Unicompartmental Knee Arthroplasty Provides Improved Outcomes and Survivorship Compared to Proximal Tibial Osteotomy at Minimum 10-Year Follow-Up

Jason Ina, Sanathan Iyer, Eva Bax, Marieke Kietselaer, Daniel B F Saris, Mario Hevesi, Mark W Pagnano, Aaron John Krych

INTRODUCTION:

Unicompartmental knee arthroplasty (UKA) and proximal tibial osteotomy (PTO) are common treatment options in younger, active patients with symptomatic unicompartmental knee arthritis. A prior study of patients undergoing UKA versus PTO for medial compartment arthritis reported higher activity levels and earlier but less frequent revision to TKA in patients undergoing UKA compared to PTO at mid-term follow-up. The purpose of this study is to compare long-term outcomes and rate of conversion to total knee arthroplasty in younger, active patients with symptomatic medial compartment knee arthritis who underwent UKA or PTO.

METHODS:

Patients between the ages of 18-55 with symptomatic medial compartment osteoarthritis who underwent either a UKA or PTO between 1998 and 2013 were retrospectively reviewed. Patients with inflammatory arthritis, concomitant ligament knee injury, history of ligamentous knee surgery, postoperative deep infection, concomitant cartilage restoration procedure or meniscus allograft transplantation were excluded. Patients who underwent a total knee arthroplasty (TKA) prior to final follow-up were excluded from PROM analysis. Medical records were reviewed for patient demographics, grade of preoperative osteoarthritis, postoperative long-leg mechanical alignment (for patients who underwent PTO), and signs of component loosening (for patients who underwent UKA). Preoperative Tegner Activity Scale and Lysholm scores were collected. At a minimum of 10-year follow-up, patients were contacted to collect Visual Analog Scale (VAS) for pain at rest and with use, Tegner Activity Score, Lysholm score, Knee Society Score (KSS), and a 10-point scale for surgery satisfaction. A Kaplan-Meier Survival analysis was performed to evaluate survivorship defined as conversion to TKA.

RESULTS:

A total of 239 patients were included with 182 patients undergoing UKA and 57 patients undergoing PTO (**Table 1**). Patients in the PTO group were younger (PTO: 42.7 years ± 10.2, UKA: 49.2 years ± 5.1; p <0.01) and more commonly males (PTO: 72% male, UKA: 45% male; p < 0.01). The mean follow-up for the PTO cohort was 20.5 years (range 16.2-25.3 years) while the mean follow-up for the UKA cohort was 16.3 years (range 12.1-23.2 years) (p < 0.001).

At final follow-up, no difference was observed in post-operative Lysholm or Tegner scores between the two groups. However, patients who underwent UKA reported a larger improvement in Lysholm and Tegner scores compared to patients who underwent PTO (p<0.001) **(Table 2).** The UKA patients also reported a decreased VAS with use at final follow-up (p=0.004). There was an increased rate of conversion to TKA in the PTO cohort compared to patients in the UKA cohort (PTO: 35%, UKA; 12%; p<0.001) with a mean time to conversion of 11.9 years ± 5.8 in the PTO group and 10.5 ± 5.4 years in the UKA cohort (p=0.09). The probability of survival for the PTO group was 65.2% at 17 years, while the probability of survival for the UKA group was 88.4% at 18.5 years (**Figure 1**).

DISCUSSION AND CONCLUSION:

In patients with isolated medial unicompartmental arthritis, UKA was associated with larger improvement in Lysholm and Tegner scores at a minimum 10-year follow-up. PTO resulted in a significantly higher rate of conversion to TKA compared to UKA with no difference in time to conversion. These results indicate that while PTO and UKA have equivalent post-operative outcome scores at final follow-up, UKA provides a larger improvement in functional outcomes with a higher rate of long-term survivorship compared to PTO.

Figure 1. Kaplan-Meier survivorship curves for the PTO and UKA groups, with revision to total knee arthroplasty (TKA) as the end point.

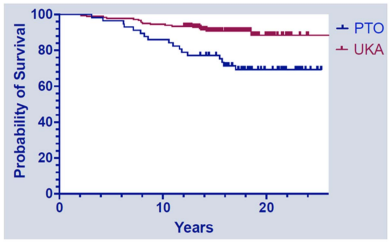

Table 1: Demographics[a]

Characteristic	PTO (n=57)	UKA (n=182)	p-value
Age (years)	42.7 ± 10.2	49.2 ± 5.1	**<0.01**
Sex			**<0.01**
Male	41 (72%)	81 (45%)	
Female	16 (28%)	101 (55%)	
BMI	31.7 ± 6.4	32.4 ± 6.3	0.21
Kellgren-Lawrence	2	3	**<0.01**
Postoperative Alignment[$]	-1.3° ± 2.4°	-	
Mean Follow-up	20.5 ± 2.9	16.3 ± 2.9	**<0.001**

[a]Data are expressed as mean ± SD or n (%).
*Includes reconstructions
[$]Negative value indicates valgus

Table 2: Postoperative Outcomes[a]

	PTO (n=57)	UKA (n=182)	p-value
Surgery Satisfaction	8.9 ± 1.9	9.4 ± 1.3	0.623
KSS	72.4 ± 24.6	82.1 ± 15.3	0.198
VAS Pain			
At Rest	2.1 ± 2.2	0.9 ± 1.4	0.052
With Use	3.7 ± 2.5	1.7 ± 1.7	**0.004**
Lysholm			
Preoperative	71.6 ± 5.4	69.5 ± 7.3	0.12
Final Follow-up	72.9 ± 24.8	87.0 ± 15.2	0.051
Δ Lysholm	1.2 ± 23.9	19.5 ± 25.1	**<0.001**
Tegner Activity Scale			
Preoperative	3.0 ± 1.3	2.6 ± 0.9	0.07
Final Follow-up	3.4 ± 1.8	3.2 ± 1.2	0.758
Δ Tegner Activity Scale	-0.3 ± 1.4	0.4 ± 1.3	**<0.001**
Conversion to TKA	20 (35)	21 (12)	**<0.001**
Mean time to TKA (years)	11.9 ± 5.8	10.5 ± 5.4	0.09

[a]Data are expressed as mean ± SD or n (%).
VAS-visual analog scale; KSS – Knee Society Score; TKA-total knee arthroplasty;