Quality of Life after Total Knee Replacement at Siriraj Hospital, Thailand

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ABSTRACT

Objective: Total knee replacement (TKR) is reportedly a safe and effective approach to treating osteoarthritis of the knee. However, there is no published data from Thailand about benefit in terms of long-term quality of life (QoL). Our aims were to assess long-term QoL after TKR and identify its associated factors.

Methods: This was a prospective, cross-sectional, analytical study of patients who had undergone TKR between 2008 and 2013. Questionnaires were sent to 560 randomly selected patients. Relevant clinical variables, surgical and anesthetic data, and duration of hospital and ICU stays were extracted from hospital records. QoL was evaluated using the Thai version of the WHOQOL-BREF questionnaire. Scores range from 0 to 100, with 100 indicating the best state. The primary outcome was long-term QoL after TKR and secondary outcomes were factors associated with QoL.

Results: The mean score within each domain was used to calculate the overall score (mean 64.6, SD 10.2), which indicated medium QoL. Educational level and length of hospital stay were the only factors significantly associated with QoL (p<0.05).

Conclusion: Long-term QoL after TKR at Siriraj Hospital was assessed as medium. Educational level and length of hospital stay were the only factors associated with long-term QoL.

Keywords: Quality of Life, total knee replacement, short version of World Health Organization Quality of Life (WHOQOL-BREF)

BACKGROUND

Osteoarthritis (OA) of the knee is a common cause of pain and functional limitations, and its prevalence increases with age.[1] Because of the aging of populations worldwide, particularly in developed countries, the prevalence of knee OA is increasing, leading to an increase in the demand for knee surgery.[2,3] Between 1991 and 2010, annual primary total knee arthroplasty (TKA) volume increased 161.5% from 93,230 to 243,802 in the USA, whereas per capita utilization increased to 99.2%.[4]

Current surgical treatments for knee OA include total knee replacement (TKR),[5] which has been shown to be safe and effective.[6,7] This procedure is indicated in patients with extensive knee OA for whom conservative medical therapy has failed.[5] Several studies have found that TKR has been performed increasingly more frequently over the last two to three decades. With the aging of populations and increased longevity, TKR rates are projected to increase even further.

Traditionally, the outcome of knee surgery has been evaluated radiologically or by clinical assessment of joint function, which includes evaluation of pain, stability, alignment, functional ability, and range of motion (ROM).[8] Since patients' perceptions of treatment outcomes may differ from those of clinicians,[9] quantifying patients' perspectives by assessing quality of life

(QoL) has become an important aspect of outcome evaluation. While TKA eradicates OA of the knee, it does have some morbidity and complications.

There are a number of published studies assessing clinical outcomes of TKR by using measures such as pain relief, ROM, and Knee Society Scores.[10–16] However, few have assessed QoL[17] and none have been performed in Thailand. Additionally, because most complications of TKR occur within the first 6 months after surgery, most studies that have assessed QoL have had only a 6-month follow-up.[18–20] Therefore, we decided to perform the present study with the aims of assessing long-term QoL after TKR and identifying its associated factors.

MATERIALS AND METHODS

Study design and patients

This study complied with the Declaration of Helsinki and the trial protocol was approved by the Ethics Committee of Siriraj Hospital. Written informed consent was obtained from all participants. The subjects of this cross-sectional analytical study were drawn from adult patients who had undergone TKR performed by selected orthopedic surgeons (K.C., K.R.) between January 2008 and June 2013 in Siriraj Hospital. Patients who were over 20 years of age, had been diagnosed with primary OA of the knee joint, and had undergone unilateral TKR more than 6 months previously were considered eligible. Because these factors may affect the outcome of TKR, patients who had undergone revision TKR or previous TKR on the other side were excluded, as were patients with other bone and joint diseases (e.g., rheumatoid arthritis). Additionally, patients with mental illness or who received any drugs that act on the central nervous system were excluded because questionnaire responses from them would likely have been unreliable.

Five hundred and sixty patients were randomly selected by a computer system from the patients who fulfilled these criteria. All patients were informed by phone about relevant details of the study before being sent the questionnaire together with standardized instructions on how to answer it. The patients were twice requested by phone to return the completed questionnaire, 3 and 5 weeks after it had been sent to them. Relevant clinical variables, surgical and anesthetic data, and durations of hospital and ICU stays were retrospectively extracted from hospital records. QoL was evaluated by using the WHOQOL-BREF-THAI questionnaire. This instrument has been translated and validated for use in Thailand.[21,22] For patients who had undergone TKA on both knees on different days, only the record regarding the knee on which the first procedure was performed was included in the analysis to avoid double counting. The primary outcome of our study was QoL after TKR. The secondary outcomes were factors associated with QoL.

Quality of life instrument

The WHOQOL-BREF-THAI is the Thai version of a brief form (WHOQOL-BREF) of a generic and transcultural QoL assessment instrument developed by the WHO (WHOQOL-100). It is a 26-item questionnaire with five point Likert responses. Question 1 constitutes a separate domain of the WHOQOL-BREF that seeks to quantify patients' satisfaction with QoL. Question 2 is another separate domain that is intended to quantify patients' satisfaction with health.[23] The other questions (3-26) map four domains (physical health, psychological well-being, social relationships and satisfaction with the environment).

