Survivorship of Unicompartmental Knee Arthroplasty Conversion to Total Knee Arthroplasty: A Retrospective Case-Control Study

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INTRODUCTION: Unicompartmental knee arthroplasties (UKA) are often used in the setting of osteoarthritis that is primarily limited to one compartment of the knee. National registries have shown that UKA also results in a significantly higher rate of revision than in matched TKA patients. A meta-analysis of 13 published studies compared outcomes of a UKA revised to a TKA versus a primary TKA, concluding that the conversion to a TKA had similar clinical and patient-reported outcomes to a primary TKA. The purpose of our study is to evaluate pre- and post-operative alignment values, length of follow-up, revision rate, reoperation rate, manipulations under anesthesia (MUAs), and complication rate between patients with a failed UKA revised to a TKA to patients with a primary TKA.

METHODS: This retrospective case-control study was approved by our university's IRB. The study reviewed all primary TKA with computer navigation from 10/2001-12/2020 (n = 3717). Our study has patients with a UKA converted to a TKA as the "conversion group (CTKA)," and the primary TKA (PTKA) group as the "control group." We conducted a chart review for revisions, re-operations, MUAs, pre- and post-operative alignment, complications and type of implant. Mechanical alignment was measured on long-standing lower extremity (LSLE) weight bearing x-rays. Revision surgery is defined as any surgery where an implant is removed, including the patella. Reoperation is defined as any subsequent return to the operating room including polyethylene exchange. All patients that had a UKA were included in data extraction (n = 85). Of those, 3 were excluded due to loss to follow-up and 3 were deceased with no follow-up. We matched patients on age (+/- 1 yr), gender, BMI (+/- 1), and date of surgery (±18 months). Variables were compared between the conversion and control groups using independent t-tests or Mann-Whitney U test for continuous variables and chi-squared test or Fisher's exact test for categorical variables. All analyses were performed using SPSS (Version 30.0.0.0 (172)).

RESULTS: Our conversion group included 79 patients (39.2% M, 60.8% F) and the control group included 158 patients. Average age for all patients was 65.55 years, average BMI was 33.78, and average length of follow-up was 61.58 months for CTKA and 66.38 months for PTKA. Ninety-three percent of all patients received a cruciate-retaining implant. The most common reason for conversion from UKA to TKA was OA progression, 76%. There were no conversions in the study group due to infection. Seventy-six x-rays were measured in the conversion group and 155 were measured in the control group. The mean pre-operative alignment was 5.37 degrees varus (range, -8-26 degrees) and 4.56 degrees varus (range, -18-25 degrees) in the conversion and control groups, respectively. The mean post-operative alignment was 1.26 degrees varus (range, -5-17 degrees) and 0.79 degrees varus (range, -9-6 degrees) in the conversion and control groups, respectively. There were no statistical differences between the two groups ($p < 0.05$) (Table 1).

Two patients in the CTKA group were revised, 97.5% survival. One had a painful TKA (15 years post-surgery) and a second patient had a failed femoral component (1-year post-surgery) and tibial component loosening (7 years post-surgery). Two patients had a reoperation for a polyethylene exchange and for an irrigation and debridement procedure and six patients had MUAs. One patient in the PTKA group underwent a TKA revision due to dissociation of the patella with a femoral fracture and metallosis (10 years post-surgery). Four patients in the control group had a reoperation 1 for an open lysis arthrotomy (1-year post-surgery), 1 for a tibial tubercle osteotomy fracture (1-month post-surgery), 1 for a tibial shaft fracture (9 years post-surgery), and 1 irrigation debridement procedure (3 years post-surgery). Eleven patients underwent MUAs.

DISCUSSION: This is a retrospective, case-control study analyzing revised UKA to a primary TKA cohort. All cases were performed using computer navigation. Some limitations include the retrospective nature of the study and data from limited number of surgeons (4) as well as no reported patient-reported outcome measures. The analysis demonstrates similar survivorship between the conversion and the control group being 97.5% and 99.4%, respectively.

SIGNIFICANCE/CLINICAL RELEVANCE: The outcomes from patients who have a UKA converted to a TKA have similar outcomes to a primary TKA. Survival rates of 97.5% in CTKA group and 99.4% in PTKA.

TABLE 1

	Conversion Group, n=79	Control Group, n=158	p-value
Mean pre-operative alignment (degrees), (range)*	5.37 (8 valgus – 26 varus)	4.56 (18 valgus – 25 varus)	0.385
Mean post-operative alignment (degrees), (range)*	1.26 (5 valgus – 17 varus)	0.79 (9 valgus – 6 varus)	0.173
Mean length of follow-up (months), (range)	61.58 (11 – 244)	66.38 (12 – 213)	0.387
Number of TKA Revisions	2 (2.5%)	1 (0.63%)	0.258
Number of Reoperations	2 (2.5%)	4 (2.5%)	1.000
Number of MUAs	6 (7.6%)	11 (6.9%)	0.859
Number of Complications	2 (2.5%)	3 (1.9%)	0.113

Table 1. Statistical significance between different outcomes in the study versus control group
*Imaging was only available for n=76 CTKA and n=155 PTKA patients when measuring alignment