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Paper #164

Reoperation, Revision, and Repeat Revision Rates and the Potential Cost-Utility of Knee Preservation in Young Total Knee Arthroplasty Patients

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Summary:
Young primary TKA patients demonstrate significantly higher rates of reoperation and serial revision, underscoring the value and potential significant cost savings of preservation-based interventions.

Abstract:

Introduction

While it has been proposed that modern implants will outlast primary total knee arthroplasties (TKAs) from previous generations, there is growing concern that TKA in young patients may lead to early failure, revision, repeat revisions, and increased medical costs. The purpose of this study was to 1) Describe the natural history of primary TKAs by patient age including reoperation and serial revision rates, and 2) Explore the potential cost-utility of knee preservation interventions.

Methods

An institutional total joint registry was reviewed for all primary TKAs performed between 1985 and 2015 for degenerative joint disease, excluding post-traumatic, neoplastic, and inflammatory indications. A total of 24,094 patient records were reviewed, and 23,173 (96.2%) met inclusion criteria. All included patients had =2 years follow-up (mean: 8.9 years, range: 2.0–32.2 years). To analyze modern revision costs, line-itemized costs for all first-time revisions performed at our institution from 2009 to 2015 were obtained and categorized by indication to calculate the costs incurred due to TKA failure over time and the potential cost-utility of interventions delaying primary TKA in young patients.

Results

Reoperation occurred in 2,417 (10.4%) patients and differed significantly by patient age, with younger patients having higher reoperation rates as compared to older patients. The 5-, 10- and 20-year survival free of reoperation for patients aged 30–39 was 86.5%, 77.8%, and 38.4% compared to 84.3%, 74.5%, and 53.2% for patients aged 40–49 and 94.6%, 92.4%, and 88.3% for patients aged 70–79, respectively ($p<0.01$).

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First- and second-time revision rates were significantly higher in younger patients (p<0.01). 1,357 (5.9%) patients underwent one revision (13.6% septic; 86.3%), 63 patients (0.3%) underwent a second revision (10.0% septic; 90.0% aseptic), and one patient underwent a third revision (septic).
Two-stage exchange TKA for septic indications averaged $52,608 per patient and aseptic revision TKA averaged $21,995-$32,214 based on indication (fracture, wear/loosening, instability). Based on the observed cost and revision rates, the average direct costs incurred in the first 20 years of follow-up for any given patient aged <39 years at the time of primary TKA was $14,469, in addition to the cost of primary arthroplasty. A potential for large first- and second-time revision cost savings was observed within a 20-year management window for interventions delaying primary TKA by 5-, 10- or 20 years in patients aged under 39 years ($5,454, $9,467, and $14,469 saved, respectively) and patients aged 40–49 ($3,165, $6,258, and $9,969, respectively) (p<0.01).

Conclusions

This study demonstrates that even when analyzing only direct in-hospital costs, patients under 39 years of age undergoing primary TKA generate an average of over $14,000 of costs within the first 20-years of post-operative management, not including the initial cost of arthroplasty. Furthermore, societal costs of early TKA are likely even greater when accounting for indirect costs and subsequent revisions occurring outside of the analyzed timeframe. Given the growing availability of knee preservation interventions, cost, quality of life, and function analyses are necessary to evaluate the utility of knee preservation procedures in comparison to TKA for young patients.