

Arthroscopic Management of Sinus Tarsi Syndrome



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Abstract: Sinus tarsi syndrome (STS) is a clinical entity characterized by pain of the lateral hindfoot and a sense of instability especially on uneven surfaces due to chronic inflammation characterized by fibrotic tissue remnants and synovitis of the sinus tarsi, associated with both traumatic and nontraumatic causes. Arthroscopic debridement of the subtalar joint is an effective and safe alternative in the treatment of STS refractory to conservative treatment. The purpose of this Technical Note is to report the details of arthroscopic management of STS.

Sinus tarsi syndrome (STS) is a clinical entity characterized by pain of the lateral hindfoot and a sense of instability especially on uneven surfaces due to chronic inflammation characterized by fibrotic tissue remnants and synovitis of the sinus tarsi, associated with both traumatic and nontraumatic causes.¹⁻⁶ The most common cause is traumatic ligament damage, particularly in inversion injuries, and the anterior talofibular and calcaneofibular ligaments can be injured together with the cervical and interosseous talocalcaneal ligaments.⁵

Nonoperative treatment of STS including sinus tarsi injections (corticosteroids, local anesthetics, platelet-rich plasma, or ozone), activity modification, and physiotherapy with appropriate proprioception training or an immobilization period has shown a success rate of 60%.^{3,6,7} Surgical treatment includes sinus tarsal debridement, subtalar joint stabilization, sinus tarsi denervation, hindfoot realignment, tarsal coalition resection, and subtalar or triple arthrodesis.^{5,6,8} Sinus tarsi debridement is the first choice of surgical treatment, and

other methods are reserved for recurrent cases or cases with underlying causes identified.⁸ Arthroscopic debridement of the subtalar joint is an effective and safe alternative in the treatment of STS refractory to conservative treatment.^{4,6,7} Compared with open evacuation of the sinus tarsi, subtalar arthroscopy allows for direct visualization of the joint and ligaments for accurate diagnosis and accurate debridement with preservation of the intact ligaments.^{5,7,9}

In this Technical Note, we report the technical details of arthroscopic management of STS. This technique is indicated for symptomatic STS recalcitrant to conservative treatment. It is contraindicated if there is subtalar osteoarthritis, posterior tibial tendon deficiency causing planovalgus foot deformity, or foot pronation causing compression injury to the sinus tarsi ligaments. It is also contraindicated if there is tarsal coalition or hindfoot malalignment requiring reconstructive surgery, as well as in the presence of osteoid osteoma at the bony boundary of the sinus tarsi, bony impingement due to elongated lateral talar processes, or symptomatic subtalar or ankle instability requiring surgery (Table 1).^{6,7}

Technique

Preoperative Planning and Patient Positioning

The diagnosis of STS is largely reliant on clinical symptoms and exclusion of other pathology.⁵ Tenderness should be present at the sinus tarsi, and tender spots at the anterior subtalar joint (at the junction between the talonavicular joint and calcaneocuboid joint pointing medially and posteriorly),¹ lateral calcaneal wall, and lateral recess of the posterior subtalar joint should be noted. Hindfoot alignment, mobility, stiffness, or instability and competence of the posterior

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Table 1. Indications and Contraindications of Arthroscopic Management of Sinus Tarsi Syndrome

Indications	
Symptomatic sinus tarsi syndrome	recalcitrant to conservative treatment
Contraindications	
Subtalar osteoarthritis	
Posterior tibial tendon deficiency	causing planovalgus foot deformity
Foot pronation causing compression	injury to sinus tarsi ligaments
Tarsal coalition	
Hindfoot malalignment requiring reconstructive surgery	
Osteoid osteoma at bony boundary of sinus tarsi	
Bony impingement due to elongated lateral talar processes	
Symptomatic subtalar or ankle instability requiring surgery	

tibial tendon should be assessed. Posterior tibial tendon deficiency can lead to planovalgus deformity and compression of the ligamentous structures in the sinus tarsi.⁵ The sural nerve is also assessed for any evidence of neuritis. Pain relief after injection of local anesthetic or cortisone into the sinus tarsi is strongly suggestive of STS.⁷ Magnetic resonance imaging is useful for detecting subtalar osteoarthritis, cervical ligament tears, sinus tarsi fat alterations, and synovial thickening but is inadequate for correctly detecting interosseous talocalcaneal ligament tears, which may play an important role in subtalar instability and pain and are the most common pathologies detected on arthroscopy in patients with STS.^{2,5,9-12}

