

Local Soft Tissue Thickness in Unicompartmental Knee Arthroplasty: Strong Inter-Parameter Correlation, Moderate Correlation with BMI, and no Impact on Implant Positioning

Lorenz Pichler ^{1,2}, Moses KD El Kayali ¹, Rosa Berndt ¹, Carsten Perka ¹, Clemens Gwinner ¹, Danko Dan Milinkovic ¹

1. Charité - Universitätsmedizin Berlin
Center for Musculoskeletal Surgery
2. Medical University of Vienna
Department of Orthopedics and Trauma-Surgery

The authors report no conflict of interest.

Background & Research Question

Several parameters for the measurement of local soft-tissue thickness (LSTT) on radiographs of the lower extremities have been described. ¹

However, their inter-parameter correlations, correlations with patient BMI, and impact on implant positioning in UKA remain unclear.

Methods

1. **93 patients** with UKA (Oxford Partial Knee; Zimmer Biomet)
2. **Measurements of LSTT and Implant Position Parameters (IPPs)**
according to manufacturer on lateral and anterior-posterior long leg radiographs fulfilling quality criteria
3. **Correlation between LSTTs, LSSTs and BMI, and LSSTs and IPPs**
tested using Pearson Correlation Coefficient

Parameters

Local Soft-Tissue Thickness

1. Pretibial subcutaneous fat (PSF)
2. Knee adipose index (KAI)
3. Ankle adipose index (AAI)

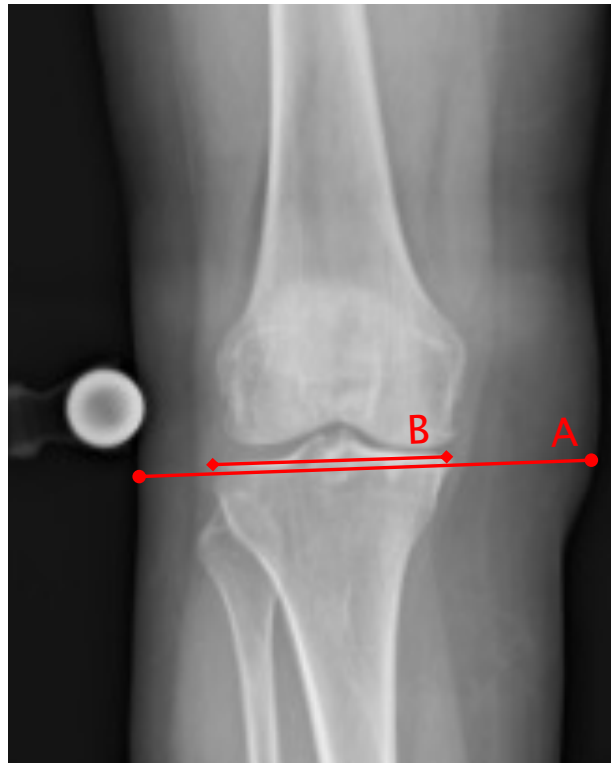
Implant Position

- A. Femoral valgus/varus angle (FVVA)
- B. Femoral flexion/extension angle (FFEA)
- E. Tibial varus/valgus angle (TVVA)
- F. Tibial flexion/extension angle (TFEA)

