



Three-Dimensional Evaluation of Distal Femoral Valgus Angle Using Whole Leg CT in Total Knee Arthroplasty



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Introduction

- Proper implant positioning is important to get correct leg alignment in total knee arthroplasty (TKA). However, the **three-dimensional evaluation** of accurate lower limb alignment is still controversial.
- Therefore, we performed a three-dimensional evaluation of the **distal femoral valgus angle (DFVA)** using full-leg CT before TKA.



Materials & Methods

- Consecutive 217 patients (169 females, 48 males, mean age: 75.4 y.o), yielded 296 knees were included in this study.
- CT-based patient-specific 3D femur model by ZedKnee software (LEXI®) was used to define a mechanical axis and distal anatomical axis of the femur.
- The case where the angle deviates from the DFVA by $\pm 3^\circ$ was defined as the outlier, and the ratio of the outlier was evaluated.

Table1. Patients Demographics

Number of Patients	217
Gender	
Female	169
Male	48
Number of knees	296
Mean age (yr)*	75.4 \pm 7.4
Mean BMI (kg/m²)*	26.4 \pm 4.3



Materials & Methods

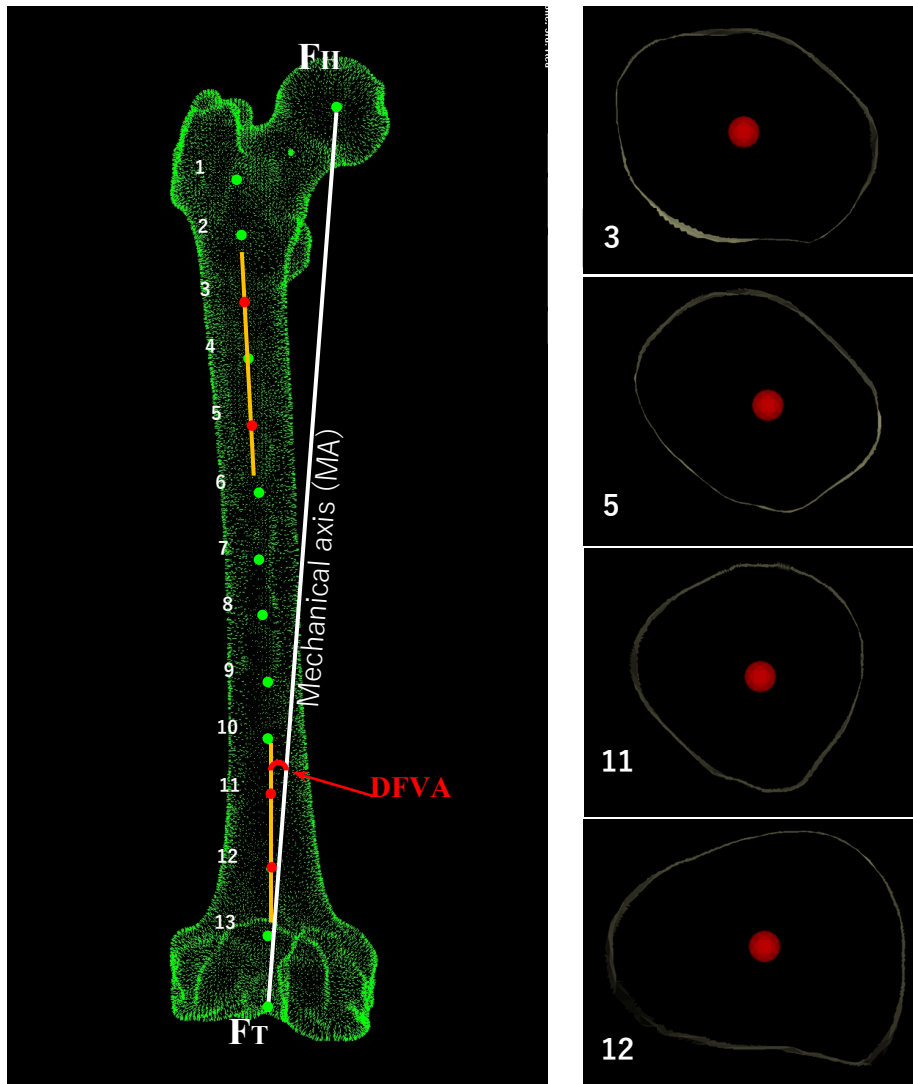


Fig. 1 Determination of DFVA

Divide FH and FT into 14 equal parts. Proximal femoral anatomical axis (PFA) is determined as the line connecting the centroids between the 3rd and 5th cross-sections of the femur. In the same way, distal femoral anatomical axis (DFA) is determined between the 11th and 12th sections. Distal femoral valgus angle (DFVA) is calculated as an angle to the mechanical axis of the femur (MA). *FH: femoral head center, FT: femoral trochlea

