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Satisfactory 10-year survivorship of medial opening wedge high tibial osteotomy for isolated medial compartment osteoarthritis and varus alignment: An analysis from a high-volume institution

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Faculty Disclosure Information

- D. Parker has the following disclosures:
- holds shares in Personalised Surgery and Ganymed Robotics
- has received royalties from Smith & Nephew
- has done consulting work for Smith & Nephew
- has given paid presentations for Arthrex and Smith & Nephew
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Background

- The increased number of unicompartmental knee arthroplasty (UKA) and total knee arthroplasty (TKA) has led to a progressive decline of interest in tibial osteotomies.

- Medial opening wedge high tibial osteotomy (MOWHTO) still represents a valid option when considering the young and active patient

Bayliss et al

- Long term data predominantly report on lateral closing wedge techniques

Spahn et al

- Risk factors for osteotomy failure include inadequate alignment correction, older age, sex, high BMI and, extent of cartilage degeneration

Kim et al

Aim

To evaluate the long-term survivorship of MOWHTO, the clinical outcomes and the risk factors associated with conversion to TKA

Hypothesis

MOWHTO yields optimal functional outcomes and can postpone knee arthroplasty beyond 10 years

Methods

- **431** MOWHTO between January 2002 and January 2023
  - Males 82.5%
  - Mean age 49.1±8.0 years
  - BMI 29.8± 5.4 kg/m2

- Pre-osteotomy knee MRI and arthroscopy performed to ensure isolated medial compartmental OA

- Data collected and investigated
  - Baseline demographics
  - Intraoperative data
  - Radiographic analysis
  - Survivorship, complications, and reoperations

Pre and post-operative radiographic analysis

- Average standing hip-knee-ankle (HKA) angle:
  - Pre-operative: **Varus 6.4 +/- 3.41deg.**
  - Post-operative: **Valgus 2.6 +/- 2.05deg.**

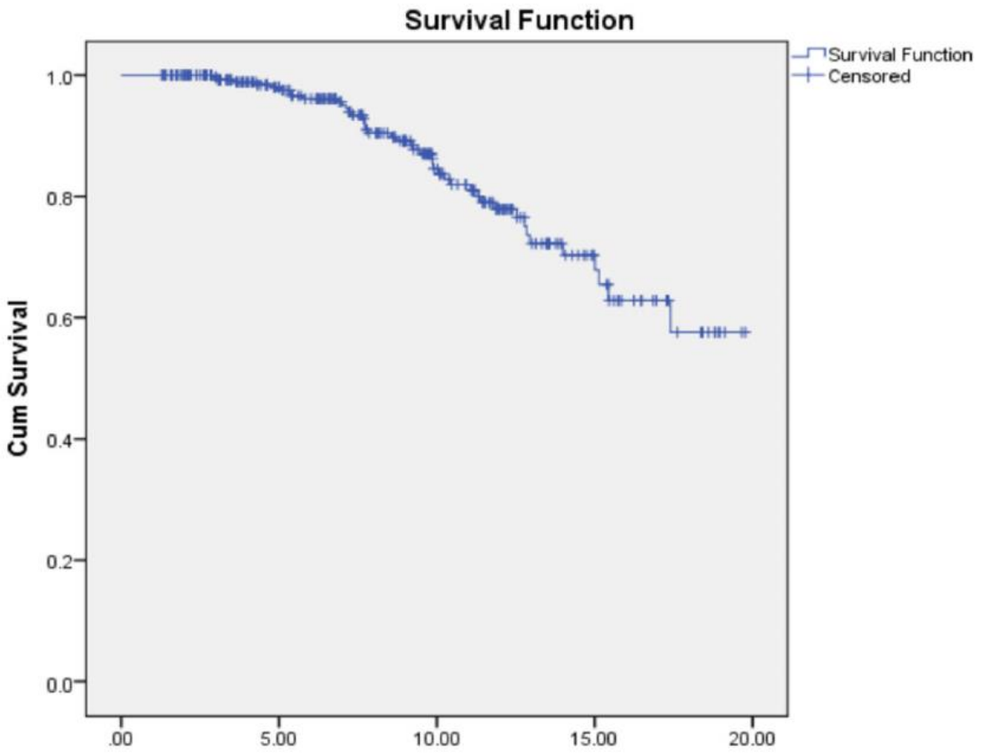
- Average standing medial proximal tibial angle (MPTA):
  - Pre-operative: **85.44 +/- 2.77deg.**
  - Post-operative: **93.42 +/- 2.55deg.**

