

# RELIABILITY OF FOOT ALIGNMENT RADIOGRAPHIC MEASURES IN DIABETIC NEUROPATHIC DEFORMITIES

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## Purpose

The purpose of this study was to report the inter- and intra-rater reliability of radiological measures of foot deformity in subjects with diabetes mellitus (DM), peripheral neuropathy (PN), and foot related complications.

## Subjects

- 15 subjects with DM, PN and foot related complications
  - 6 men, 9 women, age  $51 \pm 9$  years
  - Body mass index  $34 \pm 5$  kg/m<sup>2</sup>
  - Duration of DM  $17 \pm 9$  years

## Methods

- Transverse alignment from anterior/posterior radiograph
  - ❖ Angle formed by talocalcaneal bisector and 2<sup>nd</sup> metatarsal shaft (degrees) (Figure A)
- Sagittal alignment from lateral radiograph
  - ❖ Meary's angle (degrees), Calcaneal Pitch (degrees), Cuboid height (mm) (Figure B)
- Raters: 1) Fellowship Trained Orthopaedic Foot and Ankle Surgeon (23 yrs experience), 2) Fellowship Trained Orthopaedic Foot and Ankle Surgeon (2 yrs experience), 3) Diagnostic Radiology Resident (PGY 3)
- Rater 1 repeated measurements twice. Raters 2 and 3 repeated measurements once
- Root Mean Square Standard Deviation (RMS SD) was calculated to determine the average measurement error
- Least Significant Change of the RMS SD (LSC) was calculated to determine the smallest change that is considered a biologically real change, with 95% confidence

## Radiological Methods

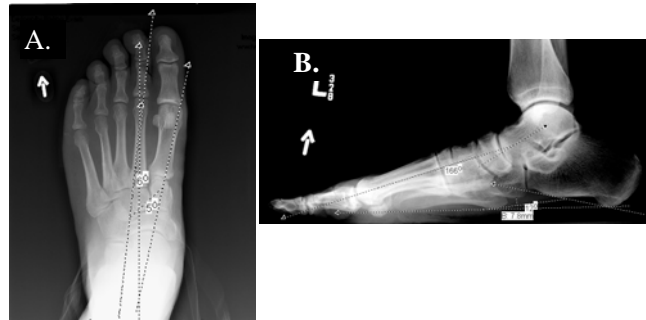
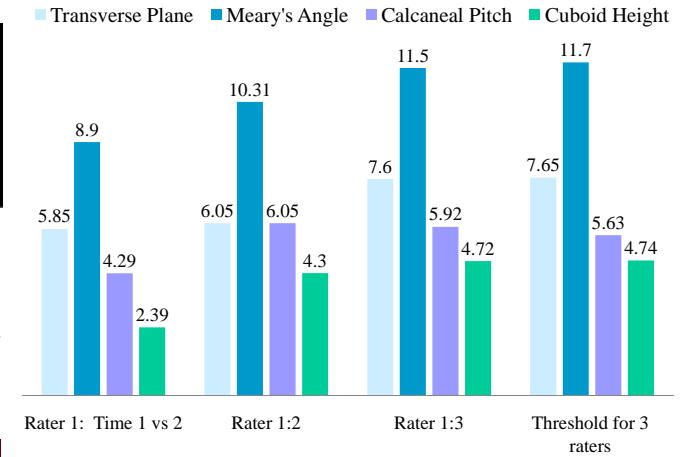
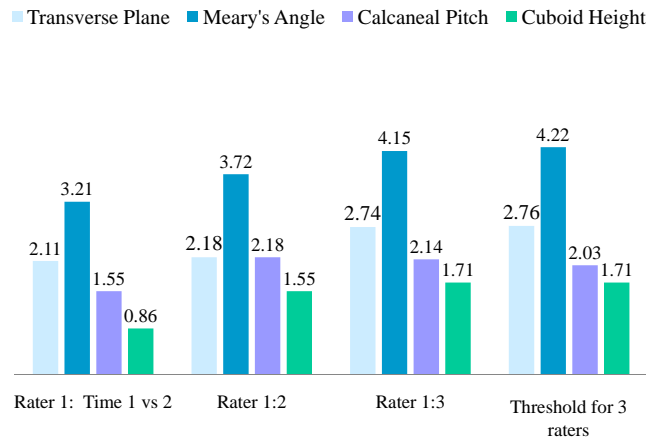


Figure A: Anterior/Posterior Measure of Talocalcaneal bisector and 2<sup>nd</sup> metatarsal shaft. B. Lateral measures of Meary's Line, Calcaneal Pitch, and Cuboid Height

## Least Significant Change (RMS SD)



## Root Mean Square Standard Deviation



## Conclusions

- Transverse plane, calcaneal pitch, and cuboid height alignment measures can be completed with excellent reliability within and between raters. Meary's angle is a challenging measure to make.
- The LSC values indicate that small changes in angular and distance measures on radiographs are important and require close attention.

## Clinical Relevance

- The ability to reliably measure foot alignment in a sample with DM, PN, and foot deformity will provide a needed tool to detect, monitor and prevent foot deformity progression and evaluate the effectiveness of intervention.