

***Morphological analyses of Distal Femur for Surgical
Reference in Bi-plane Distal Femoral Osteotomy***

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COI Disclosure

Presenter`s names: ©Shohei Sano, Takehiko Matsushita, Naosuke Nagata, Koji Nukuto,
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No disclosure with regard to this presentation.

Introduction

✓ Distal femoral osteotomy (DFO)

Treatment of patients with lower mal-alignment limb

[1] *Backstein D, et al. ; J Arthroplasty. 2007*

[2] *Kosashvili Y, et al. ; Int Orthop. 2010*

✓ Biplanar DFO

Large contact area / Better axial stability than single DFO

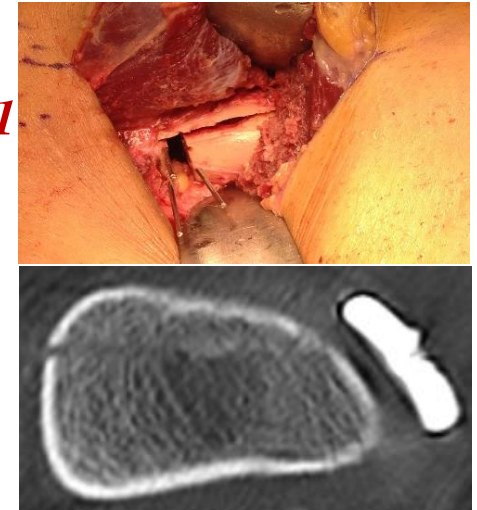
[3] *Brinkman J-M, et al. ; Knee Surg Sports Traumatol Arthrosc 2011*

A careful attention is required when creating the anterior flange to determine osteotomy angle and thickness

However

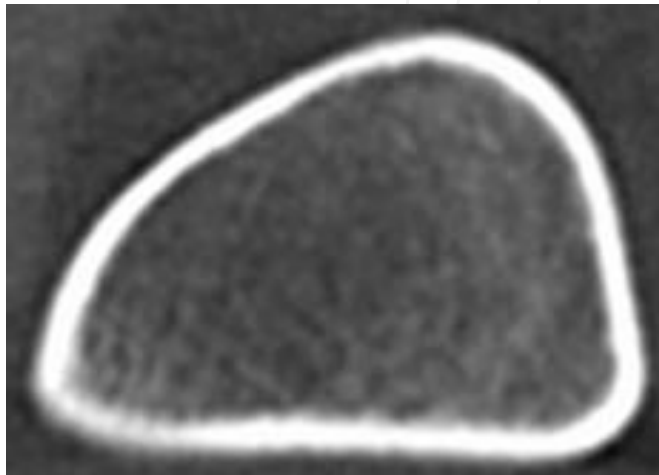


Morphological characteristics of distal femurs for DFO have not been well examined.

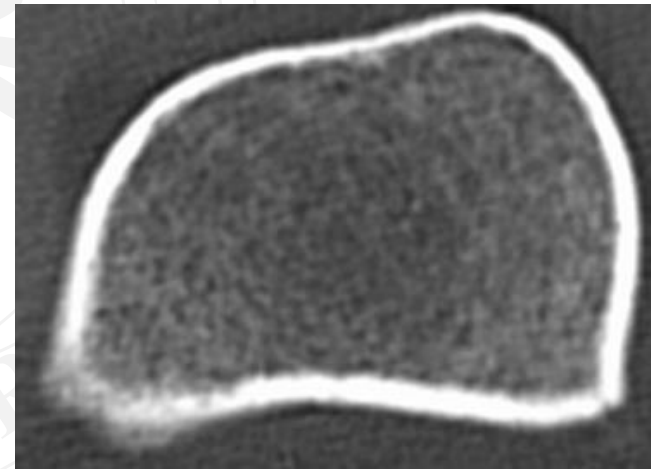


Purpose

Morphological characteristic of distal femur based on the cortical shape for surgical reference in DFO.



