Editorial

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Editorial on Tibial torsion associates with tala morphology

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Editorial

Hindfoot alignment and anatomy are critical determinants of lower extremity biomechanics and human ambulatory function. With increasing annual processes and mid-to-long term results of total ankle arthroplasty (TAA), bigger attention has been applied to adjustment of deformity to improve functional results and period of implantation. Current literature has reported extensively on alignment in the coronal and sagittal planes; however, recent work has begun to evaluate the axial plane alignment in the tibia and foot. As TAA usage develops, axial alignment will likely play an significant role in results.

With patient-specific equipment platforms and growing availability of innovative imaging for preoperative planning, many patients are go through preoperative computed tomography (CT), which make available an evaluation of bone stock and deformity in the coronal/sagittal planes; in adding, CT has been verified to be an accurate, effective measurement of axial anatomy.

Anthropologically, talar morphology has been linked with evolution towards bipedalism and distinct variations across primate and human development. Although measurement and arrangement of the tibia and tibiotalar joint have continued to be informed and highlighted, minimal attention has been paid to the talus, with maximum reports rotating around anatomic measurements of cadaveric tali. One study on adult arthritic ankles estimates talar dome curvature, but does not address axial anatomy. Equally, limited literature concerning the relationship between axial plane morphology and parallel foot structure has been stated. Present work in the pediatric domain on external tibial torsion determines some transformed mechanics in the setting of pes planus as well as reduced muscle capacity in cerebral palsy. Association of tibial torsion to talar anatomy or hindfoot alignment in adults has been more challenging to extrapolate, with several studies unable to demonstrate a correlation between tibial torsion and pes planus, pelvic or femoral version, or general gait kinematics; however, these studies did not use advanced/3-dimensional imaging to evaluate axial anatomy.

Moreover, it is significant to note that standards for "advanced imaging" itself continue to develop. Over the past decade there have been significant advances in weightbearing CT (WBCT) imaging and data analysis, including development of newer 3D biometric parameters. Use of WBCT gives earlier unparalleled detail on bony alignment through physiologic loading, in adding to the utility of 3D estimation of the anatomy. It has gained traction in valuation of the foot particularly for hindfoot deformity, but then again increasingly in forefoot conditions and even syndesmotic reduction. While not yet universally available, this technology is expanding and will become more prevalent in patient assessment and research methodology in the future.

Our aim in this study is to assess axial morphology at the ankle of patients with end-stage ankle arthrosis, with a primary anatomic focus on the tibial torsion and talar neck-body angle (TNBA). Secondarily, we look to correlate tibial anatomy with variations in hindfoot alignment and foot type, based on routine radiographic parameters, and to document the observed ranges of these anatomical measurements. We use measurements that have been earlier described indicators of axial morphology, with documented ranges in usual and arthritic patients. We search for to estimate the null hypothesis that there is no connection between tibial and talar axial anatomy, or tibial anatomy and cavus or planus foot type.