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Case Report

Role of Marital Status in Patient Recovery after Total Knee and Hip Arthroplasty

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Abstract

Background: The influence of marital status on patient reported outcomes (PROMs) in joint replacement remains ambiguous. Various studies have concluded that married patients fare better according to several postoperative variables; however, few studies have assessed marital status's correlation to joint function. Thus, this study investigates the association between marital status and PROMs after total hip arthroplasty (THA) and total knee arthroplasty (TKA). **Methods**: A retrospective review was conducted on all THA and TKA cases at a single site by seven surgeons. Patients were stratified by marital status (married or unmarried) and assessed on PROMs such as the Hip Disability and Osteoarthritis Outcome Score for Joint Replacement (HOOS JR), Knee Disability and Osteoarthritis Outcome Score for Joint Replacement (KOOS JR), and Patient-Reported Outcomes Measurement Information System (PROMIS-10). Additional endpoints included length of hospital stay, hospital readmissions, and inpatient morphine milligram equivalents (MMEs). **Results**: No significant differences were observed within the joint-specific functional PROMs (KOOS JR and HOOS JR) at any time point, nor for TKA patients on the PROMIS-10. THA patients did report significant differences on PROMIS-10 physical component at preoperative as well as twelve months postoperative. Mental PROMIS-10 differences were observed at six and twelve months postoperative. Married patients had reduced length of stays compared to unmarried, but no other clinical differences were observed. **Conclusion:** Marital status did not significantly affect the joint-specific PROMs of total joint arthroplasty patients. Orthopedic surgeons and care teams should conduct a holistic analysis of patients, including their support and candidacy external to marital status.

Keywords: Marital Status; Total Joint Arthroplasty; Patient-reported outcome measures (PROMs); HOOS JR / KOOS JR; PROMIS-10

Introduction

Clinicians and researchers have continued to investigate how patient demographics, such as age and sex, might inform treatment or expected patient outcomes. Studies of this nature have demonstrated that orthopaedic ailments and injuries are disproportionate among specific patient populations. For example, female patients exhibit a higher likelihood of experiencing intraoperative proximal femur fractures in cement less total hip arthroplasty (THA) [1] as well as an unequal incidence of autoimmune conditions affecting the musculoskeletal system, such as rheumatoid arthritis (RA) [2]. These findings have important implications for clinicians aiming to provide more personalized medicine to their patients.

Studies have demonstrated that social demographics, particularly marital status, correlate with patient outcomes; marital status affects smoking cessation success, and tranquil relationships increase medication adherence in RA patients [3-5]. Further, marital status affects surgical outcomes. Following outpatient and trauma-related orthopaedic surgeries, married patients discharge home (as opposed to rehab or a nursing facility) more frequently and report a superior postoperative quality of life compared to unwed patients [6,7]. In literature, single patients were associated with an increase in hospital readmissions following total knee arthroplasty (TKA) [8], while another study found that marital status was predictive of surgical site infection after various orthopedic surgeries [9].

Although these studies concluded that married patients fared better according to several postoperative clinical variables [6-9], few studies have assessed any correlation between marital status and joint functionality following total joint arthroplasty via patient-reported outcome measures (PROMs) [10-12]. Joint functionality PROMs include the Hip Disability and Osteoarthritis Outcome Score, Joint Replacement (HOOS JR) and Knee Disability and Osteoarthritis Outcome Score, Joint Replacement (KOOS JR) for hip and knee arthroplasties, respectively [13,14]. Previous studies investigating these metrics compared to marital status are mixed – one demonstrated non-significant improvement in some PROMs in married patients after TKA and THA [10]. Another study demonstrated worse PROMs for unmarried patients two years after THA [12]. Finally, a different study demonstrated better outcomes after TKA in married patients via one outcome measure but no difference in the other measured PROM when controlling for preoperative score [11]. Another study found no connection between marital status and joint functionality score, measured by the HOOS JR and KOOS JR for hip and knee arthroplasty, respectively [10].

Given the mixed prior literature on marital status's impact on PROMs, we sought to investigate any association. Although Singh et al found no KOOS JR or HOOS JR differences at one year between married and unmarried patients, we sought to build upon this by incorporating more scores, particularly within TKA, and additional PROM threshold analyses [10]. We hypothesized that our higher-powered study would demonstrate similar HOOS JR and KOOS JR scores between married and unmarried patients after TKA and THA. We also included comparison of PROMIS-10 (Patient-Reported Outcomes Measurement Information System) scores pre- and post-operatively between married and unmarried cohorts for further analysis and interpretation. With the results from this study, we aim to expand on current literature so that clinicians and patients can set realistic expectations regarding surgical outcomes and recovery.

