

**Radiographic Analysis and Clinical Efficacy of Hindfoot Arthrodesis With Versus Without Cotton Osteotomy in Stage III Adult Acquired Flatfoot Deformity**, Vacketta, et al. *The Journal of Foot & Ankle Surgery*, 61, (4) 879-885, July 01, 2022

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**Level of Evidence:** 3

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The purpose of this study was to determine the efficacy of the Cotton Osteotomy (Medial Cuneiform Opening Wedge Osteotomy) to address residual FF varus deformities in patients with Stage 3 adult acquired flatfoot deformities. It is hypothesized that patients in this category are only treated with a rearfoot arthrodesis are more likely to have long-term progression of the deformity, resulting in an ankle valgus. Stage 3 PTTD is characterized by a rigid flatfoot deformity (which means irreducible on physical exam) and, if symptomatic, may require surgery should bracing options fail.

This study retrospectively analyzed 48 patients who underwent hindfoot arthrodesis for Stage 3 flatfoot and all that met the inclusion criteria from the year 2015 to 2019. These patients were divided into 2 cohorts: 26 did not undergo the cotton osteotomy (control) and 22 did undergo the cotton osteotomy (treatment).

The authors analyzed radiographic angles in 3 time periods:

1. Preoperatively
2. Post-operatively (at initiation of full weight bearing)
3. Post-operatively (12 months, final visit)

The final results of this study's 48 participants included (when comparing radiographic angles):

- 8/26 [~31%] developed ankle valgus who **did not** undergo the Cotton osteotomy (Control group)
- 1/22 [~4.5%] developed ankle valgus who underwent the Cotton procedure (Treatment group)

Post-operatively, there were statistically significant differences in the CAA, MASA, and calcaneal inclination angle. CAA is the angle formed by lines at the proximal and distal articular surfaces of the medial cuneiform visualized on a lateral projection X-ray. The MASA is the angle formed by (1) a line at the proximal articular surface of the navicular and (2) a line at the proximal articular surface of the 1st metatarsal on a lateral. At final follow up (12 months), the difference in CAA, calcaneal inclination and talar tilt were statistically significant. **These results suggest correcting the sagittal plane using the Cotton osteotomy as an adjunctive procedure to hindfoot fusion to address residual forefoot varus; this may potentially prevent the further progression of ankle valgus in Stage 3 flat foot deformity.**

This study does also discuss other papers/cases that emphasize various factors that may predispose or contribute patients eventually developing ankle valgus. For example, Miniaci-Coxhead et al, studied the incidence and radiographic predictors of ankle valgus following isolated hindfoot fusion. These authors demonstrated the progression of ankle valgus in 27% of patients undergoing the procedure at an average for 3.6 months post op. When analyzing the groups that did and did not develop ankle valgus, the only factor that was different was the preoperative radiographic measurement of Meary's angle (lateral talus-1<sup>st</sup> metatarsal) - which was statistically significant. Another study by Resnick et al, found that the MDCO [medial displacement calcaneal osteotomy] reduces forces on the deltoid ligament by 56% when combined with a triple arthrodesis. However, while correction in the frontal plane using the MDCO appears to be beneficial, there continues to be outcomes of ankle valgus with hindfoot fusion without a Cotton procedure. These additional cases stress the importance of correcting deviations within the sagittal plane in order to protect the frontal plane angulation of the ankle joint.



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