SmartHTO | SmartDFO

Engineered for Precision.
Backed by Evidence.

Patient-specific planning, stable fixation, and biologic integration - engineered for accuracy and reliability.

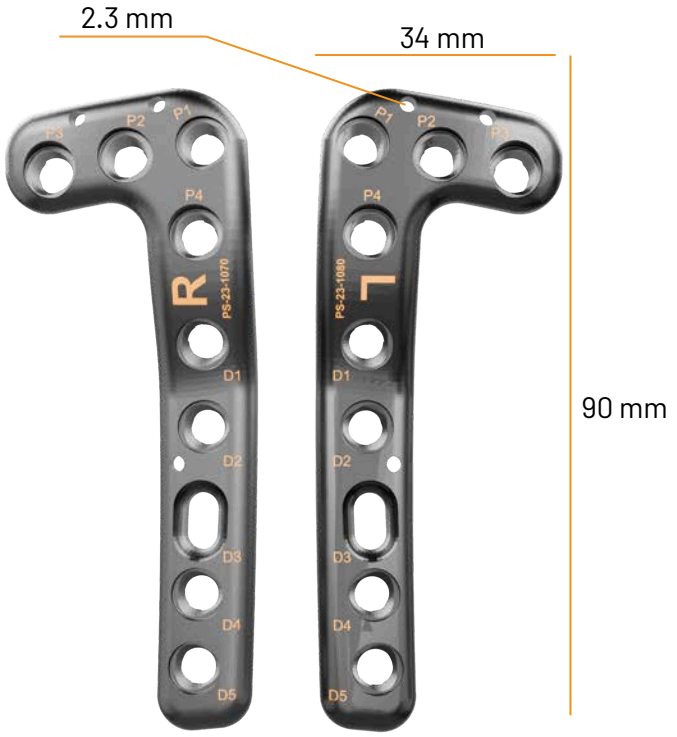
Lateral DFO

Medial DFO

Engineered for Precision.
Built for Stability.
Designed to Adapt.

Medial HTO

Lateral HTO



High Quality Titanium (Ti-6AL-4V) Plates

Manufactured from medical-grade titanium alloy for optimal strength-to-weight ratio, corrosion resistance, and biocompatibility, ensuring long-term durability and performance in challenging surgical environments.

Universal Variable Angle Configuration

All locking holes are variable angle (15° in each direction), allowing precise screw placement tailored to patient anatomy. Eliminates the need for multiple plate designs and improves versatility across a wide range of indications, including medial/lateral HTOs & DFOs and cases involving ACL or meniscal root tunnels.

Low-Profile, High-Performance Design

Anatomically contoured and low-profile to minimise soft tissue irritation, especially around the pes anserinus region. Balances a sleek form factor with robust mechanical integrity for reliable fixation.

Coated Anodising – Type II

Surface-treated with type 2 anodising to:

- Enhances biocompatibility and reduce friction to reduce risk of cold welding.
- Provide a hard, wear-resistant outer layer to support mechanical durability and ease of instrument engagement.

Locking Screw

Triple-Threaded for Locking Compression

Two threads on the shaft draw the plate toward the bone for compression, mimicking lag screw behavior to enhance fixation. A third thread at the head locks into the plate.

Stable by Design

This construct reduces micromotion and minimises the risk of screw back-out, critical for maintaining osteotomy stability.

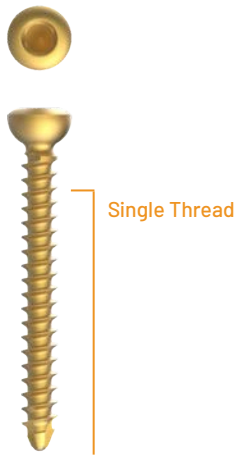
Triple-Start Thread Advantage

- Enables variable angle locking 15° in each direction.
- Offers flexibility in screw placement, accommodating ACL tunnels, meniscal root and complex trajectories with ease.

Non-Locking Screw

Single-Threaded for Efficient Compression

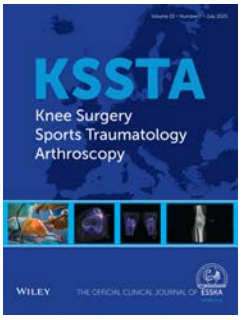
- Designed with one single shaft thread that draws the plate to bone.
- Ideal for achieving compression in selected holes where locking is not required.
- Useful for fragment reduction and enhancing overall plate-to-bone contact.



