

I Can't Get No Satisfaction: One-Month Postoperative Pain Predicts Three-Month Postoperative Dissatisfaction in Total Knee Arthroplasty Patients

Krishna Raj Tripuraneni, Jason Michael Cholewa, Mike Anderson¹, Roberta E Redfern¹, David C. Vanandel¹, Edward James Quilligan², Steven L Barnett³

¹Zimmer Biomet, ²Hoag Orthopedics, ³Hoag Orthopedic Institute

INTRODUCTION:

Dissatisfaction following total knee arthroplasty (TKA) continues to be reported as approximately 20% with conflicting data in the literature. Numerous studies report strong associations between pain and satisfaction; however, most studies have assessed these variables later (six to 12 months) in the postoperative period. The purpose of this study was to evaluate the relationship between one-month pain scores and three-month postoperative satisfaction and investigate if an immediate postoperative pain score cutoff exists between satisfied and dissatisfied patients.

METHODS:

This was a secondary analysis from data collected in a prospective multicenter longitudinal cohort study comprised of TKA patients using a digital care management platform. Patients (n=1,520) underwent primary TKA between February 2019 and February 2023. Pain was assessed at one-month postoperative via an 11-point numeric rating scale (NRS). Satisfaction was assessed at three months postoperative via the Knee Society composite satisfaction score (KSS). Patients were stratified into satisfied (KSS \geq 30) and dissatisfied (KSS < 30) subgroups. Quantile regression was used to create a best fit line to identify a cutoff between the one-month NRS and the three-month KSS. Further, a logistic regression model was used to classify patients into good/poor satisfaction that included a comorbidity index, one-month active flexion range of motion, anxiety/depression score, gender, age, and body mass index (BMI). The importance of the features in the model was assessed using permutation importance method to create a best-fit line between satisfaction and NRS. The model was compared to simpler model using only the NRS as input.

RESULTS:

The majority of patients were female (58.4%). The mean age of the population was 64.4 \pm 8.8 years, and the mean BMI was 31.4 \pm 6.2 kg/m². The median modified Charlson Comorbidity Index score was 1.0 (interquartile range, 0 – 2). The one month mean NRS and satisfaction scores were 3.7 \pm 2.0 and 29.4 \pm 8.6, respectively. A total of 624 (41.1%) patients were dissatisfied at three months postoperative. There was a moderate correlation between one-month NRS pain and three-month satisfaction (r =-0.39). Based on the best-fit line, the cut-off for dissatisfaction occurs with an NRS for pain of > 4.0 (Figure 1). The model achieves an AUC of 0.75 (std=0.03), with a maximum f1-score 0.66, corresponding to sensitivity = 0.80, specificity = 0.56. The model can be tuned to reduce false positives and increase precision.

DISCUSSION AND CONCLUSION: A high proportion of patients were dissatisfied with their TKA procedure during the early postoperative period. As expected, there was a correlation between pain and satisfaction. More importantly, one-month postoperative pain scores greater than 4.0 were associated with patient dissatisfaction at three months postoperative. Assessing pain in the immediate postoperative period may provide clinicians with diagnostic data that may help detect patients at risk for a poor prognosis three months following TKA. Further research is needed to determine if these immediate postoperative scores are associated with early and long-term follow up.