ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

# A Novel Safety Device for Bicortical Fixation in Medial-opening Wedge High Tibial Osteotomy Reduces Correction Loss and Promotes Bone Union

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# Faculty Disclosure Information

I have no conflicts.

# Background

monocortical fixation for two distal screws

vs.

bicortical fixation for all distal screws

Monocortical fixation minimizes neurovascular injury risk[1].

**Impact on post-op correction loss and bone union is unknown.**

# Purpose

To clarify the impact of different **distal screw fixation methods** on post-op **correction loss** and **bone union**.

# Hypothesis

Bicortical fixation for all distal screws can prevent correction loss and achieve earlier bone union.

# Participants

**Study Period:**

Jan. 2019 – Feb. 2024 (retrospective study)

**Cohort:**

95 consective patients (101 knees)

who underwent MOWHTO with TriS plate

**Inclusion:**

≥1 year of post-op follow-up

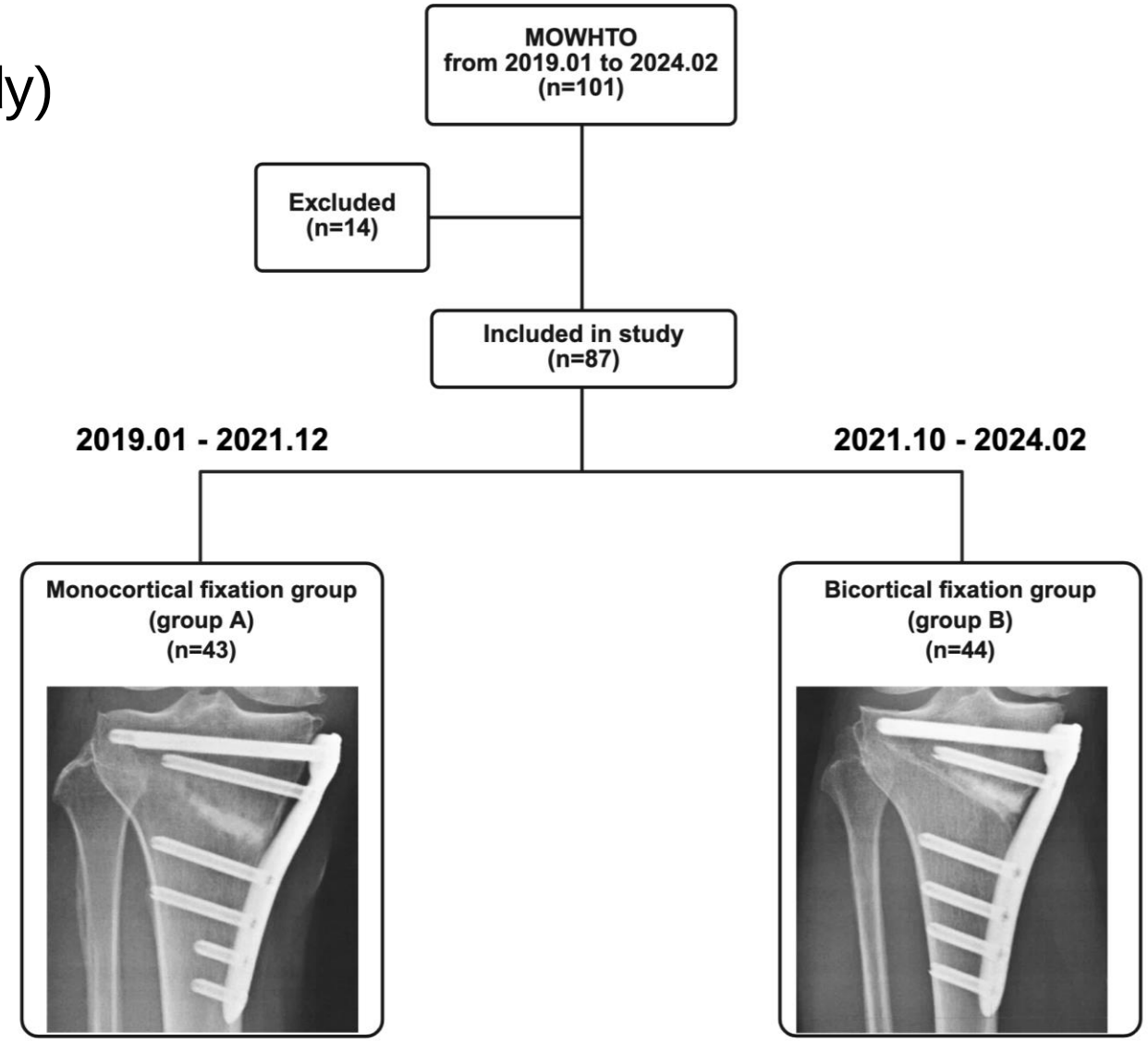
with complete data set

**Exclusion:**

Rheumatoid arthritis (RA)

