motion (ROM); ability to perform activities of daily living (ADL); ability to interact with and provide care for others; ability to return to previous leisure, recreational, or sports activities; and achieving full recovery. Based on the previous literature,¹¹ we hypothesized that expectations for recovery from symptoms and disability would be related to preoperative patient characteristics and that these expectations would be multidimensional.

METHODS

Study Design and Setting

This study was a cross-sectional analysis of preoperative measures obtained from participants in a prospective longitudinal study. The recruitment was conducted at the Holland Orthopaedic and Arthritic Centre, a centre dedicated to lower-extremity joint replacement. The study protocol was approved by the Human Ethics Research Board of the Sunnybrook Health Sciences Centre.

Participants

Consecutive candidates for primary TKA who could complete the questionnaires independently were approached to participate in this study. Sample size was based on the multiple regression analysis, using the rule of thumb of 10 observations^{19(p.31)} for each parameter in the model (both independent variables and dummy variables). Preoperative data collection took approximately 17 months. Exclusion criteria included prior ipsilateral TKA, barriers to language communication, and visual or cognitive impairment. There was no age limit for participation. All participants provided informed consent.

Subjective Questionnaires

Baseline demographic data (age, sex, comorbidity) were collected using a self-report questionnaire. Disability owing to the knee was assessed by the

WOMAC;¹⁷ general physical and mental health were assessed using the SF-36 questionnaire.¹⁸ An expectation questionnaire documented patient expectations. All questionnaires were self-administered, approximately 2 to 3 weeks prior to surgery, in the pre-surgical clinic.

The WOMAC questionnaire, a disease-specific outcome measure, contains three domains: pain (5 items), stiffness (2 items), and function (17 items). The answers are equally weighted and reported as sums; higher numbers indicate greater levels of symptom or disability. Sub-scale scores can take the following range of values: function: 0–68; pain: 0–20; stiffness: 0–8.¹⁷ The internal consistency of the WOMAC sub-domains of pain, stiffness, and functional limitation are reported to be 0.81, 0.81, and 0.93 respectively in candidates for primary TKA.²⁰ The SF-36 is a generic health-related quality-of-life instrument.¹⁸ This measure considers eight domains (physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health) and has two summary components, the Physical Component Summary (PCS) and the Mental Component Summary (MCS). The PCS and MCS are adjusted by the Canadian population mean ($\bar{x}$ = 50) and standard deviation (SD = 10) to produce norm-based scores; a higher score indicates better health status.²¹ The extent to which this measure is valid and reliable in patients with osteoarthritis has been reported elsewhere.²² The internal consistency of the sub-scales of the SF-36 has been reported to vary from 0.72 to 0.95 in candidates for primary TKA.²⁰

The expectation questionnaire (Appendix A) was non-joint-specific and was developed based on literature review^{8,9,11} and expert opinions. The questionnaire evaluated six distinct domains related to pain; ROM; ability to perform ADL; ability to interact with and take care of others; ability to return to previous leisure, recreational, or sports activities; and perception of the potential to achieve full recovery following surgery. To avoid bias relating to overlap of *hope*, which reflects wishes that a given event will occur, and *anticipation* that a given event is likely to occur, a written explanation of the difference between these two concepts was provided on the first page of the questionnaire (see Appendix A). Answers were quantified using a three- or four-point scale, with an additional *not applicable* response option. The test-retest chance-corrected agreement was estimated on 25 candidates for shoulder surgery prior to the present study. Weighted kappa statistics were calculated using the default Cicchetti-Allison weight type in SAS version 9.1.3 (SAS Institute Inc., Cary, NC). Strength of agreement was interpreted as follows: <0 = poor; 0–0.20 = slight; 0.21–0.40 = fair; 0.41–0.60 = moderate; 0.61–0.80 = substantial; 0.81–1 = almost perfect.²³ The results showed moderate to substantial reliability, with weighted kappa values varying from 0.42 to 0.78. The questionnaire was able to

discriminate between men and women with rotator cuff disease.²⁴

Statistical Analysis

Descriptive statistics were calculated for all relevant variables. The association between expectations and the proportion of patients with or without any of the comorbidities addressed by the study (cancer, diabetes, heart or lung problems, cerebrovascular disease, depression, thyroid conditions, spine and associated joint disorders) was examined.

