Arthroscopic Resection of Too-Long Anterior Process of the Calcaneus


Abstract: A too-long anterior process (TLAP) of the calcaneus is an elongated anteromedial process of the calcaneus impinging the navicular or the talar head. TLAP can cause recurrent ankle sprain, peroneal muscle spasm, or persistent tarsal pain in adolescents. Arthroscopic resection is indicated if the symptoms do not respond to conservative treatment. It has the advantage of assessment of completeness of bone resection and treatment of associated lesions of the adjacent joints. The purpose of this technical note is to report an arthroscopic approach of the resection of the TLAP with the lateral midtarsal portal as the viewing portal.

A too-long anterior process (TLAP) of the calcaneus is an anatomic abnormality in which the anteromedial process of the calcaneus is elongated and becomes interposed between the head of the talus and the cuboid far enough to cause impingement on the navicular. Actually, calcaneonavicular coalition and TLAP represent a spectrum of types of errors that occur in the embryologic mesenchymal formation during fetal life. TLAP is one of the causes of recurrent ankle sprain, peroneal muscle spasm, or persistent tarsal pain in adolescents that is usually triggered by a sprain. Surgical resection using a dorsolateral approach is indicated if conservative treatment fails to relieve the pain. The clinical outcome is usually good, but complications including infection, hematoma, and neuroma can occur. Moreover, the symptoms may recur or persist that may be a result of incomplete resection, as or as a consequence of iatrogenic trauma to soft tissue, bone or joint, or an ossification as a consequence of healing perioperative hematoma or overlook of the possible secondary lesions of the adjacent joints. Ascertainment of an adequate bone resection on the plantar aspect of the lesion can be difficult with open resection. Arthroscopic resection of the TLAP and calcaneocuboid coalition or symptomatic nonunion of the anteromedial process of the calcaneus was first reported by Lui. It provides or allows easier assessment and adequate resection, especially the plantar part of the lesion through clear visualization, and causes minimal soft tissue trauma leading to early recovery and mobilization. It also avoids the associated complications such as hematoma, infection, and neuroma seen often with open surgery, and allows assessment and treatment of neighboring joint pathologies related to the sprain injury or the bone impingement. In the previous reports, the dorsolateral midtarsal portal is the working portal and the anterolateral subtalar portal is the primary viewing portal. The dorsomedial midtarsal and lateral midtarsal portals have been reported as the secondary viewing portals for assessment of the deep part of the lesion or pathologies of the adjacent joints. In this technical note, we report the arthroscopic approach of resection of TLAP with the lateral midtarsal portal as the primary viewing portal. It is indicated in symptomatic TLAP that does not relieve by conservative measures. It is contraindicated if the local soft tissue condition of the lateral midtarsal portal site is poor or there is associated joint pathology of the talonavicular or the subtalar joint without involvement of the calcaneocuboid joint (Table 1).

Technique

Preoperative Planning and Patient Positioning

The oblique radiograph of the foot together with local tenderness over the superior corner of the anterior
The calcaneal process is sufficient to confirm the diagnosis. Detailed clinical assessment is needed to detect any possible secondary lesions. Further imaging studies are indicated if concomitant lesions are suspected.

The patient is in supine position. A thigh tourniquet is applied to provide a bloodless operative field. A 2.7-mm 30° arthroscope (Henke Sass Wolf GmbH, Germany) is used for this procedure.

**Portal Placement and Calcaneocuboid Arthroscopy**

Lateral and dorsolateral midtarsal portals are used for this procedure. The lateral portal is at the plantar-lateral corner of the calcaneocuboid joint. The dorsolateral portal is at the junction between the calcaneocuboid joint and talonavicular joint (Fig 1). For the beginners, the portals, especially the dorsolateral one, are best located under fluoroscopy. A needle can be inserted into the potential space between the calcaneocuboid and talonavicular joints to confirm the location of the dorsolateral midtarsal portal. The portal should be at the same level as the calcaneocuboid joint line. Incisions of size 3 to 4 mm are made at the portal sites. The subcutaneous tissue is bluntly dissected to the joint capsule by a hemostat and the capsule is pierced by the tip of the hemostat.

**Resection of the Soft Tissue Around the Superior Corner of the Anterior Calcaneal Process**

Calcaneocuboid arthroscopy is performed with the lateral midtarsal portal as the viewing portal. The capsule at the superior corner of the anterior calcaneal process is resected with an arthroscopic shaver (Smith and Nephew, London, UK) via the dorsolateral midtarsal portal. The soft tissue resection continues medially until the lateral capsule of the talonavicular joint is resected and the lateral part of the talonavicular joint is exposed. The talar head and the navicular are examined for any osteochondral lesion or cortical fracture as evidence of impingement (Fig 2). The space between the superior corner of the anterior calcaneal process and the talonavicular joint is assessed with an arthroscopic probe (Acufex, Smith and Nephew).

