Thursday, 12:00 – 12:35 pm

Session V: Ankle and Hindfoot Problems

Moderators: Paul J. Hecht, MD - n – nothing to disclose
            Daniel C. Farber, MD - n – nothing to disclose

12:00 pm

Plantar Pressure Measurements in Patients with Lateral Discomfort after Lateral Column Lengthening

Presenting: Scott Ellis, MD - n – nothing to disclose

Additional Authors:
Joseph Yu, BS - n – nothing to disclose
Holly Johnson, MD - n – nothing to disclose
William Aibinder, MS - n – nothing to disclose
Andrew Elliott, MD - n – nothing to disclose
Martin O’Malley, MD - n – nothing to disclose
Howard Hillstrom, PhD - n – nothing to disclose
Jonathan Deland, MD - d – Tornier; e – Zimmer; Nexa Orthopaedics (Tornier)

Summary:
Some patients undergoing lateral column lengthening develop postoperative plantar-lateral pain. This study is the first to confirm, in vivo, the relationship between increased lateral plantar pressures and plantar-lateral pain following lateral column lengthening.

Abstract:
Background: Lateral column lengthening is a commonly used adjuvant in the reconstruction of adult flatfoot deformity. Although powerfully correcting forefoot abduction, such lengthening can lead to postoperative complaints of lateral pain and discomfort. Biomechanical studies in children undergoing Evans osteotomy have demonstrated increased lateral pressure parameters (1). We hypothesized that those patients with discomfort would have increased plantar pressures compared to matched controls that did not have pain.

Methods: Ten subjects having undergone Evans lateral column lengthening and experiencing pain in the plantar-lateral aspect of the foot were selected. Patients with lateral pain localized to the sinus tarsi, anterior process, or dorsal calcaneocuboid joint were excluded. Controls without pain that also had lateral column lengthening were matched individually on a subject by subject basis. These age and sex matched controls underwent the same flatfoot reconstruction, including accessory procedures, at approximately the same period in time. At follow-up, patients were at least 22 months out from reconstruction and with their hardware removed. At an average of 3.5 years after surgery, radiographs were taken of each foot. The patients filled out SF-36 and Foot and Ankle Outcome Score (FAOS) surveys. Standing plantar pressure measurements were taken using the EMED-ST sensor platform (Novel, Munich, Germany). Average mean pressure (AMP), peak pressure (PP), and maximum force (MF) were assessed at 12 anatomic regions and normalized for body weight. Parameter ratios of lateral to medial hindfoot, lateral to medial midfoot, and fifth metatarsal to first metatarsal were calculated. Outcomes between the two groups were compared using the Wilcoxon rank-sum test for all variables.

Results:
There were no significant preoperative or postoperative differences in radiographic parameters between the two groups. Postoperatively, the average calcaneal length, lateral talometatarsal angle, and anteroposterior talonavicular coverage were the same in both groups. Those with pain had significantly lower overall SF-36 and FAOS scores.

The average weight of the pain group (92.4 +/- 18.3 kg) was higher than the control (77.3 +/- 12.5 kg), but did not reach statistical significance. The patients with pain had significantly higher lateral midfoot AMP (p = 0.01), PP (p = 0.01), and MF (p = 0.01)(Table 1). No differences were found in the hindfoot or forefoot regions (p < 0.05). The ratios of lateral to medial hindfoot PP (p = 0.07) and lateral to medial midfoot AMP (p = 0.09) trended higher in the pain group.

Discussion:
Patients having undergone lateral column lengthening who experience plantar-lateral pain have increased lateral midfoot plantar pressure values. The lateral midfoot region corresponds anatomically to the base of the fifth metatarsal and cuboid. If the incidence of increased plantar-lateral pressure can be decreased while still adequately correcting flatfoot deformity, the incidence of plantar-lateral pain following lateral column lengthening will likely be reduced.