Original Research

Published in the Journal of KSSTA

Knee Surgery, Sports Traumatology, Arthroscopy 33 (2025) 12713



A validated method accounting for joint line convergence angle reduces planning errors in medial opening wedge high tibial osteotomy

Takaaki Hiranaka*, Christopher Davey, Samuel Grasso, Giacomo Dal Fabbro, Harbeer Ahedi, Brett Fritsch, David Parker

Sydney Orthopaedic Research Institute, at Landmark Orthopaedics, St Leonards, Sydney, Australia

Abstract

Purpose: Medial opening-wedge high tibial osteotomy (MOWHTO) correction error can result from either planning or execution, or both. This study aimed to (1) identify factors contributing to planning error, and (2) propose and evaluate a new planning method for reducing planning error.

Methods: A retrospective analysis was performed on 58 patients (mean age: 46.7 ± 7.2 years) with varus alignment who underwent MOWHTO using patient-specific implants. Radiographic measurements, including hip-knee-ankle angle (HKA), medial proximal tibial angle (MPTA), joint line convergence angle (JLCA) and knee joint line obliquity (KJLO), were made preoperatively and 6 months post-operatively. Overall error in HKA and surgical error in MPTA were used to calculate planning error (planning error = overall error – surgical error). A multivariable logistic regression analysis identified risk factors for suboptimal planning error (absolute error >1°), and this information was used to create a method to minimize it.

Results: Suboptimal planning error was associated with increased standing JLCA (3.9 ± 1.0° vs. 2.0 ± 1.4°; $p < 0.001$) and valgus KJLO (–0.6 ± 0.9° vs. 1.1 ± 2.5°; $p = 0.005$); however, multivariable logistic regression analysis identified increased standing JLCA as the only significant risk factor for suboptimal planning error (odds ratio: 3.27; $p < 0.001$). A preoperative JLCA cut-off of 2.8° yielded 94% sensitivity and 78% specificity for suboptimal planning error. Retrospective ΔJLCA adjustment, performed by subtracting ΔJLCA from post-operative HKA and recalculating planning error, reduced the mean planning error from 0.6 ± 1.0° to 0.2 ± 0.7° ($p = 0.010$).

Conclusion: Preoperative standing JLCA ≥ 2.8° is a significant risk factor for suboptimal planning in MOWHTO, with an increased risk of over-correction in these patients. The ΔJLCA method, which adjusts patient-specific planning by detecting joint laxity preoperatively using standing and supine images, may minimize planning error and improve post-operative alignment.

Level of Evidence: Level IV, retrospective case series.

What are the new findings?

- A new planning method accounting for joint line convergence angle (JLCA) was developed for medial opening wedge high tibial osteotomy.
- High preoperative JLCA was associated with increased risk of planning error in coronal alignment.
- The adjusted method significantly reduced planning error by incorporating JLCA and soft tissue factors like knee joint line obliquity.
- The approach demonstrated improved accuracy and may enhance correction reliability in patients with valgus soft tissue laxity.
- Validation in 58 patients confirmed fewer alignment errors when using the JLCA-informed planning method.
- Surgeons are advised to consider JLCA-related soft tissue laxity during planning to reduce overcorrection risk.

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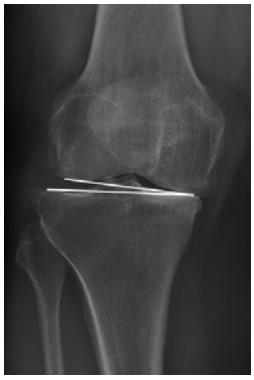
Publication - Case Overview

Case 2 with suboptimal planning

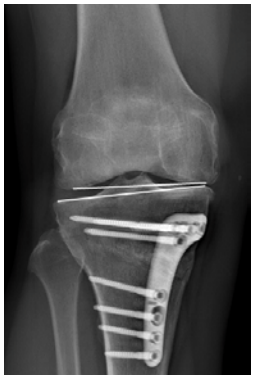
	Planning	Post-op	Error
HKA, °	182.5	183.5	-1.0 (overall error)
MPTA, °	97	96.9	0.1 (surgical error)

Planning error is -1.1° (1.1° overcorrection)

Pre-op JLCA 4.1°

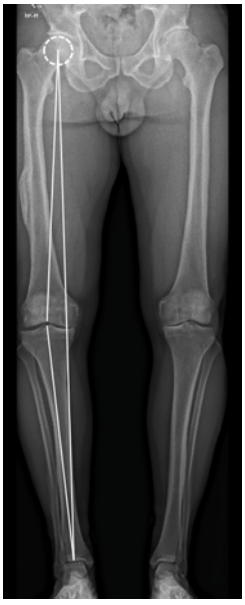


Post-op JLCA 3.1°

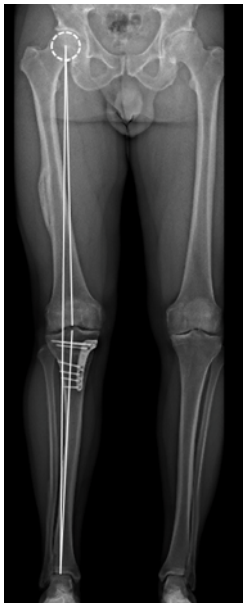


1.0° change of JLCA postoperatively

PRE-OP



POST-OP



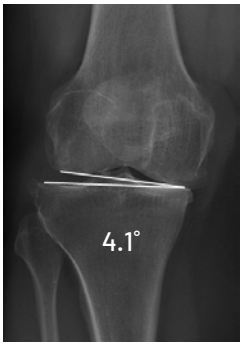
Correction angle 11.5°

How can we modify pre-planning for case 2?

