Arthroscopic Excision of the Os Trigonum: Using the Posteromedial Portal Safely

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Abstract

The os trigonum is an accessory ossicle that, though usually asymptomatic, can become a chronic source of pain, particularly in dancers and athletes. Surgical intervention is sometimes necessary, with arthroscopy having the theoretical advantages of less pain, inflammation, and scarring.

Presented here is an example of chronic posterior ankle pain in an athlete successfully treated with arthroscopic os trigonum resection using posteromedial and posterolateral portals. We review the technical features and surgical technique of safe placement of the posteromedial portal and associated advantages.

The os trigonum is an accessory bone located posterior to the lateral tubercle of the talus. It appears as a secondary center of ossification between ages 8 and 11 and then usually fuses with the talus within 1 year. Fusion of the secondary ossification site and the talus forms a large posterolateral (PL) process, the Steida process. When fusion fails to occur, the secondary ossification center remains a separate bone connected to the lateral tubercle by a fibrocartilagenous synchondrosis; the nonfused bone is called an os trigonum. This accessory bone, fused or not, is present in 1% to 25% of the general population and in most cases is asymptomatic.[1,2]

However, in some patients, usually those involved in strenuous or repetitive activities, symptoms of pain and discomfort can develop. Os trigonum syndrome is characterized by a generalized rearfoot pain, tenderness over the posterior ankle, and increased pain with hyperplantarflexion. The most common cause of os trigonum syndrome is impingement of the os trigonum and surrounding soft-tissue structures between the posterior distal lip of the tibia and the calcaneal tuberosity.[3] Another common cause, particularly in athletes, is disruption of the cartilaginous synchondrosis between the os trigonum and the lateral tubercle; this disruption results from repetitive microtrauma and chronic inflammation.[1]

The diagnosis of os trigonum syndrome can be suspected from the clinical examination findings but is confirmed by radiographs showing the os trigonum and by magnetic resonance imaging (MRI), computed tomography, and bone scans used to identify other bony and soft-tissue involvement.[4,5]

> "This technique enhances treatment of...symptomatic os trigonum, without increased risk to neurovascular structures."

Initial treatment is conservative. It includes rest, use of ice and anti-inflammatory medications, cortisone injections, and physical therapy. When conservative care is unsuccessful, surgical excision is recommended. Traditionally, surgical excision is performed through an open PL approach.[1,3] In this article, we summarize the management of symptomatic os trigonum syndrome through a posterior arthroscopic approach using both PL and posteromedial (PM) portals.

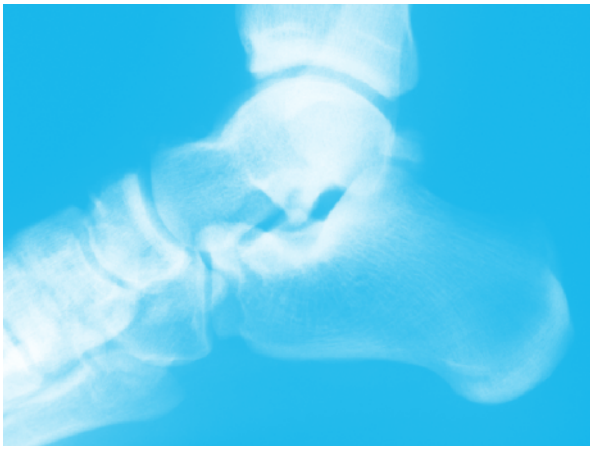

Figure 1. Lateral radiograph shows an os trigonum.

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Figure 2. Short tau inversion recovery sequence magnetic resonance imaging shows edema of os trigonum.

Case Example

A 16-year-old male football player presented to our sports medicine clinic with complaints of persistent posterior ankle pain after sustaining a hyperplantarflexion injury. Initial physical examination revealed tenderness over the retrocalcaneal bursa exacerbated by hyperplantarflexion. Radiographs showed a prominent os trigonum (Figure 1). Despite conservative measures, pain persisted in the posterior ankle compartment. MRI showed inflammatory changes of the posterior ankle consistent with os trigonum syndrome (Figure 2). Injection of a corticosteroid provided only temporary relief. After conservative management failed, the athlete elected surgical resection.

Surgical Technique

Under general anesthesia, the patient is positioned prone with the affected leg exsanguinated and no distraction device applied. The external topography of the posterior ankle is delineated with a marking pen. A spinal needle is used to infuse the retrocalcaneal bursa with saline, skin is incised, and the portal is developed with a blunt cannula. This portal should enter just lateral to the Achilles tendon to avoid injury to the sural nerve. From the calcaneal tuberosity (or tip of the fibula), the portal is placed approximately 1 cm cephalad. A PM portal is then developed under direct visualization, also with a spinal needle, directed laterally toward the arthroscope. The portal should be placed immediately adjacent to the Achilles tendon. Image intensification can be helpful in localizing portal placement. Instrumentation is then introduced in the same lateral direction.

