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Arthroscopic Management of Posterior Ankle Impingement Syndrome – A Case Series

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Learning Point of the Article:

Arthroscopic decompression of chronic posterior ankle impingement syndrome provides a good functional outcome.

Abstract

Introduction: Posterior ankle impingement is a common cause of chronic ankle pain. Although nonoperative treatment is initially preferred, there are surgical options if the symptoms are persistent. Minimally invasive arthroscopic procedures reduce surgical trauma and enable an early return to routine activities.

Case Report: We conducted a study including 6 patients who underwent arthroscopic decompression for posterior ankle impingement. Five of them were female patients and one was a male patient. The pathology varied; one had os trigonum (OT), two had stieda processes (SP), and three had OT with posterior osteophyte complex as part of ankle arthritis. In this paper, we discuss the required clinical approach, preoperative investigations, surgical indications, functional outcomes, and complications of arthroscopic treatment. The patients were followed up for a minimum of 6 months and evaluated using American Orthopedic Foot and Ankle Society (AOFAS) score, Visual Analog Scale (VAS) , and range of movement (ROM) pre and post-operatively. All the patients reported a significant reduction of pain and an improved ROMs and functional scores at the operated ankles compared to the opposite side. However, one of the patients developed post-operative tingling and numbness at the plantar aspect of the forefoot. Another one developed tingling at the lateral plantar aspect of the foot. One of the patients with SP, had an incomplete excision of the lesion.

Conclusion: Ankle arthroscopy is an effective and minimally invasive surgery that has a significant role in managing chronic ankle pain due to posterior impingement that does not respond to conservative management and provides good functional outcomes with minimal complications.

Keywords: Ankle arthroscopy, OS trigonum, stieda process, posterior ankle impingement.

Introduction

Posterior ankle impingement syndrome (PAIS) is typically noted in athletes who perform repeated plantar flexion movements during their sport. However, it is also observed in the general population following ankle trauma or as part of degenerative arthropathy. The predominant symptom is posterior ankle pain particularly during plantar flexion motion [1, 2]. PAIS is also called as posterior talar compression syndrome, os trigonum (OT) syndrome, or nutcracker type impingement [3].

The symptoms are secondary to soft tissue or bony impingement in the posterior ankle, out of which the latter is more common in the form of OT or elongated posterior talar process called stieda process (SP). These result in impingement in plantar flexion

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Author's Photo Gallery


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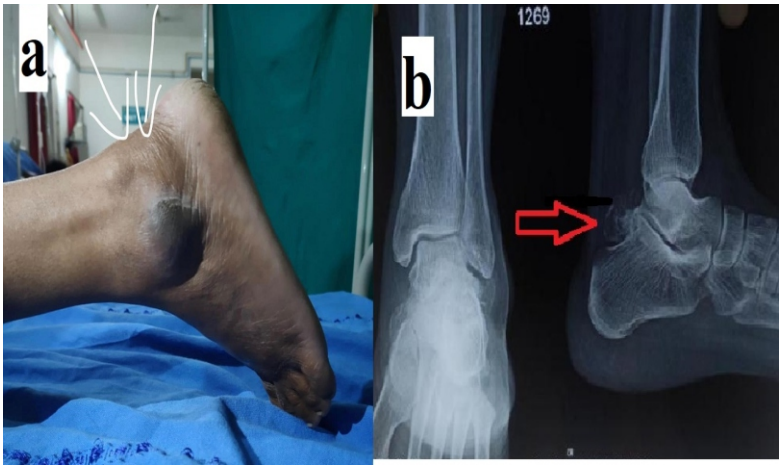

Figure 1: Clinical images showing swelling over the posterior aspect of the ankle due to large os trigonum osteophyte complex (white arrow) (a), and radiographs anteroposterior and lateral view showing large os trigonum osteophyte complex (red arrow) (b).