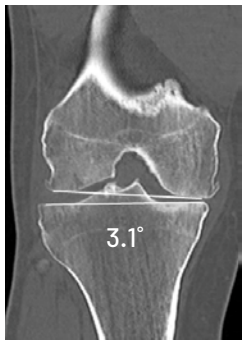
Planning error is -1.1° (1.1° overcorrection)

Application of proposed ΔJLCA method

Pre-op JLCA (WB)



Pre-op JLCA (non-WB)



ΔJLCA
1.0°

Subtract ΔJLCA (=1.0°) from overall correction angle

If the calculated correction angle is 11.5°, subtract 1.0° to obtain an actual correction angle of 10.5°

Original Research

Published in the Journal of ISAKOS

Journal of ISAKOS 12 (2025) 100859

Accurate correction with a novel patient-specific instrument for medial opening wedge high tibial osteotomy

Takaaki Hiranaka*, Samuel Grasso, Christopher Davey, Giacomo Dal Fabbro, Harbeer Ahedi, Brett Fritsch, David Parker

Sydney Orthopaedic Research Institute, at Landmark Orthopaedics, St Leonards, Sydney, Australia

Abstract

Introduction: Patient-specific instruments (PSIs) have been introduced to enhance the accuracy of medial opening wedge high tibial osteotomy (MOWHTO). This study aimed to evaluate the accuracy of a newly developed PSI and its impact on postoperative clinical outcomes.

Methods: Forty patients with varus alignment who underwent MOWHTO using the newly developed PSI were retrospectively analyzed for accuracy of correction. Radiographic evaluations, including hip-knee-ankle angle (HKA) and medial proximal tibial angle (MPTA) were performed using long-leg standing radiographs preoperatively and at 6 months postoperatively. Overall error was defined as the difference between the planned and achieved HKA (ΔHKA), while surgical error was defined as the difference between the planned and achieved MPTA(ΔMPTA). Planning error was defined as the difference between overall error and surgical error. For each type of error, positive values indicated over-correction, while negative values indicated under-correction. Knee Injury and Osteoarthritis Outcome Score (KOOS) data were collected and compared between preoperative and 12-month postoperative assessments. Results: The mean planned HKA was 182.4° ± 0.3°, and the achieved HKA was 182.6° ± 1.5° (p = 0.382). The mean planned MPTA was 93.1° ± 1.9°, and the achieved MPTA was 92.8° ± 1.9° (p ¼ 0.358). The overall error was 0.2° ± 1.5° (38% under-correction and 62% over-correction). Surgical error (ΔMPTA) averaged -0.3°± 1.1° (55% under-correction and 45% over-correction), while planning error averaged 0.6° ± 1.1° (30% under-correction and 70% over-correction). All KOOS subscales showed a statistically significant improvement at 12 months postoperatively compared to preoperative scores (p < 0.001).

Conclusion: The newly developed PSI workflow proved to be an accurate method for planning and performing MOWHTO. While overall error was low, the observed tendencies for surgical under-correction and planning over correction highlight the need for careful consideration of these factors to optimize outcomes in the future.

Level of evidence: Level IV, Retrospective Case Series.

What are the new findings?

- A newly developed patient-specific instrument workflow for medial opening wedge high tibial osteotomy was introduced.
- The workflow demonstrated high accuracy, achieving a low overall error (0.2 ± 1.5) between planned and achieved alignment.
- This study is the first to separately evaluate surgical and planning errors, revealing a tendency for surgical under-correction and planning over correction.
- While overall error was low, tendencies for surgical under-correction and planning over-correction require careful consideration to optimize alignment correction.

