

Foot and Ankle Tips and Tricks: The Operative Management of Os Trigonum Syndrome in Dancers Through a Posteromedial Approach

Karim Mahmoud, MD
Sreenivasulu Metikala, MD
Viviana M. Serra López,
MD MS
Wen Chao, MD

University of Pennsylvania,
Department of Orthopaedic Surgery
Foot and Ankle Division

Introduction

Os trigonum syndrome (OTS) is a common cause of posterior ankle impingement, and is especially prominent in dancers. This problem occurs when the os trigonum of the talus and surrounding soft tissues impinge between the posterior aspect of the distal tibia and the calcaneus.^{1,2} Os trigonum of the talus arises as a result of failure of fusion of a secondary ossification center, which happens between ages 11–13 in males and 8–10 years in females. It was first described by Rosenmuller in 1804 and it is the second most common accessory bone of the foot. It has an incidence of 10–25% in the general population and is bilateral 50% of the time. While it is usually asymptomatic, posterior ankle pain can develop in those individuals performing activities necessitating repetitive forced plantarflexion of the ankle such as in soccer players and ballet dancers.² Os trigonum syndrome can also develop in individuals who have a os trigonum which is fused to the talus, when the posterior process of the talus (also known as Stieda process or trigonal process of the talus) is prominent (Figure 1).

OTS most often presents in the classical ballet dancers because the position of the foot and ankle involves full weight bearing on a forced plantarflexed ankle during *relevé* in *demi pointe*.¹ The repetitive dorsiflexion of the first metatarsophalangeal joint and hyper plantarflexion of the ankle can also predispose dancers to flexor hallucis longus FHL tenosynovitis, which occurs in 63% to 85% of cases of OTS.²

Conservative treatment for OTS includes rest, ice, immobilization, nonsteroidal anti-inflammatory drugs (NSAIDs), ultrasound guided cortisone injections, and physical therapy. Surgical intervention to excise symptomatic os trigonum can be considered when the non-operative treatment fails. Both arthroscopic and open surgical approaches have been described in the literature. In general, an open approach is preferred to arthroscopic technique, as the latter method requires the patient to be prone and makes it challenging to address the concomitant FHL pathology.^{1,3} The open posterolateral approach was described in order to avoid exploration of the tarsal tunnel,

but is associated with high incidence of sural nerve injury.¹ Furthermore, evaluation of the FHL tendon is more difficult because it lies medial to the os trigonum. A common cause of persistent posterior or posteromedial pain in a dancer who underwent complete excision of an os trigonum via a posterolateral approach is often due to unaddressed FHL tendon or tendon sheath pathology.¹ Therefore, the posteromedial approach for surgical excision of symptomatic os trigonum is recommended, especially in dancers.

Pre-operative Evaluation

Preoperative evaluation includes a thorough history and physical exam. The appropriate candidate should have pain with tenderness to palpation of the posteromedial and/or posterolateral aspect of the ankle joint in the region of the os trigonum. Passive plantarflexion should reproduce the posterior ankle pain (positive plantarflexion test). If pain is present at posterior ankle with full dorsiflexion of the ankle and passive dorsiflexion of the first metatarsophalangeal joint, then FHL tendonitis is also present. Weight bearing lateral radiographs of the ankle will show the presence of the os trigonum, or a prominent trigonal process of the talus (Figure 1). CT scan can be helpful



Figure 1. Lateral radiograph of left ankle in a 12 year-old female ballet dancer with os trigonum.



Figure 2. Weight-bearing CT scan of the same patient demonstrating (A) os trigonum and (B) enlarged posterolateral tubercle of the talus.

to determine the size of the os trigonum and will also help demonstrate enlargement of the posterolateral tubercle of talus (Figure 2). An MRI of the ankle can also show co-existent FHL pathology. Surgical excision of the os trigonum is indicated after failed non-operative treatment.