The key arthroscopic landmark to the posterior compartment anatomy is the flexor hallucis longus (FHL) tendon and sheath (Figures 3, 4). Identification of the FHL affords a distinct medial border. All débridement should be performed lateral to the FHL so as not to endanger the neurovascular bundle. Directly lateral to the FHL is the os trigonum. The os is then resected and the posterior talus inspected along with the FHL tendon and sheath (Figure 4). Resection of inflammatory tissue and taloplasty are performed as needed, always staying lateral to the FHL.

Alternatively, a stacked double lateral portal approach, described by Lombardi and colleagues,[6] or a side-by-side double lateral approach, described by Horibe and colleagues,[7] can be used.

Postoperative Care

After surgery, patients are allowed immediate weightbearing, and physical therapy is instituted. At 4 weeks, running and sport-specific drills are begun, with full return to sport within 6 weeks.

Discussion

Accessory ossicles of the feet are found with variable frequency in the general population and are usually asymptomatic. When conservative management of os trigonum syndrome is not successful, surgical excision is the treatment of choice. Traditionally, surgical excision is performed through an open incision, as it provides adequate visualization and access to the posterior ankle and minimizes risk to the neurovascular

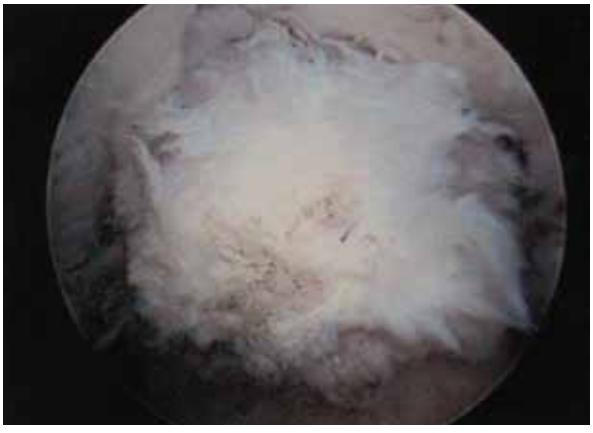

Figure 3. Arthroscopic view of os trigonum in posterior compartment before resection.

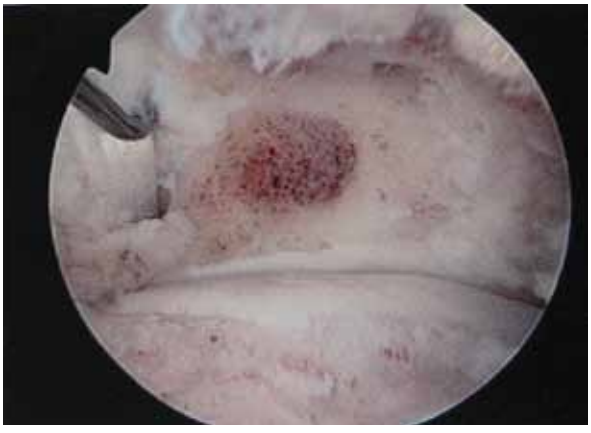

Figure 4. Posterior tibiotalar articulation after os trigonum resection, with probe indicating flexor hallucis longus.

structures. Abramowitz and colleagues[1] reported 4 permanent and 4 transient sural nerve palsies after 41 open resections of the os trigonum.

In comparison with the open procedure, arthroscopic surgery as treatment for a symptomatic os trigonum offers less scarring, minimal soft-tissue damage, and faster return to athletics.[7,8]

Various techniques and portal placements have been used to approach the os trigonum.[6,7,9,10] The supine position using anterior portals has been suggested as the safest method for performing standard ankle arthroscopy.[9] In this position, however, only intra-articular pathology of the ankle joint can be addressed, making it difficult to visualize or treat the periarticular structures of the posterior ankle compartment.[4,11] Recent studies have suggested, given the shape of the ankle joint and the deep location of the posterior ankle structures, a posterior approach when dealing with pain or pathology in the posterior ankle compartment.[4,5,8,11] Phisitkul and colleagues[8] were able to significantly extend the working area by adding the PM portal to the standard PL portals.