**Analysis:**

**81** patients (**87** knees) included




Divided into two time-based groups

# Surgical technique

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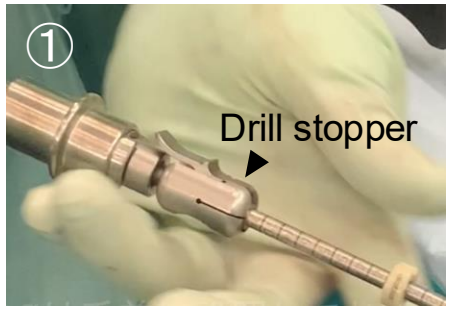
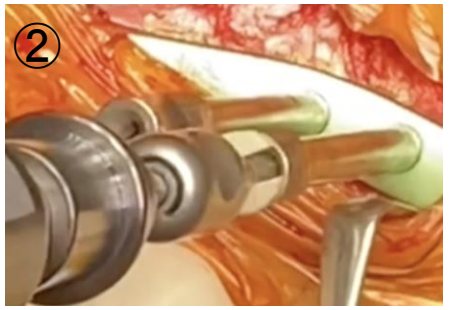
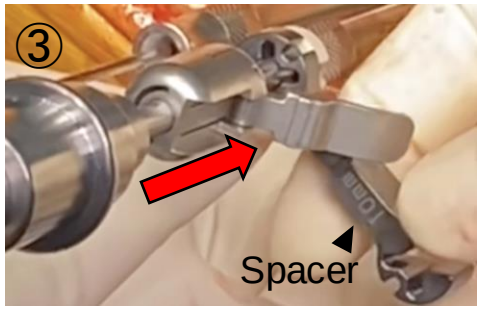
MOWHTO with TriS plate (OLMPUS TERUMO BIOMATERIALS®)

A novel “**drill stopper device**” was used for safe bicortical drilling.






①Attach the drill stopper to the drill shaft.

②Drill the near cortex until the tip contacts the far cortex.

③Insert the 6 mm spacer and slide the stopper to it.

④Remove the spacer.

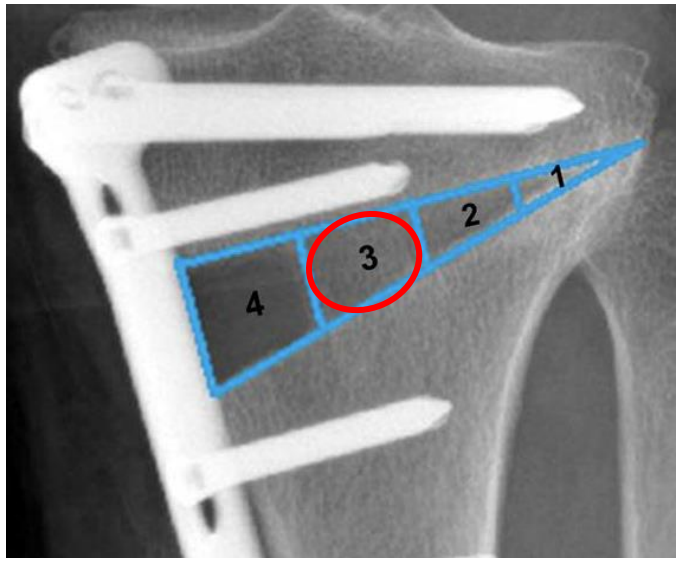
⑤Drill through the far cortex.