Materials and Methods

After IRB approval, a retrospective review was conducted on all THA and TKA cases performed at a single site by seven orthopedic surgeons. Cases occurred from June 1st, 2023, to November 30th, 2023, and were required to have been fully compliant with PROM collection: PROMIS-10 (quality of life) and HOOS JR or KOOS JR (joint-specific) scores preoperatively, as well as three, six, and twelve months postoperatively. Additional data collected from the electronic medical record (EMR) included self-reported marital status, age, sex, body mass index (BMI), length of stay, morphine milligram equivalents (MMEs), and readmissions within thirty and ninety days. Patients were classified as married if they reported a marital status of married or partnered, while patients were classified as unmarried if they reported a marital status of single, divorced, separated, widowed. Analysis was not conducted on the subsets of the unmarried cohort due to low representation. Calculations of MMEs were conducted only during the hospital stay.

Cohort Identification

A total of 278 primary THAs and 409 primary TKAs were initially identified. Within TKA, 25 patients were excluded for incomplete clinical records rendering them incongruent with the study's goals and 2 patients were excluded for refusal to disclose marital status. This resulted in 382 TKAs being included. In THA, 17 patients were excluded for incomplete clinical records, and 1 for no marital status. This resulted in 260 THAs included.

Statistical Analysis

Data were analyzed using Python v3.11 (Python Software Foundation, Wilmington, DE). Continuous variables were analyzed using student's t-tests, while categorical variables were assessed using χ^2. The Fisher's exact test was utilized when there were ≤5 instances. Statistical significance was determined at p< 05. Achievement of the Patient Acceptable Symptom State (PASS)

was calculated as a proportion of patients who recorded at least 63.7 on the KOOS JR and at least 76.7 on the HOOS JR., based on established thresholds [15]. The minimal clinically important difference (MCID) achievement was compared to the previously described anchor-based threshold of 14 and 18 for the KOOS JR and HOOS JR, respectively [16]. The overall score change (Δ) was calculated and analyzed for both the KOOS JR and HOOS JR.

Results

Total Knee Arthroplasty

Regarding demographics, married TKA patients were significantly younger than unmarried patients (66.5 ± 7.7 v 69.5 ± 9.5, P=.0011; Table 1). The proportion of married females was significantly lower than unmarried (51.2% v 73.8%, P=.0001). No significant differences in KOOS JR, PROMIS-10 Physical (PCS), or PROMIS-10 Mental (MCS) were observed for any timepoint between married and unmarried patients (Table 2). Both married and unmarried patients achieved PASS at nondifferent rates (82.8% v. 86.5%, respectively; P=.3539; Supplementary Table 1). The MCID achievement rate was also nonsignificant between married and unmarried patients (72.3 v 77.0%, respectively; P=.1623). The ΔKOOS JR scores between married and unmarried patients were insignificant (Supplementary Table 2). Married patients had a shorter length of stay than unmarried patients (0.9 ± 0.4 v 1.2 ± 0.8 days, respectively; P<.0001; Table 3). No other differences were observed for clinical variables.

Variable	Married	Unmarried	P Value
TKA	256	126	-
Age	66.51 ± 7.69	69.49 ± 9.51	**.0011**
M: F	125:131	33:93	**.0001**
BMI	32.64 ± 6.17	32.62 ± 7.94	.9785
Smoking Status	10 (n=254)	10 (n=125)	.1529
Preop Opioid Use	85 (n=251)	46	.6111
THA	181	79	-
Age	64.16 ± 10.99	67.06 ± 10.27	**.0470**
M: F	85:96	24:55	**.0127**
BMI	30.48 ± 6.27	30.81 ± 8.00	.7208
Current Smoker	12 (n=179)	5	.9999
Preop Opioid Use	47 (n=180)	24 (n=76)	.3720

Note: Bold p values indicate statistical significance.

Abbreviations: BMI=body mass index, F=female, M=male, preop=preoperative. THA=total hip arthroplasty, TKA=total knee arthroplasty.

Table 1: Patient Demographics by Marital Status and Joint Arthroplasty Procedure.

