

Ankle Pain Is Aggravated Following Medial Opening-Wedge High Tibial Osteotomy In Patients With Concurrent Ankle Osteoarthritis



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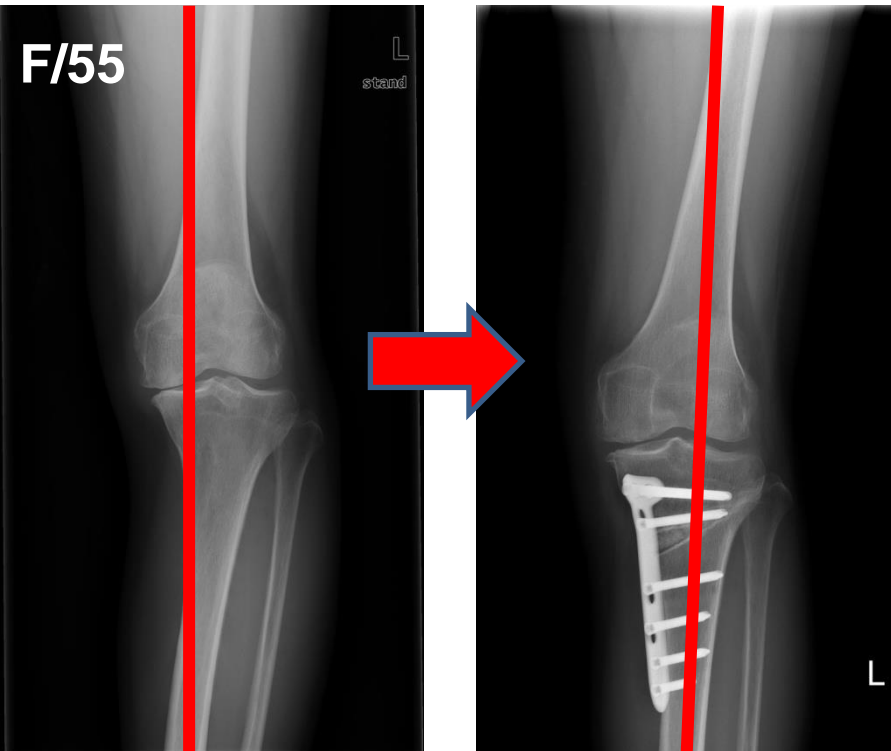


Conflict of interest

**Choi KY, MD.
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We have no financial conflict to disclose.

Introduction



◆ Transfer wt-bearing force

Arthritic portion (medial)



Intact portion (lateral)

- **Offload compartment**
- **Relieve the knee pain**
- **Promote the healing potential**
- **Postpone the degeneration**

Introduction

- ◆ Changes in lower limb alignment after MOWHTO
 - Affect ankle and hindfoot alignment
- ◆ Among patients undergoing MOWHTO
 - 10–30% have accompanying ankle OA
- ◆ The compensatory ability of the ankle and hindfoot
 - Varies according to the severity of ankle OA
- ◆ When ankle OA is present in patients undergoing TKA
 - Adverse effects on the clinical outcomes of the knee joint
- ◆ TKA study cannot be applied to HTO patients
 - HTO is intended to produce more valgus alignment than TKA

Purpose

- ◆ To investigate whether ankle & hindfoot alignment changed according to the severity of ankle OA when the alignment of the lower extremity was altered by MOWHTO to treat medial compartment OA with a varus deformity
- ◆ To determine whether differences in ankle and hindfoot alignment changes affect ankle symptoms

Materials and Methods

◆ Retrospective Review

- 2013 ~ 2017
- Single surgeon, Single institute
- 145 MOWHTOs

◆ Inclusion

- Minimum 4 Y follow up

◆ Exclusion

- Lateral and patellofemoral OA
- Traumatic OA/ Osteonecrosis
- Incomplete data

◆ Final enrollment

- 130 MOWHTOs

◆ Radiographic variables

- Degree of knee and ankle OA (K-L grade)
- Ankle OA: 37 cases (28.5%) (17/13/7/0)
- Classified into 2 groups
- ✓ Group 1: no ankle OA and KL grade 1 ankle OA
- ✓ Group 2 : ankle OA at KL grade 2 and above

◆ Patient reported outcomes measures (PROMs)