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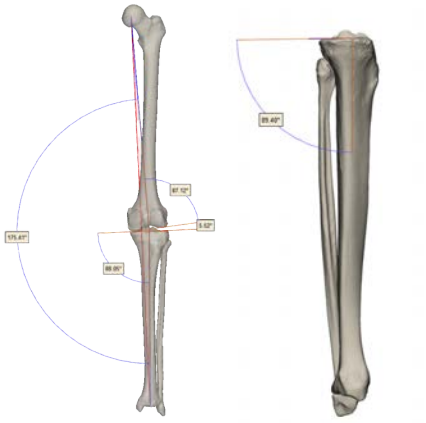
Available online 5 April 2025

Publication - Case Overview

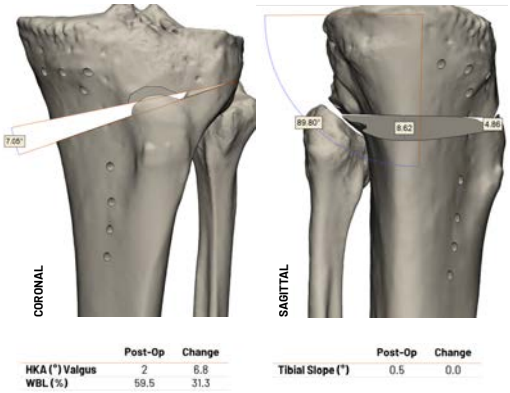
Medial Open Wedge Osteotomy

1.Pre-op Analysis



2. Planned Correction

Tibia

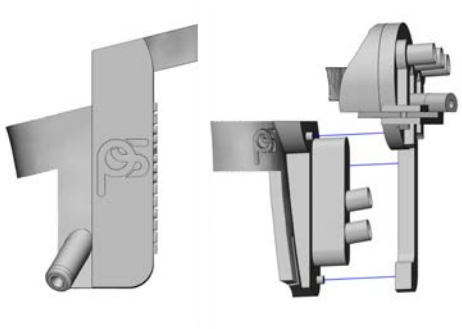


	Post-Op	Change
HKA (°) Valgus	2	6.8
WBL (%)	59.5	31.3

	Post-Op	Change
Tibial Slope (°)	0.5	0.0

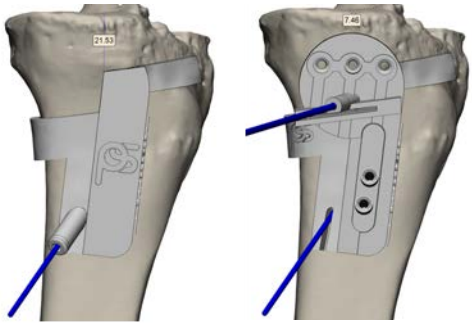
3. PSI Construction

Patient Specific Cutting Guide



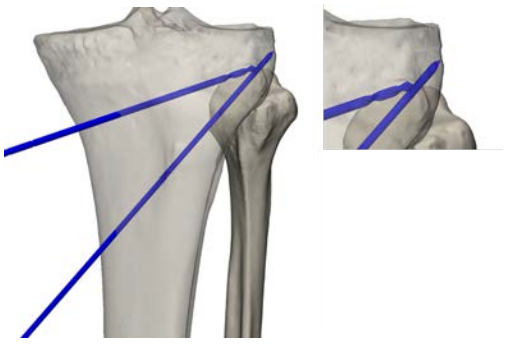
4. PSI Positioning

Position Relative to Anatomical Landmarks



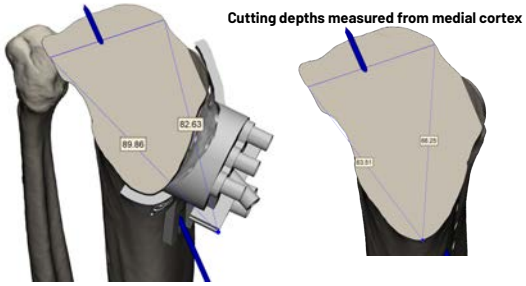
5. PSI Fixation

Cutting Wire & De-tension Pin



6. Cutting

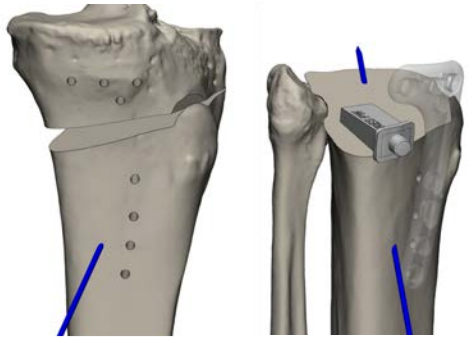
Cutting Depths



Cutting depths measured from posteromedial corner of PSI cutting slot

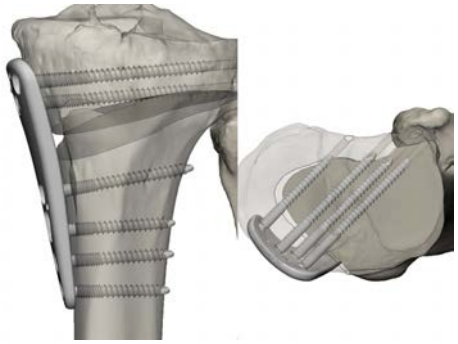
7. Wedge

Osteotomy Distraction & Wedge Positioning



8. Fixation

Plate Position & Screw Lengths



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