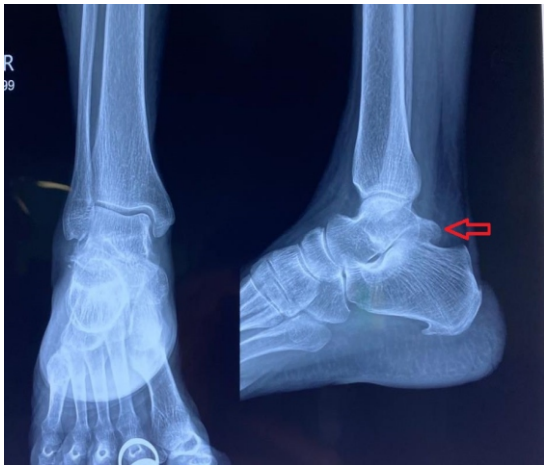

Figure 2: Preoperative radiograph of ankle showing stieda process (red arrow).

movements and restriction of the range of movement (ROM) depending on the size and location of the pathology. There can be associated bursitis around the lesions secondary to irritation of surrounding soft tissue structures and can lead to calcification if the disease process is long-standing [4]. OT is an accessory bone that represents a developmental analog of the secondary ossification center of the posterolateral talus which mineralizes between 7 and 11 years of age in girls and 11 and 13 years in boys and fuses within 1 year [5]. In 7–14% of adults it remains as a separate accessory bone, which is bilateral in 1.4% of cases [6]. The most common soft tissue pathology is flexor hallucis longus (FHL) tendon tenosynovitis, the rest being subtalar synovitis and impingement from anomalous muscles crossing the posterior ankle [7]. The PAIS can also result from previous fractures, degenerative arthritis, subtalar osteophytes, loose bodies, and chondromatosis.

The diagnosis of posterior ankle impingement is based primarily on the clinical history. The patient usually reports chronic or recurrent posterior pain caused or exacerbated by forced plantar flexion or push-off activities. On physical examination, there is typical posteromedial or posterolateral tenderness [8]. Passive terminal plantar flexion may reproduce the patient's symptoms, which is known as Nutcracker's sign [9]. Associated FHL pathology can be found out by passively flexing and extending the great toe.

Plain radiographs, computed tomography (CT), and magnetic resonance imaging (MRI) are helpful in proper diagnosis and preoperative planning. Radiographs particularly lateral radiographs help in diagnosing osseous lesions, such as OT, SP, loose bodies, and osteophytes. CT helps in the detailed evaluation of such osseous lesions with respect to their size, location, and numbers. MRI particularly helps in diagnosing soft tissue etiology and also in evaluating anomalous muscles, such as peroneus quartus and flexor digitorum accessorius longus which are seen in 7–22% and 1–8% of the population, respectively [10].

The initial treatment of PAIS includes conservative management with rest, cold compression, non-steroidal anti-inflammatory medications, and the avoidance of extreme ankle plantar flexion for 3 months [11]. When conservative treatment

Figure 3: Preoperative radiograph showing large os trigonum, a red arrow (a), and magnetic resonance image showing posterior subtalar arthritis with a subchondral cyst in posterior talus (yellow arrow).

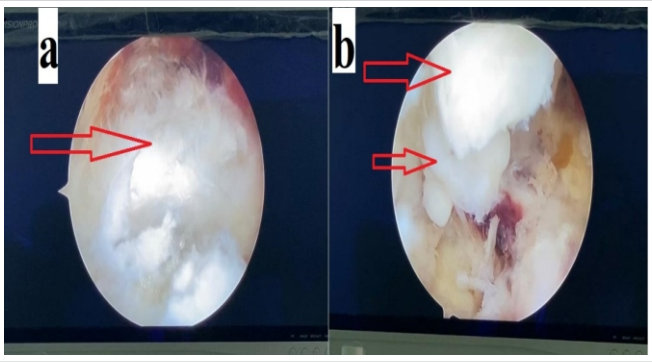

Figure 4: Intraoperative arthroscopic images showing os trigonum projecting over the posterior aspect of the talus (red arrows) (a and b).