Use of a PM portal is not usually recommended because of the apparent risk to the neurovascular bundle.[11,12] However, recent literature suggests that a PM approach is safe when the FHL tendon is used as a landmark to avoid the neurovascular bundle.[8,11,13,14] Van Dijk and colleagues[4] described using 2 portals (PM, PL) to approach the posterior ankle. They used the arthroscope shaft through the PL portal to guide instrumentation from the PM portal. This technique was used by Willits and colleagues[15] in their functional and clinical evaluation of 24 posterior ankle arthroscopies, 11 of which were os trigonum excisions. All patients reported good to excellent results, and no complications were noted. In a cadaveric study, Sitler and colleagues[14] measured the distance from the PM portal to the posterior tibial nerve and artery. Mean distance from the PM cannula was 6.4 mm and 9.6 mm, respectively.

Regardless of portal selection, the concepts for safe posterior ankle arthroscopy remain the same. With use of a meticulous operative technique, particularly during portal creation, posterior approach ankle arthroscopy in the prone position can be successful. This technique enhances treatment of posterior ankle pathology, such as a symptomatic os trigonum, without increased risk to neurovascular structures.

Conclusions

Arthroscopic excision is the ideal treatment for a symptomatic os trigonum as long as careful attention is paid to the structural anatomy of the ankle. With proper patient positioning, appropriate instrumentation, and careful operative technique, arthroscopy significantly decreases morbidity, scarring, and soft-tissue damage, allowing a faster return to sport. Multiple portal combinations have been reported to be successful in arthroscopic excision of symptomatic os trigonum.

In this article, we have presented the case of a young athlete who underwent successful posterior 2-portal arthroscopic excision of a symptomatic os trigonum without neurovascular damage and with return to athletics at 6 weeks. We support use of both PL and PM portals for arthroscopic resection of an os trigonum.

Authors' Disclosure Statement and Acknowledgment

The authors report no actual or potential conflict of interest in relation to this article.

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References

1. Abramowitz Y, Wollstein R, Barzilay Y, et al. Outcome of resection of a symptomatic os trigonum. *J Bone Joint Surg Am.* 2003;85(6):1051-1057.
2. Kose O, Okan AN, Durakbasa MO, Emrem K, Islam NC. Fracture of the os trigonum: a case report. *J Orthop Surg.* 2006;14(3):354-356.
3. Yilmaz C, Eskandari MM. Case report: arthroscopic excision of the talar Stieda's process. *Arthroscopy.* 2006;22(2):225.e1-225.e3.
4. van Dijk CN, Scholten PE, Krips R. A 2-portal endoscopic approach for diagnosis and treatment of posterior ankle pathology. *Arthroscopy.* 2000;16(8):871-876.
5. Williams MM, Ferkel RD. Subtalar arthroscopy: indications, techniques, results. *Arthroscopy.* 1998;14(4):373-381.
6. Lombardi CM, Silhanek AD, Connolly FG. Modified arthroscopic excision of the symptomatic os trigonum and release of the flexor hallucis longus tendon: operative technique and case study. *J Foot Ankle Surg.* 1999;38(5):347-351.
7. Horibe S, Kita K, Natsu-ume T, Hamada M, Mae T, Shino K. A novel technique of arthroscopic excision of a symptomatic os trigonum. *Arthroscopy.* 2008;24(1):121.e1-121.e4.
8. Phisitkul P, Tochigi Y, Saltzman CL, Amendola A. Arthroscopic visualization of the posterior subtalar joint in the prone position: a cadaver study. *Arthroscopy.* 2006;22(5):511-515.
9. Marumoto JM, Ferkel RD. Arthroscopic excision of the os trigonum: a new technique with preliminary clinical results. *Foot Ankle Int.* 1997;18(12):777-784.
10. Jerosch J, Fadel M. Endoscopic resection of a symptomatic os trigonum. *Knee Surg Sports Traumatol Arthrosc.* 2006;14(11):1188-1193.
11. Lijoi F, Lughi M, Baccarani G. Posterior arthroscopic approach to the ankle: an anatomic study. *Arthroscopy.* 2003;19(1):62-67.
12. Voto SJ, Ewing JW, Fleissner PR Jr, Alfonso M, Kufel M. Ankle arthroscopy: neurovascular and arthroscopic anatomy of standard and trans–Achilles tendon portal placement. *Arthroscopy.* 1989;5(1):41-46.
13. Feiwell LA, Frey C. Anatomic study of arthroscopic portal sites of the ankle. *Foot Ankle.* 1993;14(3):142-147.
14. Sitler D, Amendola A, Bailey C, Thain L, Spouge A. Posterior ankle arthroscopy: an anatomic study. *J Bone Joint Surg Am.* 2002;84(5):763-769.
15. Willits K, Sonneveld H, Amendola A, Giffin JR, Griffin S, Fowler PJ. Outcome of posterior ankle arthroscopy for hindfoot impingement. *Arthroscopy.* 2008;24(2):196-202.