- 11-point Likert VAS for ankle pain
- WOMAC score (Pain, Function, Total scores) for knee

Materials and Methods

◆ Parameters for the ankle alignment



- (1) Tibial plafond inclination (TPI) (b-d)
 - Tangent to the tibial plafond
 - Horizontal grid line

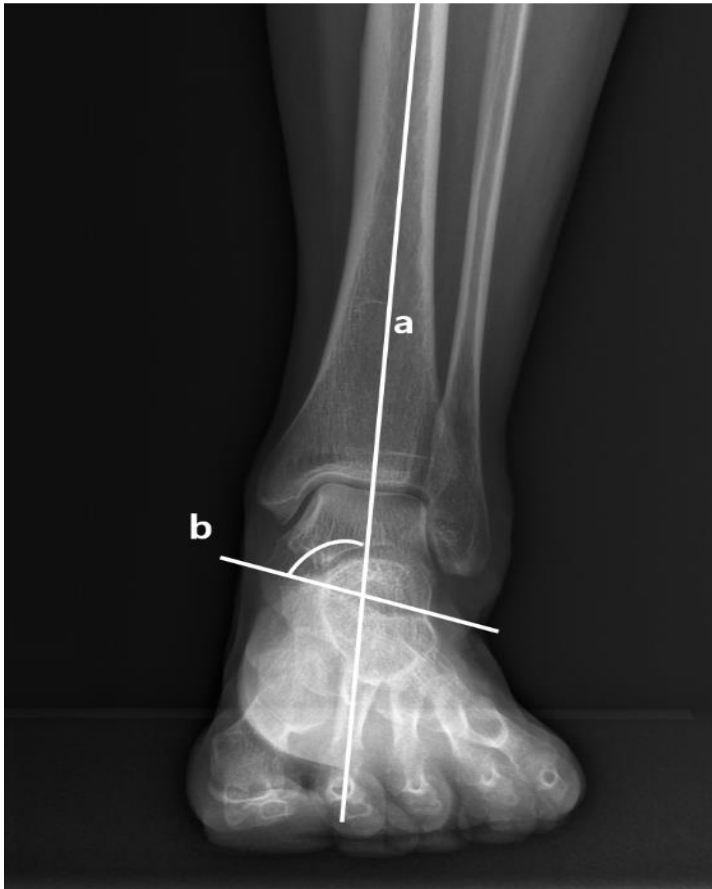
- (2) Talar tilt (TT) (c-d)
 - Tangent to the talar dome
 - Horizontal grid line

- (3) Talar inclination (TI) (b-c)
 - Tibial plafond & the talar dome

- (4) Tibia surface angle (TSA) (a-b)
 - The long axis of the tibia
 - The surface of the distal tibia

Materials and Methods

◆ Parameters for the Hindfoot alignment



- Varus–valgus angle (VVA) of the calcaneus
 - The axis of the tibia
 - The line from the top of the sustentaculum tali to the lateral-inferior end of the posterior facet of the calcaneus.
- ✓ $VVA > 76^\circ$: valgus alignment
- ✓ $VVA \leq 76^\circ$: varus alignment

Results: Preop to Postop

	Preoperative	4 years postoperatively	P-value
HKA angle (°)	Varus 7.4 ± 2.9	Valgus 2.5 ± 1.4	< 0.001
TPI (°)	7.8 ± 3.5	1.9 ± 3.3	< 0.001
TT (°)	7.8 ± 3.4	2.1 ± 3.5	< 0.001
TI (°)	0 ± 1.0	-0.2 ± 1.1	0.021
TSA (°)	88.6 ± 3.0	88.7 ± 2.4	0.934
VVA of the calcaneus (°)	78.0 ± 3.1	74.0 ± 2.9	<0.001

Results: Demographic

	Group 1 (n=110)	Group 2 (n=20)	P-value
Age (years)	56.2 ± 6.6	56.0 ± 6.3	0.923
Sex (Female, %)	95 (86.4 %)	19 (95.0 %)	0.464
Body mass index (kg/m ²)	26.1 ± 3.6	26.5 ± 3.5	0.663
Correction angle (°)	11.0 ± 2.9	11.7 ± 3.3	0.398
Knee KL grade			0.156
2	33 (30.0%)	2 (10.0%)	
3	70 (63.6%)	17 (85.0%)	
4	7 (6.4%)	1 (5.0%)	
Ankle KL grade			< 0.001
0	93 (84.5 %)	0 (0 %)	
1	17 (15.5 %)	0 (0 %)	
2	0 (0 %)	13 (65.0%)	
3	0 (0 %)	7 (35.0%)	