A multivariable forward stepwise ordinal logistic regression analysis, with a minimal significance level of 0.05 for entry, was used to examine the association between each preoperative expectation and the following baseline variables: age (years); gender; existence of comorbid conditions (yes/no); preoperative pain, stiffness, and physical function (quantified by WOMAC); and perceived health (measured by the physical and mental summary scores of the SF-36). The test of parallel lines was used to determine whether the proportional odds assumption was satisfied.²⁵ Analyses were performed with and without outliers to determine whether these affected the regression findings. Patients with missing data were not included in the analysis. Multicollinearity diagnostics were conducted for each analysis, and distribution of the expectation residuals was examined to ensure that they met the assumptions of normality.²⁶ To ensure stability of analyses, the result of the stepwise ordinal logistic regression was compared with a full-model logistic regression for each question, and any variables that was not significant at $p < 0.05$ in

both models was considered non-significant. The statistical significance of the odds ratio is related to the 95% confidence interval; a confidence interval that excludes an odds ratio of one will be statistically significant at $p \leq 0.05$. Statistical analysis was performed using SAS version 9.1.3 (SAS Institute Inc., Cary, NC). Statistical results are reported using two-tailed p -values with significance set at $p < 0.05$.

RESULTS

We recruited 331 candidates for TKA, of whom 236 (154 women and 82 men; mean age = 67 years, SD = 10.0; minimum, maximum: 42, 87) completed the 1-year follow-up (71% response rate). Twenty-four of 236 patients had incomplete expectation questionnaires, two had incomplete WOMAC physical function sub-domain data, and two had missing data for the PCS and MCS of the SF-36. The initial sample ($N=331$) was not significantly different in terms of preoperative scores of the WOMAC, age, or proportion of men and women from the sample with complete data ($n=208$; $p > 0.05$). Because this paper reports the results of the first component of a larger longitudinal study, only patients with complete data at 1 year were used for analysis. Table 1 illustrates the sample's preoperative mean scores for the individual domains and component summaries of SF-36. The mean (SD) scores for the WOMAC were as follows: pain, 9.71 (3.5); stiffness, 4.42 (1.6); physical function, 33.7 (11.6). One hundred seventy-two patients (73%) possessed at least one comorbid condition. The frequencies of expectation responses are shown in Table 2.

Table 1 Preoperative Scores of SF-36 Domains and Summaries (Canadian-adjusted)

	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
Score	30.6	21.3	36.0	72.3	49.5	69.4	61.8	74.7		
Mean	85.8	82.1	75.6	77.0	65.8	86.2	84.0	77.5	50.0	50.0
SD	20.0	33.2	23.0	17.7	18.0	19.8	31.7	15.3	10.0	10.0
NS	22.4	31.7	32.8	47.3	41.0	41.5	43.0	48.2	27.3	52.0

BP = Bodily Pain; GH = General Health; MCS = Mental Component Summary; MH = Mental Health; NS = Normalized Scores; PCS = Physical Component Summary; PF = Physical Functioning; RE = Role Emotional; RP = Role Physical; SF = Social Functioning; VT = Vitality

Table 2 Frequency of Levels of Expectations for Six Questions

Item	Item Scores Frequency (%) ^a					Missing
	NA	1	2	3	4	
Pain relief	2 (1)	0	1 (0)	23 (10)	186 (79)	24 (10)
Improved ROM	5 (2)	5 (2)	2 (1)	40 (17)	159 (67)	25 (11)
Return to ADL	7 (3)	2 (1)	4 (2)	40 (17)	159 (67)	24 (10)
Providing care	48 (20)	12 (5)	9 (4)	46 (20)	97 (41)	24 (10)
Return to sports	44 (19)	13 (5)	71 (30)	84 (36)	0	24 (10)
Full recovery	—	8 (3)	0	97 (41)	103 (44)	28 (12)