The four domain scores are calculated by adding the scores of the items in each domain. The overall score is the summation of all domain scores. The maximum possible score is 100, and higher scores indicate better outcomes.

Statistical analysis

The WHOQOL-BREF-THAI has been summarized to a four domain construct (physical health, psychological health, social relationships and environment) in which items 3, 4 and 26 have been reversed in accordance with the guidelines for the WHOQOL-BREF.[24] The scores for each domain were calculated by multiplying the mean score of all items within each domain by a factor of four. Missing values were replaced by the mean score for the domain to which the item belonged, in accordance with the WHOQOL-BREF guidelines.

The independent variables assessed were age, sex, level of education, marital status, occupation, American Society of Anesthesiologists (ASA) classification, underlying disease (diabetes mellitus, hypertension, coronary artery disease and other heart disease), and type of anesthesia (spinal block, spinal block with spinal morphine, femoral nerve block, sciatic nerve block, general anesthesia with intubation, general anesthesia with laryngeal mask airway, total intravenous anesthesia and other). The data are presented as mean±SD or percentages. Student's independent sample t-test was performed to compare two groups' scores on the same variable. Pearson's correlation coefficients were calculated to examine the relationship between changes in questionnaires' scores and the assessed variables. An effect size of 0.8 or greater was considered large.[25] Values of p<0.05 were considered statistically significant. Statistical analyses were performed using SPSS 11.5.

RESULTS

Only 400 of the 560 questionnaires (71.5%) were completed and therefore eligible for analysis. In accordance with the criteria, all respondents had a primary diagnosis of knee OA and the TKRs had been perfomed at least 6 months previously. At the time of surgery, the mean age was 67.97 years (range 48-87 years). The mean time since surgery was 3.92 years (range 1.35-7.18 years). Three hundred and forty-eight patients (87%) were female and 52 (13%) male. Approxmiately half of the patients (53%) had been educated to less than high school level. More than half (64%) had retired from work. Ninety-five patients (23.8%) had subsequently undergone TKR on the other side.

Most patients were assessed preoperatively as ASA class 2 and the procedures were frequently performed under regional anesthesia (88%). The mean length of stay (LOS) in hospital was 6.77 days (range 3-45 days). Only two patients (0.5%) were admitted to the ICU postoperatively. Table 1 summarizes the main characteristics of the study subjects.

Domain scores and overall score are shown in Table 2. The scores range from 0 to 100 for each domain, with 100 indicating the best state.

The mean scores for all four domains were about average, suggesting medium QoL. Patients' satisfaction with QoL and health are shown in Table 3.

There were no statistically significant differences in WHOQOL-BREF-THAI scores for sex, age, marital status, occupation, ASA classification, underlying disease, body mass index and type of anesthesia. Figure 1 demonstrates relationship between time since surgery and QoL. QoL in the first year after surgery tended to be better than the others. Nonetheless, there was no statistically significant correlation between time since surgery and QoL (Pearson's correlation coefficient = -0.046). However, as shown in Table 4, ANOVA and post hoc testing showed significant differences in QoL between patients with no education and those with tertiary education. In addition, LOS

TABLE 1. Relevant clinical characteristics of study subjects (n=400)

Variables	
Mean age at surgery, years (SD)	67.97 (6.84)
Current age, years (SD)	72.17 (7.11)
Time since surgery, years (SD)	3.92 (1.70)
Sex, n (%)	
- Male	52 (13%)
- Female	348 (87%)
Education, n (%)	
- None 29 (7%)	
- Elementary school	183 (46%)
- High school	120 (30%)
- Tertiary	68 (17%)
Occupation, n (%)	
- None	259 (64.8%)
- Office work	124 (31%)
- Manual work	17 (4.3%)
ASA status	
- ASA 1	33 (8.3%)
- ASA 2	307 (76.8%)
- ASA 3 or higher	60 (15.0%)
Type of anesthesia	
- Regional anesthesia	352 (88%)
- General anesthesia	48 (12%)
Length of hospital stay, days (SD)	6.77 (3.79)
ICU admission, n (%)	2 (0.5%)
TKA on both knees, n (%)	95 (23.8%)

TABLE 2. Distribution of domain scores

Quality of life domain	Minimum	Maximum	Mean	SD
Physical	10.7	96.4	62.3	14.7
Psychological	20.8	100	64.3	11.4
Social relationships	50	100	69.9	11.9
Environmental	31.3	100	62.1	11.8
Overall score	38.0	96.1	64.6	10.2

TABLE 3. Patients' satisfaction with QoL and health

Patients' satisfaction	Minimum	Maximum	Mean	SD
QoL (Question 1)	1	5	3.7	0.78
Health (Question 2)	1	5	3.6	0.82