- Average joint line obliquity (JLO):
  - Pre-operative: **1.1 +/- 2.5deg. tilted medially**
  - Post-operative: **4.5 +/- 3.1deg. tilted laterally**

- Average weight bearing line ratio (WBL%)
  - Pre-operative: **22.5 +/- 15.9%**
  - Post-operative: **61.5 +/- 9.6%**

Survivorship

- 89 out of 431 (20.6%) patients were converted to TKA at a mean of 9.6 years follow-up
  - *Mean age (*)51.8 vs 48.6 years (p<0.05)*
  - *Postoperative HKA (*) 3.3° vs 2.5° (p=0.049)*
  - *Postoperative MPTA (*) 94.4° vs 93.1° (p=0.0*



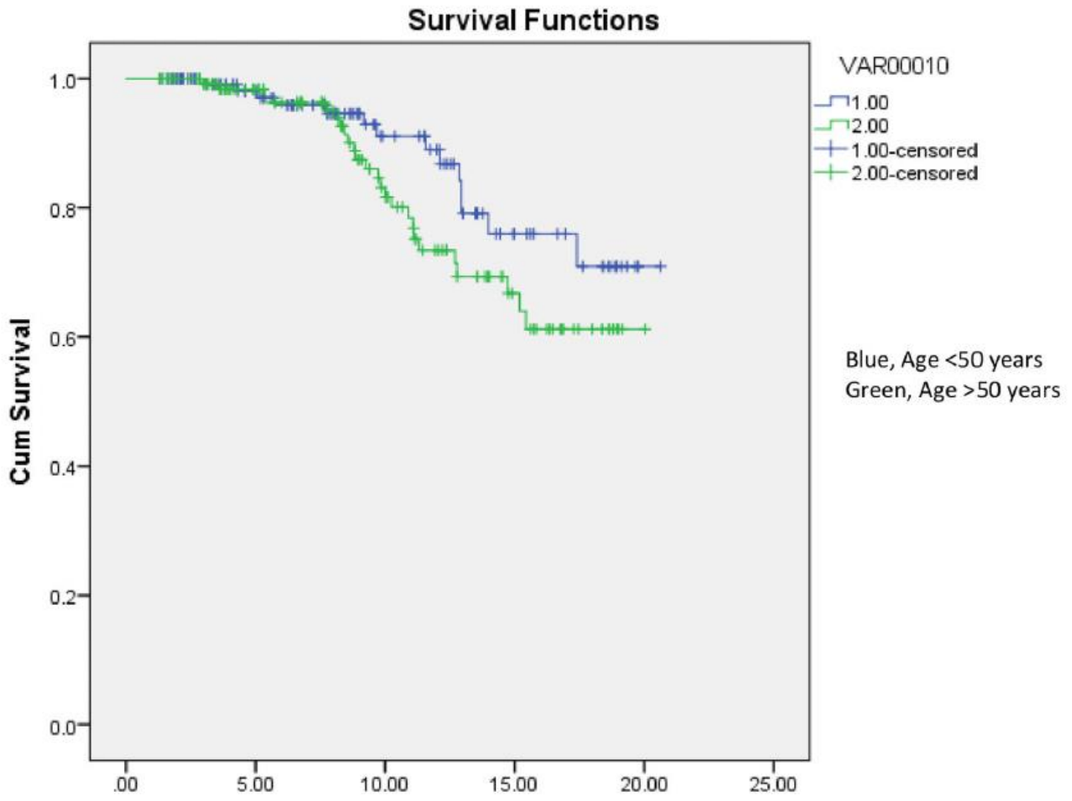
Cumulative conversion rates:

- At 5 years, 2.2% (97.8% survival)
- At 10 years, 17.8% (82.2% survival)
- At 15 years, 37.1% (62.9% survival)