^aPercentages are rounded to the nearest whole number

ADL = activities of daily living; ROM = range of motion

Preoperative Patient Characteristics and Expectations

There was no significant multicollinearity among the independent variables. Comparison between the full-model logistic regression and logistic stepwise analysis showed inconsistent results for age as a predictor of expectations related to improved ROM; these results are therefore not reported. Otherwise, only the expectations results that were the same in both regression analyses are reported. Table 3 shows the results of the stepwise logistic regression with respect to the relationship between preoperative patient characteristics (independent variables) and expectations for TKA surgery (dependent variable). An odds ratio (OR) of 1 is the null value, meaning that no relationship exists between independent and dependent variables. When an OR is < 1, it can be subtracted from the null value and the result multiplied by 100 to indicate how much less (in %) the odds were for higher expectations. Conversely, after subtracting the null value from an OR > 1, an increase in the odds of higher expectations can also be expressed as a percentage.

Expectation of pain relief was associated with presence of comorbidity after controlling for all other independent variables in the model. Patients with comorbidity were 0.12 times as likely as those without comorbidity to report lower expectations for improved pain. In other words, for patients with comorbidity, the odds of higher expectations for pain relief were 88% less $((1 - 0.12) \times 100)$ than for those with no comorbidity.

Expectation of improved ROM was not significantly associated with any baseline variable in this sample.

Expectation of improved ADL was affected by mental health, with healthier individuals reporting a higher level of expectation. The OR of 1.04 suggests that each increase of one unit on the MCS was associated with an increase of approximately 1.04, or 4% $((1.04 - 1) \times 100)$, in the OR of being in a higher expectation category, controlling for all other variables in the model.

Expectation of improved interaction and ability to provide care was not significantly associated with any baseline variable in this sample.

Expectations related to improved participation leisure, sports, or recreation had a statistically significant association with SF-36 physical and mental health, age, and gender. Men and younger and physically and mentally healthier patients reported higher levels of expectation of returning to these activities. Each increase of one unit on the PCS was associated with an increase of approximately 1.04 (4%) in the OR of being in a higher category of expectation of improved participation in recreational activities. For the MCS, the odds increased by 1.07 (7%). For men, the odds of having a higher expectation of returning to these activities was 51% more than for women. With every 1-year increase in age, the odds of having a higher expectation of returning to these activities were 5% lower.

Expectation of full recovery was associated with physical health: overall, patients with higher scores on the physical health component of the SF-36 possessed a greater expectation of achieving full recovery following surgery. For every 1-unit increase in the PCS (i.e., increasing health), the odds of higher expectations of a full recovery increased by 6%.

DISCUSSION

Patients included in this study were more limited in physical health than in mental health (see Table 1), which is consistent with the higher impact of arthritis on the physical aspect of health. In the present study, expectations for pain relief were related to the presence of comorbidity.

Physical and mental health were significantly linked to patients' expectations of "improved ADL and achieving full recovery" and "improved sports/recreational activities" respectively. Expectations of improved participation in leisure, recreational, or sports activities were associated with the highest number of patient baseline characteristics (age, gender, and physical and mental health). Except for expectations of improved ROM and expectations related to providing care for and interacting with others, which were not significantly

Table 3 Association Between Expectations and Independent Variables*

<i>Independent Variables</i>	<i>Adjusted Odds Ratios (95% CI)</i>	<i>Wald's χ^2</i>	<i>p</i>
Expectations for improved pain			
Comorbidity	0.12 (0.01–0.58)	4.29	0.038
Expectations for improved daily activities			
Mental health	1.04 (1.01–1.06)	7.99	0.005
Return to leisure, recreational or sports activities			
Physical health	1.07 (1.03–1.12)	10.52	0.001
Mental health	1.04 (1.02–1.07)	10.51	0.001
Gender	0.49 (0.26–0.93)	4.59	0.032
Age	0.95 (0.91–0.99)	7.48	0.006
Expectations for full recovery			
Physical health	1.06 (1.03–1.10)	13.11	<0.001

