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Case report

Endoscopic management of posterior ankle impingement syndrome—A case report

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ABSTRACT

Posterior ankle impingement syndrome (PAIS) is a clinical condition characterized by pain in the posterior aspect of ankle on performing activities requiring extreme plantar flexion. The impinging lesion could be bony and/or soft tissue. The operative treatment aims at removing the impinging lesion either by open or endoscopic surgery. The later has been shown to have benefits of early return to sports, better cosmesis, less wound complications.

We report a case of a 19 year old footballer with PAIS secondary to Os Trigonum. The patient complained of pain on performing running and on kicking football. Conservative treatment in form of NSAIDS, rest, physiotherapy modality use could not ensure pain free return to sports.The patient was managed using endoscopic excision of the Os Trigonum followed by aggressive rehabilitation. The patient returned to competitive football at the end of 14 weeks after surgery. There were no wound complications. AAFOS score had changed from 73 to 100 and NPS scale showed pain score reduce from 7/10 to 1/10.

We concluded that endoscopic management of PAIS to remove the impinging lesion is a minimally invasive technique that ensures early return to sports, good cosmesis, less risk of wound complications and good patient satisfaction.

1. Introduction

Posterior ankle impingement syndrome (PAIS) is a clinical disorder characterized by pain in posterior ankle on performing activities involving forced plantar flexion.[1,2]Professions involving regular use of such ankle movements like ballet dancers, footballers, gymnasts, cricketers, horizontal jumpers more commonly experience features of PAIS.[1,3,4,5]

The impingement occurs due to entrapment of a bony (viz os trigonum,Shepherd's fracture, steida's process) or soft tissue (viz hypertrophied/torn posterior inferior tibiofibular ligament, pathological labrum of posterior ankle joint, soft tissue scar, FHL pathologies, anomalous muscles) structure between the posterior malleolus of tibia and posterolateral aspect of talus. The incidence of os trigonum is 10% unilateral and 2% bilateral in general population.[18]50% patients of os trigonum have bilateral involvement.[19] Os trigonum results from failure of fusion of a secondary ossification center at the posterolateral aspect of talus.

The treatment includes conservative management by rest, cessation of activity, modification of technique, NSAIDS, physiotherapy modalities, local corticosteroid injections, rehab exercises and orthotic/footwear modification.[5] Patients not responding to the conservative treatment are managed operatively. Traditionally surgery is by open technique and aims at removal of the pathology causing the impingement either bony or soft tissue.[5] Open surgery is reported to cause longer time to return to sports and certain complications like poor wound healing, wound hematoma collections and inability to address intraarticular associated pathology.[5]

With advances in minimally invasive techniques the pathology can now be successfully addressed using endoscopic techniques.[5]We report a case of a 19 year old footballer with symptoms of PAIS secondary to os trigonum treated using endoscopic excision of the lesion.

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Fig. 1. Plain X rays in neutral and plantarflexion showing impinging os trigonum (*arrow*).

2. Case report

The patient was a 19 year old male footballer who visited the opd with complaints of pain in the back of his right ankle since one year. The pain was insidious in onset and aggravated on activities like running for long distance and kicking football. It was now interfering with his sporting activities. On examination of his right ankle the patient used to walk with inversion at his hind foot (sickling foot). There was diffuse swelling along the posteromedial aspect of the ankle with tenderness on the postero medial and poster lateral aspect. Flexion of great toe against resistance was painful. The AAFOS score was 73. NPS score was 7/10.Plain X-rays (in neutral and plantarflexion) and MRI ankle were performed. The X-rays showed the presence of os trigonum impinging with the posterior aspect of tibia in extreme plantarflexion (Fig. 1). The MRI confirmed the findings of os trigonum along with edematous changes in the flexor hallucis longus tendon sheath (Fig. 2). A trial of conservative treatment in the form of physiotherapy, NSAIDS, activity restriction and ankle strengthening exercises implemented for a period of three months was not successful as the patient could not pursue active life style like playing football. As the patient was not satisfied with the results of conservative treatment methods, the decision for operative treatment was taken. We opted for the endoscopic excision of the os trigonum because of reported advantages of minimal scar and good soft tissue healing, ability to assess and address any associated intraarticular pathology and the advantage of early return to sports. After taking informed consent from the patient the surgery was performed in prone position under general anesthesia with tourniquet control (pressure set at 300 mm Hg) .Surface marking demarcating the achillis tendon, both malleoli and the desired portal sites was done.