TABLE 4. Associations between Quality of Life scores and assessed variables

Variable	Total score Mean (SD)	T-test or ANOVA (F)/p-value	Post hoc
Education			
- None	60.83 (9.54)	2.868/0.037	None < Tertiary
- Elementary	64.62 (10.00)		
- High school	64.57 (9.86)		
- Tertiary	67.09 (12.06)		
Marital status			
- Single	65.35 (11.57)	2.446/0.088	
- Married	65.21 (10.28)		
- Widowed	62.47 (9.21)		
Occupation			
- None	63.78 (9.93)	2.817/0.061	
- Office work	65.59 (9.56)		
- Manual work	66.79 (11.46)		
ASA classification			
- ASA 1	65.93 (8.12)	0.425/0.654	
- ASA 2	64.66 (10.54)		
- ASA 3	63.89 (9.51)		
Type of anesthesia			
- General anesthesia	63.85 (9.25)	0.552/0.563	
- Regional anesthesia	64.76 (10.33)		
TKA on both knees			
- TKA on single knee	64.86 (10.53)	3.121/0.078	
- TKA on both knees	63.97 (9.09)		
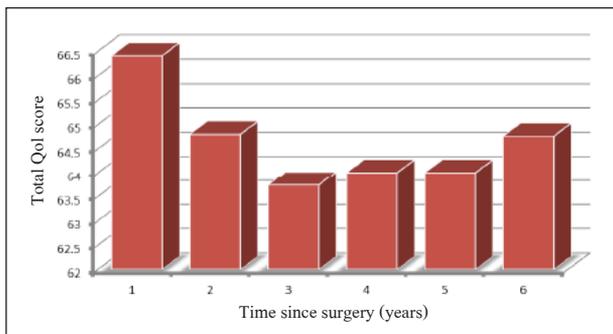
Fig 1. Relationship between time since surgery and QoL

was significantly correlated with QoL. Patients with LOS less than 6 days had significantly better QoL than those with LOS more than 6 days (overall QoL scores 65.21 vs. 63.56, respectively, p=0.046).

DISCUSSION

Quality of life measures such as WHOQOL-BREF questionnaires which assess physical, mental and social well-being can be used to evaluate the impact of interventions, including TKA. Several studies have shown overall improvement in pain, physical function and social behavior after TKR. All patients report reduction in pain, which reaches normal values by 6 months postoperatively. Thus, the best results are achieved by 6 months postoperatively, with little change occuring thereafter. In most studies, the QoL is medium 6 months after surgery.[26–31]

However, no reported studies have assessed long-term QoL (more than 6 months after surgery). In our study, all patients had undergone TKR at least 6 months previously and had moderate scores for all domains and overall (overall score 64.6±10.2), indicating medium QoL, the same as the QoL 6 months after surgery. These findings confirm the important role of TKR in reducing pain and therefore improving QoL both in the short- and long-terms.

In our study, the QoL of patients who had undergone TKR for OA of the knee was significantly associated with education (none vs. tertiary), whereas other assessed factors such as age, sex, marital status, occupation, ASA classification, underlying disease, body mass index, type of anesthesia and time since surgery were not sig-

nificantly associated with QoL, similar to the findings of others.[32,33]

There was also a relationship between QoL and LOS in our study. Patients whose LOS was more than 6 days had a lower QoL than those whose LOS was less than 6 days. This may be attributable to the frequent association of longer LOS with medical and surgical complications. Another possible explanation relates to cost-effectiveness, which plays an important role in QoL,[25] especially in low-income subjects such as older adults. This finding is in agreement with those of several other studies in which the estimated LOS after primary TKR was about 3.5 days from 2007 to 2010 in the USA.[4] However, some previous studies have reported somewhat conflicting findings. Mauerhan et al, demonstrated an association between decreasing LOS and increased rate of manipulation after TKR.[34] However, this study included patients who had undergone primary TKR from 1993 to 1996; thus, the surgical techniques would have differed from those used currently. Moreover, this finding may be more attributable to a lower ROM at discharge from hospital than LOS.

Development of strategies for reducing LOS while simultaneously improving patient comfort is essential and several studies have focused on ways of doing so.[35,36] Reported successful strategies for minimizing the average LOS following TKR include better discharge planning, use of pre-emptive analgesia, nausea prevention, and earlier mobilization.

Recently, Cram et al, showed that decreases in hospital LOS were accompanied by increases in hospital readmission rates.[4] Major causes were wound infection, sepsis, hemorrhage, and heart attack. The results of this study as well as others suggest that there are limitations to how much LOS can be reduced and that cost savings from further LOS reductions are unlikely to materialize.[37,38] In particular, there is an inherent tradeoff between shorter hospital LOS, greater need for post-acute care, and higher readmission rates.

Our study has a few limitations. First, this was a cross-sectional study that used mail correspondence. Furthermore, we have no data about baseline QoL. Since our patients had under-

gone TKR more than 6 months it was difficult for patients to remember about their QoL before operation. Additionally, we did not have any readmission data.

CONCLUSION

Long-term QoL after total knee replacement at Siriraj Hospital was medium. In this study, educational level and LOS were the only two factors associated with long-term QoL. Our findings may supplement information about the efficacy of TKR and, more particularly, how to optimize QoL of patients undergoing orthopedic surgery.

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