**Bicortical fixation is possible**
**without risk of neurovascular injury!**

# Radiographic assessment

1. Medial proximal tibial angle (MPTA) @ pre-op, 1 mo and 1 year
2. Bone union @ immediate post-op, 3 mo and 6 mo

※ Bone union = the bridging callus reached zone 3[2,3]




**Primary Outcome**

Correction loss of MPTA（1-year post-op)

**Secondary Outcome**

Bone union in the osteotomy gap at 3 and 6 mo

Hinge fracture is evaluated by CT scan at 1 wk

# Statistical analysis



**Univariate analysis**

Student’s t-test and Chi-squared test

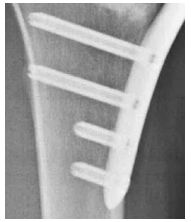
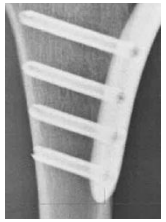
**Multiple Linear regression analysis**

Dependent variable: correction loss of MPTA

Independent variables: distal screw fixation method
opening width
BMI
presence of hinge fracture

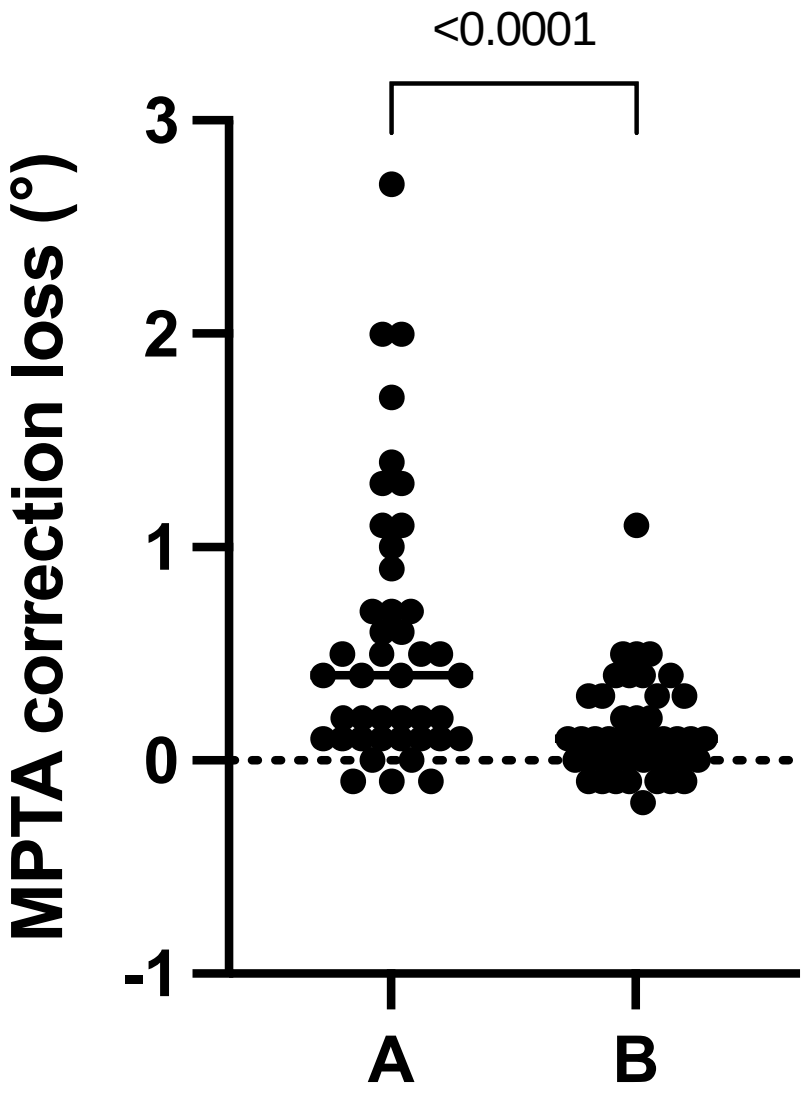
$P < 0.05$ was considered statistically significant.

# Patient demographics

| | Group A (n = 43)  | Group B (n = 44)  | *p* value |
|---|---|---|---|
| Age (y) | 54.0 ± 10.3 | 58.8 ± 10.0 | 0.03 |
| Male / Female | 15 / 28 | 19 / 25 | NS |
| BMI (kg/m$^2$) | 24.8 ± 3.5 | 24.4 ± 3.5 | NS |
| Pre HKA (°) | 183.6 ± 2.1 | 183.1 ± 1.8 | NS |
| Pre MPTA (°) | 84.7 ± 2.4 | 84.8 ±1.5 | NS |
| Opening width (mm) | 7.9 ± 1.9 | 7.5 ± 1.7 | NS |
| Hinge fracture | 10 | 6 | NS |

mean ± SD
Fisher's exact test and unpaired t test

# Results: correction loss




Group A: **0.6**±0.6° Group B: **0.1**±0.2°

**Group A shows a large variability.**

greater than 1° ＝ 9 cases (21%)

greater than 2° ＝ 3 cases (7%)