*Only factors significant at $p < 0.05$ are presented

Odds ratio: OR = 1 is the null value, meaning that no relationship exists between the independent and dependent variables. When OR < 1, it can be subtracted from the null value and multiplied by 100 to indicate how much less (in %) the odds were for higher expectations. Conversely, after subtracting the null value from an OR > 1, an increase in the odds of higher expectations can also be expressed in %.

related to patient baseline variables in this sample, all expectations were associated with at least one patient baseline factor.

Consistent with previous studies,^{8–11} we observed that the overall expectations for recovery following surgery were high. Total joint arthroplasty is a major elective surgery with risks and a recovery time that may be prolonged by preoperative physical impairment or by postoperative medical or surgical complications.²⁷ It may be anticipated, therefore, given the uncommon but significant risks associated with TKA, that candidates for surgery would have high expectations for this procedure.

In our study, expectation of pain relief was reduced in patients with associated medical health conditions, possibly because of a more realistic assessment of the physiological impact of those comorbidities on recovery or as a coping mechanism adopted in the face of chronic disease.^{28,29} Consistent with our results, Mahomed et al.⁸ reported that patients with lower levels of comorbidity expected higher pain relief. In their study, postoperative scores were significantly different between groups with different levels of preoperative expectations for pain relief. In their study of patients awaiting revision of TKA, Venkataramanan et al.¹¹ showed that patients with fewer previous surgeries (who potential had less comorbidity) had higher expectations for pain relief. However, concerns about surgery were the only factor that remained significant in the multivariable analysis of patient baseline variables.

The expectation of improved ROM was not associated with any baseline factor. This component of expectations has not been examined in previous studies. Although patients with more stiffness are expected to have higher expectations for improved ROM, lack of heterogeneity in the level of pathology and age in this sample may have reduced the strength of that relationship.

Expectations for improved ADL were associated with mental health. The mental-health component summary score is affected by vitality, social functioning, and overall mental health, which may explain the need for higher expectations of independence in basic daily tasks. Mental health was not significantly associated with baseline factors in previous studies, possibly because expectations related to improved ADL were not explored¹⁰ or because a sub-domain of the SF-36 (physical functioning) was used in the multivariable analysis instead of the total summary scores.⁸

Lack of association between “expectations for providing care and interacting with others” and patient baseline variables in this sample may be related to the higher age range or to more limited caregiving roles in candidates for TKA, a possibility that warrants further investigation. Although a similar question was used in Mancuso et al.’s study,⁹ these authors did not comment

on the association of this expectation with patient baseline factors.

Our results indicate that patients’ age, gender, physical health, and mental health are associated with expectations related to complex tasks and activities that are harder to achieve, such as ability to return to recreational and sports activities. This finding is consistent with those of some studies^{9,10} but contradicts those of others.⁸ In Mahomed et al.’s study,⁸ categories of “slightly, moderately and very painful/limited” were collapsed into one category and “not at all limited” into another category. Collapsing “slightly limited” with “moderately limited” and “very limited” may not be justified statistically, since it reduces the variability of the responses from three to one. The present study, apart from explaining the difference between “hopes and wishes” and “realistic anticipations,” included three or four groups (after eliminating the “not applicable” category) in the analysis, which may provide a better assessment of the levels of expectations.

The only study that presents information on expectation of full recovery is that by Mahomed et al.⁸ Expectations of the likelihood of achieving complete success from surgery were initially recorded on a visual analogue scale (0–100) but were later analyzed as dichotomized responses ($\geq 90\%$ and $< 90\%$). The authors⁸ did not find any association between these expectations and the domains of physical functioning and bodily pain on the SF-36. The present study used the PCS summary score, which captures “perception of overall health” as well as the patient’s “physical functioning” and “bodily pain.” A significant association between expectations for full recovery and PCS summary score in our study may be related to a more realistic assessment of what is achievable among patients with chronic osteoarthritis.