(*)= Cases converted to TKA

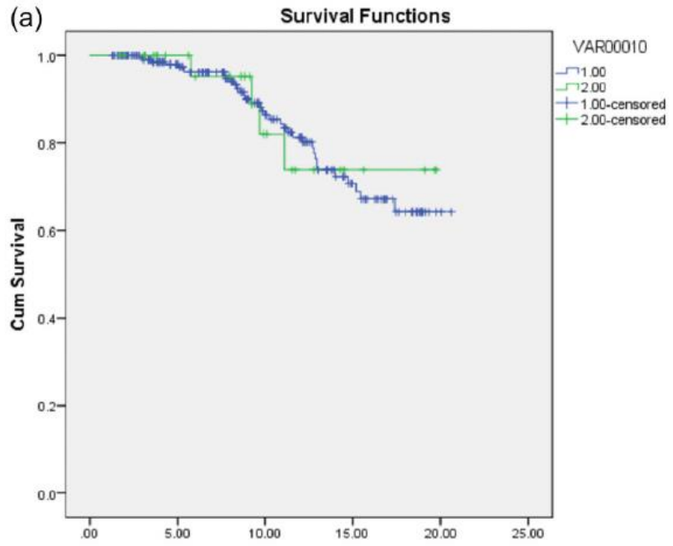
Risk Factors

- Older age associated with an odds ratio (OR) of 1.05 (95% CI: 1.008-1.086, *p = 0.017*)
  - **5% increase in risk of conversion to TKA with each year older**

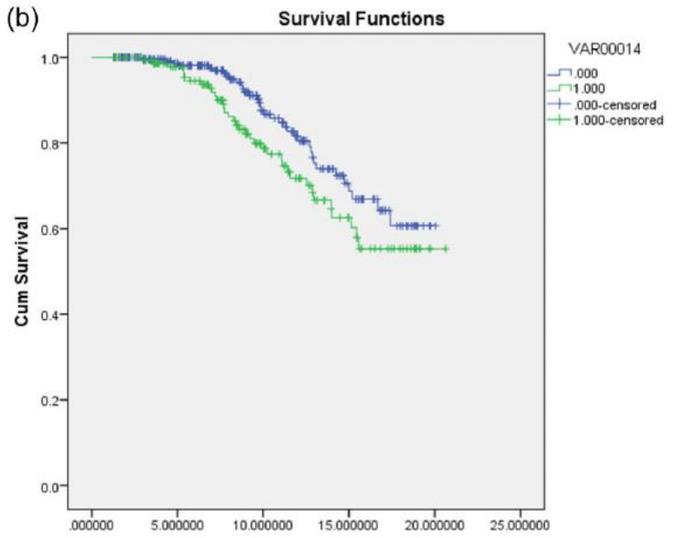


BMI and surgical complications

- **No significant differences** were seen in survivorship between:
  - Patients who were of BMI <35 vs. BMI >35
  - Patients who sustained surgical complications vs. those who did not



Blue, BMI<35 Kg/m^2
Green, BMI>35 Kg/m^2



Green, Yes
Blue, No

Risk factors for conversion to TKA

- **Preoperative Cartilage Wear**

- **Medial compartment**
- Medial femoral condyle ICRS IV
  - OR of 3.41 (95%CI 1.167 to 9.968, p=0.029)
- Medial tibial plateau ICRS IV
  - OR of 2.04 (95%CI 0.684 to 6.057, p=0.044)

