

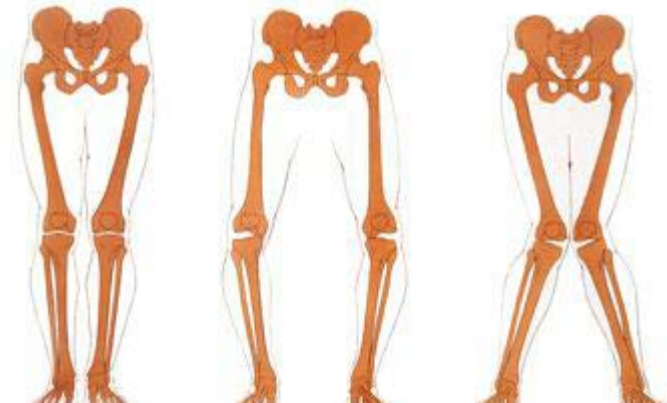
Cite this as: Tong LIU, Chen-yu WANG, Jian-lin XIAO, Lan-yu ZHU, Xue-zhou LI, Yan-guo QIN, Zhong-li GAO, 2014. Three-dimensional reconstruction method for measuring the knee valgus angle of the femur in northern Chinese adults. *Journal of Zhejiang University-SCIENCE B (Biomedicine & Biotechnology)*, 15(8):720-726. [doi:10.1631/jzus.B1400019]

Three-dimensional reconstruction method for measuring the knee valgus angle of the femur in northern Chinese adults

Key words: Knee valgus angle, 3D reconstruction femoral model, Northern Chinese adults, Total knee arthroplasty, Preoperative design

Research Background

- Total knee arthroplasty (TKA) is regarded as an effective treatment approach for late-stage osteoarthritis.
- One key to minimizing the TKA failure rate is to reestablish the normal mechanical alignment of the knee joint, while preventing any abnormal varus or valgus errors.
- Knee Valgus Angle(KVA) plays an important role in restoring normal alignment of the knee joint.

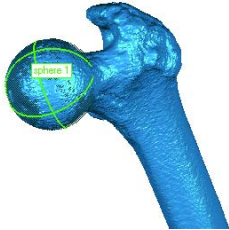


Normal

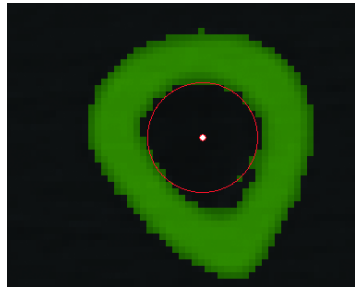
Varus

Valgus

Methods



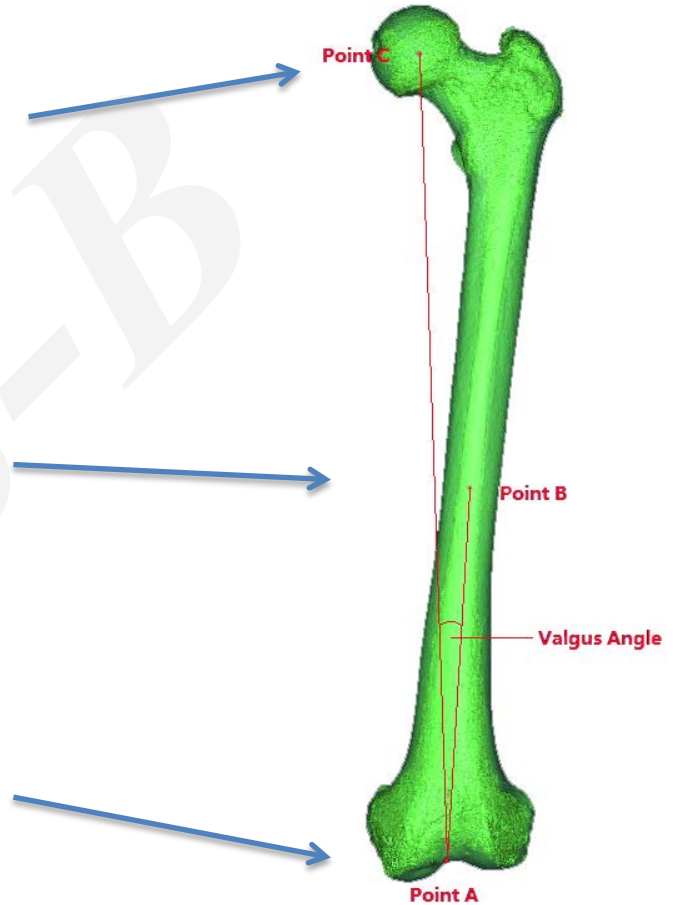
Point C
(femoral head rotation center)



Point B
(the midpoint of the medullary cavity 20 cm above the knee-joint line)



Point A
(the deepest point in the intercondylar notch)



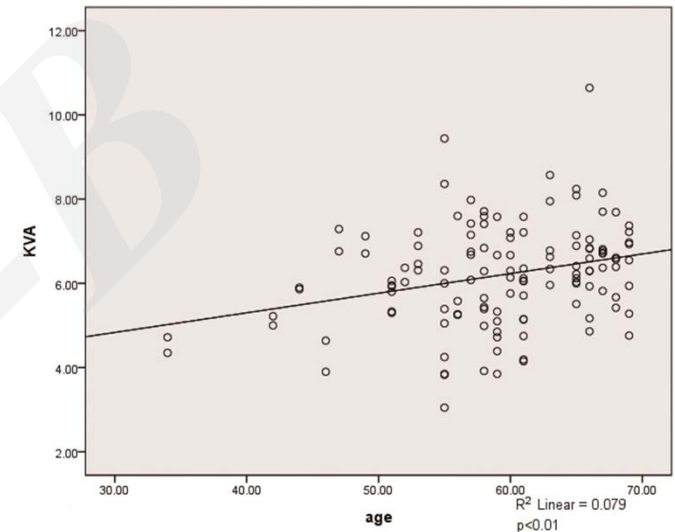
- CTA data in DICOM format for 128 normal femurs were chosen for analysis.
- The knee valgus angle was defined as the angle enclosed by the distal femoral anatomical axis (Line AB) and the femoral mechanical axis (Line AC).

Results & Conclusions

Knee Valgus Angle Data by Gender and Side

KVA	<i>n</i>	Average(°)	Range(°)
Total	128	6.20 ± 1.20	3.05 - 10.64
Male	76	6.02 ± 1.25	3.05 - 10.64
Female	52	6.47 ± 1.08	4.15 - 8.57
Left	64	6.19 ± 1.31	3.05 - 10.64
Right	64	6.21 ± 1.09	3.83 - 8.36
Male-Left	38	6.04 ± 1.44	3.05 - 10.64
Male-Right	38	6.00 ± 1.06	3.83 - 8.36
Female-Left	26	6.42 ± 1.10	4.19 - 8.57
Female-Right	26	6.52 ± 1.09	4.15 - 8.09

KVA indicates Knee Valgus Angle.
Average is mean ± SD.



- During total knee arthroplasty, choosing a valgus cut angle of approximately 6° may achieve a good result in reestablishing the natural mechanical alignment of the lower extremity for patients of Northern Chinese ethnicity.
- Larger valgus cut angles should be chosen for older patients.