High Level of Residual Symptoms in Young Patients After Total Knee Arthroplasty

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Abstract

Background TKA is among the fastest growing interventions in medicine, with procedure incidence increasing the most in younger patients. Global knee scores have a ceiling effect and do not capture the presence of difficulty

or dissatisfaction with specific activities important to patients.

Questions/purposes We quantified the degree of residual symptoms and specific functional deficits in young patients who had undergone TKA.

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Each author certifies that his or her institution approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

Methods In a national multicenter study, we quantified the degree of residual symptoms and specific functional deficits in 661 young patients (mean age, 54 years; range, 19–60 years; 61% female) at 1 to 4 years after primary TKA. To eliminate observer bias, satisfaction and function data were collected by an independent, third-party survey center with expertise in administering medical outcomes questionnaires for federal agencies.

Results Overall, 89% of patients were satisfied with their ability to perform normal daily living activities, and 91% were satisfied with their pain relief. After TKA, 66% of patients indicated their knees felt normal, 33% reported some degree of pain, 41% reported stiffness, 33% reported grinding/other noises, 33% reported swelling/tightness, 38% reported difficulty getting in and out of a car, 31% reported difficulty getting in and out of a chair, and 54% reported difficulty with stairs. After recovery, 47% reported complete absence of a limp and 50% had participated in their most preferred sport or recreational activity in the past 30 days.

Conclusions When interviewed by an independent third party, about 1/3 of young patients reported residual symptoms and limitations after modern TKA. We recommend informing patients considering surgery about the high likelihood of residual symptoms and limitations after contemporary TKA, even when performed by experienced surgeons in high-volume centers, and taking specific steps to set patients' expectations to a level that is likely to be met by the procedure as it now is performed.

Level of Evidence Level III, therapeutic study. See Instructions for Authors for a complete description of levels of evidence.

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Introduction

TKA continues to enhance the quality of life and alleviate pain for a large number of patients [10]. This surgical procedure carries such a high success rate that it has become one of the most frequently performed procedures, with more than 600,000 procedures performed in the United States last year alone [8].

Previous studies have shown that TKA carries a high survivorship, with more than 90% of the prosthetic knees being in place at 10 years and beyond [8, 14]. The majority of published studies evaluate the outcome of TKA using survivorship as the primary end point. Although these results are encouraging, it is less clear whether a prosthetic joint confers adequate functional benefits to patients and whether they are considered successful by the patients themselves. In addition, the available survivorship data originate from different countries and cultures, with immense differences in patient expectations and using many different types of implants, including those with a poor track record.

Most surgeons who perform TKA are aware that some patients with seemingly well-fixed and well-positioned components continue to complain of pain [5]. A study by Noble et al. [9] that utilized a self-administered questionnaire to patients at 1 year after TKA reported a 14% incidence of dissatisfaction and continued residual symptoms after TKA. Thus, some would argue that survivorship data overlook patient dissatisfaction. It is also believed that current functional instruments, such as the Knee Society score, may not be appropriate measures to reveal subtle functional deficits.

In this multicenter study, we quantified the degree of residual symptoms and specific functional deficits in young patients who had undergone TKA using contemporary components and surgical techniques. A detailed questionnaire survey was administered to these patients over the telephone by a third-party telephone survey center.

Patients and Methods

Before initiation of this study, institutional review board approval was obtained by each of the five centers. Investigators at each center queried their total joint registries and compiled a list of patients who had undergone primary TKA within 1 to 4 years of the study. Inclusion criteria were patient age between 18 and 60 years old, diagnosis of osteoarthritis as the indication for index TKA, and the use of a posterior-stabilized or cruciate-retaining prosthesis. Patients undergoing complex primary TKA or conversion TKA, patients with diagnoses other than osteoarthritis, and patients in whom a nonprimary prosthesis was used were excluded.

The five centers participating in this study are all high-volume centers with a group of adult reconstructive trained

surgeons who each routinely perform more than 100 TKAs per year. In addition, each center had a well-established joint registry database already in place that could be used to identify the patients and evaluate inclusion and exclusion criteria. These centers represented a geographically diverse mix of academic, referral, and/or community-based practices and each center utilized a different modern implant, which provided us with the unique opportunity to compare the performance of these different designs.

A third-party independent center, familiar with conducting telephone medical surveys, contacted these patients and administered a detailed questionnaire (Appendix 1). The center had been selected after interviewing various independent telephone survey centers that were not affiliated with any of the surgeons or institutions involved in this study to eliminate bias. The University of Wisconsin Survey Center (UWSC) administered the questionnaire to the patients and obtained independent institutional board review consent from their institution before initiating this study.

Interviewers at the UWSC called each patient, and if the patient was successfully contacted, the interviewer asked a series of screening questions to determine whether that person was eligible for the study. The full questionnaire was administered to only those patients who gave verbal consent to participate and were determined to be eligible and capable of participating after their responses to screening questions. All interviews were conducted in English.

