How Are Coronal Alignments of the Knee and Hindfoot Correlated?: A Clinical Study of 124 Lower Limbs Using 3D Weightbearing Imaging

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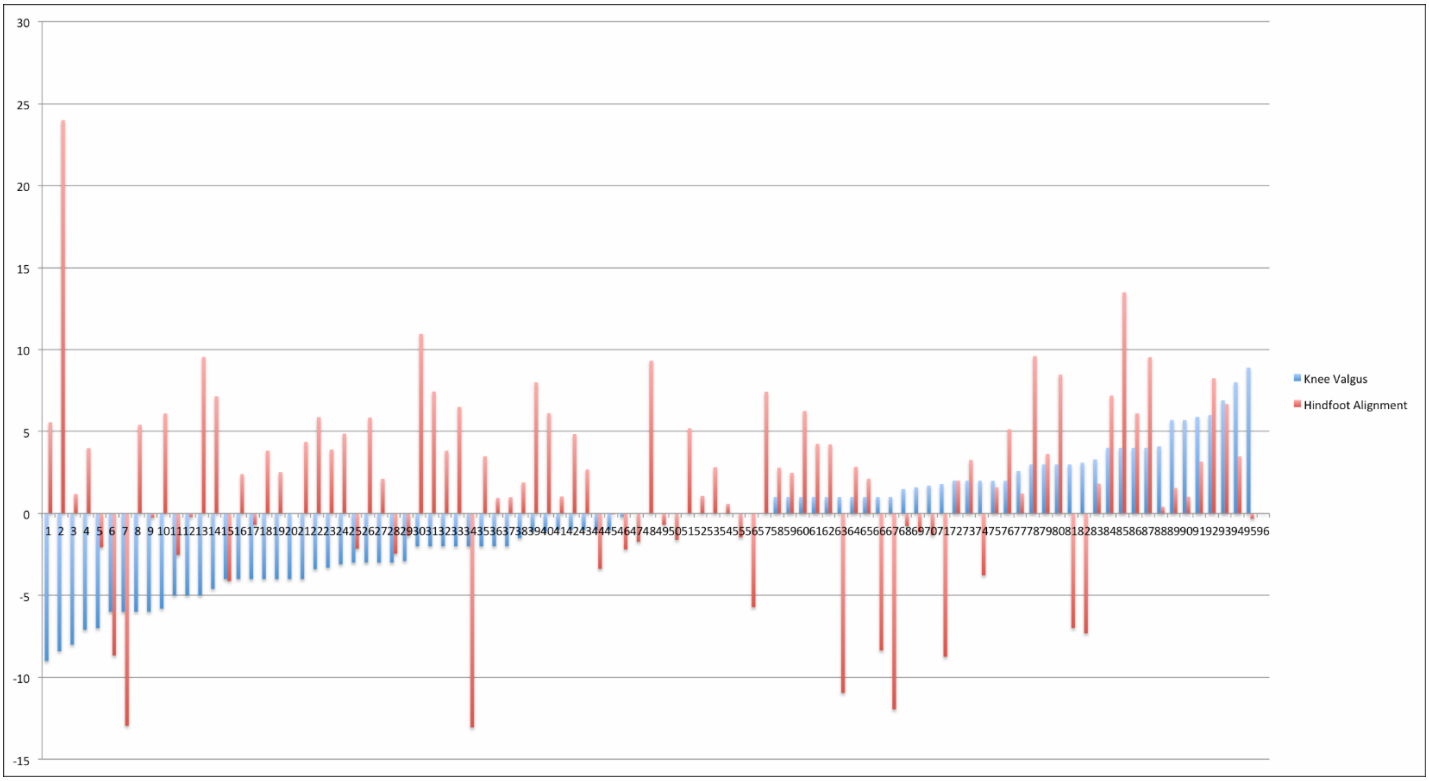
Introduction/Purpose: Hindfoot and knee coronal alignments have shown to be related in previous literature suggesting that there might be some degree of compensation between the two. However, previous studies have focused on the effects of knee surgery on hindfoot alignment, not on the preoperative relationship. Recent 3D weight bearing imaging technology may help to investigate this. The objective of this study was to analyse the preoperative relationships between knee and hindfoot coronal alignments using bilateral weight bearing CT (WBCT) and biplanar low dose radiography (BLDR). We hypothesized that hindfoot valgus and varus respectively compensates knee varus and valgus.

Methods: Relevant ethical approval was obtained for this retrospective comparative level 3 study including 124 limbs in 62 patients (32 female, 30 male), mean age 56 (23-84). Mean BMI was 27 (20-38). Cases included had been referred continuously according to diagnostic protocols in our institution, for a combined WBCT and BLDR investigation. Age, gender and BMI were recorded. Cases with a history of trauma or surgery, which may have caused a change in lower limb alignment, were excluded. Hindfoot alignment was measured using a semi automatic software (TALAS, Curvebeam, Warrington PA, USA) and given as Foot Ankle Offset (FAO). Knee alignment was measured using the EOS platform (EOS Imaging, Paris, France) and given as HKA. Distribution and demographics of hindfoot alignment in the varus and valgus knee groups were studied. Correlations were investigated using linear regression and Bland and Altman plots.

Results: Incidence of Varus hindfeet was 15.8% in the Valgus knee group and 25.5 % in the Varus knee group but the difference was not significant (p=0.82). Bland and Altman plots did not yield any additional result. No linear correlation was found between hindfoot and knee coronal alignments in the study population.

Conclusion: Our results do not confirm prior findings regarding compensatory valgus in varus knees, and do not confirm the hypothesis according to which linear compensatory mechanisms may relate knee and hindfoot alignments. In practice, these results suggest that in cases where knee and hindfoot misalignments are associated, the causes for each should be analyzed independently before any assumption is made as to hypothetical interactions. Furthermore, subsequent studies are warranted to investigate whether other kinds of non-linear correlations way be found in selected populations.



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