

The Use of Tibial Osteotomy (Ankle Plafondplasty) for Joint Preservation of Ankle Deformity and Early Arthritis

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KEYWORDS

- Tibia osteotomy • Ankle arthritis • Asymmetric • Varus ankle • Valgus ankle
- Plafondplasty

KEY POINTS

- Asymmetric ankle osteoarthritis (OA) is an increasingly recognized condition and it is imperative to differentiate between extraarticular and intraarticular deformity and to address these appropriately.
- Associated instability and multilevel deformity must be recognized and addressed.
- Patients with intraarticular varus or valgus asymmetric OA have poorer outcomes and higher rates of recurrence when treated with standard extraarticular supramalleolar and inframalleolar osteotomies.
- Plafondplasty is an intraarticular osteotomy and aims to correct the deformity at its center of rotation and angulation.

INTRODUCTION

The prevalence of ankle osteoarthritis (OA) is 1% to 4%¹ with an incidence of 48 per 100,000 per annum.² Owing to the advancing age of the population, this is set to increase significantly.^{3,4} Although the incidence of ankle OA remains far lower than that in the hip or knee, its clinical importance should not be underestimated. It has been demonstrated that the physical and mental disability associated with end-stage ankle OA is at least as severe as that of end stage OA affecting the hip.⁵

In contrast with the hip and knee, the incidence of primary OA in the ankle is low with secondary OA being far more common.^{1,6} Trauma remains the single most common

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cause of secondary ankle OA accounting for approximately 80%.^{6,7} The most common cause of posttraumatic ankle OA is a fracture of the ankle but chronic ankle instability is an increasingly recognized cause.^{8,9} In contrast with primary OA, which affects the joint symmetrically, posttraumatic ankle OA frequently affects the joint asymmetrically resulting in a valgus or varus deformity of the ankle¹⁰ (**Box 1**).

Ankles with pathologic valgus and varus deformities suffer from lateral and medial joint overload, respectively, with associated subsequent lateral or medial tibiotalar joint degeneration. This in turn causes further lateral/medial load shift resulting in a vicious cycle of ever-increasing mechanical malalignment.¹¹ In many of these cases of asymmetrical ankle OA, the presenting patients are comparatively young making joint-sacrificing procedures such as total ankle replacement or ankle arthrodesis less attractive treatment options.¹ In these cases, joint-preserving realignment surgery to unload the affected area and attempt to normalize joint biomechanics is particularly attractive. Without realignment, asymmetric ankle OA progresses to generalized end-stage ankle OA.^{12,13} Traditionally, these have been extraarticular. The senior author (M.S.M.) had noted that there was a group of patients where the deformity was in fact truly intraarticular. In these cases, chronic varus and valgus stresses result in depression of the medial or lateral tibial plafond respectively. Despite the ability of these extraarticular osteotomies to realign the mechanical axis, they did not address the intraarticular pathology and over time there was a tendency for the talus to fall back into the depression and the deformity to recur.

Substantial ankle malalignment is common in ankles with end-stage OA. The ability of the foot and ankle to tolerate deformity above or at the level of the ankle depends, to a significant extent, on the flexibility of the foot to secondarily accommodate and compensate for this deformity. With a proximal varus or valgus deformity, the subtalar joint must evert or invert to maintain a plantigrade foot. The subtalar joint often compensates for the malaligned ankle in static weight bearing¹⁴ and is able to accommodate more valgus than varus.^{12,14} Owing to this ability of the subtalar joint to better accommodate valgus and the association with instability,⁹ asymmetric varus OA is more common than asymmetric valgus OA of the ankle.^{1,15} However, regardless of

Box 1

Etiology of ankle asymmetric osteoarthritis

Valgus

Intraarticular fracture: shortened externally rotated fibula/valgus impacted plafond

Chronic medial instability

Posterior tibial tendon dysfunction grade IV

Tarsal coalition

Pes planovalgus

Primary

Varus

Intraarticular fracture: Varus impacted plafond

Chronic lateral instability

Cavovarus deformity

Primary

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