Hallux Valgus Deformity and Treatment

A Three-Dimensional Approach

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KEYWORDS

• First metatarsocuneiform joint • Hypermobility • Hallux valgus • First ray
• Intermetatarsal angle • Hallux valgus angle

KEY POINTS

- Normal mobility of the first ray consists of an axis from dorsal-medial to plantar-lateral.
- Because of the complexity of the three-dimensional anatomy of the first metatarsocuneiform (MTC) joint, it is imperative that radiographs are standardized and consistent during evaluation.
- Hypermobility of the first ray, in association with hallux valgus, is not an absolute indication for first MTC arthrodesis.

INTRODUCTION

Motion and spatial orientation of the first metatarsocuneiform (MTC) joint has been shown to have significant clinical implications. The planes of motion make the two major axes of the first MTC joint move in a dorsal-medial to plantar-lateral direction. The contribution of each, especially mobility via the sagittal plane, in the development of hallux valgus deformities is at the center of much debate (**Fig. 1**).

Morton[1–3] was the first to suggest first MTC hypermobility contributed to multiple conditions of the foot and ankle. He made no connection with the development of hallux valgus at that time. There are 2 major planes of motion involved with hallux valgus deformity. To patients, the deformity in the transverse plane is most glaring and what they attribute their bunion to originate from. To the clinician, it is a much more complicated matter, as this relationship between the deformity in the

Disclosure Statement: The authors have nothing to disclose.
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Foot Ankle Clin N Am 23 (2018) 271–280
https://doi.org/10.1016/j.fcl.2018.01.007
foot.theclinics.com

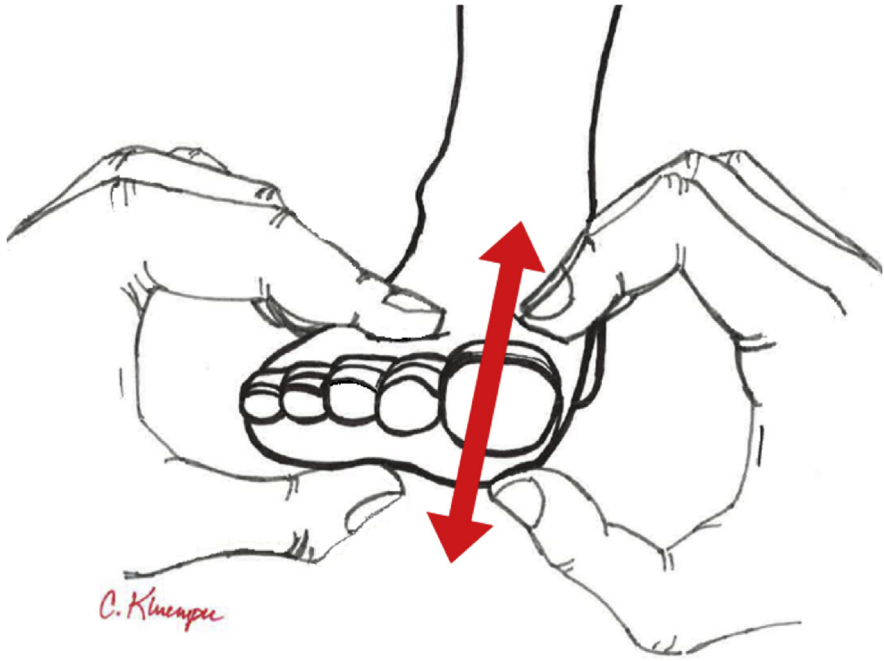

Fig. 1. First ray axis of motion. The first ray axis moves from dorsal-medial to plantar-lateral. *Courtesy of* Chase Kluemper, MD, University of Tennessee Orthopedic Surgery, Chattanooga, TN.

transverse plane and motion in the sagittal plane is more involved. It has been paralleled by some investigators to the philosophic debate of which came first, the chicken or the egg?

There is a sparse amount of objective literature supporting either camp of thought, though recent evidence has provided some clarity.[4,5] Many think it is the transverse plane deformity involving hallux valgus with the sagittal plane hypermobility resulting secondarily and not acting as the primary deforming force.[6–11] Others claim those patients with higher motion in the sagittal plane are predisposed to the development of transverse plane malalignment and hallux valgus deformity.[12–17] Further ambiguity arises in the lack of uniformity from an imaging and radiographic standpoint.[5] To have a fair debate, the terms must be defined and they must be as objective as possible. Because of the complexity of the three-dimensional anatomy of the first MTC joint, slight changes in position can cause significant changes in radiographic measurements and manual examination findings used for clinical evaluation.[5,18]

Questions to Be Answered

The following are pertinent questions related to first ray hypermobility and its relationship to hallux valgus:

Is first ray hypermobility a pathologic entity?

Morton[1–3] and Lapidus[19] theorized that hypermobility of the first ray originated from the first MTC joint and that stabilizing this would normalize mobility and correct the hallux valgus deformity. This theory was later supported by Lee and Young,[15] Klaue and colleagues,[14] and Faber and colleagues[20] who associated increased sagittal plane mobility with hallux valgus.