- **Lateral compartment**
  - Not significant risk factor

- **PFJ**
  - Not significant risk factor

- **Surgical Characteristics**

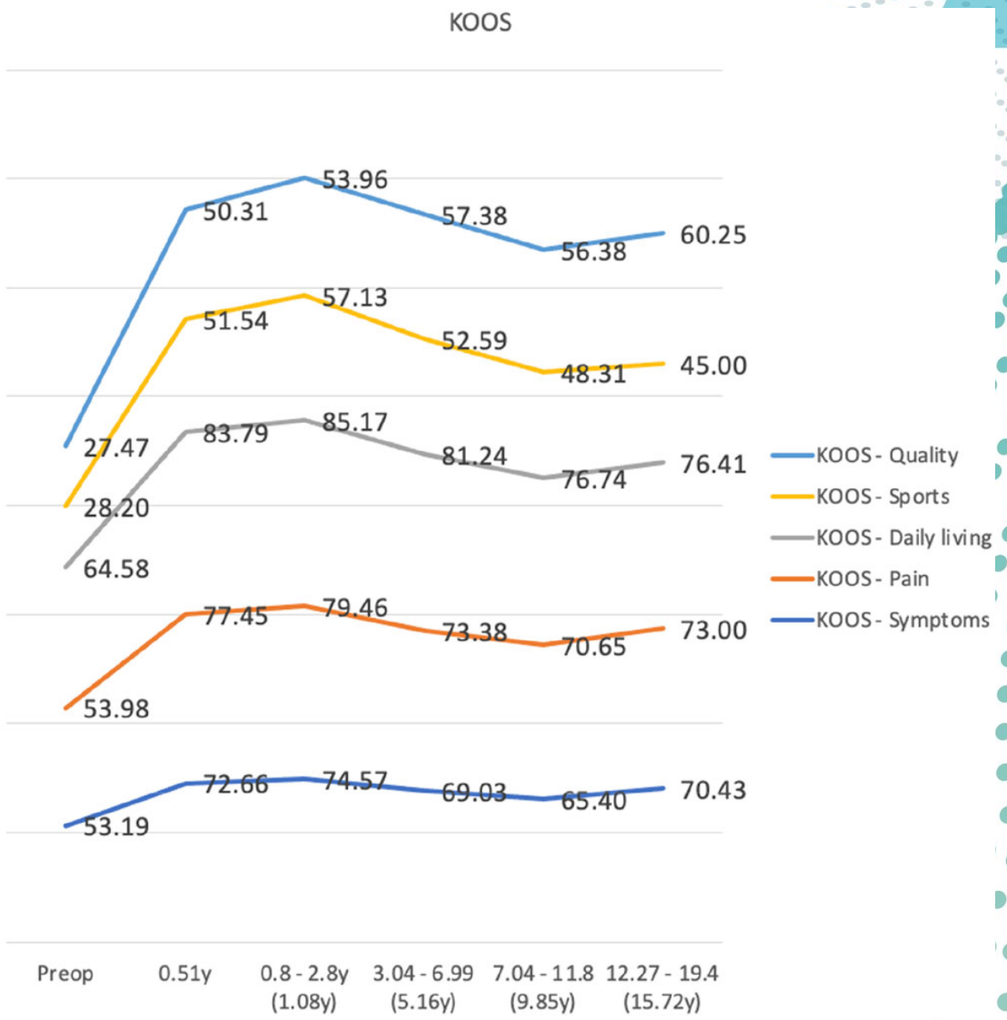
- **Wedge thickness**
  - OR of 1.08 (95% confidence interval [CI] 1.000 to 1.155, p=0.015)

- **Postoperative HKA**
  - OR of 1.25 (95%CI 1.02 to 1.74, p=0.031)

- **Postoperative MPTA**
  - OR of 1.26 (95%CI 1.00 to 1.69, p=0.04)

Patient reported outcome measures (PROMs)

- Preoperative and postoperative KOOS scores available for 280 patients (out of 431, 65%)
- Mean follow-up 5.7±4.5 years (range, 0.5 to 19.6 years)
- Improvements sustained at longer term follow up



Complications and re-operation rates

- 149 out of 431 patients had complications (35.9%)
- 110 out of 431 patients required re-operation (25.5%)
  - Hardware removal (95 patients, 22%)
  - DVT (21 patients, 4.9%)
  - Infection (18 patients, 4.1%)
    - Washout and debridement (9 patients, 8.2%)
  - Delayed or non-union (6 patients, 1.4%)
  - Intra-operative fracture of the lateral hinge (4 patients, 0.9%)

Conclusion

- HTO is a reliable procedure and an effective treatment with satisfactory 10-year survivorship in selected patients

- The risk of conversion to TKA is significantly increased in case of specific patient-related factors
  - Older age
  - Larger degree of correction
  - Higher preoperative stage of OA disease and cartilage wear
  - Postoperative alignment (Overcorrection HKA or excessive MPTA)

References: Bayliss LE, Culliford D, Monk AP, Glyn-Jones S, Prieto-Alhambra D, Judge A, Cooper C, Carr AJ, Arden NK, Beard DJ, Price AJ (2017) The effect of patient age at intervention on risk of implant revision after total replacement of the hip or knee: a population-based cohort study. Lancet 389(10077):1424–1430. Spahn G, Hofmann GO, von Engelhardt LV, Li M, Neubauer H, Klinger HM (2013) The impact of a high tibial valgus osteotomy and unicondylar medial arthroplasty on the treatment for knee osteoarthritis: a meta-analysis. Knee Surg Sports Traumatol Arthrosc 21(1):96–112. Kim J-H, Ryu DJ, Lee S-S, Jang SP, Park JS, Kim WJ, Kim I-S, Wang JH (2022) Does Transection of the Superficial MCL During HTO Result in Progressive Valgus Instability? [Formula: see text]. Am J Sports Med 50(1):142–151