Interval	Married (n=256)	Unmarried (n=126)	P Value
KOOS, JR.			
Preop	51.95 ± 13.52	49.94 ± 13.63	.1739
3 months	70.91 ± 14.15	70.88 ± 13.86	.9844
6 months	74.12 ± 14.68	75.62 ± 14.76	.3492
12 months	77.32 ± 15.55	78.82 ± 15.02	.3706
PROMIS-10 Physical			
Preop	42.64 ± 7.13	41.74 ± 8.04	.2671
3 months	48.51 ± 7.37	47.80 ± 8.29	.3964
6 months	49.23 ± 7.61	49.10 ± 8.17	.8783

12 months	49.08 ± 8.12	48.03 ± 8.03	.2338
PROMIS-10 Mental			
Preop	51.82 ± 8.40	50.49 ± 9.00	.1526
3 months	53.22 ± 7.68	51.67 ± 8.10	.0694
6 months	52.87 ± 8.22	52.10 ± 8.69	.3989
12 months	52.80 ± 8.13	52.22 ± 8.58	.5202

Note: Bold p values indicate statistical significance.

Abbreviations: KOOS, JR.=Knee Disability and Osteoarthritis Outcome Score, Joint Replacement, Preop=preoperative, PROMIS-10=Patient-Reported Outcomes Measurement Information System, PROMs=patient-reported outcome measures, TKA=total knee arthroplasty.

Table 2: PROMs of Patients Having Undergone TKA by Marital Status.

Outcome	Married (%)	Unmarried (%)	P Value
KOOS JR	212 (82.81)	109 (86.51)	.3539
HOOS JR	131 (72.38)	59 (74.68)	.6996

Abbreviations: HOOS JR= Hip Disability and Osteoarthritis Outcome Score for Joint Replacement; KOOS JR= Knee Disability and Osteoarthritis Outcome Score for Joint Replacement

Supplementary Table 1: Achievement of Patient Acceptable Symptom State (PASS) [15] by Cohort.

Score	Married	Unmarried	P Value
HOOS JR Δ	31.54 ± 17.98	35.97 ± 19.39	.0756
KOOS JR Δ	25.38 ± 17.90	28.88 ± 17.59	.0716

Abbreviations: HOOS JR= Hip Disability and Osteoarthritis Outcome Score for Joint Replacement; KOOS JR= Knee Disability and Osteoarthritis Outcome Score for Joint Replacement

Supplementary Table 2: Δ12 month HOOS and KOOS.

Category	Married (%)	Unmarried (%)	P Value
TKA	**256**	**126**	
LOS	0.94 ± 0.40	1.17 ± 0.75	**<.0001**
MME	46.62 ± 40.47	48.44 ± 43.37	.6868
Readmission 30D	0 (n=255)	1 (n=125)	0.3289
Readmission 90D	8 (n=255)	3 (n=125)	.9999
THA	**181**	**79**	
LOS	0.93 ± 0.50	1.17 ± 0.79	**.0034**
MME	39.11 ± 29.00	41.54 ± 32.52	.5500
Readmission 30D	0 (n=180)	0	
Readmission 90D	3 (n=180)	0	.5553

Note: Bold p values indicate statistical significance.

Abbreviations: D=day, LOS=length of stay, MME=morphine milligram equivalents, THA=total hip arthroplasty, TKA=total knee arthroplasty.

Table 3: Clinical Outcomes of Patients by Marital Status and Joint Arthroplasty.

Total Hip Arthroplasty

Regarding demographics, married THA patients were significantly younger than unmarried patients (64.2 ± 11.0 v 67.1 ± 10.3 years, respectively; P=.0470; Table 1). The proportion of females was significantly lower in married than unmarried (53.0% v 69.6%, respectively; P=.0127). Preoperatively, married patients reported a higher PCS score than unmarried (41.1 ± 6.3 v. 38.7 ± 7.7, respectively; P=.0101; Table 4), and after twelve months postoperatively, married patients reported higher PCS than unmarried patients (50.6 ± 8.8 v 48.0 ± 9.9, respectively; P= 0.0411). Married patients reported a higher MCS than unmarried patients at six months postoperatively (53.2 ± 7.8 v 50.3 ± 7.7, respectively; P= 0.0061). Married patients also reported a higher MCS than unmarried patients at twelve months postoperatively (53.5 ± 7.7 v 51.1 ± 8.7, respectively; P= 0.0282). No other significant differences were observed with respect to PROMs. Both married and unmarried patients achieved PASS at similar rates (72.4 v. 74.7, respectively; P=.6996; Supplementary Table 1). The MCID achievement rate was also nonsignificant between married and unmarried patients (74.6 v 81.0%, respectively; P= 0.1309). The ΔHOOS JR was not significant between groups (Supplementary Table 2). Married patients had a shorter length of stay than unmarried patients (0.9 ± 0.5 v 1.2 ± 0.8 days, respectively; P= 0.0034, Table 3). No other clinical differences were observed.