Results: Radiographic measurement

	Group 1 (n=110)	Group 2 (n=20)	P-value
Preoperative			
HKA angle (°)	Varus 7.3 ± 2.7	Varus 7.9 ± 3.2	0.401
WBL ratio (%)	18.2 ± 11.0	16.3 ± 10.9	0.497
TPI (°)	7.7 ± 3.3	8.4 ± 4.4	0.439
TT (°)	7.5 ± 3.2	9.1 ± 4.3	0.068
TI (°)	0.1 ± 0.7	-0.7 ± 1.6	<0.001
VVA of the calcaneus (°)	78.7 ± 2.8	74.6 ± 2.7	<0.001
4 years postoperatively			
HKA (°)	Valgus 2.5 ± 1.5	Valgus 2.4 ± 0.9	0.523
WBL ratio (%)	54.3 ± 8.9	53.9 ± 11.3	0.777
TPI (°)	1.7 ± 3.1	3.5 ± 3.9	0.024
TT (°)	1.6 ± 3.1	5.1 ± 3.9	<0.001
TI (°)	0.1 ± 0.7	-1.6 ± 2.1	<0.001
VVA of the calcaneus (°)	74.0 ± 3.1	73.7 ± 2.2	0.639
Changes			
HKA (°)	9.8 ± 2.9	10.4 ± 3.1	0.404
WBL (%)	36.2 ± 11.6	37.5 ± 13.7	0.709
TPI (°)	6.0 ± 2.8	4.9 ± 3.5	0.034
TT (°)	5.9 ± 2.8	4.1 ± 3.5	0.010
TI (°)	0.0 ± 0.6	0.8 ± 1.2	<0.001
VVA of the calcaneus (°)	4.7 ± 3.3	1.0 ± 3.0	<0.001

Results: PROM

	Group 1 (n=110)	Group 2 (n=20)	P-value
Knee WOMAC score			
Preoperative			
Pain	9.8 ± 3.9	9.6 ± 3.8	0.844
Stiffness	3.3 ± 1.9	2.8 ± 1.6	0.315
Function	34.0 ± 12.3	36.5 ± 13.9	0.439
Total	46.6 ± 17.1	46.3 ± 20.7	0.946
Postoperative			
Pain	3.7 ± 3.7	5.0 ± 4.5	0.163
Stiffness	2.0 ± 1.8	2.7 ± 2.4	0.125
Function	13.6 ± 11.5	17.3 ± 12.9	0.200
Total	19.2 ± 16.3	25.0 ± 18.7	0.163
Ankle VAS pain			
Preoperative	0.1 ± 0.3	2.0 ± 1.4	<0.001
Postoperative	0.1 ± 0.4	2.8 ± 2.4 *	<0.001
Preoperative ankle pain	5 (4.5%)	18 (90.0%)	<0.001
Increased ankle pain at postop	7 (6.4%)	9 (45.0%)	<0.001

Results: Factors for ankle pain

Variables	Univariate regression coefficient	95% CI	P-value	Multivariate regression coefficient †	95% CI	P-value
Age	0.992	0.918-1.072	0.834			
Sex (Male vs. Female)	0.980	0.201-4.775	0.980			
Body mass index	1.029	0.891-1.187	0.700			
Preoperative HKA angle	0.925	0.765-1.118	0.419			
Change in TI	2.319	1.322-4.068	0.003	1.563	0.755-3.234	0.229
Change in VVA	0.686	0.555-0.847	< 0.001	0.775	0.618-0.972	0.027
KL grade (Group 1 vs. Group 2)						
KL grade 2,3,4 vs. KL grade 0,1	12.039	3.747-38.677	< 0.001	4.241	1.024-17.563	0.046

Conclusion

- ◆ **More severe a patient's ankle OA**
- **The less the ankle joint orientation changed** to be parallel to the ground
- **The less compensation** occurred in the **hindfoot**
- ◆ PROM of the knee improved irrespective of ankle OA
- **Ankle pain worsened** following MOWHTO in patients with preoperative **ankle OA**

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