

Pre-Operative Radiographic Parameters of Arch Collapse Do Not Predict Future Treatment Failure in Patients with Stage IIb Pes Planus

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Introduction/Purpose: Adult-acquired flatfoot deformity (AAFD) is a complex pathology of the foot that often results from dysfunction of the posterior tibial tendon (PTTD) and encompasses a wide spectrum of deformity. A high-degree of continued morbidity following flatfoot reconstruction exists for which prognostic indicators of future poor outcomes are uncertain. AP and lateral weight-bearing radiographs are commonly utilized to assess the severity of deformity including forefoot abduction, medial arch collapse, and hindfoot valgus. However, the relationship between pre-operative radiographic severity of deformity and predilection for future surgical treatment failure remains uncertain. The purpose of this study was to perform pre-operative radiographic measurements of patients with stage IIb PTTD and determine which preoperative radiographic parameters, if any, predict future surgical treatment failure.

Methods: Following IRB approval, an institutional electronic medical record database was queried from January 2000-2014 to identify all patients undergoing surgical correction for stage IIb PTTD. 256 patients with stage IIb PTTD underwent medial displacement calcaneal osteotomy and flexor digitorum longus transfer, with possible spring ligament repair and/or Achilles lengthening. Patients undergoing concomitant lateral column lengthening or midfoot fusion, patients with previous hardware, and patients with incomplete medical records were excluded. Preoperative radiographs were retrospectively analyzed to assess preoperative deformity. Talonavicular coverage angle was measured using AP radiographs. Lateral radiographs were used to measure talar-1st metatarsal angle (Meary's) angle, calcaneal pitch and medial cuneiform-floor height. Patient charts were also reviewed to determine whether patients experienced treatment failure, defined as return to the operating room for unplanned revision surgery (e.g. broken/painful hardware, nonunion, residual deformity, infection, nerve damage, blood clot/DVT). The degree of pre-operative deformity was compared between treatment failure and non-failure groups.

Results: Out of the 256 patient cohort, a total of 58 patients (22.7%) experienced treatment failure indicated by the need for an unplanned revision surgery, while 198 patients (77.3%) did not experience failure. There were no significant differences in the severity of pre-operative radiographic deformity between the treatment failure and non-failure groups including Meary's angle ($p = 0.93$), calcaneal pitch ($p = 0.70$), talonavicular coverage angle ($p = 0.99$), and medial cuneiform height ($p = 0.52$, Table 1).

Conclusion: The results of this study show that there is no significant difference in pre-operative radiographic deformity between patients who experienced failure versus non-failure following surgical flatfoot correction suggesting that the degree of pre-operative deformity is not significantly associated with an increased risk for future surgical failure. The analysis of these results, may underscore the relative importance of the physical exam in the evaluation of patients with symptomatic stage IIb PTTD and a relative lack of prognostic value in radiographic parameters commonly used to describe patients' deformity.

Table 1. Comparison of Radiographic Parameters of Arch Collapse in Study Groups

	Treatment Failure (N=58)		Non-Failure (N=198)		P-value
	Mean	SD	Mean	SD	
Meary's Angle (degrees)	16.88	10.07	16.75	9.55	0.93
Calcaneal Pitch (degrees)	17.72	4.80	17.44	5.33	0.70
Medial Cuneiform Height (mm)	15.22	7.33	15.23	6.32	0.99
Talonavicular Coverage Angle (degrees)	20.75	11.03	21.83	11.14	0.52

*where SD = standard deviation, p-values <0.05 were considered statistically significant