The patient is in the lateral position. A thigh tourniquet is applied to provide a bloodless operative field. A 2.7-mm 30° arthroscope (Henke Sass Wolf, Tuttlingen, Germany) is used for this procedure. Fluid inflow is driven by gravity, and no arthro-pump is used.

Portal Placement

The procedure is performed via the anterolateral subtalar portal, middle subtalar portal, and dorsolateral midtarsal portal. The anterolateral subtalar portal is just dorsal to the angle of Gissane. The middle subtalar portal is just anterior and distal to the lateral malleolar tip. The dorsolateral midtarsal portal is at the junction between the talonavicular and calcaneocuboid joints (Fig 1).

Debridement of Sinus Tarsi

The middle subtalar portal is the viewing portal, and the anterolateral subtalar portal is the working portal. The inflamed synovium and scar tissue of the sinus tarsi are resected with an arthroscopic shaver (Dyonics; Smith & Nephew, Andover, MA) (Fig 2). The intact ligaments of the sinus tarsi should be preserved. The portals can be interchanged as the viewing and working portals to achieve complete synovectomy.

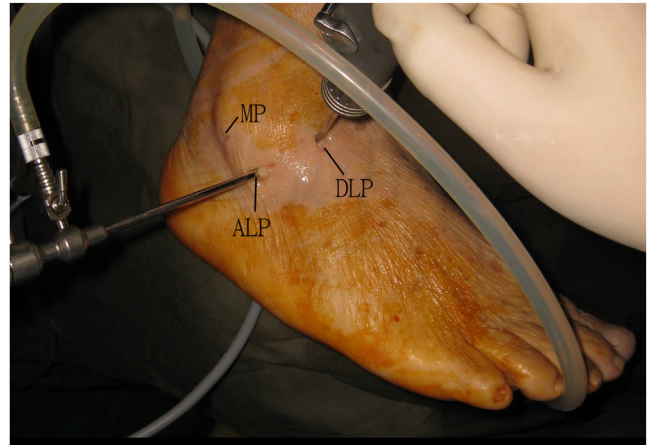


Fig 1. Arthroscopic management of sinus tarsi syndrome in right foot. The patient is in the lateral position. The procedure is performed via the anterolateral subtalar portal (ALP), middle subtalar portal (MP), and dorsolateral midtarsal portal (DLP). The ALP is just dorsal to the angle of Gissane. The MP is just anterior and distal to the lateral malleolar tip. The DLP is at the junction between the talonavicular and calcaneocuboid joints.

Debridement of Tarsal Canal

The middle subtalar portal is the viewing portal, and the anterolateral subtalar portal is the working portal. After sinus tarsi debridement, the lateral opening of the tarsal canal can be identified. The inflamed synovium of the tarsal canal is resected with the shaver with preservation of the integrity of the interosseous talocalcaneal ligament if it is not torn (Fig 3).

Debridement of Lateral Recess of Posterior Subtalar Joint

The anterolateral subtalar portal is the viewing portal, and the middle subtalar portal is the working portal. Both the arthroscope and arthroscopic shaver are advanced posteriorly into the lateral recess of the posterior subtalar joint, and arthroscopic synovectomy is performed (Fig 4).

Debridement of Inflamed Synovium at Lateral Calcaneal Wall

The anterolateral subtalar portal is the viewing portal, and the middle subtalar portal is the working portal. The inflamed synovium extending from the sinus tarsi to the lateral calcaneal wall is resected (Fig 5). The portals can be interchanged as the viewing and working portals to achieve complete synovectomy.

Debridement of Lateral Recess of Anterior Subtalar Joint

The anterolateral subtalar portal is the viewing portal, and the dorsolateral midtarsal portal is the

Fig 2. Arthroscopic management of sinus tarsi (ST) syndrome in right foot. The patient is in the lateral position. The middle subtalar portal is the viewing portal, and the anterolateral subtalar portal is the working portal. The inflamed synovium (IS) and scar tissue of the ST are resected with an arthroscopic shaver (AS). (C, calcaneus; TN, talar neck.)