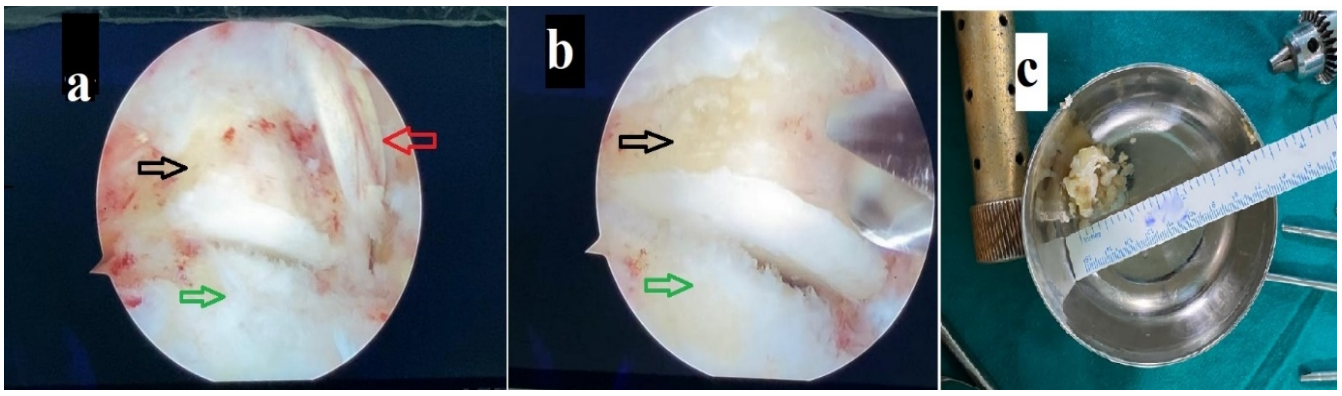

Figure 5: (A and B) showing post arthroscopic resection of os trigonum osteophyte complex with the posterior aspect of the talus (black arrow) and posterior aspect of calcaneum (green arrow) clearly exposed. Red arrow indicating flexor hallucis longus tendon. Excised bone [C].

fails, surgical management is a viable option with either open or arthroscopic procedures like posterior hindfoot arthroscopy. We report a series of six such patients of PAIS all due to osseous pathology (OT and SP) and how patients were managed successfully by arthroscopic procedures following failed conservative management.

Case Series

From July 2019 to January 2022, six patients visited our out-patient department with symptoms of PAIS. This prospective study included six patients out of which two were elderly (55–70 years), three were middle-aged (35–50 years) and one was young (22 years). Five of them were females and one was a male patient .All these patients presented with atraumatic chronic posterior ankle pain. On examination, they all had tenderness on the posteromedial and posterolateral part of the ankle with pain exaggerating on plantar flexion with no anterior ankle joint tenderness ruling out anterior ankle pathology. One patient had a large osseous lesion probably secondary to OT and posterior osteophyte complex, which was felt as a clinial bony mass at the posterior aspect of the ankle. There were no neurological deficits in any of them. Radiological examination revealed OT in one patient, SP in two patients, and OT with degenerative subtalar arthritis in three patients (Fig. 1 and 2). MRI showed hyperintense signals surrounding the osseous lesion due to surrounding bursae/soft tissue inflammation (Fig. 3). Patients were given conservative treatment with non-steroidal anti-inflammatory drugs, physiotherapy, lifestyle modifications, and rest before considering surgical management. Posterior ankle/subtalar arthroscopy was planned for all patients considering pathology mainly around the posterior ankle. After proper consent and explanation about procedures to the patients, all patients were operated on by a single surgeon between July 2019 and January 2022 with arthroscopic excision of osseous lesions (OT/SP) with resection by surrounding bursae. One patient underwent additional subtalar debridement in view of minimal subtalar arthritis.

