

# Medial Column Soft Tissue Plication with Internal Brace Augmentation following Lateral Column Lengthening in the Ambulatory Pediatric Cerebral Palsy Population with Pes Planovalgus Foot Deformities: A Novel Indication

Sean Tabaie, Smitha Elizabeth Mathew

## INTRODUCTION:

Pes planovalgus foot deformities are common in children with cerebral palsy (CP) and with painful progression, surgery is often indicated. This study examines the effect of flatfoot reconstruction utilizing a novel approach to address the redundant medial column soft tissue (Fig. 1). We hypothesize that augmenting the medial column soft tissue plication (STP) with an internal brace (IB) results in a more stable construct following flatfoot reconstruction when compared to a matched cohort undergoing medial sided STP alone.

**METHODS:** An IRB approved, retrospective review was conducted for patients with ambulatory CP, GMFCS I-III, with pesplanovalgus foot deformities. These patients underwent a lateral column lengthening (LCL) along with medial column STP, with/without IB augmentation at a single institution by the same surgeon from 2017-2020. Patients were divided into surgical groups without IB, and with IB augmentation. Radiographic indices on orthogonal weight-bearing (WB) x-rays were measured at multiple intervals: Preoperative, immediate postoperative, and at the 3/6/12/24-month timepoints. Variables on WB radiographs included AP and lateral talar-first metatarsal angles (TFMA), talonavicular coverage angle (TCA), and calcaneal pitch (CalcP). Means and standard deviations for the radiographic variables were calculated, followed by one-sided t-tests to compare the values between the two groups at all intervals.

## RESULTS:

A total of 58 patients were identified, 31 without IB and 27 with IB augmentation. The groups were well matched with respect to age, gender, type of CP, GMFCS level, and type of lateral column lengthening procedure. Preoperative WB radiographs showed no statistical difference between the two groups (with w/out IB): Mean AP TFMA (26° vs. 28°,  $p=0.073$ ), lateral TFMA (27° vs. 30°,  $p=0.067$ ), TCA (34° vs. 30°,  $p=0.059$ ), and CalcP (4° vs. 2°,  $p=0.069$ ). Both cohorts maintained improved radiographic indices at the final 24-month timepoint. However, WB radiographs for the IB group had less midfoot collapse, maintaining a statistically significant difference in all radiographic parameters two years following the index procedure: Mean AP TFMA (13° vs. 5°,  $p<0.001$ ), lateral TFMA (11° vs. 2°,  $p<0.001$ ), TCA (15° vs. 6°,  $p<0.001$ ) and CalcP (10° vs. 19°,  $p<0.001$ ).

## DISCUSSION AND CONCLUSION:

IB augmentation is an innovative surgical technique that provides additional stability to the medial column soft tissues following LCL. This procedure will help prevent mid-foot collapse and better maintain long-term foot shape when WB. Utilizing this novel surgical technique helps to maintain proper biomechanical orientation of the foot following LCL for correction of a pesplanovagus foot deformity in the ambulatory pediatric CP population.