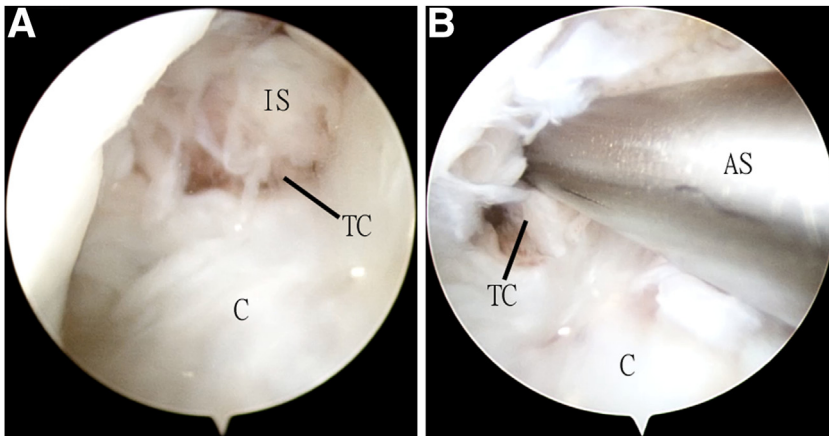
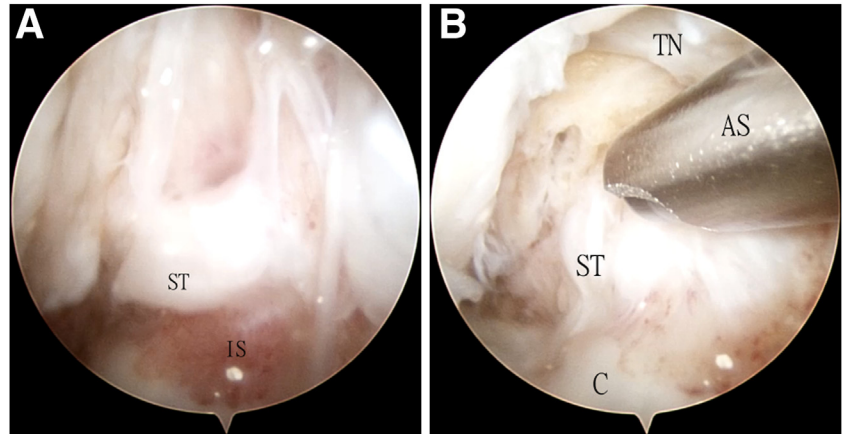


Fig 3. Arthroscopic management of sinus tarsi syndrome in right foot. The patient is in the lateral position. The middle subtalar portal is the viewing portal, and the anterolateral subtalar portal is the working portal. After debridement of the sinus tarsi, the lateral opening of the tarsal canal (TC) can be identified. The inflamed synovium (IS) of the TC is resected with the arthroscopic shaver (AS) with preservation of the integrity of the interosseous talocalcaneal ligament if it is not torn. (C, calcaneus.)

working portal. The inflamed synovium on the lateral side of the anterior subtalar joint is resected with the shaver (Table 2, Fig 6, Video 1). Postoperatively, the patient is instructed on bear weight as tolerated by pain and perform ankle and hindfoot mobilization exercises.

Discussion

There is a particularly high density of nociceptive free nerve endings and proprioceptive mechanoreceptors in the synovial tissue and fat pad of the sinus tarsi, and various pathologies of the sinus tarsi can cause the pain and subjective feeling of instability described in STS.⁵ Arthroscopic debridement has a denervation effect

that may be successful regardless of what the underlying pathology is so long as the nociceptors and proprioceptors in the synovium and fat pad are excised.⁵ Removal of the ligamentous structures has no additional benefit owing to a lack of nociceptors and proprioceptors in these structures. Therefore, identification of an intra-articular diagnosis more specific than STS is not necessary given that arthroscopic debridement with synovectomy may be a suitable universal treatment to relieve the symptoms caused by a variety of underlying intra-articular pathologies in the sinus tarsi.⁵ Instead, the extent of involvement is important for adequate arthroscopic debridement. The subtalar joint axis passes through the centers of the talar head

