

# Subtalar Joint Arthritis

## OVERVIEW

Arthritis of the subtalar joint refers to a degenerative condition of the articular cartilage in the joint that accounts for a large portion of the inversion and eversion range of motion of the hindfoot. There is not a treatment for this condition that is restorative for the cartilage, however there are multiple conservative and surgical treatment options for this condition that are successful in alleviating pain and swelling that accompanies the condition.

## ANATOMY

The subtalar joint is comprised of the plantar surface of the talus and the superior or dorsal surface of the calcaneus. There are three main facets to the subtalar joint: anterior, middle and posterior, with the posterior facet accounting for the majority of the cross sectional area of the joint. Similar to the ankle joint, there are ligamentous supports to the subtalar joint, including the interosseous ligament and the cervical ligament. However, the bony architecture of the joint itself imparts a significant amount of inherent stability to the joint. The main range of motion for which the subtalar joint accounts is inversion and eversion of the hindfoot. It does so in conjunction with the transverse tarsal joint (talonavicular and calcaneocuboid joints) to complete the triple joint complex.

## BIOMECHANICS

The subtalar joint functions in conjunction with the talonavicular and calcaneocuboid joints to make up the "triple" joint complex. The subtalar joint functions to provide the majority of the inversion and eversion range of motion of the hindfoot. Subtalar joint range of motion is critical to normal function of the hindfoot, and accounts for the ability of the foot to accommodate to uneven or irregular surfaces, in addition to being integral in proprioceptive function of the foot and ankle.

## PATHOGENESIS

As with ankle arthritis, the primary etiology for subtalar arthritis is post-traumatic. This is most commonly seen following an intra-articular fracture of the calcaneus, but can also be seen following a talus fracture. This can be due to direct injury to the chondral surface of the plantar talus, or due to avascular necrosis of the talus. Chondral injuries can also be seen following pure dislocations of the subtalar joint, which can lead to degenerative changes, however this is much less common. Arthrosis of the subtalar joint is also commonly found in the setting of deformity of the hindfoot. This can either be due to advanced stages of acquired flatfoot deformity resulting from dysfunction of the posterior tibial tendon, or significant cavus deformity of the hindfoot. Arthrosis of the subtalar joint can also be primary in nature, or less commonly, can arise in the setting of inflammatory arthropathies.

## **CLINICAL PRESENTATION**

Arthritis of the subtalar joint often presents with hallmark symptoms of arthritis in any joint in the lower extremity. Most patients will complain of pain that tends to be localized to the medial or lateral aspects of the hindfoot. Swelling in the hindfoot can also be a presenting symptom, and tends to be localized over the sinus tarsi. However, diffuse swelling in the hindfoot can also be encountered. Patients will often also complain of and present with stiffness in the subtalar joint.

Clinical examination of the hindfoot will often reveal swelling in the hindfoot, however swelling may not be present depending on the degree of disease present. The foot must be examined not only with the patient seated, but also with the patient weightbearing on the foot. This allows for an accurate depiction of the weightbearing alignment of the hindfoot joint complex, where specific attention should be paid to the coronal alignment of the hindfoot. Passive range of motion of the subtalar joint should be assessed, in addition to evaluation of the range of motion of the ankle and the transverse tarsal joint. A complete neurologic exam of the lower extremity should be performed, paying particular attention to any loss of sensory function, as well as imbalances in motor function across the hindfoot. Detailed palpation of the hindfoot should be performed to localize specific areas of tenderness, considering that the subtalar joint may not be the only location of pathology.

## **IMAGING**

The primary radiologic evaluation of the subtalar joint consists of weightbearing radiographs of the foot and ankle. This includes AP, oblique and lateral views of the foot, as well as AP and mortise views of the ankle joint. Findings on radiographs that are indicative of degenerative changes in the subtalar joint include narrowing of the joint space as well as peri-articular osteophytes. Subchondral cyst formation can also be seen along the joint surfaces, as well as sclerosis of the subchondral bone. Attention must be paid to the condition of the adjacent joints, including the transverse tarsal joint, the midfoot joints and the ankle joint, as well as to the alignment of those joints. At times, a weightbearing hindfoot alignment view can also be obtained to assist in the assessment of the coronal alignment of the hindfoot.

Computed tomography can also be a helpful tool if more detailed assessment of the alignment of the hindfoot is needed, specifically if this is not clearly determined on plain radiography. This can be particularly valuable in the setting of post traumatic arthritis, where fractures may be malunited, and there can be retained hardware that obscures the view of the joint on plain radiographs. The degree of cyst formation can also be better appreciated on a CT scan. CT can also provide valuable information regarding the architecture of the subtalar joint surface and the surrounding joints in the setting of significant hindfoot deformity.

Magnetic resonance imaging is less helpful in the assessment of subtalar arthrosis, however it can be useful in the post-traumatic setting. Specifically, in cases of post-traumatic arthrosis following a fracture of the talus, it can be necessary to determine the viability of the talus, which can affect treatment options.

## **TREATMENT**

Multiple conservative therapies are available for the treatment of subtalar joint arthrosis. As in any other arthropathy, anti-inflammatory medications and modalities can be employed to decrease swelling and joint inflammation. Oral medications include non-steroidal anti-inflammatory medications, as well as oral corticosteroid therapy. Certainly, if subtalar arthrosis is present in the setting of inflammatory arthropathy, disease modifying anti-rheumatic drugs can be effective. Topical anti-inflammatory medications are also useful in the treatment of subtalar arthrosis, considering the proximity of the joint to the skin surface. A corticosteroid injection can also be a useful conservative treatment option. Cryotherapy and elevation can be helpful modality adjuncts to help decrease swelling and pain.

Orthotic devices are also viable conservative options for the treatment of subtalar arthritis. In the setting of acquired flatfoot deformity, orthotic inserts in the shoes that consist of a longitudinal arch support with a medial heel post can help to offset hindfoot valgus alignment that can lead to lateral subtalar impingement. Accommodative bracing is a good option for the support of the hindfoot joint complex in patients without significant deformity. Custom bracing offers a more supportive option that can also account for moderate to severe deformity.

Operative treatment for arthritis of the subtalar joint generally consists of joint sparing and joint sacrificing options. Joint sparing options can be considered when there are minimal degenerative changes noted on radiographic studies, and clinical exam demonstrates maintenance of some range of motion. Joint sparing operative treatments include open debridement of the sinus tarsi, which includes the anterior aspect of the posterior facet. Arthroscopy of the subtalar joint is another option that allows debridement of inflamed synovium in the anterior aspect of the posterior facet. Osteotomies of the hindfoot as well as tendon transfers can be of benefit to restore more normal alignment and balance to the subtalar joint in the setting of acquired flatfoot deformity or cavovarus deformity.

The main joint sacrificing option for advanced subtalar arthritis is an arthrodesis of the joint. Arthrodesis is a durable option that can provide long term improvement in pain and swelling. Deformity can also be corrected through the arthrodesis, and it is critical that the subtalar joint be aligned anatomically at the time of fusion. Arthrodesis of the subtalar joint can impact the patient's ability to walk on uneven surfaces, and may cause sensations of instability when on such surfaces. An isolated subtalar fusion can also predispose the transverse tarsal joint to the development of degenerative changes.

## **CONCLUSION**

Subtalar arthritis can have large impacts on activities of daily living due to pain and swelling, as well as on the functional performance of the foot and ankle. There are numerous conservative and operative treatment options available for this condition, depending on the degree of disease that is present.

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