Surgical technique

All the patients were operated in a prone position under spinal anesthesia with a pillow under the operating leg to keep the knee flexed and a high tourniquet applied. The operating foot was placed on the edge of the operating table for dorsiflexion of the ankle during surgery. Two portals were made medial (PM) and lateral (PL) just adjacent to the Achilles tendon just below the tip of the fibula. PL portal was used as the scope portal and the PM portal was used as the instrument portal. A 4 mm arthroscope with a 30° inclination was used in all cases. Subcutaneous blunt dissection was performed using a mosquito clamp through both portals. Care must be taken to avoid damage to the sural nerve by advancing the trocar with the sleeve carefully through the PL portal to touch the posterior aspect of the talus by directing it toward the first interdigital web space. Shaver passed

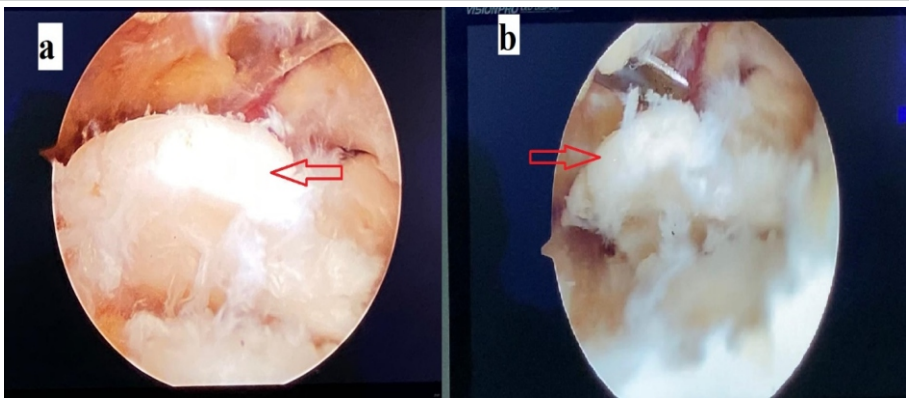

Figure 6: Intraoperative arthroscopic images (a and b) showing disc-shaped Stieda process projecting on the posterior aspect of the talus (red arrow).

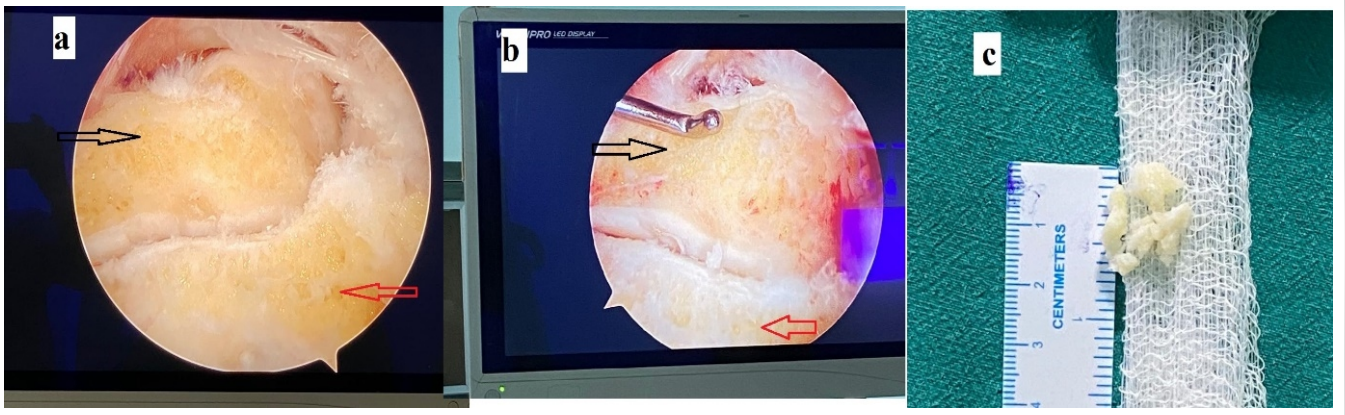

Figure 7: Arthroscopic images showing post-resection of the stieda process with the posterior aspect of the talus (black arrow) and clacaneum (red arrow) exposed. 7 (c) showing piecemeal excised fragments of the stieda process.