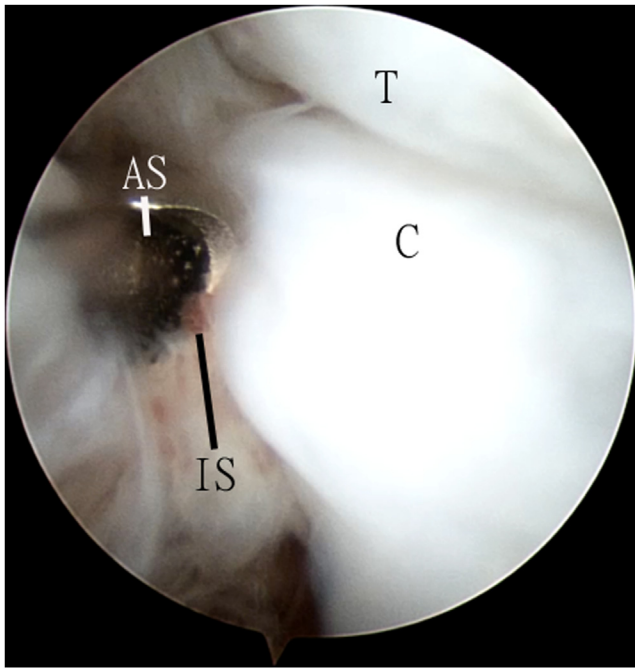


Fig 4. Arthroscopic management of sinus tarsi syndrome in right foot. The patient is in the lateral position. The antero-lateral subtalar portal is the viewing portal, and the middle subtalar portal is the working portal. Both the arthroscope and arthroscopic shaver (AS) are advanced posteriorly into the lateral recess of the posterior subtalar joint, and arthroscopic synovectomy is performed. (C, calcaneus; IS, inflamed synovium; T, talus.)

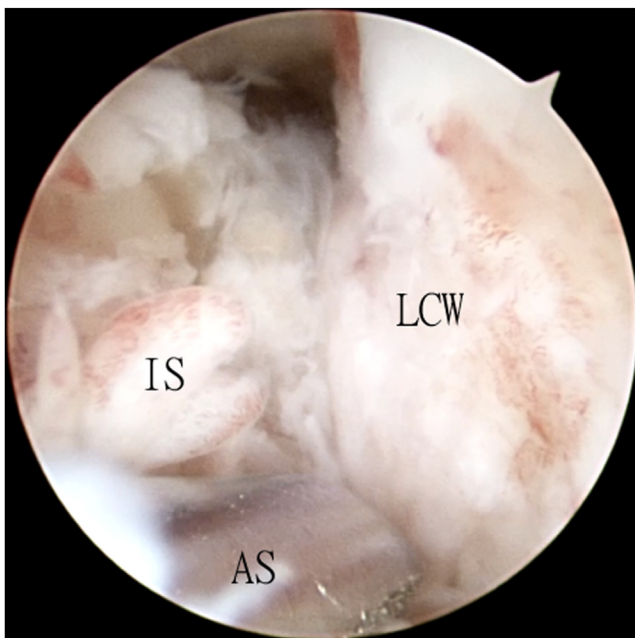


Fig 5. Arthroscopic management of sinus tarsi syndrome in right foot. The patient is in the lateral position. The antero-lateral subtalar portal is the viewing portal, and the middle subtalar portal is the working portal. The inflamed synovium (IS) extending from the sinus tarsi to the lateral calcaneal wall (LCW) is resected. (AS, arthroscopic shaver.)

Table 2. Pearls and Pitfalls of Arthroscopic Management of Sinus Tarsi Syndrome

Pearls

- Assessment of the extent of involvement by identification of the tender spots is important for preoperative planning.
- The dorsolateral midtarsal portal and the medial tarsal canal portal may provide better arthroscopic visualization during debridement of the lateral border of the sinus tarsi.

Pitfalls

- Injury to the sinus tarsi ligaments during arthroscopic debridement can cause symptomatic subtalar instability.
- The inability to achieve adequate debridement of all zones of injury may lead to persistent symptoms.

and the posterior calcaneal facet. The capsulo-ligamentous structures lateral to the axis can be injured during inversion injury. The “zones of injury” center on the sinus tarsi and can extend posteriorly to the lateral recess of the posterior subtalar joint, laterally to the lateral calcaneal wall, anteriorly to the lateral recess of the anterior subtalar joint, and medially to the tarsal canal.¹ In our technique, the technical details of arthroscopic debridement of all of these zones are described. To preserve subtalar stability, the interosseous and lateral talocalcaneal ligaments should be preserved during arthroscopic debridement of the tarsal canal and lateral calcaneal wall, respectively. The area most prone to incomplete debridement is the lateral border of the sinus tarsi. If needed, the dorsolateral midtarsal portal or the medial tarsal canal portal can be used to provide better arthroscopic visualization during debridement of this area.¹³⁻¹⁵ Compared with the 2-portal approach to the anterior and posterior subtalar joints, this 3-portal approach provides more classic arthroscopic views of the anterior and posterior subtalar joints, which are more familiar to foot and ankle arthroscopists.^{10,11,13,16-18}

The advantages of our minimally invasive approach include better cosmetic results, minimal soft-tissue trauma, complete debridement of all zones of injury, decreased postoperative pain, early mobilization, and faster postoperative recovery. The potential risks include injury to the branches of the superficial peroneal nerve, the nerve to the extensor digitorum brevis (terminal branch of the deep peroneal nerve), the sural nerve, the sinus tarsi ligaments, or the articular cartilage of the subtalar joints, as well as recurrence of symptoms (Table 3).¹⁹⁻²² This approach is not technically difficult and can be managed by the average arthroscopist.

Disclosures

All authors (K.L., T.H.L.) declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Fig 6. Arthroscopic management of sinus tarsi syndrome in right foot. The patient is in the lateral position. The anterolateral subtalar portal is the viewing portal, and the dorsolateral midtarsal portal is the working portal. The inflamed synovium (IS) on the lateral side of the anterior subtalar joint is resected with the arthroscopic shaver (AS). (C, calcaneus; TH, talar head.)

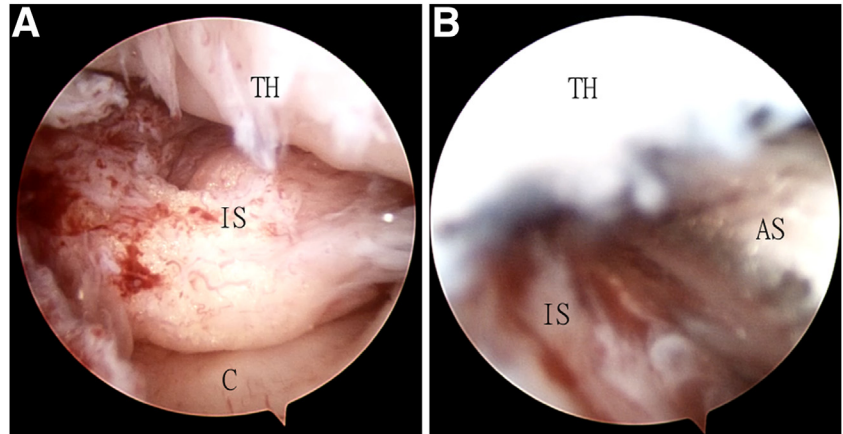


Table 3. Advantages and Risks of Arthroscopic Management of Sinus Tarsi Syndrome

Advantages	
Better cosmetic results	
Minimal soft-tissue trauma	
Complete debridement of all zones of injury	
Decreased postoperative pain	
Early mobilization and faster postoperative recovery	
Risks	
Injury to branches of superficial peroneal nerve	
Injury to nerve to extensor digitorum brevis (terminal branch of deep peroneal nerve)	
Injury to sural nerve	
Injury to sinus tarsi ligaments	
Injury to articular cartilage of subtalar joints	
Recurrence of symptoms	

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