Optimal Position of the Heel Following Reconstruction of the Stage II Adult Acquired Flatfoot Deformity

Matthew S. Conti, BA (New York, New York)
Jeremy Y. Chan, BS; Huong T. Do, MA; Scott J. Ellis, MD; Jonathan T. Deland, MD

Summary:
Improvement in FAOS subscales in 55 patients undergoing stage II AAFD reconstruction were compared based on postoperative hindfoot alignment. Patients corrected to mild hindfoot varus showed greater improvement in the pain subscale compared to patients in valgus. Similarly, the mild hindfoot varus group had greater improvement in the symptoms subscale compared to patients in moderate varus. Our study suggests optimal outcomes are achieved when flatfoot patients are corrected to a position of mild varus of the heel.

Introduction:
Current biomechanical and clinical outcomes literature supports the use of a medializing calcaneal osteotomy (MCO) in patients with stage II Adult Acquired Flatfoot Deformity (AAFD). While previous studies have demonstrated an association between the amount of MCO and change in hindfoot alignment, we know of no study which tries to identify the best position of the heel for this commonly used procedure. The aim of this study was to establish an optimal postoperative hindfoot alignment by correlating the radiographic alignment with patient outcomes using the Foot and Ankle Outcome Score (FAOS), previously validated for AAFD.

Methods:
Fifty-five feet (26 right, 29 left) in 55 patients from the authors’ institution that underwent flatfoot reconstruction for stage II AAFD performed by two fellowship-trained foot and ankle orthopedic surgeons from January 2008 to March 2011 were eligible for this study. The cohort consisted of 20 men and 35 women (mean age 61.6 years, mean BMI 28.1) with available hindfoot alignment radiographs at greater than 48 weeks (mean 1.8 years postoperatively) and an FAOS at greater than 22 months (mean follow-up 3.1 years) postoperatively. Hindfoot valgus deformity was treated with a combination of MCO (n=16) or MCO with lateral column lengthening (n=39). Hindfoot alignment was determined as previously described (Saltzman and El-Khoury, FAI 1995) using the distance between the mid-tibial axis and most inferior aspect of the calcaneus on a hindfoot alignment radiograph. Change in pre- and postoperative scores in each FAOS subscale were calculated for patients in postoperative hindfoot valgus (≥0 mm valgus, n=18), mild varus (>0 to 5 mm varus, n=17), and moderate varus (>5 mm varus, n=20). Analysis of variance (ANOVA) and post-hoc Tukey’s tests were used to compare the change in FAOS scores between these three groups. Additionally, the relationship between the amount of MCO performed intraoperatively and FAOS subscales were analyzed using Spearman rank correlations.
Results:
Patients corrected to mild hindfoot varus showed a significantly greater improvement in the FAOS pain subscale compared to patients in valgus (p = 0.04) and in the symptoms subscale compared to patients in moderate varus (p = 0.02) (Figure 1). Additionally, patients moved to mild hindfoot varus showed more improvement in the FAOS pain subscale over patients in moderate varus (p = 0.20) and symptoms subscale over patients in valgus (p = 0.09) although this was not statistically significant. There were no statistically significant differences in the daily activities (p = 0.25), sports activities (p = 0.08), or quality of life (p = 0.18) FAOS subscales between groups. The three groups did not differ in preoperative FAOS subscales. No statistically significant correlations between intraoperative MCO slide distances and FAOS subscales were found. In addition, concomitant procedures were not correlated with changes in FAOS subscales.

Conclusions:
Our study indicates that correction of hindfoot alignment to between 0 and 5 mm of varus on the hindfoot alignment view following stage II AAFD flatfoot reconstruction is associated with improved patient outcomes in pain and symptoms. These results suggest that a position of mild varus of the heel is likely the optimal alignment following hindfoot reconstruction in stage II AAFD.

Figure 1. Differences in pre- and post-op FAOS subscales. Change in FAOS subscales were compared between patients in hindfoot valgus, mild varus (0-5 mm) and moderate varus (>5 mm) following flatfoot reconstruction with an MCO procedure. Patients corrected to mild varus showed a significantly greater improvement in the pain subscale over patients corrected to valgus (p = 0.04) and in the symptoms subscale compared to patients corrected to moderate varus (p = 0.03).

References: