# Restoration of Prearthritic Coronal Alignment following Ligament-guided medial UKA Yielded Improved Patient-reported Outcomes

## A retrospective study of 618 knees

**Roderick J.M. Vossen**[1,2], MD; Joost A. Burger[3] *, MD; Gaby V. ten Noever de Brauw[1,2], BS; Tarik Bayoumi[1,2], MD; Jake A. Fiore[1], BE; Lindsey V. Ruderman[1], BA; Hendrik A. Zuiderbaan[4], MD PhD; Andrew D. Pearle[1], MD

* Shared first authorship

[1]**Hospital for Special Surgery, New York, USA**

[2]Amsterdam UMC location University of Amsterdam, Amsterdam, The Netherlands

[3]Charité – Universitatsmedizin, Berlin, Germany

[4]Medische Kliniek Velsen, Velsen-Noord, The Netherlands

ISAKOS CONGRESS 2025 MUNICH GERMANY June 8–11

Published article:

# I (and/or my co-authors) have something to disclose.

**All relevant financial relationships have been mitigated.**

Co-author, Hendrik A. Zuiderbaan – paid consultant Smith&Nephew
Co-author, Andrew D. Pearle - paid consultant Smith&Nephew & Depuy Synthes

# Background and Objective

**Background**

- The importance of re-developing superficial medial collateral ligament (sMCL) biomechanics during medial UKA and its' role in facilitating normal knee kinematics might be understated in current surgical techniques. [1]

- The recently introduced ligament-guided, kinematic alignment technique for medial UKA seeks to resurface the medial compartment, reapproximate pre-arthritic tension in the sMCL through flexion and extension, and achieve central tracking of the femoral component over the tibial component. [1,2]

**Objective**

- To evaluate patient-reported outcomes and implant survival rate following the ligament-guided medial UKA and compare these outcomes between CPAK phenotypes and sagittal medial tibial wear patterns.

- This could provide further insights into the application of the ligament-guided medial UKA technique.

*MCL, medial collateral ligament; UKA, unicompartmental knee arthroplasty; CPAK, Coronal Plane Alignment of the Knee*

# METHODS AND MATERIALS

The study comprised 618 knees (mean follow-up 4.1 ± 1.5 years, mean age 62.4 ± 8.2 years, 53.4% male), selected from a single-surgeon's registry.

**Patient selection**

- Robot-assisted, ligament-guided, medial UKA between 2008 and 2016.
- End-stage medial OA (KL ≥3) with an unaffected lateral compartment.
- Follow-up > 2 years.
- Available complete data on patient-reported outcomes (KOOS-JR, Kujala, patient satisfaction) and implant failure.

**Radiographic evaluation**

- Pre- and post-operative CPAK phenotype [3] – *figure 1, figure 2*
  - aHKA = MPTA – LDFA
  - JLO = MPTA + LDFA
- Pre-operative sagittal medial tibial wear pattern [4] – *figure 3*
  - Maximal tibial wear = (distance anterior cortex to PMTW) – (AP distance)
  - If maximal tibial wear > 55% of AP distance = posteromedial wear (indicator for ACL deficiency)

Figure 1.

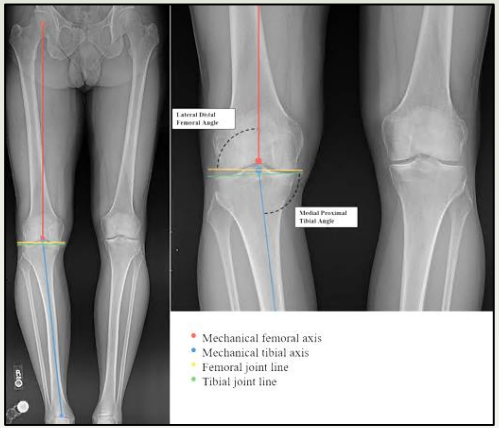



Figure 2.

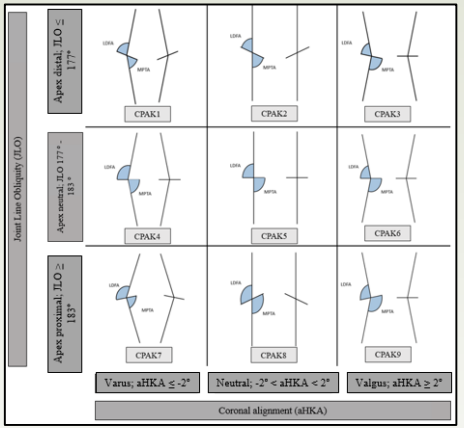
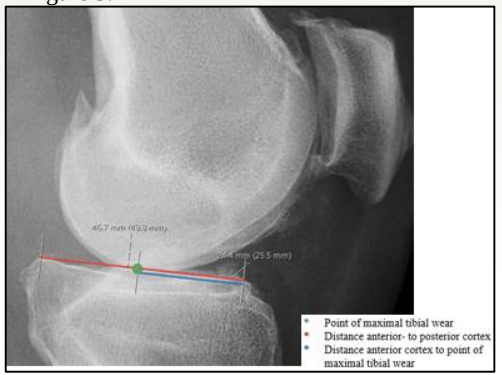



Figure 3.




*UKA, unicompartmental knee arthroplasty; KL, Kellgren Lawrence; CPAK, Coronal Plane Alignment of the Knee; PMTW, point of maximum tibial wear*

# SUMMARY OR RESULTS

Figure 4.

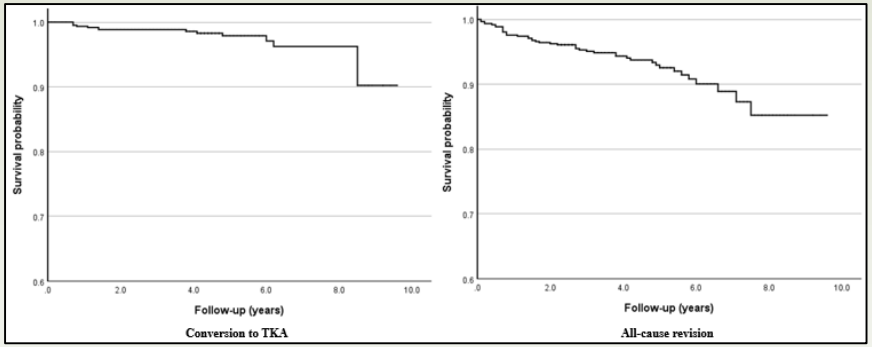
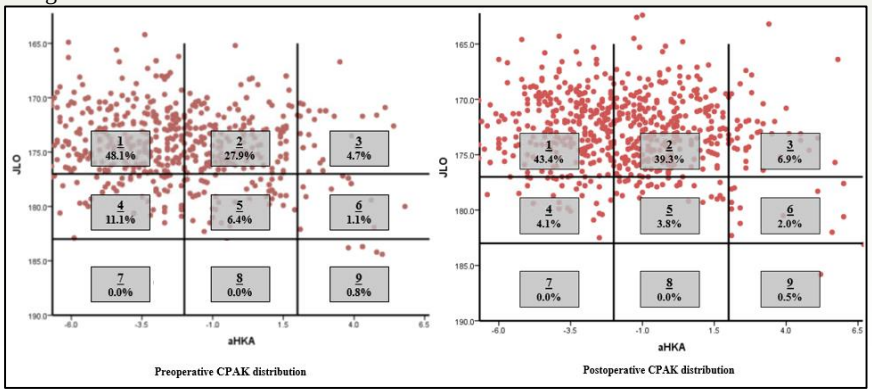



Figure 5.




**Implant survivorship** – *figure 4*

- 4-year conversion to TKA rate – 98.9% [ 98.4% - 99.3%].
  - Mean time to conversion – 3.5 ± 2.5 years.
- 4-year all-cause revision rate – 94.3% [93.3% - 95.3%].
- No significant differences in survival rates among CPAK phenotypes or between antero- or posteromedial tibial wear.

**Radiographic evaluation** – *figure 5, table 1*

- Highly variable pre- and post-operative CPAK phenotype distribution.
- Patients with restored pre-arthritic coronal alignment and pre-operative CPAK phenotype had a greater Kujala score.

Table 1.

| | N (%) of knees | KOOS JR. | Kujala | Satisfaction | Re-do Surgery |
|---|---|---|---|---|---|
| **Restoration of CPAK phenotype** | | | | | |
| Restored | 277 (53.8%) | 84.7 ± 15.7 | 84.5 ± 14.9 | 91.8% | 92.1% |
| Altered | 238 (46.2%) | 83.6 ± 16.2 | 81.8 ± 15.5 | 88.6% | 90.8% |
| *P-value* | | *0.374*× | *0.033*×* | 0.177 | 0.554 |

Patient-reported outcomes at a mean FU of 4.1 years. * significant value, p > 0.05.

*TKA, total knee arthroplasty; CPAK, Coronal Plane Alignment of the Knee*

# CONCLUSION

- This study demonstrated that restoration of pre-arthritic coronal alignment and pre-operative CPAK phenotype resulted in a significantly higher Kujala score.
- No other significant differences in patient-reported outcomes or implant survival rates were observed among CPAK phenotypes or between antero- or posteromedial tibial wear.
- This may suggest that ligament-guided medial UKA is equally beneficial for all knee phenotypes and medial tibial wear patterns as long as pre-operative CPAK phenotype is preserved post-operatively.

**Reference to full-text article**

Vossen RJM, Burger JA, Ten Noever de Brauw GV, et al. Preservation of prearthritic coronal knee phenotype and prearthritic coronal alignment yielded improved Kujala scores following ligament-guided medial unicompartmental knee arthroplasty. Knee Surg Sports Traumatol Arthrosc. 2024;32(12):3185-3197. doi:10.1002/ksa.12282

# References


1. Roche, M., Pearle, A.D.: Robotic arm-assisted unicompartmental knee arthroplasty: preoperative planning and surgical technique. Am J Orthop (Belle Mead NJ). 38, 10–5 (2009)

2. Pearle, A.D., P.F., Kendoff, D.O.: Robot-Assisted Unicompartmental Knee Arthroplasty. J Arthroplasty. 25, 230–237 (2010). https://doi.org/10.1016/j.arth.2008.09.024

1. MacDessi, S.J., Bellemans, J., Chen, D.B.: Coronal Plane Alignment of the Knee (CPAK) classification. Journal of bone and joint surgery. British volume. 103-B, 329–337 (2021). https://doi.org/10.1302/0301-620X.103B2.BJJ-2020-1050.R1

2. Scott, C.E.H., Keenan, O.J.F.: Patterns of cartilage loss and anterior cruciate ligament status in end-stage osteoarthritis of the knee. Bone Joint J. 102-B, 716–726 (2020). https://doi.org/10.1302/0301-620X.102B6.BJJ-2019-1434.R1