Limitations

In the present study, patients with missing data and those who said they did not expect to see improvement were not included in the data analysis. We do not expect a significant bias related to missing data, however, because there was no significant difference in preoperative characteristics between the initial sample and the sample of patients with complete data. In terms of missing expectation questions, the proportion of missing values was small (24 of 236, or 10%), and, since the sample was homogenous, excluding patients with incomplete data was not expected to have a significant adverse consequence. In addition, to maintain the gradient property of the ordinal data, we excluded patients who had no expectation of improvement (no difficulty with symptoms or function). Therefore, our results pertain only to patients with a certain level of expectation for improvement.

In the present study, the impact of comorbidity was documented as “yes” or “no.” This may underestimate the impact of multiple associated organ/system pathologies. Using a cumulative illness scale would provide more insight in terms of both presence and severity of pathology.

The results of this study indicate associations between a number of preoperative factors and patient expectations. Because of the cross-sectional nature of the analysis, we cannot draw conclusions as to the presence or absence of a cause-and-effect relationship between variables examined.

Further longitudinal studies are required to evaluate the causal relationship between preoperative patient characteristics and recovery, as well as to explore the relationship between degree of fulfilment of expectations and overall satisfaction with surgery in patients with osteoarthritis of the knee joint. This information may be useful to physical therapists who wish to provide more focused preoperative education to their patients.

CONCLUSION

Patient expectations related to recovery from surgery represent a multidimensional construct, and all but two of the dimensions studied (improved ROM and providing care) showed significant associations with patient characteristics such as age, gender, comorbidity, and preoperative level of physical and mental health.

Physical therapists and surgical staff working with candidates for TKA need to consider that individuals who enjoy higher levels of physical and mental health expect a higher level of recovery, especially in more complex tasks. By taking patient demographics, characteristics, and expectations into account, clinicians may be able to provide more effective education and establish more achievable goals.

KEY MESSAGES

What Is Already Known on This Subject

There is controversial information on the relationship between baseline characteristics of candidates for primary TKA and their expectations of recovery. This inconsistency appears to be related to the use of heterogeneous populations and different questionnaire formats. The generalization of the relationship between expectations and baseline factors may be limited if patients with different knee pathologies are examined. In addition, using a binary response format (yes/no) and questions with overlapping concepts can affect the validity of the correlation analysis. Given that patients' expectations of surgery may be modified by preoperative education, further study of this subject is warranted.

What This Study Adds

In the present study, patient expectations were documented in six domains that are deemed important to patients with osteoarthritis of the knee. Because of the homogeneous sample used in this study, our results are more generalizable to candidates for primary TKA. We explained the difference between *hope* and *anticipation* and quantified answers by using a three- or four-point scale to capture the levels of expectations more precisely. Our preliminary results contribute to a better understanding of what patients with advanced osteoarthritis of the knee expect from their surgery.

