

A Retrospective Case-Control Study Comparing Long-Term Implant Survivorship and All-Cause Revision Rates Following Uncemented and Cemented Primary Total Knee Arthroplasty

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INTRODUCTION:

The increasing prevalence of total knee arthroplasty (TKA) highlights the need for improved fixation methods to enhance implant durability. Cementless TKA offer benefits such as preserving bone stock and avoiding cement debris, with a notable advantage being the potential for a lasting biological bond between the implant and bone. There is limited literature reviewing long term survivorship of cementless TKA. The hypothesis proposed that cementless knees would exhibit a similar or lower revision rate compared to cemented knees at a 15-year follow-up.

METHODS:

After obtaining approval from the Institutional Review Board, a retrospective chart review was conducted for all patients who underwent either cemented or uncemented total knee arthroplasty (TKA) utilizing a cruciate-retaining knee prosthesis between January 2006 and December 2010. The study excluded patients with posterior-stabilizing knee prostheses, other types of constrained knee implants, partial knee arthroplasties, revision TKAs, and those lacking follow-up information. Data on descriptive statistics, demographics, and types of implants were gathered. The rates of revision, reasons for revision, and long-term survivorship were analyzed and compared within the group. The independent samples t-test was employed to analyze continuous data, while the chi-squared test was utilized for categorical data.

RESULTS:

The study included a total of 458 total knee arthroplasty (TKA) cases, comprising 277 cemented and 181 cementless procedures. The average follow-up period was 16.5 years, with a range of 14.5 to 18.5 years. In the cemented group, 19 cases and in the cementless group, 17 cases required revision surgeries. The overall revision rates were 6.86% for the cemented TKA and 9.4% for the cementless TKA. When excluding revisions related to the patella, the revision-free cumulative survival rate at the 16.5-year mean follow-up was 95.64% for the cemented group and 95.60% for the cementless group. Acute infections were responsible for 4 (1.4%) of the revisions in the cemented group, compared to 2 (1.1%) in the cementless group. Additionally, 2 (0.72%) revisions in the cemented group and 4 (2.2%) in the cementless group were due to periprosthetic fractures. There were 2 cases of aseptic loosening of the tibia in the cemented group and 1 case in the cementless group. No cases of femoral component aseptic loosening were reported in either group. The survival rate free of aseptic loosening at the 16.5-year mean follow-up stood at 99.38% for the cemented group and 99.45% for the cementless group.

DISCUSSION AND CONCLUSION:

Discussion

Several studies have illustrated positive outcomes associated with modern cementless designs. However, a few studies have reported mixed findings regarding the link between the mode of fixation and the longevity of TKA implants. Our findings indicate that cementless total knee arthroplasty (TKA) has shown excellent long-term survival rates that are on par with those of cemented TKA. The primary reasons for revision surgeries included patellar pain, periprosthetic fractures, and infections. We acknowledge that our register-based study has certain limitations, one of which is the absence of clinical data, such as patient-reported outcomes and range of motion. Additionally, the nature of the register-based study, which involved a large population, did not permit us to perform radiographic evaluations beyond those conducted during revision surgeries, thereby limiting our ability to assess radiographic indicators of component loosening or osteolysis.

Conclusion

Cementless cruciate-retaining total knee arthroplasty demonstrated impressive long-term survival rates comparable to those of cemented total knee arthroplasty.