Valgus knee



Varus knee

※ Left side is inside, right side is outside

Patient profiles

Inclusion

- Retrospective analysis (6/1/2012 - 4/1/2022)
- Patients who underwent DFO, high tibial osteotomy (HTO) and total knee arthroplasty (TKA) in our hospital
- Plain CT scan before surgery

Exclusion

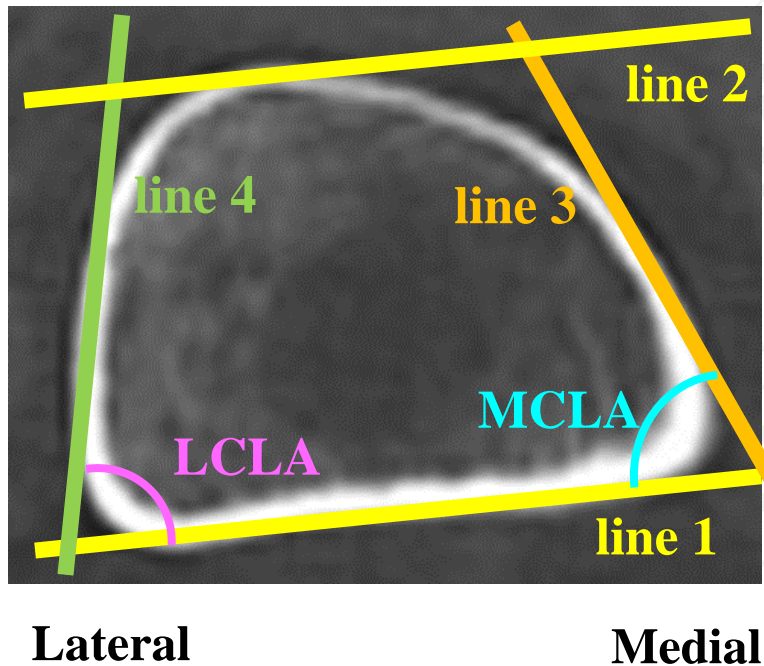
- Post-traumatic severe deformity
- Rheumatoid arthritis

50 valgus knees in 49 patients (16 males / 33 females)

50 varus knees in 48 patients (28 males / 20 females)

Methods: Angle measurement

- ✓ The axial slice 65 mm proximal to the joint line was chosen based on the average starting level of the transverse osteotomy in DFO previously performed in our hospital.

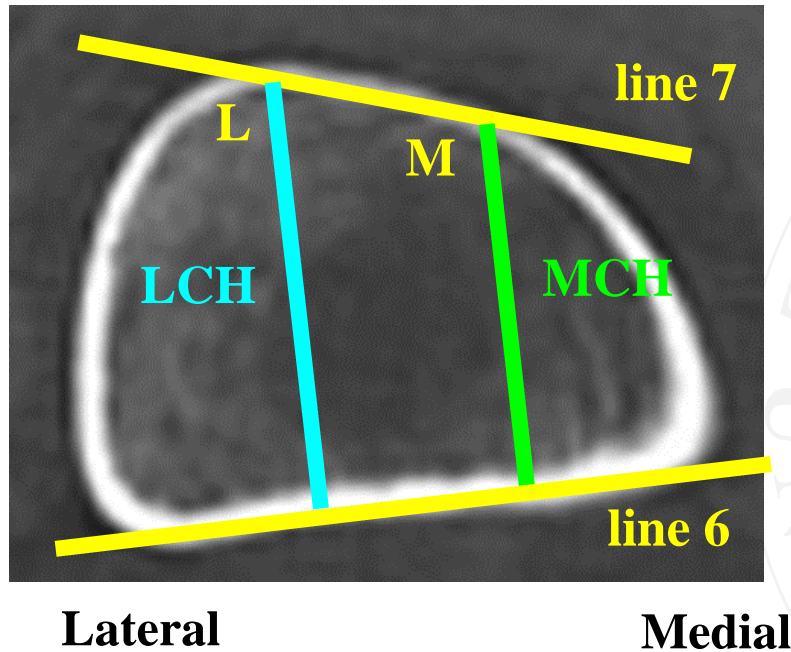


- ① A tangential line to the outside of the posterior cortex was drawn (line 1)
- ② A tangential line to the anterior cortex and parallel to the line 1 was drawn (line 2)
- ③ Tangential lines to the medial cortex (Line 3) and to the lateral cortex (Line 4) were drawn

Medial cortex line angle (MCLA) : Angle between Line 1 and Line 3

Lateral cortex line angle (LCLA) : Angle between Line 1 and Line 4

Methods: Height measurement



- ① The tangential lines to the inside of the posterior cortex line (Line 6) and the anterior cortex (Line 7) were drawn.
- ② The inner crossing points of the Line 7 at the medial side (point M) and the lateral side (point L) were determined.

Medial cortex height (MCH) : Vertical distance between Line 6 and Point M
Lateral cortex height (LCH) : Vertical distance between Line 7 and Point L

Results

□ Comparison between MCLA and LCLA in valgus and varus knees

	MCLA (°)	LCLA (°)	P value
valgus	68.1 ± 8.5	78.4 ± 4.3	< 0.01
varus	74.8 ± 5.9	80.4 ± 4.7	< 0.01

➔ **MCLA** was **significantly smaller than LCLA** in both valgus and varus knees

□ Comparison between MCH and LCH in valgus and varus knees

	MCH (mm)	LCH (mm)	P value
valgus	21.3 ± 3.5	27.3 ± 3.8	< 0.01
varus	24.7 ± 3.1	30.3 ± 3.3	< 0.01

➔ **MCH** was **significantly lower than LCH** in both valgus and varus knees

Results

□ Comparison of MCLA, LCLA, MCH, and LCH between valgus and varus knees

	valgus	varus	P value
MCLA (°)	68.1±8.5	74.8±5.9	< 0.01
LCLA (°)	78.4±4.3	80.4±4.7	0.015
MCH (mm)	21.3±3.5	24.7±3.1	< 0.01
LCH (mm)	27.3±3.8	30.3±3.3	< 0.01

➔ **MCLA and LCLA in valgus knees** were **significantly smaller** than those in varus knees.

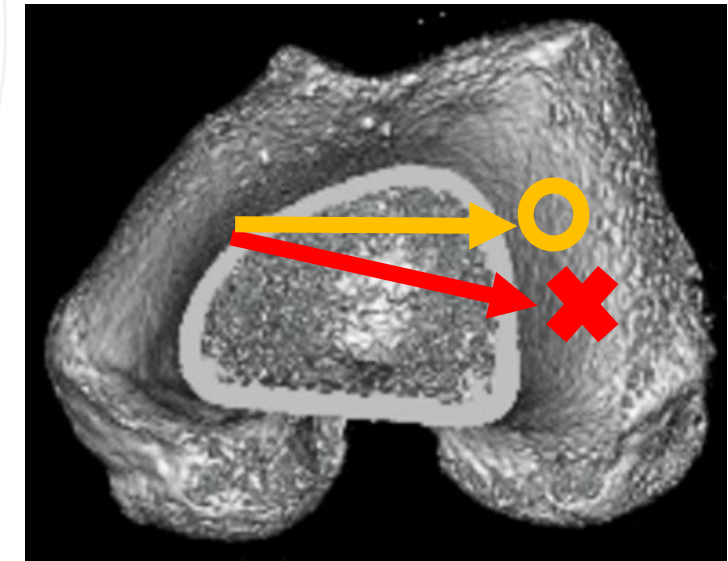
MCH and LCH in valgus knees were **significantly lower** than those in varus knees

Discussion

The **medial cortical angle and height were smaller and lower** than those of the lateral cortex at the osteotomy site, particularly in patients with **valgus knee**.



A careful control of cutting angle may be necessary when creating anterior flange to **avoid too thick anterior flange**.



Conclusion

- The **angle and height of the medial cortex** tended to be **smaller and lower** than those of the lateral cortex at the osteotomy level, particularly in **valgus knees**.
- Surgeons should **consider anatomical difference between medial and lateral cortex** and be careful when creating anterior flange, particularly in **medial closing wedge DFO**.

References

- [1] Backstein D, *et al.* A. Long-term follow-up of distal femoral varus osteotomy of the knee. *J. Arthroplasty.* 22, 2-6 (2007).
- [2] Kosashvili Y, *et al.* Distal femoral varus osteotomy for lateral osteoarthritis of the knee: A minimum ten-year follow-up. *Int. Orthop.* 34, 249-254 (2010).
- [3] Brinkman J-M, *et al.* Axial and torsional stability of an improved single-plane and a new bi-plane osteotomy technique for supracondylar femur osteotomies. *Knee Surg Sports Traumatol Arthrosc.* 19(7), 1090-1098 (2011).