

Subtalar Arthroereisis in Pediatric Flexible Flatfoot: Implant Migration Patterns and Long-term Radiographic and Functional Outcomes

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INTRODUCTION:

Subtalar arthroereisis (STA) is a widely used surgical intervention for symptomatic flexible flatfoot in children. While radiographic and functional outcomes have generally been favorable, implant migration remains a frequently reported concern. The clinical relevance of the migration, timing, and impact on long-term outcomes remain poorly understood. This study aimed to characterize the migration pattern of STA implants over a 5-year follow-up period and evaluate associated clinical and radiographic outcomes in children with pediatric symptomatic flatfoot.

METHODS:

This retrospective cohort study included 141 feet in patients aged 8–13 years who underwent STA with adjunctive soft tissue procedures between 2014 and 2018 at a single tertiary medical center. Surgical adjuncts included gastrocnemius recession (Strayer), medial capsule plication, or the Kidner procedure when indicated. Implant positioning was assessed using AP foot and ankle radiographs at immediate postoperative, 1, 3, 6, 12 months, and 5 years. Migration was defined as displacement of the implant tip relative to the longitudinal talar axis. Radiographic parameters, including AP and lateral Meary's angles and calcaneal pitch; and clinical outcomes assessed by the AOFAS Score were measured at each time point. Migration trends were analyzed using the Friedman test and Wilcoxon signed-rank test. Complications were recorded.

RESULTS:

All patients completed a minimum of 5-year follow-up (mean 282 weeks). The cohort had a mean age of 11.1 years and included 117 males and 24 females. At the 5-year follow-up, all radiographic parameters demonstrated sustained improvement: AP Meary's angle decreased from 13.09° to 6.69°, lateral Meary's angle from 9.77° to 4.88°, and the calcaneal pitch increased from 14.52° to 16.89°. Additionally, the AOFAS Score improved significantly from 67.5 preoperatively to 96.3 (all $p < 0.001$). Implant migration was most pronounced during the first month (mean movement: 3.2 mm on ankle AP, 3.0 mm on foot AP) and gradually plateaued thereafter.

By the 5-year follow-up, 85.1% of implants had migrated laterally. However, this migration did not correlate with worsening alignment or function. Four complications (8.5%) were reported: one early implant dislodgement post-sprain requiring revision STA; one implant subsidence following ankle sprain requiring lateral column lengthening; and two cases of sinus tarsi pain, one treated with corticosteroid injection and one requiring implant removal. Notably, only one patient exhibited both migration and persistent pain warranting explantation.

DISCUSSION AND CONCLUSION:

STA when combined with adjunctive soft tissue procedures, offers effective and durable correction for symptomatic pediatric flexible flatfoot. In this study, radiographic and functional improvements were maintained over a 5-year follow-up, with no evidence of recurrent deformity. While implant migration was frequently observed, particularly within the first postoperative month, it subsequently stabilized. This early positional shift likely represents a physiological adaptation of the surrounding soft tissues rather than true mechanical failure.

Importantly, implant migration did not compromise clinical outcomes in the majority of patients. These findings suggest that asymptomatic migration should not be considered a complication. Recognizing the benign nature of early migration may help prevent unnecessary surgical revision. Radiographic implant position should be combined with functional alignment and patient symptoms, supporting a more conservative and patient-centered management strategy for post-STA follow-up.

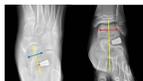


Table 1. Baseline Characteristics of Cohort

Characteristic	Number (n)	%
Age (years)	11.1 ± 2.1	
Sex		
Male	117	83.0
Female	24	17.0
Operative time (min)	105.0 ± 35.0	
Follow-up (weeks)	282.0 ± 110.0	
Meary's angle (°)		
AP	13.09	
Lateral	9.77	
Calcaneal pitch (°)	14.52	
AOFAS Score	67.5	
Migration (mm)		
Ankle AP	3.2	
Foot AP	3.0	
Lateral	2.5	
Medial	1.8	
Vertical	0.5	
Distal	0.2	
Proximal	0.1	
Total	3.2	
Lateral	2.7	
Medial	0.5	
Vertical	0.0	
Distal	0.0	
Proximal	0.0	
Total	3.2	
Lateral	2.7	
Medial	0.5	
Vertical	0.0	
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