

Medial Closed-Wedge Distal Femoral Varus Osteotomy Improves Patellofemoral Joint Congruity

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COI Disclosure Information

HAMASAKI Masanari

My disclosure along with my co-authors is listed in the disclosure index on the ISAKOS website.

I have no conflicts.



Distal Femoral Varus Osteotomy (DFO)

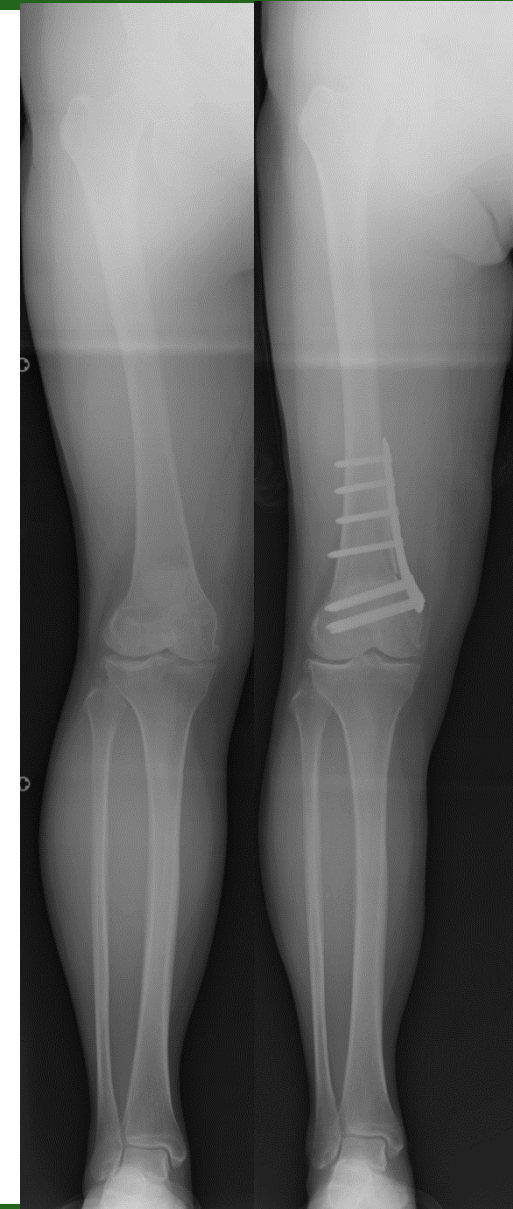
- A well-established treatment option for patients with valgus malalignment

Weil et al KSSTA 2017

- Medial closing wedge (M)-DFO

- ✓ A useful procedure in patients with meniscus deficiency, focal chondral defects and OA in lateral compartment

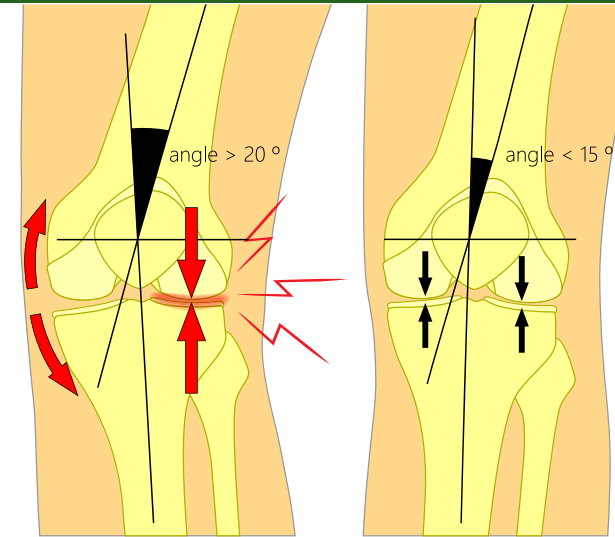
Sheehan et al JAAOS 2017



Patellofemoral (PF) joint congruity after DFO

- Reduction of Q angle and medialization of tibial tuberosity can improve patellar tracking