REFERENCES

1. Dieppe P, Basler HD, Chard J, Croft P, Dixon J, Hurley M, et al. Knee replacement surgery for osteoarthritis: effectiveness, practice variations, indications and possible determinants of utilization. *Rheumatology*. 1999;38:73–83.
2. Rissanen P, Aro S, Sintonen H, Slati P, Paavolainen P. Quality of life and functional ability in hip and knee replacements: a prospective study. *Qual Life Res*. 1996;5:56–64.
3. Buckwalter JA, Lohmander S. Operative treatment of osteoarthritis: current practice and future development. *J Bone Joint Surg Am*. 1994;76:1405–18.
4. Kirwan JR, Currey HL, Freeman MA, Snow S, Young PJ. Overall long-term impact of total hip and knee joint replacement surgery on patients with osteoarthritis and rheumatoid arthritis. *Brit J Rheumatol*. 1994;33:357–60.
5. Callahan CM, Drake BG, Heck DA, Dittus RS. Patient outcomes following tricompartmental total knee replacement: a meta-analysis. *J Am Med Assoc*. 1994;271:1349–57.
6. Woolhead GM, Donovan JL, Dieppe PA. Outcomes of total knee replacement: a qualitative study. *Rheumatology*. 2005;44:1032–7.
7. Drewett RF, Minns RJ, Sibbly TF. Measuring outcome of total knee replacement using quality of life indices. *Ann R Coll Surg Engl*. 1992;74:286–9; discussion 289–90.
8. Mahomed NN, Liang MH, Cook EF, Daltroy LH, Fortin PR, Fossel AH, et al. The importance of patient expectations in predicting functional outcomes after total joint arthroplasty. *J Rheumatol*. 2002;29:1273–79.
9. Mancuso CA, Sculco TP, Wickiewicz TL, Jones EC, Robbins L, Warren RF, et al. Patients' expectations of knee surgery. *J Bone Joint Surg Am*. 2001;83A:1005–12.
10. Lingard EA, Sledge CB, Learmonth ID, Kinemax Outcomes Group. Patient expectations regarding total knee arthroplasty: differences among the United States, United Kingdom, and Australia. *J Bone Joint Surg Am*. 2006;88:1201–7.
11. Venkataramanan V, Gignac MA, Mahomed NN, Davis AM. Expectations of recovery from revision knee replacement. *Arthritis Rheum*. 2006;55:314–21.
12. Ross CK, Sinacore JM, Stiers W, Budiman-Mak E. The role of expectations and preferences in health care satisfaction of patients with arthritis. *Arthritis Care Res*. 1990;3:92–8.
13. Lochman JE. Factors related to patients' satisfaction with their medical care. *J Community Health*. 1983;9:91–109.
14. Fitzpatrick R, Hopkins A. Problems in the conceptual framework of patient satisfaction research: an empirical exploration. *Social Health Ill*. 1983;5:297–311.
15. Mancuso CA, Graziano S, Briskie LM, Peterson MG, Pellicci PM, Salvati EA, et al. Randomized trials to modify patients' preoperative expectations of hip and knee arthroplasties. *Clin Orthop Relat Res*. 2008;466:424–31.

16. O'Neill T, Jinks C, Ong BN. Decision-making regarding total knee replacement surgery: a qualitative meta-synthesis. BMC Health Serv Res [serial on the Internet]. 2007 Apr 10 [cited 2008 Oct 21];7:52 [9 p.]. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1854891>.
17. Bellamy N, Buchanan WW, Goldsmith CH, Campbell J, Stitt LW. Validation study of WOMAC: a health status instrument for measuring clinically important patient relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee. J Rheumatol. 1988;15:1833–40.
18. McHorney CA, Ware JE, Jr, Raczek AE. The MOS 36-Item Short-Form Health Survey (SF-36), II: psychometric and clinical tests of validity in measuring physical and mental health constructs. Med Care. 1993;31:247–63.
19. Norman GR, Streiner DL. PDQ statistics. 3rd ed. Hamilton (ON): BC Decker; 2003.
20. Escobar A, Quintana JM, Bilbao A, Arostegui I, Lafuente I, Vidaurreta I. Responsiveness and clinically important differences for the WOMAC and SF-36 after total knee replacement. Osteoarthritis Cartilage. 2007;15:273–80.
21. Hopman WM, Towheed T, Anastassiades T, Tenenhouse A, Poliquin S, Berger C, et al. Canadian normative data for the SF-36 health survey: Canadian Multicentre Osteoporosis Study Research Group. Can Med Assoc J. 2000;163:265–71.
22. Kosinski M, Keller SD, Ware JE Jr, Hatoum HT, Kong SX. The SF-36 Health Survey as a generic outcome measure in clinical trials of patients with osteoarthritis and rheumatoid arthritis: relative validity of scales in relation to clinical measures of arthritis severity. Med Care. 1999;37:MS23–39.
23. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977;33:159–74.
24. Razmjou H, Davis AM, Jaglal S, Holtby R, Richards R. Cross-sectional analysis of pathology, disability, and expectations in candidates for rotator cuff related surgeries: a sex and gender perspective. Presented at the Combined American and Canadian Orthopaedic Association Conference, Quebec City (QC), 2008 Jun 4–7.
25. Gamreoff MJ. Using the proportional odds model for health-related outcomes: why, when, and how with various SAS procedures [SUGI 30, Paper No. 205-230]. In: SAS SUGI proceedings: statistics, data analysis and data mining; 2005 Apr 10–13 [updated 2005; cited 2008 Oct 8]. Available from: <http://www2.sas.com/proceedings/sugi30/toc.html>.
26. Norris CM, Ghali WA, Saunders LD, Brant R, Galbraith D, Faris P, et al. Ordinal regression model and the linear regression model were superior to the logistic regression models. J Clin Epidemiol. 2006;59:448–56.
27. Katz JN, Barrett J, Mahomed NN, Baron JA, Wright RJ, Losina E. Association between hospital and surgeon procedure volume and the outcomes of total knee replacement. J Bone Joint Surg Am. 2004;86A:1909–16.
28. Razmjou H, Yee A, Ford M, Finkelstein JA. Response shift in outcome assessment in patients undergoing total knee arthroplasty. J Bone Joint Surg Am. 2006;88:2590–5.
29. Sprangers MA, Schwartz CE. Integrating response shift into health-related quality of life research: a theoretical model. Soc Sci Med. 1999;48:1507–15.

APPENDIX A: EXPECTATION QUESTIONNAIRE

Understanding and responding to our patients' expectations of surgery is very important to us. Please note that expectation is *anticipation* that a given event is likely to occur as a result of medical care. Expectation is different than a *desire*, which reflects wishes that a given event would occur.

We would appreciate if you could take a few moments to give us your thoughts about how you think your surgery will ultimately affect your knee pain and overall lifestyle.

1. Do you expect your surgery to help with **pain relief**?
 - ☐ 0 not applicable, I do not have pain
 - ☐ 1 no, I do not expect surgery to help with my pain
 - ☐ 2 yes, but just a little
 - ☐ 3 yes, somewhat
 - ☐ 4 yes, a lot
2. Do you expect your surgery to increase your pain-free **range of motion**?
 - ☐ 0 not applicable, I do not have restricted range
 - ☐ 1 no, I do not expect surgery to increase my pain-free range of motion
 - ☐ 2 yes, but just a little
 - ☐ 3 yes, somewhat
 - ☐ 4 yes, a lot
3. Do you expect your surgery to improve your **ability to carry out the normal activities of daily living**?
 - ☐ 0 not applicable, I do not have problems with activities of daily living
 - ☐ 1 no, I do not expect surgery to improve my ability to carry out the normal daily activities
 - ☐ 2 yes, but just a little
 - ☐ 3 yes, somewhat
 - ☐ 4 yes, a lot
4. Do you expect your surgery to improve your **ability to care for others**?
 - ☐ 0 not applicable, I do not have problems interacting and caring for others
 - ☐ 1 no, I do not expect surgery to improve my ability to interact and care for others
 - ☐ 2 yes, but just a little
 - ☐ 3 yes, somewhat
 - ☐ 4 yes, a lot
5. Do you expect that following your surgery you will be able to participate in the **leisure, sports, or recreational activities** you did before your problem started?
 - ☐ 0 not applicable (did not do sports or recreational activities before)
 - ☐ 1 no, I do not expect surgery to improve my participation in sport/recreational activities
 - ☐ 2 yes, but not as much as before
 - ☐ 3 yes, as much as before
6. Do you expect that following your surgery the area operated upon will be **back to the way it was** before you began having problems there?"
 - ☐ 1 no, I do not expect the area operated upon to be back to the way it was before I had problems there.
 - ☐ 2 no, but a little improved
 - ☐ 3 no, but somewhat improved
 - ☐ 4 yes, completely