Past patients’ long-term experiences with complications, revision, and contralateral knee replacement after primary TKA can meaningfully inform the journey of new patients

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Keywords: Total Knee Arthroplasty; Complications; Revision; Contralateral Knee Replacement; Shared-Decision Making; Patient-Centred Approach

Abstract (max 3600 characters) 3492 characters (spaces included)

Background

Individuals who will undergo a total knee arthroplasty (TKA) are often concerned about potential postoperative complications, whether they may need a revision procedure or a replacement of their contralateral knee and if so when. Despite these well-known concerns, patient-friendly tools that support shared-decision making by helping individuals understand the risks they face following TKA are currently lacking.

Objectives

This study aims to inform patients and clinicians about the risks of complications (infection and arthrofibrosis), all-cause revision, and contralateral knee replacement after primary elective TKA, using registry data from past patients over 12-year follow-up. A patient-centred approach was employed, generating subgroups of past patients with similar outcomes as well as predictors of group membership to which new patients can be matched as a reference of how patients like them did.

Design and Methods

All patients who underwent a primary elective TKA between January 2012 and December 2023 at a tertiary hospital were included. Risks of infection, arthrofibrosis, revision, and contralateral knee replacement were estimated over 12 years using conditional inference trees (CIT), including relevant pre-surgery predictors. Missing

data on predictors were imputed using multiple imputation by chained equations and internal validation was performed using bootstrapping.

Results

2710 TKAs were included in the analysis (65% female, mean age 70.6 years). Overall, 30 infections, 68 cases of arthrofibrosis, 133 all-cause revisions, and 433 contralateral knee replacements occurred during follow-up, corresponding to 12-year cumulative incidences (Cis) of 1.6%, 2.6%, 7.1%, and 30.9%, respectively. CIT analysis identified five trajectories for infection with different 12-year Cis: 0.5%, 2.4%, 3.2%, 6.3%, and 14.0%. Statistically significant trajectory predictors were smoking status, previous surgery, number of comorbidities, and weight, with higher risks in smokers, having had previous surgery, >4 comorbidities, and/or ≥125kg in weight. For arthrofibrosis, three trajectories were identified (12-year Cis: 1.3%, 4.3%, 6.2%), determined by age and neuropathic pain pre-surgery, with higher risks in patients ≤60 years or presence of neuropathic pain. For revision, three trajectories were identified (12-year Cis: 3.6%, 9.0%, 15.0%), determined by age, with highest risk in patients <60 years. For contralateral knee replacement, CIT identified four trajectories (12-year Cis: 25.8%, 37.2%, 56.7%, 69.6%), determined by contralateral knee status, BMI and diagnosis, with higher risks in patients with abnormal non-operated contralateral knee, BMI >28, and/or primary osteoarthritis.

Conclusions

Distinct patient trajectories were identified for each of the four outcomes studied. Statistically significant predictors of group membership were consistent with findings in previous studies in most cases, but this is the first known attempt to identify groups using classification tree methods based on registry-based data with the aim of informing the journey of new patients facing TKA. As findings are based on patients seen in a single hospital, they should not be assumed to be generalisable to other populations until proper external validations are conducted. These findings will help inform new patients and clinicians about how past patients with similar characteristics did over time regarding the outcomes of interest in a more personalized approach.