Puddu et al Int Orthop 2010



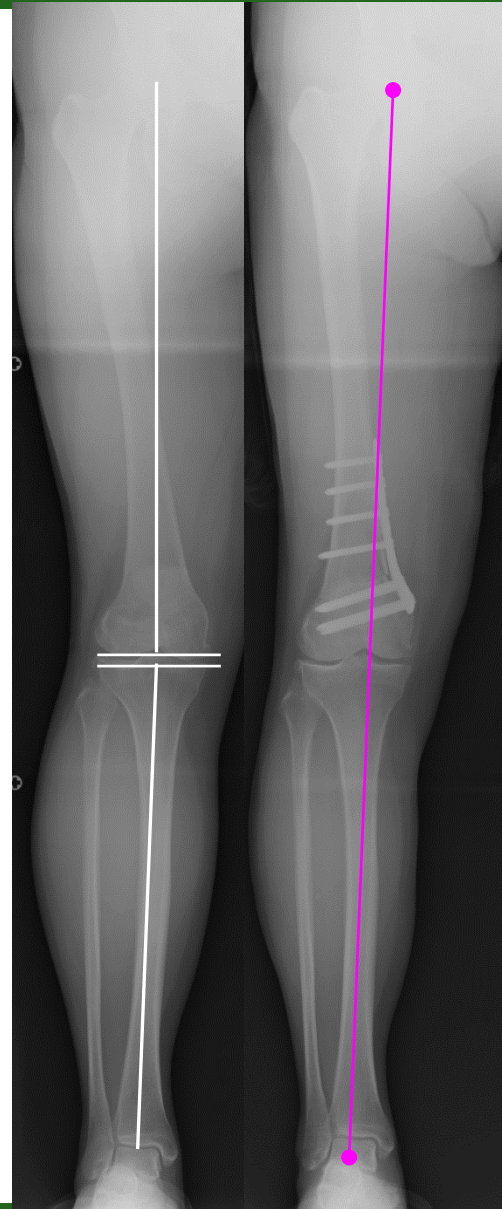
- ✓ However, change in PF joint congruity after M-DFO remains unclear

Purpose

- To clinically and radiologically evaluate the changes of the PF joint congruity in M-DFO

Study design

- 20 patients (23 knees): 2016-2021
 - ✓ M-DFO for lateral compartment OA or SONK
 - ✓ 2 men, 18 women
 - ✓ 42 (14-75) years
- Clinical and radiological examinations were performed before and 2 years after surgery
 - ✓ Radiographic evaluation of coronal alignment
 - Hip-knee-ankle angle (HKA)
 - % of Mechanical Axis (MA)
 - mechanical Lateral Distal Femoral Angle (mLDFA)



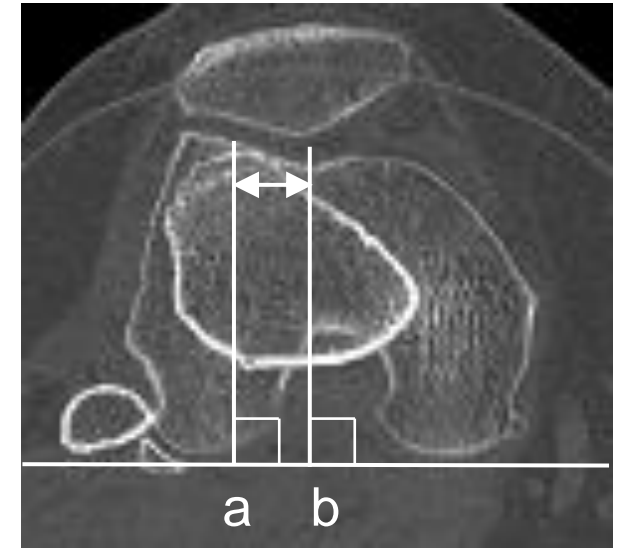
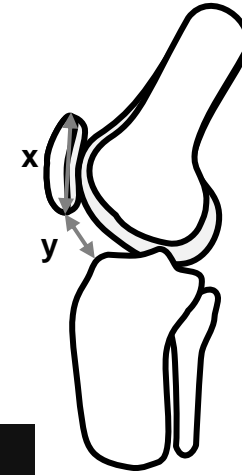
- PF joint congruity

