7:40 – 7:47 am

Assessment of Lateral Hindfoot Pain in Flatfoot Deformity using Weightbearing, Multiplanar CT Imaging

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Background:
Current radiographic assessment of stage II posterior tibial tendon insufficiency (PTTI) presents several challenges. Conventional radiographs provide only two dimensional representations of deformity, making it difficult to assess fibulocalcaneal and fibulotalar relationships as well as localized subtalar joint arthrosis. Supine three dimensional techniques (CT or MRI) allow better visualization of these structures, but lack the ability to detect the degree of arch collapse, lateral impingement, and subtalar arthrosis present with weightbearing. These limitations also impede understanding the true etiology of lateral pain.

Unlike traditional three dimensional (3D) imaging modalities, the Philips Multi Diagnostic Eleva scan performs multiplanar imaging (coronal, sagittal and axial) in an upright weightbearing position. We hypothesized that images acquired on the Philips 3D Rx workstation would be reliable and that patients with flatfoot deformity and lateral hindfoot pain would have an increased incidence of calcaneofibular impingement and subtalar arthrosis as compared to controls.

Methods:
Following IRB approval, a pilot study of 10 consecutive patients with stage II flatfoot (mean age, 55.5 ± 13.2) and complaints of lateral hindfoot pain were examined. Patients with inflammatory arthritis were excluded. A group of 10 consecutive patients with stage II flatfoot (mean age, 62.8 ± 6.0) without lateral hindfoot pain served as control. Conventional radiographs and standing 3D image acquisition were performed on all symptomatic patients shortly before reconstruction. Hindfoot impingement and arthrosis parameters were read for both modalities in an independent and blind fashion by a fellow (rater 1) and attending (rater 2) musculoskeletal radiologist, both who were board certified. Interrater reliability for all parameters was determined with intraclass correlation coefficients (ICC). Reliability was rated as excellent
(≥ 0.74), good (0.73 to 0.60), fair (0.59 to 0.40), or poor (≤0.39). Nonparametric Wilcoxon rank-sum tests were used to assess differences between the two groups.

**Results:**
In general, the 3D parameters demonstrated good to excellent reliability (Table 1). All ICC values for conventional radiographs were good except for calcaneocuboid arthrosis (0.41, fair) and posterior subtalar arthrosis (0.49, fair).

For the 3D parameters versus conventional radiographs, a significant increase was found by Rater 2 for posterior subtalar arthrosis (p = 0.006) and combined anterior and posterior subtalar arthrosis (p = 0.022) (Table 2). For Rater 1, these differences did not reach significance (p = 0.120 and 0.081 respectively). A trend was found in increased fibulocalcaneal impingement (p = 0.057) and calcaneocuboid arthrosis (p = 0.067) in the pain group in Rater 2, but not Rater 1.

**Discussion:**
The results indicate that weightbearing 3D assessment provides a reliable means of assessing hindfoot lateral pain in patients with PTTI. Patients with stage II flatfoot deformity and lateral pain have an increased incidence of localized subtalar arthrosis poorly visualized on conventional x-rays. The 3D multiplanar images allowed good visualization of the subtalar joint and fibulocalcaneal relationships. The cause of pain in these patients stems from subtalar arthrosis, impingement at the angle of Gissane, and less frequently fibulocalcaneal impingement. These parameters are often difficult to assess on conventional radiographs. The 3D multiplanar scan provides a novel and powerful tool to assess deformity and pain in the fully weightbearing position and may help guide complex surgical decision making.