Results 1

Table 1. Femoral Valgus Angle compared to MA*

Distal femoral valgus angle (DFVA)	6.2 ± 2.2°
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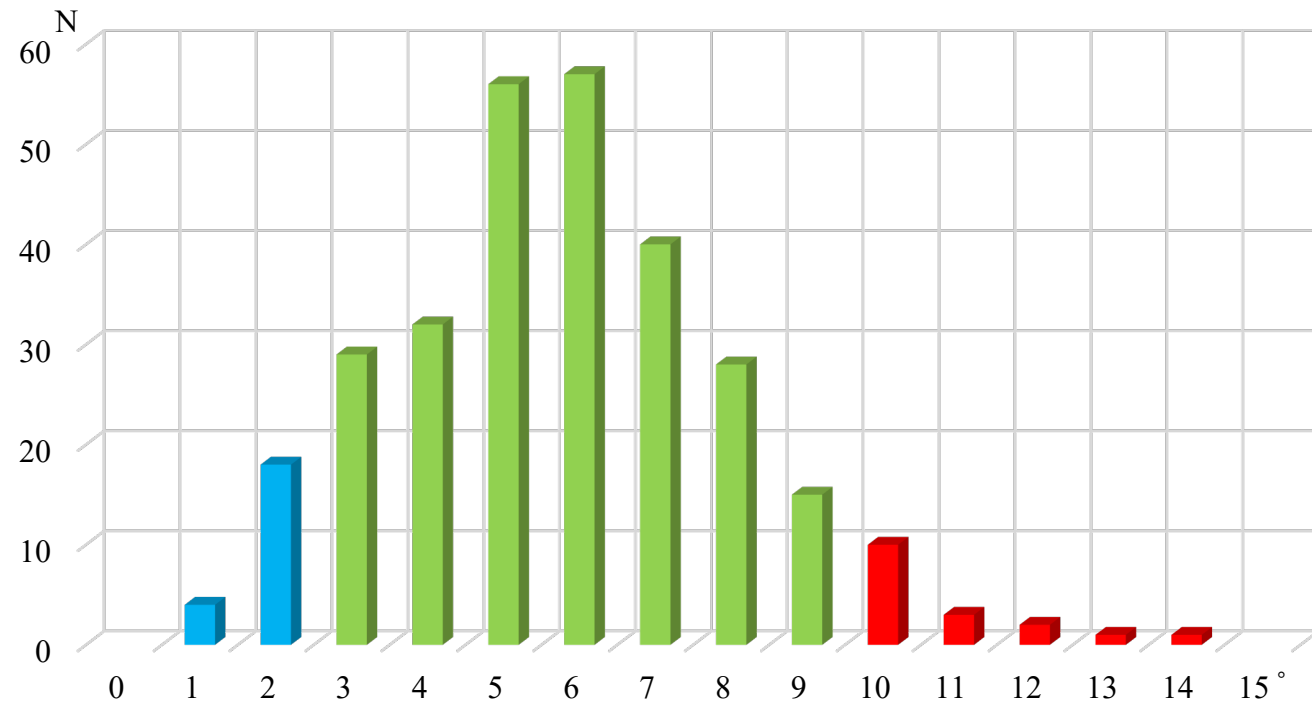
Presented as mean±SD

***MA: mechanical axis**

- Outliers were recognized in 53 knees (17.9%).**

Results 1

DFVA Distribution



- **22 (7.6%) had DFVA less than 3°**
- **31 (10.5%) had greater than 9°**

Discussion

- Three-dimensional CT evaluation for limb alignment is more accurate because there is an error depending on the limb position in the X-ray. **This study showed distal femoral valgus angle three-dimensionally based on the individual 3D bone model.**
- Previous reports support our results that **DFVA varies from each patient, the same cutting angle may lead to malposition of the femoral component in TKA.**
- This small cohort study would need more number of patients.





References

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Significance

- **This study showed the variability of distal femoral anatomy, and orthopedic surgeons should consider it for the accuracy of postoperative femoral component alignment and limb alignment.**
- **However, even higher quality researches are needed.**