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Hindfoot alignment of adult acquired flatfoot deformity: a comparison of clinical assessment and weightbearing cone beam CT examinations

Alexandre Leme Godoy-Santos¹, Cesar de Cesar Netto², Lauren Roberts³, Francois Lintz⁴, Lew C. Schon², Shadpour Demehri⁵

1. Instituto de Ortopedia e Traumatologia, Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo, São Paulo, SP, Brazil.
2. Medstar Union Memorial Hospital, Baltimore, MD, USA.
3. Hospital for Special Surgery, New York City, USA.
4. Clinique de L'Union in Toulouse, Toulouse, France.
5. Johns Hopkins University School of Medicine, Baltimore, MD, USA.

ABSTRACT

Introduction: Clinical assessment of hindfoot alignment (HA) in adult acquired flatfoot deformity (AAFD) can be challenging, and the weightbearing (WB) cone beam CT (CBCT) may potentially better demonstrate this three-dimensional (3D) deformity.

Objective: To compare clinical and WB CBCT assessments of HA in patients with AAFD.

Methods: In this prospective study, we included 12 men and 8 women (mean age: 52.2 years, range: 20-88) with flexible AAFD. All subjects also underwent WB CBCT and clinical assessment of hindfoot alignment. Three fellowship-trained foot and ankle surgeons performed six hindfoot alignment measurements on the CT images. Intra- and Inter-observer reliabilities were calculated using Intraclass correlation (ICC). Measurements were compared by paired T-tests, and p-values less than .05 were considered significant.

Results: The mean of clinically measured hindfoot valgus was 15.2 (95% confidence interval [CI]: 11.5-18.8) degrees. It was significantly different from the mean values of all WB CBCT measurements: Clinical Hindfoot Alignment Angle, 9.9 (CI: 8.9-11.1) degrees; Achilles tendon/Calcaneal Tuberosity Angle, 3.2 (CI: 1.3-5.0) degrees; Tibial axis/Calcaneal Tuberosity Angle, 6.1 (CI: 4.3-7.8) degrees; Tibial axis/Subtalar Joint Angle, 7.0 (CI: 5.3-8.8) degrees, and Hindfoot Alignment Angle, 22.8 (CI: 20.4-25.3) degrees. We found overall substantial to almost perfect intra- (ICC range: 0.87-0.97) and interobserver agreement (ICC range: 0.51-0.88) for all WB CBCT measurements.

Conclusion: Using 3D WB CBCT can help characterize the valgus hindfoot alignment in patients with AAFD. The different CT measurements were reliable and repeatable, significantly differing from the clinical evaluation of hindfoot valgus alignment.

Keywords: Flatfoot deformity; Measurement; Weightbearing computed tomography.