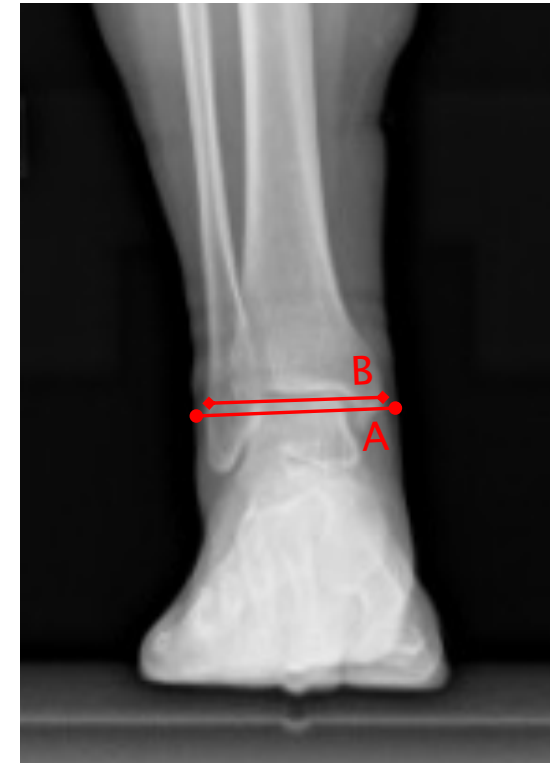
Local Soft-Tissue Thickness Parameters



Pretibial subcutaneous fat (PSF)
Measured 12 cm distal of joint line



Knee adipose index (KAI)
A/B at height of tibial plateau

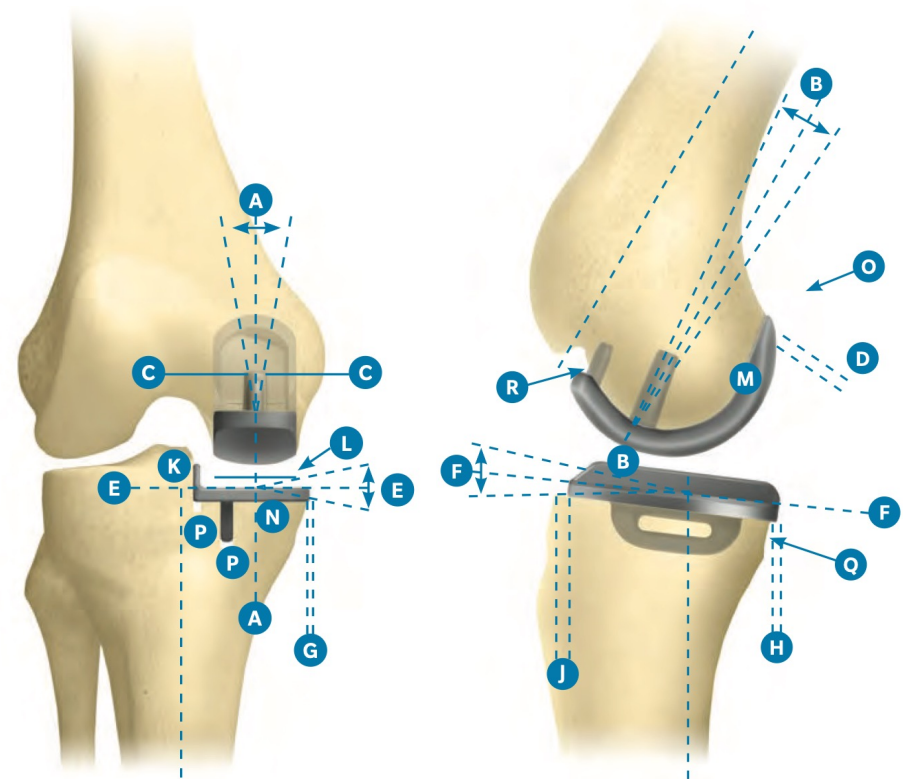


Ankle adipose index (AAI)
A/B at height of Malleoli

Implant Position Parameters (IPP) Measurements

Implant Position

- A. Femoral valgus/varus angle (FVVA)
- B. Femoral flexion/extension angle (FFEA)
- E. Tibial varus/valgus angle (TVVA)
- F. Tibial flexion/extension angle (TFEA)



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IPP Target Values

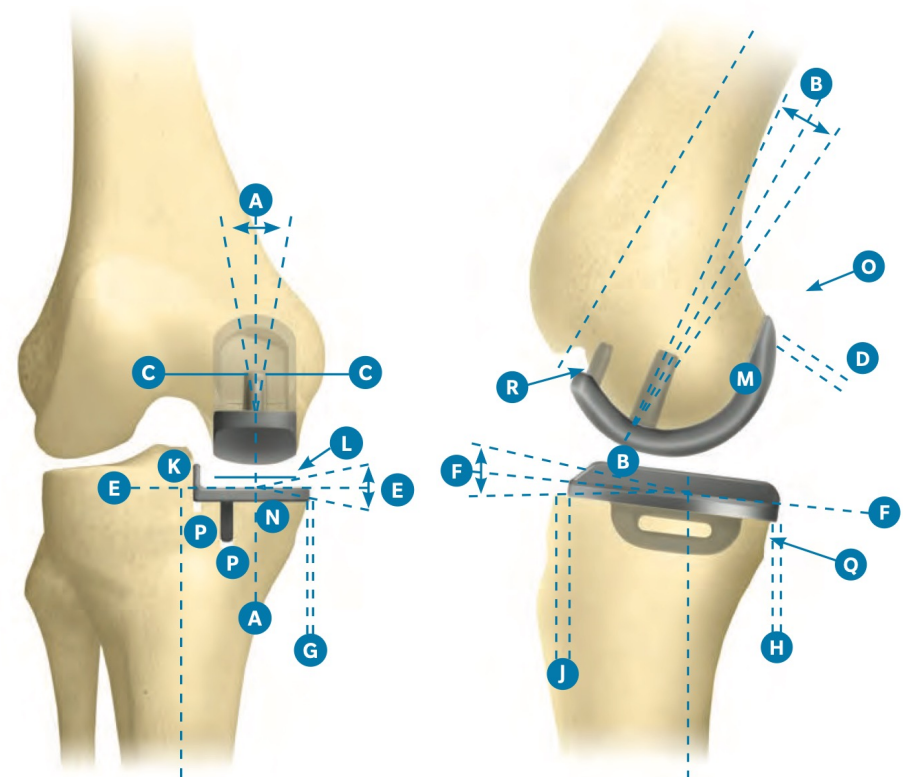
Femoral Component (Relative to the Femur)

A/A	Varus/valgus angle	< 10 degrees varus — < 10 degrees valgus
B/B	Flexion/extension angle	15 degrees flexion — < 0 degrees extension
C/C	Medial/lateral placement	Central
D	Posterior fit	Flush or < 4 mm overhang

Tibial Component (Relative to the Tibia)

E/E	Varus/valgus angle	< 5 degrees varus — < 5 degrees valgus
F/F	Posteroinferior tilt	7 degrees + or - 5 degrees
G	Medial fit	Flush or < 2 mm overhang
H	Posterior fit	Flush or < 2 mm overhang
J	Anterior fit	Flush or < 5 mm short
K	Lateral fit	Flush — No gap

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Results

Parameter	Mean		Correlation w/ BMI	Correlation w/ e. o.
BMI	28.4	SD 4.9		
PSF	12.4 mm	SD 5.8	0.46	w/ KAI: 0.70
KAI	1.6 mm	SD 0.2	0.45	w/ AAI: 0.64
AAI	1.2 mm	SD 0.1	0.36	w/ PSF: 0.61

Parameter	Cases w/ recommend implant position achieved
Femoral valgus/varus angle	89.2%
Femoral flexion/extension angle	77.4%
Tibial varus/valgus angle	66.7%
Tibial flexion/extension angle	77.4%

Conclusions

Local soft tissue thickness parameters of the lower extremities correlate well with each other but only moderately with BMI and have no impact on accurate implant positioning in UKA.

References

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Local Soft-Tissue Thickness vs. Body Mass Index as Predictors of
Complications After Total Knee or Hip Arthroplasty: A Literature
Review. JBJS Rev. 2023;11(11).