

Factors Associated with Prolonged Intraoperative Time in Primary TKA: A Systematic Review

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INTRODUCTION: Total knee arthroplasty (TKA) is one of the most common orthopedic surgeries. It has been well established that increased operative time during TKA is associated with worse clinical outcomes and higher complication rates, such as periprosthetic joint infection and wound complications. Thus, it is vital to understand the factors that impact operative time. The aim of this systematic review is to identify the factors that are associated with prolonged operative time during primary TKA.

METHODS: The PubMed and Ovid MEDLINE databases were searched to identify studies that reported factors associated with prolonged operative time during primary TKA. The keywords used for the search included “total knee arthroplasty”, “operative time”, and “factors.” Exclusion criteria included revision TKA and arthroplasty not specific to the knee. Articles were screened using Rayyan and PRISMA guidelines were followed. The primary outcome was factors that led to increased operative time, which were divided into two groups – patient-associated factors (i.e., patient comorbidities and demographics) and non-patient associated factors.

RESULTS: The search yielded 164 articles, of which 24 met the inclusion criteria. Table I summarizes the study findings. Patient demographics associated with prolonged operative time included increased age and height, functional status, male sex, smoking history, weight loss six months prior to the surgery, and American Society of Anesthesiologist (ASA) status. Comorbidities included low preoperative hematocrit, low femoral and tibial bone mineral density, increased tibiofemoral angle, prior ACL reconstruction, and hypertension. Non-patient factors included resident (PGY 1-4) involvement, side of the operation, nonelective surgery, use of technology, conversion TKA, cemented implants, operating room door openings, spinal anesthesia (compared to general), traditional sutures (compared to barbed), operation at a tertiary teaching hospital (compared to community hospitals), and inaccurate implant size match. The impact of patient BMI and level of surgeon experience were unclear, as some studies reported increased operative time, while some report no affect.

DISCUSSION: In this systematic review we elucidated many factors affecting intraoperative time, including patient- and non-patient associated factors. While a number of patient-associated factors are well established in the literature as being independent risk factors for complication they also appear to be related to increasing operative time which is an independent risk known to increase complication rates, hospital length of stay, as well as recovery time. This systemic review also sheds light on non-patient associated factors that can lead to increased operative time. A number of these factors are non-modifiable and brings up the discussion and importance of identifying risk factors that may increase complication rates. This study has limitations. As with any systematic review, we are limited to the research that is reported in the literature. Secondly, the studies identified in this review had different set points for what is defined as a prolonged operation. Further research is required to elucidate the factors that negatively impact the clinical outcomes of primary TKA.

SIGNIFICANCE/CLINICAL RELEVANCE: Many patient- and non-patient specific factors have been shown to increase operative time during primary TKA, which is associated with increased complication rates and poor surgical outcomes. By understanding these factors, orthopedic surgeons can work with their patients and healthcare team try and improve their operative time.

IMAGES AND TABLES:

Table I.

Article	Factors associated with prolonged operative time
Acuña et al, 2020	Age, male sex, BMI, functional status, preoperative hematocrit, INR, smoking history, hypertension requiring medication, weight loss within the last 6 months, resident involvement
Ishii et al, 2022	Body height, body weight, BMI, operative side
Khanuja et al, 2019	Morbid obesity
Ishii et al, 2020	BMI, TFA, BMD of tibia, and BMD of femur
Jiganti et al, 1993	Obesity
Sodhi et al, 2019	Nonelective surgery
Sun et al, 2019	Overlapping surgery
Biazzo et al, 2019	Bicompartmental knee arthroplasty
Haberal et al, 2019	ASA status, age
Liabaud et al, 2013	Obesity
Riechelmann et al, 2023	Inaccurate implant size match
Zak et al, 2023	Use of technology
Sloan et al, 2021	Conversion TKA
Witvoet et al, 2023	Males, BMI > 40, and cemented implants
Hamilton et al, 2018	Door openings
Badawy et al, 2017	Male sex, ASA score 3+
Chong et al, 2018	Prior ACL reconstruction
Bao et al, 2018	Resident involvement (PGY 1-4); Not for PGY 5
Heckmann et al, 2023	Spinal anesthesia compared to general anesthesia
Basques et al, 2018	Male gender
Watters et al, 2018	Prior ACL reconstruction
Ting et al, 2012	Traditional sutures (Compared to barbed sutures)
Khanuja et al, 2019	Academic hospital (Compared to community hospital), morbid obesity
Bradley et al, 2014	BMI