- ✓ Xray: Caton-Deschamps Index

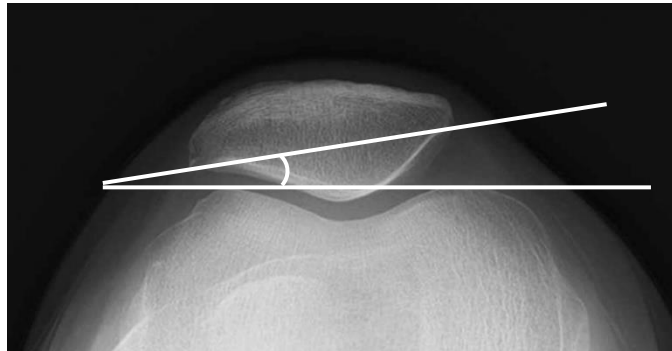
- Tilting angle, Lateral shift ratio, Radiological Q-angle

- ✓ CT: Tibial tuberosity-trochlear groove (TT-TG) distance

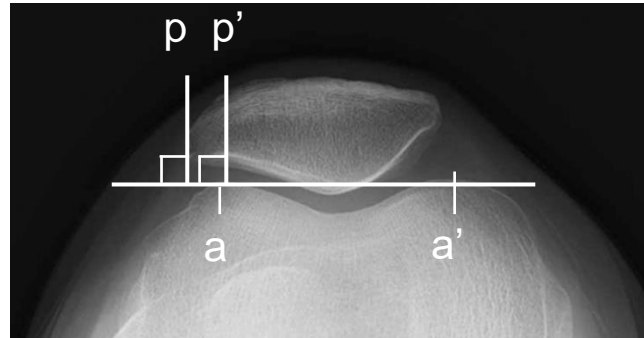
- Femoral anteversion



TT-TG distance



Tilting angle



Lateral shift ratio($pp'/aa' \times 100$)



Radiological Q-angle



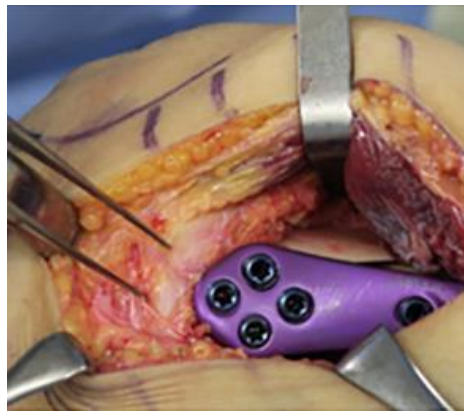
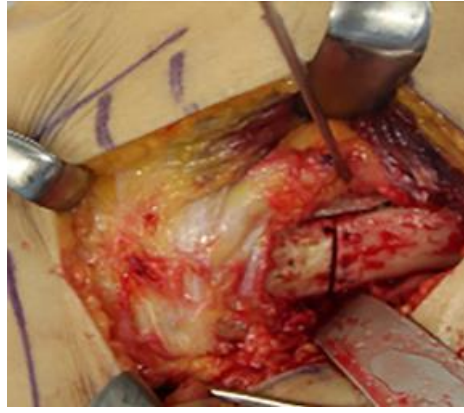
Femoral anteversion