Surgical Technique

Exposure

The surgery is typically performed as an outpatient procedure. General anesthesia is preferred. A thigh tourniquet is applied, and a bump is placed under contralateral hip to place the surgical extremity into external rotation. A 5-7 cm curvilinear longitudinal incision is made along the posteromedial ankle centered on the posterior talus and tarsal tunnel. Subcutaneous tissue is dissected to identify the lacinate ligament. This is carefully incised using Stevens scissors in order to gain access to the tarsal tunnel. The neurovascular bundle is identified and gently retracted posteriorly. The small perforating branches found anteriorly are cauterized as anteriorly as possible using bipolar electrocautery. The FHL tendon sheath is then incised to the fibro-osseous tunnel using Stevens Scissors and inspected. Tenosynovectomy is performed as needed. If there is a tear in the FHL tendon, it is repaired using a 3-0 non-absorbable suture.

Surgical steps

The FHL tendon and the neurovascular bundle are then retracted posteriorly using a blunt retractor. The os trigonum is then identified. Limited capsulotomy is performed around the os trigonum using a Freer Elevator and Stevens Scissors. The elongated posterolateral tubercle of talus, if present, is then resected using a small osteotome (Figure 3). The ankle is then placed into full plantarflexion with direct visualization of the posterior talus to make sure that there is no impingement. This can also be performed under fluoroscopy on the lateral view of the ankle. The wound is irrigated and skin is closed with a 4-0 nylon suture. Sterile dressings are applied, and a well-padded posterior splint is placed with a “U” shaped stirrup, with the ankle in slight plantarflexion. The tourniquet is deflated at this time and care is taken to make sure that all toes are well perfused.

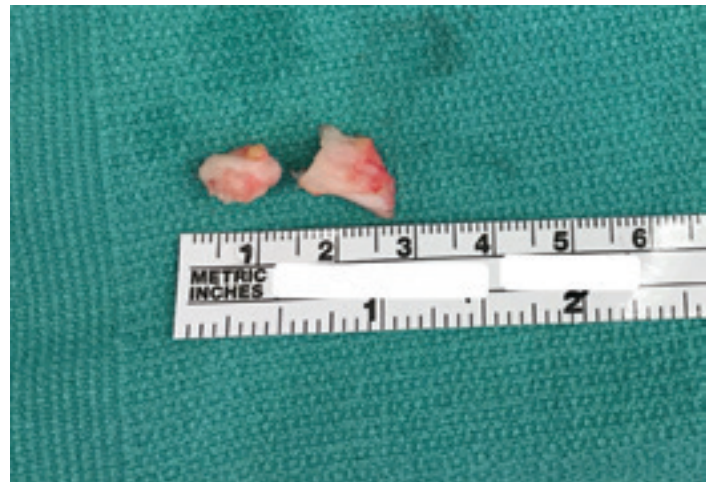


Figure 3. Intraoperative picture of an excised os trigonum (left) and enlarged posterolateral tubercle of talus (right).

Post-op care and follow-up

The first post-operative visit typically occurs 10 to 14 days post-operatively. The splint and skin sutures are removed. The ankle is placed in a removable CAM walker and patients are allowed to bear partial weight as tolerated. Formal physical therapy is initiated to help with range of motion, proprioception and strengthening. Gradual return to dancing is resumed at around 8-12 weeks.

Conclusion

The posteromedial open approach to excise symptomatic os trigonum is a safe and reliable technique, especially in dancers. It gives direct access to the neurovascular bundle, which can be protected throughout the procedure. Furthermore, the FHL tendon is easily visualized with this approach and any concurrent pathology can be effectively addressed.

References

1. Heyer, J. H. & Rose, D. J. Os Trigonum Excision in Dancers via an Open Posteromedial Approach. *Foot Ankle Int.* 2017; 38: 27–35.
2. Chao, W. Os trigonum. *Foot Ankle Clin.* 2004; 9: 787–796.
3. Morelli, F. *et al.* Endoscopic Excision of Symptomatic Os Trigonum in Professional Dancers. *J. Foot Ankle Surg.* 2017; 56: 22–25.