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Original Article

Does Marital Status Impact Outcomes After Total Knee Arthroplasty?

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ABSTRACT

Background: There is a paucity of research on the relationship between marital status and patient outcomes following total knee arthroplasty (TKA).
Methods: This was a retrospective chart review of patients who underwent TKA by a single surgeon at a university-based orthopedic practice. Data abstracted included age, gender, marital status, body mass index, length of hospital stay, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and Oxford Knee Score (OKS). The WOMAC and OKS were administered at the preoperative visit and at approximately 10, 30, 90, and 180 days after TKA. Multivariate analyses with patient-reported outcomes as repeated measures, marital status, day of assessment; and the interaction of marital status and day of assessment as fixed effects; and age, gender, body mass index, and length of hospital stay as covariates were conducted as well as analyses in which preoperative patient-reported outcomes were treated as fixed effects.
Results: Of 422 patients who underwent TKA during the study period, complete data were available for 249, of whom 124 were married and 125 unmarried. Married patients had significantly higher WOMAC scores than unmarried patients at all postoperative assessments, even after controlling for preoperative scores. Although married patients also had significantly higher postoperative OKS scores than their unmarried peers, differences between groups were attenuated after adjusting for preoperative OKS scores.
Conclusion: This study found that married patients have better overall outcomes after TKA but yielded conflicting results as to whether the positive effects of marriage are specific to the postoperative period.

Each year, 700,000 people undergo total knee arthroplasty (TKA) in the United States [1]. The financial cost of TKA on both patient and societal levels has been well defined [2-4]. Although recent research has begun to identify modifiable and non-modifiable risk factors that have significant effects on TKA outcomes [5-10], the impact of social support, including marital status, on outcomes after TKA has received little attention. In some disease states, being married has been associated with better treatment outcomes. For example, married patients with heart disease have a faster recovery from cardiac surgery, less psychological distress, and higher rates of survival after a cardiac event than their unmarried peers [11]. In addition, there is a well-established positive association between marital status and survival rates in patients with various types of cancer [12]. Given this literature indicating a positive association between being married and improved treatment outcomes, a recent summit convened by American Association of Hip and Knee Surgeons identified marital status as one of the key variables that should be investigated in future research on outcomes of knee and hip surgery [13].

The purpose of the present study is to assess whether marital status has a significant influence on outcomes after TKA. We hypothesize that TKA patients who are married will have significantly better outcomes than those who are unmarried.

Materials and Methods

Patient Selection and Methods

The present study was a retrospective chart review of 422 patients who underwent TKA performed by a fellowship-trained

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Table 1
Patient Characteristics by Marital Status.

Item	Marital Status		Marital Status Effect
	Unmarried	Married	*P*-Value
n	125	124	—
Male, % (n)	18.4 (23)	49.2 (61)	<.0001
Age, years, mean (SD)	61.6 (12.1)	67.7 (6.2)	<.0001
Length of stay, days, mean (SD)	1.8 (1.7)	1.5 (1.0)	.114
Body mass index, kg/m^2, mean (SD)	33.8 (6.8)	34.0 (6.2)	.773

SD, standard deviation.

single surgeon at a university-based orthopedic practice from January 2008 to December 2014. The study collected demographic, socioeconomic, and clinical data, including age, gender, marital status, body mass index (BMI), and length of hospital stay (LOS), as well as 2 patient-reported outcomes: the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and Oxford Knee Score (OKS). Patient-reported outcomes were prospectively assessed at preoperative and postoperative (approximately 10, 30, 90, and 180 days after surgery) visits. An institutional review board approved the study protocol.

All patients received the same preoperative, intraoperative, and postoperative care throughout the entire course of treatment. Patients were categorized as either married or unmarried. The WOMAC consists of 24 items (5 assessing pain, 2 stiffness, and 17 physical function) scored from 0-4, with higher scores indicating better outcomes [14]. The OKS is a 12-item survey consisting of 5 questions related to pain and 7 related to function [15,16]. The modified method of scoring the OKS was used, whereby each question was scored between 0 and 4, with 4 being the best outcome [16].