The telephone survey protocol included 25 telephone call attempts per patient. In general, patients refusing to participate were called back in an attempt to convert the refusal into a completed interview. If a second refusal occurred, no further attempts were made. The final data were sent from the UWSC via a secure website in SPSS[®] format (Version 16.0; SPSS Inc, Chicago, IL, USA).

There were 1139 potential participants meeting inclusion criteria that were sent to the survey center for contact. Of those, there were 112 screen failures, 54 refusals at the household level, and 69 participant refusals. An additional 114 participants were never available, 109 were not found due to bad address/telephone number, eight were deceased, seven were contacted but did not complete the interview, and five had a language barrier that prevented them from completing the survey. This left 661 completed interviews (64%) for final analysis. The final study group had a mean age of 54 years at the time of surgery (range, 19–60 years) with 61% being women, and they were contacted at an average of 2.6 years postoperatively (range, 1–4.7 years). Descriptive statistics of socioeconomic variables and outcomes of interest have been previously reported in a separate article [1].

The satisfaction section of the survey was constructed from a review of recent investigations detailing patient satisfaction and function after TKA [3, 9]. Questions

selected were based on previous studies that determined factors most important to patients and/or most highly correlated with patient satisfaction as reported by Bourne et al. [3] and Noble et al. [9]. Questions regarding symptoms or function had five choices for responses as described by Likert [7]. For purposes of analysis, the responses were grouped into two broad categories of either “never/rarely” or “sometimes/often/frequent,” similar to the methodology described by Bourne et al. [3]. The Patient-Specific Functional Scale [4, 6, 13] was incorporated to determine whether there were one or more activities critical to the patient in their recreation that they had to limit participation in before surgery because of their knees. We then examined the percentage of patients who returned to this critical activity after surgery. The questions related to satisfaction consisted of asking the patient questions regarding overall function of the knee, ability to perform normal activities of daily living, and satisfaction with degree of pain relief. The principle questions related to symptoms inquired about the presence of any pain or stiffness in the knee, audible noises from the knee, including popping, clicking or grinding, and experiencing any swelling or a sense of tightness in the knee. To assess function, the patients were asked about getting in and out of a car, getting in and out of a chair, going up and down stairs, the presence of any limp, and whether their knee felt normal as described by Noble et al. [9].

The responses of patients related to satisfaction and functional outcome based on the type of prosthesis (posterior stabilized versus cruciate retaining), type of polyethylene used (high-flex versus normal congruence), and make of prosthesis (different companies) also were compared. There were no differences in terms of satisfaction, symptoms, or function based on implant type. The data therefore were pooled on all implant types.

We used descriptive statistics to present the demographic information of the study sample. Categorical data were presented with frequency and percentage, whereas continuous variables were described with mean and SD. All *p* values were two sided with values of less than 0.05 considered statistically significant.

Results

The degree of overall satisfaction was relatively high, with 90% of patients satisfied with the overall functioning of their knees, 89% satisfied with their ability to perform normal activities of daily living, and 91% satisfied with the degree of pain relief.

After TKA, 66% of patients indicated their knees felt normal, 33% reported some degree of pain, 41% reported stiffness, 33% reported grinding/other noises, 33% reported

swelling/tightness, 38% reported difficulty getting in and out of a car, 31% reported difficulty getting in and out of a chair, and 54% reported difficulty with stairs. After recovery, 47% reported complete absence of a limp and 50% had participated in their most preferred sport or recreational activity in the past 30 days.

Discussion

TKA is among the fastest growing interventions in medicine, with procedure incidence increasing the most in younger patients [8]. Global knee scores have a ceiling effect and do not capture the presence of difficulty or dissatisfaction with specific activities important to patients. We therefore quantified the degree of residual symptoms and specific functional deficits in young patients who had undergone TKA.

This study had a number of limitations. First, the patients included in this cohort had been operated on by high-volume surgeons trained in adult reconstruction and the findings may not be applicable to patients operated in the community by low-volume surgeons. Second, because of the multicenter nature of this study, many surgeons with different techniques for doing TKA had contributed patients to the study, which may introduce an element of heterogeneity. Third, the patients were all contacted by a third party administering the questionnaire over the telephone. One does not know whether the responses might have been different if patients were interviewed in person, and interviewing patients in person would have allowed comparison of objective measurements such as ROM and gait to the more subjective parameters considered in the survey. Finally, the patients in the study all had their TKA done within 1 to 4 years of the study. It is possible that the degree of residual symptoms may have been different if the followup had been longer.

