Reliability of Hindfoot Alignment Using Weightbearing CT Semi Automatic Software : an Analysis of 135 Feet
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Introduction/Purpose: Hindfoot Alignment (HA) on 2D radiographs presents anatomical and operator-related bias. In this study, weightbearing CT (WBCT) was used to measure HA using a semi-automatic software which gives HA as a value of Foot Ankle Offset (FAO) after selecting four landmarks (weight bearing points of first and fifth Metatarsals, Calcaneus and center of the ankle joint). We assessed the intra and interobserver reproducibility and the distribution of FAO values in a series of datasets from clinically normal, varus and valgus cases. We hypothesized that reproducibility would be excellent. Furthermore, FAO in normals should have a Gaussian distribution and be significantly different to the varus and valgus groups.

Methods: In this level 3, retrospective comparative study, WBCT (PedCAT ®, CurveBeam LLC, Warrington, PA, USA) datasets were obtained from an existing database. The 135 feet were assessed by a senior foot and ankle surgeon as normal, varus or valgus (57, 38 and 40 respectively). Two surgeon investigators (one senior and one trainee) independently analyzed each case using a semi-automatic HA measurement tool (TALAS ™, CurveBeam LLC, Warrington, PA, USA). A third, independent investigator conducted the statistical analysis using Stata® Software.

Results: The overall intraobserver and interobserver reliability were 0.99 ± 0.002 and 0.97 ± 0.02 respectively. In normal cases, mean value for FAO was 2.38% ± 2.96, whereas in varus and valgus cases mean was -11.67% ± 6.90 and 11.47% ± 5.79, respectively (p<0.001). The normal population had a Gaussian distribution with a Kolmogorov-Smirnov test > 0.8

Conclusion: This study reports excellent reliability and discriminative power of a semi-automatic 3D measurement tool for Hindfoot Alignment in WBCT.