Statistical Analysis

Data were analyzed using SAS/STAT version 9.2 (SAS Institute Inc, Cary, NC). The association of marital status and gender was examined using a chi-square test. The mean age, BMI, and LOS of married and unmarried patients were compared using the mixed procedure with marital status as the sole fixed effect in the model. Patient-reported outcomes measured over time were analyzed as repeated measures with marital status (unmarried vs married), day (0 for preoperative and 10, 30, 90, and 180 days for postoperative), and the interaction, age, gender, BMI, and LOS as fixed effects. The slice option was used to establish the effect of marital status at each time point. To adjust for preoperative differences by marital status, postoperative patient-reported outcomes also were analyzed while including the preoperative values as a fixed effect in the model described previously. Residuals were independently identically normally distributed with homogenous variances. P values < .05 were considered statistically significant.

Results

Patient Characteristics

Among the 422 patient charts that were reviewed, 66 were excluded from analyses because they did not include any patient-reported outcomes and an additional 107 were excluded because they did not specify the patient's marital status. A total of 249 patients (125 unmarried and 124 married) were included in the final sample. The characteristics of the sample are shown in Table 1. Married patients had a significantly higher percentage of males (49.2 vs 18.4%, $P < .0001$) and were older (mean 67.7 vs 61.6 years, $P < .0001$) compared to unmarried patients. Mean LOS was lower for married patients than unmarried patients but did not reach statistical significance (1.5 vs 1.8 days, $P = .1136$).

Relationship Between Marital Status and Patient-Reported Outcomes

As shown in Table 2, there was no significant interaction between marital status and day of assessment ($P = .2002$); however, there was a significant overall effect of marital status ($P = .0002$), such that married patients had significantly better WOMAC scores than unmarried patients over time. As shown in Table 2 and Figure 1, married and unmarried patients had similar preoperative WOMAC scores (41.0 vs 38.2) and the differences in postoperative WOMAC scores between the groups remained fairly consistent over time. Analyses of the adjusted postoperative WOMAC scores produced similar results (Table 3). The overall mean postoperative WOMAC score was 8.5 points higher for married compared to unmarried patients (62.9 vs 54.4, $P = .0008$).

As shown in Table 2, there was no significant interaction between marital status and day of assessment for the overall OKS score ($P = .2010$), the OKS pain subscale ($P = .4265$), and the OKS function subscale ($P = .2311$). A significant effect of marital status was observed for the overall ($P = .0016$), pain ($P = .0014$), and function ($P = .0039$) OKS scores. Married patients had higher preoperative overall OKS scores (Fig. 2), OKS pain scores, and OKS function scores than unmarried patients (Table 2). After adjusting for differences in preoperative OKS scores, there were no statistically significant differences between married and unmarried patients in postoperative overall, pain, and function OKS scores over time (Table 3).

Table 2
Patient-Reported Outcomes Over Time by Marital Status.

Outcome Score	Preoperative		Postoperative								SEM	Fixed Effect[a]		
			10 d		30 d		90 d		180 d			MS	Day	MS × Day
	UNM[b]	M[b]	UNM[b]	M[b]	UNM[b]	M[b]	UNM[b]	M[b]	UNM[b]	M[b]		Pr > F		
WOMAC	38.2	41.0	43.9**	52.4	52.6***	63.1	58.8**	68.7	63.7**	71.3	2.5	0.0002	<0.0001	0.2002
Oxford knee score														
Overall	15.4*	18.5	17.8	18.8	24.3*	27.6	28.1*	32.2	28.5**	34.2	1.3	0.0016	<0.0001	0.2010
Pain	5.6*	6.8	6.7	7.3	8.9*	10.3	10.7*	12.6	11.4**	13.6	0.6	0.0014	<0.0001	0.4265
Function	9.7*	11.7	11.0	11.5	15.2*	17.2	17.5*	19.6	17.4**	20.7	0.8	0.0039	<0.0001	0.2311

*$P < .05$.
**$P < .01$.
***$P < .001$.
M, married; MS, marital status; SEM, standard error of the mean; UNM, unmarried; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; Pr, probability; F, F value.
[a] Fixed effects included age, gender, body mass index, and length of hospital stay as covariates.
[b] Values are least square means.