- Statistical analysis

- ✓ Paired Student t-test

- ✓ $p = 0.05$

- Surgical procedure
 - ✓ A Biplanar osteotomy of the distal femur
 - ✓ A locking plate was fixed to the medial side of the femur
 - ✓ PWB was permitted @3 weeks after surgery



Clinical evaluations

	Pre-operative	Post-operative	<i>P value</i>
Lysholm score (points)	58.6 (19.7)	88.1 (5.8)	0.0014
JOA score (points)	64.3 (14.6)	88.6 (5.5)	<0.001

JOA: Japanese Orthopedic Association

Mean (SD)

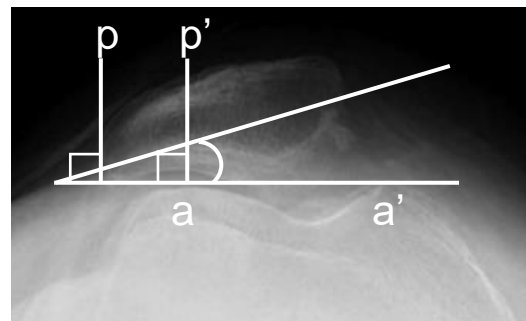
Radiological evaluations

	Pre-operative	Post-operative	<i>P value</i>
Correction angle (°)	N/A	7.1 (1.5)	
HKA (°)	6.0 (4.6)	-2.0 (2.4)	<0.001
FTA (°)	168.4 (4.2)	177.5 (2.8)	<0.001
MA (%)	75.4 (10.2)	42.1 (8.7)	<0.001
mLDFA (°)	82.3 (3.1)	89.3 (3.8)	<0.001

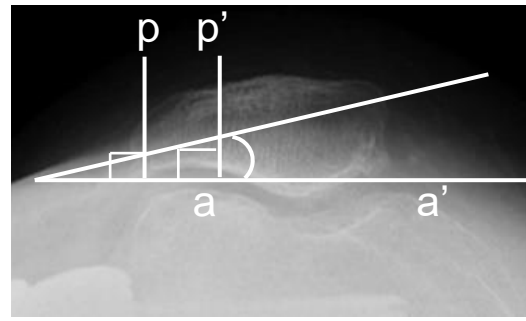
Mean (SD)

Change in the PF joint congruity

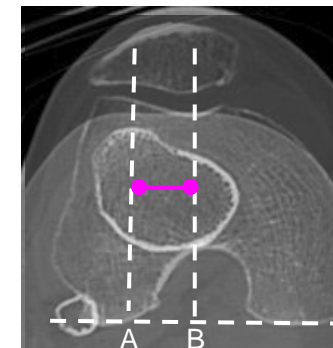
	Pre-operative	Post-operative	<i>P</i> value
Caton-Deschamps Index	0.9 (0.3)	0.9 (0.2)	<i>NS</i>
Radiological Q-angle (°)	11.5 (4.6)	6.1 (3.4)	<0.001
Tilting angle (°)	7.4 (4.3)	5.4 (3.3)	<0.001
Lateral shift ratio (%)	18.2 (7.2)	13.9 (5.9)	<0.001
TT-TG distance (mm)	23.2 (12.8)	21.8 (13.2)	<0.001
Femoral anteversion (°)	24.6 (13.7)	21.7 (13.2)	0.004



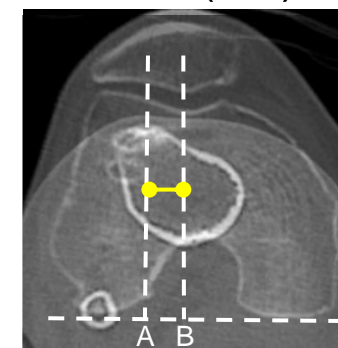
Pre



Post



Pre



Post

Mean (SD)

- Postoperative clinical scores significantly improved after M-DFO
- The valgus malalignment was significantly corrected to mild varus alignment
- Regarding postoperative PF joint, the radiological Q-angle, the tilting angle, the mean femoral anteversion and TT-TG distance was significantly decreased
 - ✓ The lateral shift ratio showed significant medial translation

