

3D biometrics for hindfoot alignment using Weight Bearing CT: a prospective assessment of 140 feet

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Category: Hindfoot

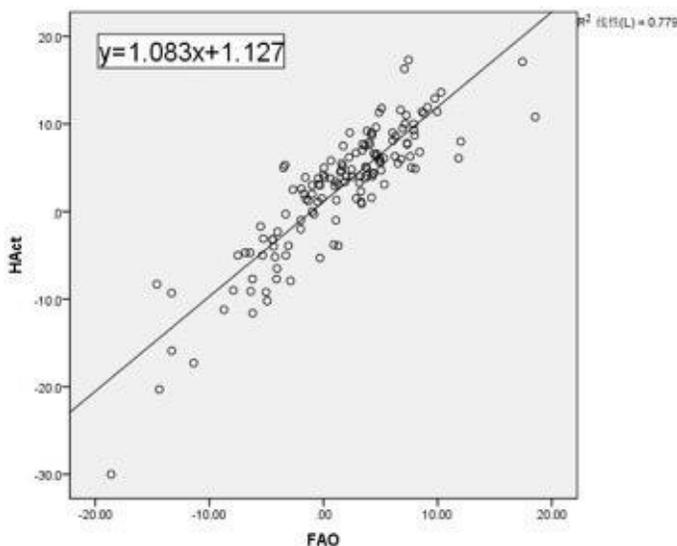
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Introduction/Purpose: Hindfoot alignment is an important reference for foot and ankle surgery, and the Foot Ankle Offset (FAO) using semi-automatic software has been reported as a valuable hindfoot alignment measurement in weightbearing CT(WBCT). The objective was to assess the clinical relevance and reproducibility of the FAO value for hindfoot alignment and compare it with previous findings.

Methods: A prospective study was conducted, with ethics committee approval. Patients were included, clinically examined and divided into 3 groups: normal alignment (Group 1), valgus (Group 2), varus (Group 3). A continuous series of 140 feet (71 patients) were referred from September to December 2017 (65 normal, 41 valgus, and 34 varus). All patients had a bilateral weight bearing CT , and the FAO values were recorded. The long axial view angle(HAct)was measured on Digitally Reconstructed Radiographs (DRR) as comparison. All values were measured and compared by two different investigators. The reproducibility of FAO and HAct were calculated using intraclass correlation coefficients(ICCs) and regression analysis was conducted to study the correlation between the two methods.

Results: In Group 1, the mean value for FAO/HAct was $1.69\% \pm 2.58\% / 4.13 \pm 2.67$, in Group 2, the FAO/HAct was $7.46\% \pm 3.18\% / 9.00 \pm 3.43$; in Group 3 the values were $-6.11\% \pm 4.55\% / -7.49 \pm 6.06$. The intra- and interobserver reliability were 0.991/0.992 and 0.976/0.976. There was a good linear correlation between HAct and FAO ($R^2=0.778$, and the regression slope was 1.083).

Conclusion: The use of weightbearing CT can help characterize hindfoot alignment objectively using WBCT. The present study is the first prospective comparative assessment of this technology and shows that FAO has good repeatability, and it correlates well with clinical examination,, X ray findings and previous literature. The FAO is a clinically relevant and reproducible method for measuring hindfoot alignment.



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