

Subtalar Instability



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KEYWORDS

• Subtalar joint • Subtalar instability • Ankle instability • Subtalar dislocation

KEY POINTS

- Subtalar instability is difficult to diagnose and is often overlooked as a component of traditional ankle instability.
- Clinicians should have a high index of suspicion of this diagnosis in patients who have been diagnosed with chronic lateral ankle instability but have failed standard management and have continued pain in the sinus tarsi.
- Operative management includes ligamentous reconstruction of key lateral stabilizers of the subtalar joint.

INTRODUCTION

Although often overlooked and grouped into the larger clinical entity of ankle instability, an unstable subtalar joint is a relatively common clinical entity occurring in approximately one-quarter of all cases of chronic lateral ankle instability.¹ When considering that chronic ankle instability occurs in nearly 20% of all patients sustaining inversion injuries to the foot and ankle,² one may appreciate the importance of identifying and addressing this condition.

ANATOMY AND BIOMECHANICAL ANALYSIS

The subtalar joint describes the articulation between the calcaneus and talus. The bony anatomy of the joint is composed of 3 articulating facets: posterior, middle, and anterior. In concert, these glide in 3 different planes of motion to produce inversion/eversion, abduction/adduction, and flexion/extension.³ The motion of the subtalar joint occurs about a center of rotation that is positioned $42 \pm 9^\circ$ of inclination in the sagittal

The authors have nothing to disclose.

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Foot Ankle Clin N Am 20 (2015) 243–252
<http://dx.doi.org/10.1016/j.fcl.2015.02.007>

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plane and $23 \pm 11^\circ$ of medial deviation in the horizontal plane relative to the axis of the foot passing through the second web space of the foot.⁴ In concert, these articulations are responsible for stability and accommodation when walking on uneven ground.

Reported range of motion (ROM) of the subtalar joint varies widely in the literature and is largely thought of as motion specifically at the posterior facet. Sarrafian⁵ initially reported a ROM of 25° of inversion/supination and 10° of eversion/pronation. Meanwhile, others have demonstrated positioning of the ankle joint impacts the measured ROM of the joint.⁶ Last, clinical subtalar motion, as measured by goniometer, may vary from radiographic measurements. Pearce and Buckley⁷ demonstrated a large difference in clinical measurement, mean 46° (range, 39–54) as compared with measurements using computed tomography, mean 11° (range, 5–16), which they concluded was the result of soft tissue and talocrural motion.

The lateral ligamentous structures of the subtalar joint are organized in layers. The superficial layer includes the calcaneofibular ligament (CFL), the lateral talocalcaneal ligament, and the lateral root of the inferior retinaculum. The middle layer is composed of the cervical ligament and the intermediate root of the retinaculum, and the deep layer is formed by the interosseous talocalcaneal ligament (ITCL) and medial root of retinaculum.⁸

Etiologies for subtalar instability include the cervical ligament, the CFL, and the ITCL. Historically, the CFL was recognized as the primary ligamentous stabilizer to the subtalar joint.⁹ However, a large body of evidence now supports the ITCL as the primary stabilizer to the subtalar joint.^{10–12} Recently, Choisne and colleagues¹⁰ reported the greatest increase in subtalar joint instability with sectioning of the ITCL with the foot dorsiflexed, supinated, and inverted. These findings are consistent with the hypothesis that rupture of the ITCL and cervical ligament occur during subtalar dislocation, as described previously by several investigators.^{13–16} Moreover, the ITCL appears to play a role in ankle stability in addition to the subtalar joint. Tochigi and colleagues¹⁷ demonstrated that combined sectioning of the ITCL and anterior talofibular ligament (ATFL) resulted in an anterolateral rotatory displacement of the talus, whereas isolated sectioning of the ATFL did not. The investigators conducted a follow-up study investigating ITCL injuries in acute ankle sprains and found a correlation between persistent symptoms of lateral ankle pain, instability, and limitation of motion with ITCL injuries on MRI.¹⁸ These studies help underscore the importance of the ITCL in hind foot stability.

CLINICAL PRESENTATION

Patients with subtalar instability generally provide a history of an acute inversion injury to the ankle in the past. Typically, they report multiple recurrent events. Initially diagnosed and treated for an ankle sprain, these patients are managed conservatively and often return with vague complaints of lateral pain about the ankle and hind foot that is worse with activity, especially athletics or activity on uneven ground. The pain often may be nonspecific and diffuse. Patients report symptoms of instability, including a feeling of the ankle “giving way” or “rolling over.” Occasionally, patients may state they must look at the ground because they are unsure of their footing. In addition, patients may report lateral ankle swelling and stiffness.^{19,20} Unfortunately, the presentation of this entity is nearly impossible to differentiate from lateral ankle instability.

PHYSICAL EXAMINATION

The signs of subtalar instability on physical examination mirror lateral ankle instability. Depending on the chronicity of the injury, patients may have lateral swelling,

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