Interval	Married (n=181)	Unmarried (n=79)	P Value
HOOS, JR.			
Preop	51.95 ± 14.27	49.00 ± 18.20	.1610
3 months	77.64 ± 14.51	78.86 ± 14.08	.5298
6 months	81.01 ± 15.85	78.95 ± 14.88	.3272
12 months	83.49 ± 15.56	84.97 ± 13.47	.4638
PROMIS-10 Physical			
Preop	41.07 ± 6.25	38.72 ± 7.71	**.0101**
3 months	48.76 ± 7.39	47.91 ± 8.73	.3495
6 months	49.22 ± 8.39	48.11 ± 7.89	**.**3189
12 months	50.55 ± 8.81	48.02 ± 9.86	**.0411**
PROMIS-10 Mental			
Preop	50.29 ± 8.64	48.31 ± 9.07	.0954
3 months	53.38 ± 7.56	51.74 ± 7.86	.1132
6 months	53.19 ± 7.82	50.29 ± 7.68	**.0061**
12 months	53.51 ± 7.67	51.13 ± 8.67	**.0282**

Note: Bold p values indicate statistical significance.

Abbreviations: HOOS, JR.=Hip Disability and Osteoarthritis Outcome Score, Joint Replacement, Preop=preoperative, PROMIS-10=Patient-Reported Outcomes Measurement Information System, PROMs=patient-reported outcome measures, THA=total hip arthroplasty.

Table 4: PROMs of Patients Having Undergone THA by Marital Status.

Discussion

Demographic factors remain important considerations in surgical practice, and our study sought to investigate the effect of a particular demographic factor, marital status, on both clinical and patient-reported outcomes after total joint arthroplasty. Specifically, we focused on what differences might be found in PROMs and recovery threshold achievements between these two cohorts. To accomplish this, we evaluated the differences between pre-operative and post-operative scores in the KOOS JR, HOOS JR, and PROMIS-10 scores in cohorts of married and unmarried patients after TKA and THA.

Overall, our study demonstrates little significant difference in PROMs after these procedures. For TKA, no difference in any measured PROM was seen between married and unmarried cohorts at any time point. For THA, patients did demonstrate slightly higher MCS scores at six and twelve months post-operatively and also demonstrated slightly higher PCS scores pre- and post-operatively; these differences, however, are of questionable clinical relevance, particularly considering that the PCS difference is observed both before and after intervention. All other PROMs measured were not significantly different between the cohorts, including PASS and MCID achievement rates.

Our study sheds further light on an area where previous literature showed mixed results. One study of 512 THA patients demonstrated better PROMs at 2-year follow up in married patients compared to unmarried [12]. Another study of TKA and THA patients demonstrated findings quite like ours: KOOS JR and HOOS JR scores were not significantly different between married and unmarried cohorts after TKA and THA, whereas a statistically significant difference of questionable clinical significance was noted in other PROMs between the married and unmarried THA cohorts [10]. Another demonstrated no significant difference in TJA patients' PROMs regarding marital status or other difference in living situation [17]. Overall, when viewed in combination with previous literature, our study demonstrates equivalent PROMs after knee and hip arthroplasty, despite few clinically insignificant differences in PROMs between married and unmarried cohorts after THA.

Surgeons may hesitate to recommend surgery to a patient who self-reports as single, divorced, or widowed; however, this study's results suggest that such bias is misguided. Surgeons should instead thoroughly assess the patient's mental and physical health in addition to their social support network. In cases of scarce social support, the medical care team can implement creative solutions to bridge this gap, such as recommending a support group or, in select cases, a nursing facility to promote optimal healing. Clinicians should recognize that simple classifications such as marital status fail to consider external factors that may influence patient outcomes and should strive toward a more holistic evaluation for post-surgical care.

Limitations

This study has several limitations. To begin, this research project was retrospective in nature, hindering proactive data collection. The study may also lack generalizability given data collection at one metropolitan site. Further, one limitation that may warrant further study is our lack of further assessment of patients' living arrangements. For instance, we did not capture whether an unmarried patient lives with a non-spousal partner or other family member who may participate in this patient's recovery. However, despite these limitations, the group remains confident in the accuracy and completeness of the results and study.

Conclusions

In total hip and knee arthroplasty, no differences in joint-specific PROMs were observed between married and unmarried patients. Some differences were observed both pre- and post-operatively between married and unmarried patients on the PROMIS-10 score. Unmarried patients do incur significantly more time in hospital following joint arthroplasty than married patients. Orthopedic surgeons should use the findings of this study to conduct holistic assessments of patients and their candidacy for arthroplasty irrespective of their marital status.

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