through the PM portal and debrided fatty tissue anterior to the Achilles tendon and retrocalcaneal bursa to locate the intermalleolar ligament. The FHL tendon was localized and confirmed by great toe movements. Since vital neurovascular structures lie medial to FHL, we need to place instruments lateral to the tendon while visualizing the fibro-osseous tunnel. Posterior talofibular ligament is identified wherein SP and OT are generally in continuity with ligament (Fig. 4). Bony projections are resected with a shaver and burr. In three cases, OT was removed en bloc with meniscal punches, and ST and large OT with osteophyte were removed with shavers (Fig. 5-9) After complete resection, the subtalar joint and ankle joints were inspected. In one case of large OT with osteophyte, there was subtalar arthritis and the joint was debrided along with microfracture for cartilage defect. After satisfactory removal of bony projections and debridement, impingement was assessed with plantar flexion of the ankle. Closure was done with skin sutures.

All the patients were started with early ROM exercises within a week of surgery and weight bearing was allowed after suture removal at 2 weeks.

Routine post-operative radiographs were performed to assess the clearance of the bony lesions (Fig. 10 and 11).

Results

At 1 year follow-up (94.2%), mean American Orthopedic Foot and Ankle Society (AOFAS) scores were significantly better than pre-operative (56.6%) Visual Analog Scale (VAS) scores were significantly improved from 6.8 mean pre-operative scores to 0.8 mean at 6 months. Near normal ROMs at both ankle and subtalar joints were achieved by 3 patients compared to the unaffected side. Two of the six patients experienced neuropraxia with sensory loss along sural nerve distribution which resolved spontaneously around 6 weeks. One patient with SP had incomplete resection and showed minimal signs of persistent PAIS symptoms which resolved with 3 months of physiotherapy and analgesics. One patient with degenerative changes with an osteochondral defect on the talar dome complained of anterior ankle pain. However, the pain was minimal and the patient was not willing for further treatment and hence, was managed conservatively.

Discussion

In our series , the causes of impingement were stieda process, os trigonum and OT with osteophyte complex,.. We followed up

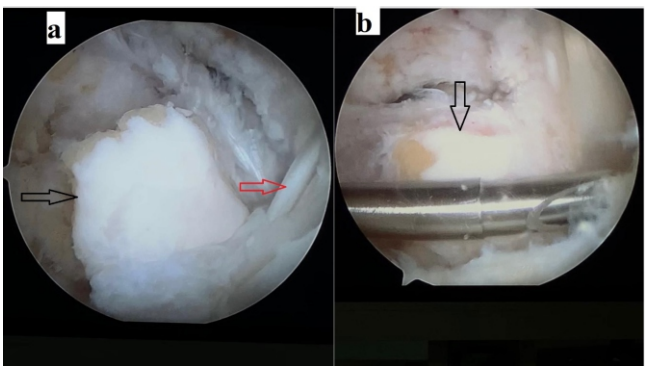

Figure 8: (a and b) Intraoperative arthroscopic images showing large os trigonum osteophyte complex (black arrow) and red arrow showing flexor hallucis longus tendon.