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**Table 1. Pearls and Pitfalls of Arthroscopic Resection of the Too-Long Anterior Process of the Calcaneus**

<table>
<thead>
<tr>
<th>Pearls</th>
<th>Pitfalls</th>
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<tr>
<td>(1) The dorsolateral portal is the working portal.</td>
<td>(1) The lateral midtarsal portal is not suitable if the local soft tissue is poor.</td>
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<td>(2) The viewing portal depends on the location of the associated lesion of the adjacent joint.</td>
<td>(2) The lateral midtarsal portal should not be the primary viewing portal if there is an associated lesion at the talonavicular or the subtalar joints.</td>
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<td>(3) Associated pathology of the adjacent joints should be treated accordingly.</td>
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<tr>
<td>(4) The lateral midtarsal portal is the preferred viewing portal if there is no associated joint lesion.</td>
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<td>(5) Hindfoot inversion test is useful to detect any residual impinging bone.</td>
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Fig 1. Arthroscopic resection of the too-long anterior process of the right calcaneus. (A) The lateral midtarsal portal (LP) is the viewing portal. The dorsolateral midtarsal portal (DLP) is the working portal. (B) The lateral midtarsal portal is located at the plantar lateral corner of the calcaneocuboid joint. The dorsolateral midtarsal portal is at the junction between the calcaneocuboid and talonavicular joints and at the level of the calcaneocuboid joint line.
hindfoot inversion test is performed and impingement of the navicular or the talar head by the anterior calcaneal process is shown.

Resection of Superior Corner of the Anterior Calcaneal Process

The superior corner of the anterior calcaneal process is resected with an arthroscopic burr (Smith and Nephew) via the dorsolateral portal (Fig 3). The resection is started from the dorsal surface of the process and proceeds plantarly until the soft tissue plantar to the tarsal bones can be seen through the space between the talonavicular and calcaneocuboid joints. The hindfoot inversion test should be repeated time to time to detect any residual impinging bone. Intraoperative fluoroscopy can be helpful to assess the amount of bone resection.

Confirmation of Complete Decompression

After completion of arthroscopic decompression, there should not be any bone impingement during the hindfoot inversion test (Fig 4, Video 1). Postoperatively, the patient is instructed on weight bear as pain tolerated and ankle and hindfoot mobilization exercise (Fig 5).

Discussion

The viewing portal of arthroscopic resection of the TLAP can be the lateral midtarsal, dorsomedial midtarsal, or anterolateral subtalar portal. Which portal is used depends on where is the associated joint lesion. If anterior or posterior subtalar joint pathology exists, the anterolateral subtalar portal is used as the viewing portal. Similarly, the dorsomedial or the lateral midtarsal portal is used if there is pathology at the
talonavicular or calcaneocuboid joint, respectively. If there is no associated lesion of the adjacent joint, the lateral midtarsal portal is the preferred viewing portal. In our experience, calcaneocuboid arthroscopy is technically much easier than talonavicular arthroscopy especially for the beginners. The risk of nerve injury is also less for the lateral midtarsal portal (sural nerve) than the dorsomedial midtarsal portal (intermediate dorsal cutaneous nerve). Moreover, the lesion at the plantar lateral side of the navicular or the talar head due to bone impingement is more directly visualized through the lateral midtarsal portal than the dorsomedial portal. When the anterolateral midtarsal portal is used as the viewing portal, it starts as an endoscopy rather than an arthroscopy and is more difficult for the beginner to orientate the arthroscopic view. Moreover, the arthroscope will pass through and injure the ligaments of the sinus tarsi before it can reach the TLAP. The freedom of motion of the arthroscope is limited by the ligaments of the sinus tarsi. To facilitate assessment of the deep part of the TLAP and the plantar part of the talar head and navicular, the lateral midtarsal portal is made slightly dorsal than usual.

The dorsolateral midtarsal portal is the working portal. The lateral branches of superficial peroneal nerve and the nerve to the extensor digitorum brevis (terminal branch of the deep peroneal nerve) are at risk during dissection of the portal. Skin incision should be superficial, followed by blunt dissection of subcutaneous tissue to avoid nerve injury. The advantages of this minimally invasive approach include better cosmetic result, better assessment of adequate bone resection, assessment and treatment of associated lesions of the adjacent joint, minimal soft tissue trauma, and early mobilization. The potential risks include injury to the branches of the superficial and deep peroneal nerves. The sensory nerves including the sural nerve and intermedial dorsal cutaneous branch of the superficial peroneal nerve are at risk (Table 2). This approach is not technically difficult and can be managed by the averaged arthroscopist if the technical details are followed.

Table 2. Advantages and Risks of Arthroscopic Resection of the Too-Long Anterior Process of the Calcaneus

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Risks</th>
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<td>(1) Better cosmetic result</td>
<td>(1) Injury to the intermedial dorsal cutaneous branch of the superficial peroneal nerve</td>
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<tr>
<td>(2) Less pain</td>
<td>(2) Injury to the nerve to the extensor digitorum brevis</td>
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<tr>
<td>(3) Less surgical trauma</td>
<td>(3) Injury to the sural nerve</td>
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<td>(4) Early mobilization</td>
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<td>(5) Easier assessment of completeness of bone resection</td>
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<td>(6) Assessment and treatment of associated lesions of the adjacent joints</td>
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References


