Is Advanced Imaging Necessary Before Surgical Repair

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• Adult acquired flatfoot

KEY POINTS

- Plain-film weight-bearing radiographs continue to be the mainstay for initial imaging of structural deformity in patients with adult acquired flatfoot (AAFF).
- Although AAFF is frequently diagnosed based on incisive clinical acumen, magnetic resonance imaging (MRI) can provide abundant evidence regarding the health and quality of hindfoot articulations and soft tissues.
- The complex nature of AAFF entails insufficiency of numerous structures in addition to the posterior tibial tendon. Underlying deficiency of the deltoid complex and/or spring ligament can be more thoroughly assessed with MRI.
- In the appropriate setting with trained personnel, ultrasound can be a powerful and inexpensive imaging modality to appraise the pertinent soft tissue structures associated with AAFF.

Posterior tibial tendon (PTT) dysfunction (tendinitis, tendinosis, or rupture) and adult acquired flatfoot deformity can manifest with a wide array of bony and soft tissue abnormalities visible on plain radiographs, ultrasound, and magnetic resonance imaging (MRI). Imaging abnormalities include various combinations of malalignment, anatomic variants, and enthesopathic and tendinopathic changes.[1–3] A thorough understanding of differences between anatomic and pathologic presentations of structures in various imaging modalities is an essential tool for clinical and surgical planning.

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PLAIN RADIOGRAPHS

Abnormal bony position observed with plain radiographs may give clues to long-standing insufficiency of the PTT. Malalignment and angular deformity on radiographs often correlate to soft tissue abnormalities identified on ultrasound and MRI.[1] Three weight-bearing views (lateral, anteroposterior, medial oblique) of the foot are generally necessary to evaluate for signs of PTT dysfunction. Ankle views are necessary to evaluate for valgus deformity, especially with advanced deformity (**Fig. 1**). Additional hindfoot alignment views (calcaneal axial, long-leg axial) may be beneficial to ascertain the frontal plane relationship of the tibia, talus, and calcaneus (**Fig. 2**).

Flattening of the plantar arch on a lateral weight-bearing view may be observed through evaluating the calcaneal inclination angle. Although variation normally ranges from 11° to 38°, it is considered low when it is less than 20°.[4,5] Attenuation and weakness of the surrounding supporting soft tissue structures may lead to increased talar declination of the long axis of the talus below the long axis of the navicular. Talar declination, normally 21°(±4°), is measured using the lateral talar axis and the weight-bearing surface.[1,4]

Secondary to the unopposed force of the peroneal tendons, mainly the peroneus brevis, hindfoot valgus and forefoot abduction may be appreciated.[5] Greater than a 6° angulation of the long axis of the calcaneus away from midline relative to the long axis of the tibia in the frontal plane defines hindfoot valgus.[4,6] Uncovering of the head of the talus as the navicular moves away from midline in the transverse plane is the result of forefoot abduction. Talar head uncovering is considered abnormal if more than 15% of the head is exposed.[6]

Hypertrophic change and bony irregularity may also be noted at the navicular attachment of the PTT, which suggests enthesopathy.[1] Another sign of posterior tibialis tendinopathy is a tibial spur, which may be visible adjacent to the tendon in the retromalleolar groove.[1,6] Congenital navicular abnormalities may also predispose patients to tendinopathy. A true accessory navicular is present in approximatley 4%

Fig. 1. Anteroposterior view of the ankle showing valgus deformity.