TKA continues to provide excellent pain relief and functional improvement for the majority of patients, as was evidenced by this study, with more than 90% of patients being satisfied with the overall function of their prosthetic knee. However, this study, like a previous study by Noble et al. [9], found that a relatively large number of young patients undergoing TKA continued to have residual symptoms and did not feel their prosthetic knee was normal. The presence of residual symptoms after TKA is a well-recognized issue that has been addressed by other studies also [2, 3, 10, 12]. A study by Bourne et al. [3] in a cohort of 1703 patients undergoing TKA using modern-design prostheses found that 19% of patients appeared to be dissatisfied with the outcome. Satisfaction with pain relief and ability to perform daily activities varied from 72% to 86% and from 70% to 84%, respectively. The study

found that the strongest predictors of patient dissatisfaction after primary TKA were expectations not met (10.7 times greater risk), a low 1-year WOMAC (2.5 times greater risk), preoperative pain at rest (2.4 times greater risk), and a postoperative complication requiring hospital readmission (1.9 times greater risk) [3].

Another study by Scott et al. [12] on a cohort of 1217 consecutive patients detected dissatisfaction with TKA in up to 20% of patients. The study investigated preoperative and postoperative predictors of dissatisfaction in this cohort and, based on a multivariate regression analysis, found preoperative SF-12 mental component score, depression, and pain in other joints to be independent predictors of dissatisfaction at 1 year after TKA [12].

The exact reason as to why such a high number of patients undergoing TKA continue to have residual symptoms is unclear. Based on previous studies, it is abundantly clear that patient expectation plays a critical role in eventual outcome and satisfaction. Patients with higher expectations are more likely to be dissatisfied [3, 12]. Another important parameter that affects the outcome relates to mental status of the patients. Those with affective disorders or lower mental function score at the outset are more unlikely to be satisfied with the outcome of TKA [2, 3, 12]. There are other reasons related to the knee itself that affect the outcome. Some believe that the sacrifice of the ACL (and PCL), which are known to be important proprioceptors in the knee, may result in the “abnormal” feeling that most patients with TKA report experiencing [11]. The latter recognition has led to efforts to produce knee implants that aim to retain the ACL. Another reason for the larger number of patients with TKA experiencing residual symptoms may relate to the superficial nature of the knee that allows patients to experience or feel the grinding, popping, and other sounds, which may be perceived by the patient as an indication of malfunction.

One important contributor to patients with TKA experiencing a lower degree of functional improvement may relate to the advice that surgeons provide the patients, with most surgeons being uncomfortable with allowing patients to engage in higher-impact sports. Our survey could not dissect out the reasons for the limitations that patients were experiencing, and it is possible that some of these functional limitations may be surgeon recommended.

Our study highlights the fact that many patients continue to experience knee symptoms after full recovery from TKA, even when performed by experienced surgeons in high-volume centers, and that in some of these patients, the residual symptoms result in clinical dissatisfaction. In light of this, we recommend informing patients considering TKA of the high likelihood of residual symptoms and limitations after contemporary TKA and taking specific

steps to set patients' expectations to a level that is likely to be met by the procedure as it now is performed.

Appendix 1

Telephone Questionnaire: Outcomes of Interest
(Residual Symptoms)

Satisfaction Section

1. Since you had the operation on your (left/right) knee, are you satisfied, dissatisfied, or in-between with the overall functioning of your knee?
If "in-between": Do you lean more toward satisfied or dissatisfied?
2. Since you had the operation on your (left/right) knee, are you satisfied with your ability to perform your normal activities of daily living?
3. Since you had the operation on your (left/right) knee, are you satisfied with the degree of pain relief?
4. Do you have problems getting in and out of a car?
Never, rarely, sometimes, often, or extremely often
5. Do you have problems getting in and out of a chair?
Never, rarely, sometimes, often, or extremely often
6. How difficult is it for you to go up and down stairs because of the operation on your knee?
Not at all difficult, a little difficult, somewhat difficult, quite difficult, very difficult, or extremely difficult
7. In the last 30 days, about how often did you experience any pain in your (left/right) knee?
Never, rarely, sometimes, often, or extremely often
8. In the last 30 days, about how often did you experience any swelling or a sense of tightness in your (left/right) knee?
Never, rarely, sometimes, often, or extremely often
In the last 30 days, about how often did you experience any stiffness in your (left/right) knee?
Never, rarely, sometimes, often, or extremely often
In the last 30 days, about how often did you experience grinding or popping or hear clicking or other noises in your (left/right) knee?
Never, rarely, sometimes, often, or extremely often
9. In the last 30 days, about how often did you experience any stiffness in your (left/right) knee?
Never, rarely, sometimes, often, or extremely often
10. In the last 30 days, about how often did you experience grinding or popping or hear clicking or other noises in your (left/right) knee?
Never, rarely, sometimes, often, or extremely often
11. Does your (left/right) knee that was operated on feel normal to you?

Activity Section

12. How often do you limp while walking?
Never, rarely, sometimes, very often, or extremely often

Patient-Specific Functional Scale–Sports/Hobby Section

13. During the last 30 days, how often did you (do/play/etc) Activity 1?

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