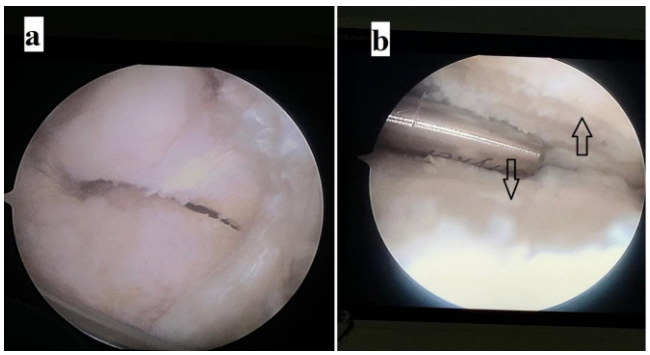

Figure 9: Intraoperative arthroscopic image after complete resection of os trigonum osteophyte complex (a) and arthritic changes showing at posterior subtalar joint (b) (black arrows)

Figure 10: Post-operative radiograph ankle showing complete resection of stieda process (white arrow).

Figure 11: 6 months post-operative radiograph of ankle showing complete resection of os trigonum osteophyte complex with screws in situ and complete union of subtalar arthrodesis.

with patients for a minimum of 6 months with a mean follow-up of 18.8 months. A similar study by Galla and Lobenhoffer in 2011 included 30 patients (11 females and 19 males) with OT or osteophytes causing posterior ankle impingement with an average age of 46 years followed up for 6 months minimum with a mean 9.7 months [12]. In a prospective study by Carreira et al., done in 2016, including 6 males and 14 females (a total of 20 patients) who underwent ankle arthroscopy for posterior impingement, with a mean age of 21 years who were followed up for a minimum of 1 year (mean 38.2 months) [13]. Rui Xiang et al., in 2021 conducted a retrospective case series of seven patients (five males and two females) of posterior ankle impingement due to OT in five and ankle osteoarthritis in two patients with age group between 22 and 53 years. They were followed up for a minimum of 6 months and a maximum of 2 years [14].

Arthroscopic treatment is considered to give similar outcomes as open procedure but with lesser complication rates and early return to their activity as described in the studies of Georgiannos and Bisbinas, Guo et al. [15, 16]. Open procedures are usually performed through a posterolateral incision 5 mm lateral to the lateral border of the achilles tendon. Arthroscopic procedures are followed usually as per Van Dijk's approach [17].

We assessed patients by comparing AOFAS, VAS scores, and ROMs pre-operatively and at 6-month follow-up. At 6-month follow-up (94.2%), mean AOFAS scores were significantly better than pre-operative scores (56.6%) . VAS scores were significantly improved from 6.8 mean pre-operative scores to 0.8 mean at 6 months. Near normal ROMs at both ankle and subtalar joints were achieved by three patients compared to their unaffected side. Galla and Lobenhoffer in his study, observed VAS scores of 1.3 at 6-month follow-up as an improvement from 7.2 pre-operatively [12]. Carreira et al, noted significant improvement from a VAS score of 5.4 preoperatively to 0.9 at 6-month post-operatively. The mean ROM in all motion variables at 6-month follow-up was statistically similar to the unaffected side [13]. Rui Xiang et al. in his study also had a significant improvement in VAS score from 6.6 to 1 at the final follow-up [14].

With respect to complications, one of our patient experienced forefoot tingling and numbness of the lateral border of the foot for 6 weeks after surgery which eventually reduced with Vitamin B12 dose supplementation. Another patient complained of anterior ankle pain at 6 months (Fig. 12). The other studies noted similar complications. Galla and Lobenhoffer had one case of superficial infection, one deep infection, two patients had sural nerve neuritis and two required revision surgery.[12] Carreira et al., noted one case of plantar neuritis and another one had Achilles tightness.[13] However, Rui Xiang et al. did not report any post-operative complications.[14].

Figure 12: Showing numbness with tingling sensation over the lateral aspect of the foot in a patient with os trigonum following surgery.

Conclusion

Ankle arthroscopy plays a considerable role in managing chronic ankle pains due to posterior impingement which did not respond to non-operative treatment modalities and

provides good functional outcomes with minimal complications.

Clinical Message

In patients with chronic PAIS, when there is no response to conservative modes of management, arthroscopic decompression is an effective treatment option.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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