CASE REPORT

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Combined posterior and anterior ankle arthroscopy arthrodesis with triple hemisection Achilles tendon lengthening in equinus ankle contracture: a case report

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ABSTRACT

Background: Arthroscopic surgery has been one of the fastest-growing surgical treatments of choice in orthopedics in the last decade. Ankle arthroscopy is an established treatment of choice for most ankle pathologies. It has generally been performed with the use of anterior portals with the patient in the supine position. Only a few articles have been published on ankle arthroscopy performed using posterior portals, particularly with the patient in the prone position. Various arthroscopy techniques have been successfully applied to the treatment of various ankle pathologies, including equinus ankle contracture.

Case presentation: A 34-year-old female patient presented with an equinus gait 2 years prior to the consultation. This occurred after open reduction with internal fixation (ORIF) of her left proximal tibia fracture. After the surgery, the patient had chronic osteomyelitis complications and deep peroneal palsy (drop foot). The patient had four previous surgeries of debridement of the tibia until the infection healed. As the deep peroneal palsy was left untreated, the patient developed an equinus ankle contracture. Achilles tendon lengthening with triple hemisection was planned with combined posterior and anterior ankle arthroscopic arthrodesis procedure. This included the release of the tibiotalar and subtalar capsule, along with arthrodesis of the ankle with 2 cannulated screws.

Conclusion: Triple hemisection Achilles tendon lengthening with combined posterior and anterior ankle arthroscopy arthrodesis is an effective treatment modality in equinus ankle contracture cases. Arthroscopy is beneficial as it minimally invasive, with less surgical duration time and is associated with faster recovery and less postoperative infections.

Keywords: Arthroscopy, Ankle, Triple Hemisection, Arthrodesis, Equinus Contracture

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INTRODUCTION

Arthroscopy surgery is one of the fastest-growing surgical procedures in orthopedics in the last decade.[1] Burman MS, in 1931 concluded, that the ankle joint was unsuitable for arthroscopy because of its typical anatomy.[2] The joint space was too narrow and the dome of the talus was too convex for adequate viewing.[1-3] Nowadays, it is considered a treatment of choice for most ankle pathologies. Improvements in technique, instrumentation, and distraction have established ankle arthroscopy as a useful and practical procedure.[1,4] Routinely, anteromedial and anterolateral portals are used.

Additionally, a posterolateral portal has been used in cases of posterior ankle pathology. Arthroscopic procedures that are performed using this portal are not accessible.[2,4] The use of a two portal arthroscopic approach to the posterior ankle with the patient in the prone position gives excellent access for the examination and treatment of posterior ankle pathology.[1,2,4]

Various arthroscopic techniques have been successfully applied to the treatment of non-insertional Achilles tendinopathy, Haglund's syndrome, Achilles tendon rupture, and equinus contracture.[5] The value of arthroscopy surgery as a minimally invasive treatment is well recognized and includes less perioperative pain, less scarring, minimal blood loss, and faster recovery.[1,3,5]

This case report describes a patient with combined posterior and anterior arthroscopic arthrodesis approaches with triple hemisection Achilles tendon lengthening and release of tibiotalar and subtalar capsule. Initially, the patient prone to posterior arthroscopy and then turned supine for the anterior arthroscopic procedure, both in the same surgical session. This combined arthroscopic approach gives excellent access to both the anterior and posterior aspects of the ankle.

CASE PRESENTATION

A 34 years old female patient presented with an abnormality of gait 2 years prior to the consultation. This occurred after open reduction with internal

fixation (ORIF) of her left proximal tibia fracture in another hospital. After surgery, the patient had complications of chronic osteomyelitis and deep peroneal palsy (drop foot). The patient had 4 surgeries for chronic osteomyelitis. Post-operatively the patient developed sensory loss and muscle wasting. Two years following the accident, these findings progressed to severe prominent atrophy of left lower limb distal to the knee. As the deep peroneal palsy was left untreated, the patient developed an equinus ankle contracture. Physical examination revealed an equinus gait on her left foot. From inspection, there was muscle wasting and a scar on the heel, with no tenderness found.

Figure 1. A-B patient had equinus gait on her left foot. D-E limited ROM of the left ankle with fixed 55^0 of plantar flexion.

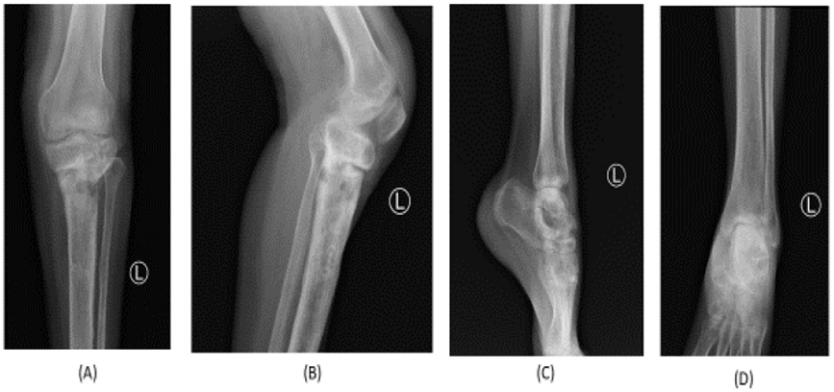

Figure 2. A-B. The knee joint plain radiographic revealed chronic osteomyelitis of the tibia with a screw mounting mark. C-D. The anteroposterior ankle joint plain radiographic revealed decreased bone density and the ankle in equinus position from the lateral view.