## Multivariate analysis

| Dependent variable | Independent variable | B | *p* value |
|---|---|---|---|
| Correction loss of MPTA | fixation method ○ | -0.44 | < 0.0001 |
| | Opening width × | -0.03 | 0.37 |
| | BMI × | 0.16 | 0.22 |
| | hinge fracture × | 0.0009 | 0.95 |

(adjusted $R^2$ = 0.2)

mean ± SD
unpaired t test

# Results: bone union

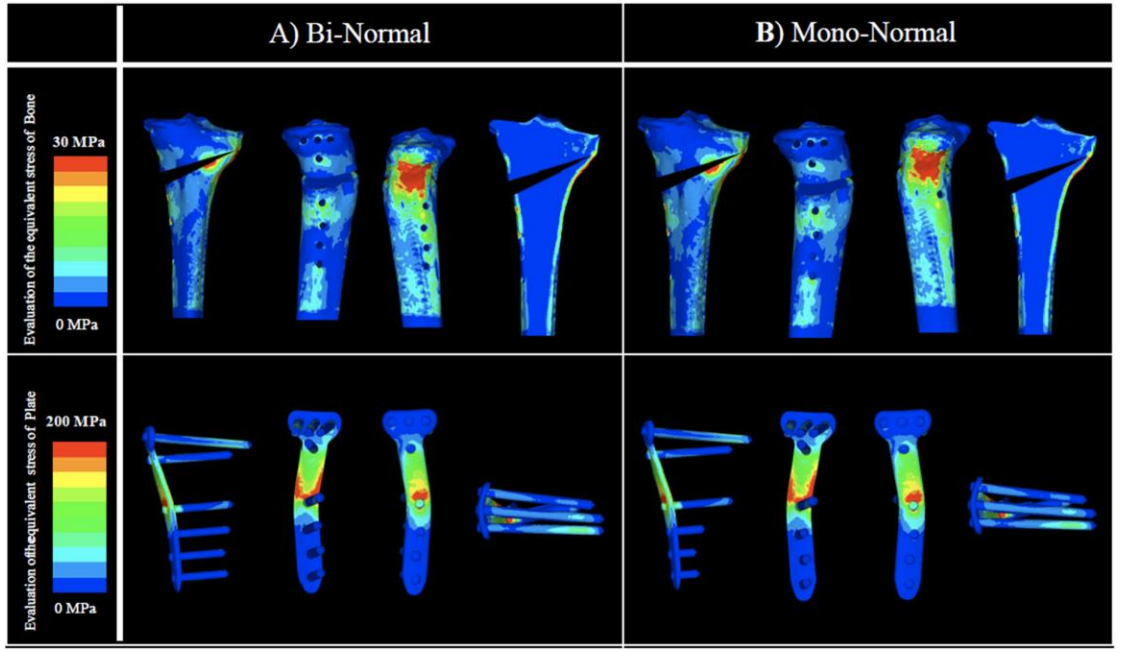
| | Union rate (%) **3 mo** | *p* value | Union rate (%) **6 mo** | *p* value |
|---|---|---|---|---|
| Group A (43 knees) | 23 | 0.0002 | 71 | NS |
| Group B (44 knees) | **64** | | 89 | |

Bicortical fixation achieved significantly earlier bone union at 3 mo.

Fisher's exact test

# Discussion






- **FEA results**

Monocortical fixation **does not** compromise mechanical stability in OWHTO[1].

- **Clinical practice (this study)**

Bicortical fixation showed smaller MPTA correction loss.

- **Possible reason for discrepancy**

**What FEA Can Do ✓** → Evaluate initial mechanical properties

**What FEA Cannot Do ×** → Predict long-term effects until bone healing

# Conclusion

Bicortical fixation for all distal screws significantly prevented correction loss of MPTA and achieved earlier bone union than mono-cortical fixation.

# Clinical relevance

The use of a novel drill stopper device allows safe bicortical fixation of distal screws, potentially minimizing correction loss and leading to improved long-term outcomes after OWHTO.

**Reference**


1. Itou J, et al. *Knee Surg Sports Traumatol Arthrosc*. 2020
2. Goshima K ,et al. Knee Surg Sports Traumatol Arthrosc. 2019
3. Jung WH, Takeuchi R, et al. Knee Surg Sports Traumatol Arthrosc. 2020