- The goal of correction angle of valgus HTO has been well studied and established

Fujisawa et al Clin Orthop North Am 1979

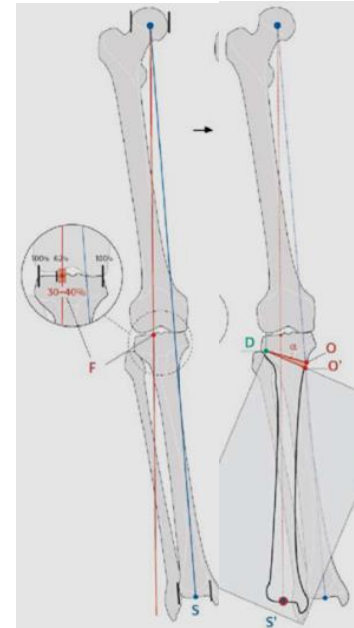
- However, the goal of varus correction angle of the valgus knee remains unknown

- ✓ Favorable clinical outcomes in varus DFO were reported to be obtained in the alignment within MA of 36-43%

Shivji et al KSSTA 2021

- In this study

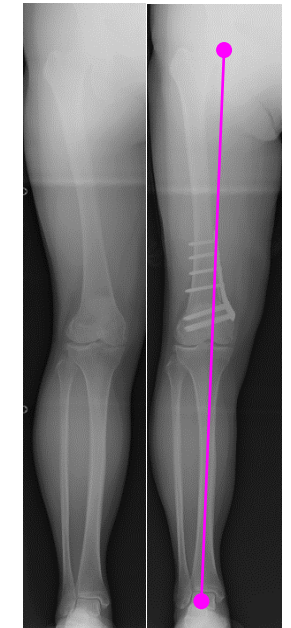
- ✓ MA was 42.1% and HKA -2°
- ✓ Clinical scores significantly improved



*Fujisawa et al
Clin Orthop North Am 1979*



*Forkel et al
KSSTA 2014*



Present study

- PF congruity in DFO

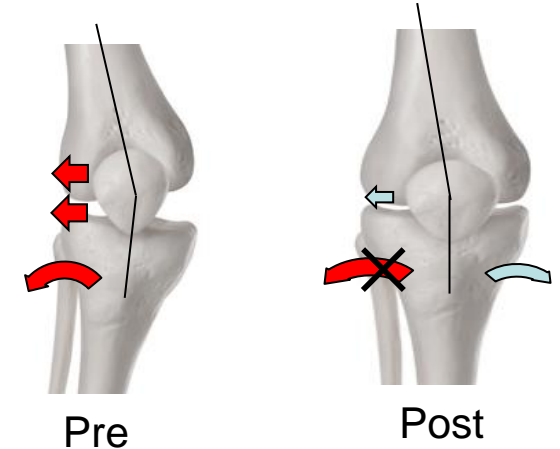
- ✓ Femoral anteversion affect the tilting angle in DFO

Nha et al AJSM 2018

- ✓ 3D-CT simulation study

- The Q-angle changed linearly 0.9° per 1° of varization
- TT-TG distance changed irregularly and minimally.

Flurly et al KSSTA 2021



- Present study

- ✓ The reduction of PF congruity suggested that this osteotomy might decrease the contact pressure on the lateral PF joint by decreasing the Q angle, TT-TG distance, and femoral anteversion
- ✓ M-DFO can be a treatment option for lateral compartment OA with PFOA

- This study clearly demonstrated that postoperative clinical scores significantly improved after M-DFO
- M-DFO decreased radiological Q-angle, the tilting angle, lateral shift ratio, TT-TG distance, and femoral anteversion
- The present study suggests that M-DFO effectively improved the congruity of the PF joint in valgus deformity