Movement examination revealed a limited range of motion (ROM) of the left ankle, fixed in 55^0 of plantar flexion (Figure1).

The plain anteroposterior and lateral radiographic view of the knee joint revealed chronic osteomyelitis of the tibia with screw mounting marks. The ankle joint showed decreased bone density from the lateral view of the ankle equinus position (Figure 2). The patient was diagnosed with chronic osteomyelitis and equinus ankle contracture. The first surgical approach was debridement of the proximal tibia for the chronic osteomyelitis. The patient underwent re-debridement two months later and the chronic osteomyelitis healed. The patient had good healing of the wound post debridement.

After the successful debridement, the patient was planned for Achilles tendon lengthening with a triple hemisection procedure using a combined posterior and anterior ankle arthroscopic arthrodesis procedure. This procedure was accompanied by the release of the tibiotalar and subtalar capsule, along with arthrodesis of the ankle with two cannulated screws.

Initially, the patient was placed in the prone position, the foot and ankle were disinfected, and a sterile draping was applied. The triple hemisection Achilles tendon lengthening procedure was performed and the plantigrade ankle position was achieved. Through a posterolateral portal, a 4.0 mm scope was introduced. The posteromedial portal was used for instrumentation. The subtalar joint and tibiotalar capsule were removed using a 4.5 mm shaver (Figure 3). About 50% articular cartilage of distal tibia and talus was removed through curettage. Since the removal of cartilage is not adequate from the posterior due to the ankle joint's tightness, the anterior arthroscopy was performed to achieve full removal of articular cartilage (Figure 4).

With all the instruments placed on a sterile table, the patient was turned unto the supine position. The foot and ankle were disinfected again and a fresh sterile draping was applied. Using standard anteromedial and anterolateral portals, an anterior ankle arthroscopy was performed. The remaining articular cartilage was removed through curettage. The tibiotalar joint was fixed using two large cannulated screws.

A Kirschner wire was first inserted 10° to 20° starting at the posterolateral tibia and towards the talar head's subchondral bone. A second Kirschner wire was then inserted from the tibia's medial aspect in a similar orientation, aiming toward the lateral talar dome. The location of the Kirschner wires was confirmed by both arthroscopy and fluoroscopy. Two cannulated screws were then inserted over these Kirschner wires.

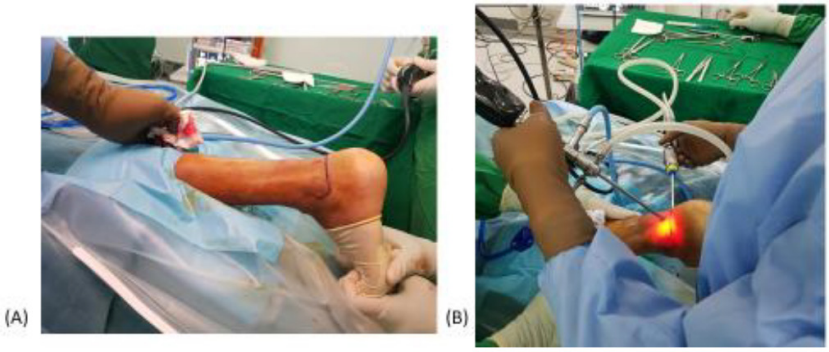

Figure 3. A-B Posterior portals arthroscopy

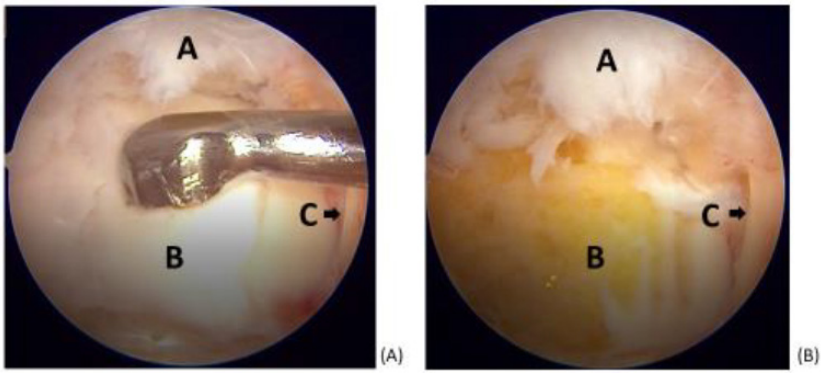

Figure 4. A-B Posterior arthroscopy portals during curettage revealing (A) Tibia (B) Talus and (C) Flexor Hallucis Longus (FHL).

DISCUSSION

Equinus is a condition in which there is decreased dorsiflexion at the ankle joint.[6] Equinus can occur in one or both feet.[6] When it involves both feet, the limitation of motion is sometimes worse in one foot than in the other.[6] There are several possible causes for the limited range of ankle motion. Often, it is due to tightness in the Achilles tendon or calf muscles. Equinus may also result from one leg being shorter than the other. Less often, equinus is caused by spasms in the calf muscle. These spasms may be signs of an underlying neurologic disorder.[6,7]

Peroneal neuropathy is the most frequent mononeuropathy encountered in the lower limb and the third most common focal neuropathy encountered overall, after median and ulnar neuropathies.[8] The weakness of ankle dorsiflexion and the resultant foot drop are common presentations of peroneal neuropathy.[8] The deep peroneal nerve (DPN) supplies motor innervation to all anterior compartment muscles and the fibularis tertius, also known as the peroneus tertius.[9] The anterior tibialis is the strongest foot dorsiflexor, although the extensor digitorum longus and the fibularis tertius assist with this movement.[8-10] Reichner D et al. reported a case of foot drop due to peroneal nerve compression.[8] A previous studies by Itoh M et al. and Jeong JH et al. reported the same case of DPN palsy after open wedge high tibial osteotomy.[11,12]

In our case, the patient had DPN palsy after treatment ORIF of a proximal tibial fracture two years prior to consultation in another hospital. After surgery, the patient had complications of chronic osteomyelitis and drop foot. Post-operatively the patient developed sensory loss and muscle wasting. Two years following the accident, these findings progressed to severe prominent atrophy of right lower limb distal to the knee. Physical examination revealed plantar flexion was present with minimal eversion of the ankle but no definite dorsiflexion. Limited ROM of the left ankle with fixed in 55^0 of plantarflexion. These clinical findings were consistent with equinus ankle contracture due to untreated DPN palsy.

To eradicate the chronic osteomyelitis, the patient underwent four debridements of the proximal tibia—two times in another hospital and two times in our hospital. After the chronic osteomyelitis healed, we planned for the arthrodesis of the ankle. The aim is a plantigrade ankle for better walking. Firstly, Achilles tendon lengthening was performed to the patient. We planned to use the triple hemisection technique. For the arthrodesis of the ankle, we performed a combined posterior and anterior ankle arthroscopic arthrodesis procedure. A study by Scholten PE and van Dijk CN reported a case using a combined posterior and anterior arthroscopic approach to the patient diagnosed with a nonunion of the posterior distal tibial rim with secondary flexor hallucis longus (FHL) tendinitis causing posterior ankle pain.[4] The operation was performed under general anesthesia, the patient was placed in a prone position. The posteromedial portal was used for FHL release by cutting the flexor retinaculum. The non-united fragment of the distal posterior edge of the tibia was removed. The patient was turned unto the supine position, using standard anteromedial and anterolateral portals. An anterior ankle arthroscopy was performed to remove the loose fragments on the medial malleolus and osteophyte excision.[4]

Similar to our case, the patient was placed in a prone position. The posterior portal was used for the subtalar and tibiotalar capsule release and curettage of the distal tibia and talar cartilage. After curettage, about 50% of the articular cartilage remained, we were unable to remove all articular cartilage in the anterior portion. The decision was made to perform curettage on the remaining articular cartilage from the anterior portals. The patient was turned unto the

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supine position and anterior portals arthroscopy was performed to remove the remaining articular cartilage. Arthrodesis of the ankle was then performed used two cannulated screws.

Most surgeons would perform an open approach for combined anterior and posterior ankle pathology. This is since a combined ventral and dorsal arthrotomy carries a higher risk of complications and stiffness.[1,4] An anterior arthroscopic approach with a posterior accessory portal gives good access to the anterior joint but provides limited access to the posterior joint. A combined anterior arthroscopic and posterior open treatment bears the risk of posterior scar formation, scar tenderness, and stiffness.[4,13] Only a previous study by Scholten PE and van Dijk CN reported the combined posterior and anterior arthroscopic approach in one surgical session, whereby the patient is turned from prone to a supine position halfway throughout the session.[4]

CONCLUSION

This combined posterior and anterior arthroscopy procedure provided an excellent surgical alternative approach to treat anterior and posterior ankle pathology. Compared to the open approach, which carries a higher risk of scar tenderness, stiffness, and posterior scar formation. In summary, the above technique has the advantage of being minimally invasive with reduced soft-tissue trauma, better cosmetic results, and early postoperative mobilization.

CONFLICT OF INTEREST

There is no competing interest regarding the manuscript.

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None

AUTHOR CONTRIBUTION

All of the authors equally contributed to the study from the conceptual framework, data gathering, and data analysis until reporting the study results through publication.

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