A horizontal line was made from lateral to medial across the achillis tendon, starting at the tip of lateral malleolus. Standard poster medial and poster lateral portals were made 5 mm anterior to tendoachillis just above the horizontal line. A 4 mm arthroscope and normal saline through a pressure pump set at 40 mm Hg pressure was used as the irrigating fluid. Diagnostic endoscopy was performed. The crural fascia was removed using a shaver till the subtalar joint space could be visualized. The rent in the fascia was slowly enlarged to get the full view of the os trigonum (Fig. 3) and then of the medially lying tendon of flexor hallucis longus (Fig. 4). The tendon acts as an anatomical landmark and use of shaver or burr medial to it carries a high risk of neurovascular injury to the adjacent posterior tibial neurovascular bundle. The soft tissue around the os trigonum is gradually cleared to obtain a full view of the bony lesion. In the process ligament attachments viz talar attachment of posterior talo fibular ligament and posterior

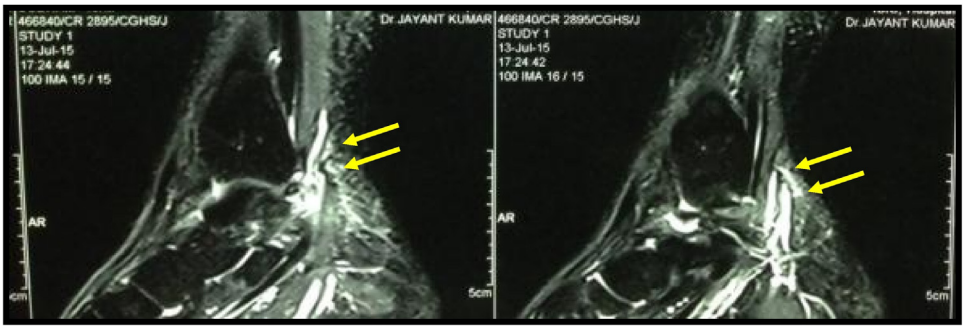

Fig. 2. MRI showing FHL tendinitis (*arrow*).

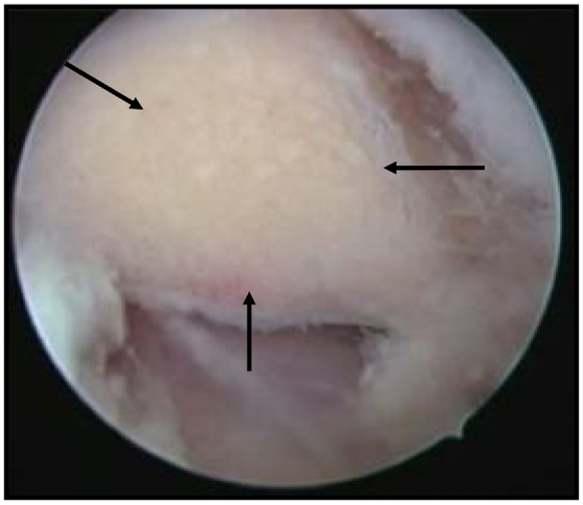

Fig. 3. Endoscopic view of os trigonum (*arrow*).

intermalleolar ligament are released from the bony lesion. Then with the use of a shaver the os trigonum was gently removed till endoscopy (Fig. 5) and fluoroscopy (Fig. 6) confirmed a smooth bony contour on the posterior aspect with no impingement on extreme plantar flexion. We did not require a burr to excise the lesion as the os trigonum bone was soft and could be easily excised piecemeal with use of a shaver and punch forcep.The tendon of flexor hallucis longus was visualized by pulling it in the endoscopic field of vision with the arthroscopic probe. The tendon was examined for changes of tear, split tendon, low lying anomalous muscle belly or constricting fibrous bands around it which could be the causes of recurrent tendinitis along with the impinging os trigonum. In this case only inflammation of the tendon sheath was found. Hence the tendon sheath was split open and excised using an arthroscopic scissor to decompress the tendon. The pulley around the tendon was also released to allow smooth gliding of the tendon. In the process of removal of the os trigonum the posterior ankle and subtalar joint capsules are also excised which aids in the intraarticular examination of these joints to identify any coexisting pathologies like osteochondral lesions, bony osteophytes etc which can be dealt with at the same time. In our case no intraarticular pathologies were seen. The procedure was thus successfully completed at the end of ninety minutes of surgical time. The skin

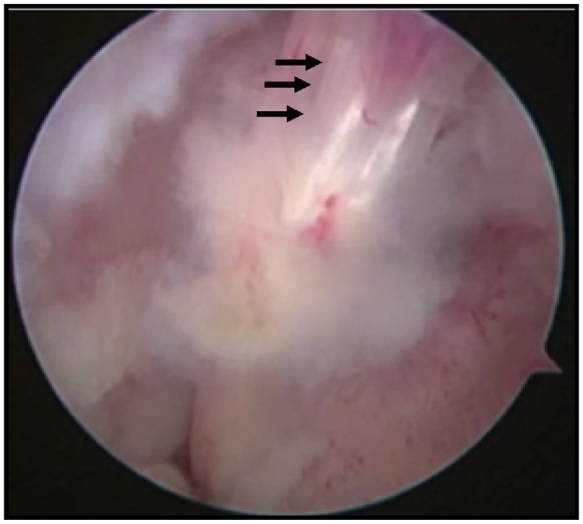

Fig. 4. Endoscopic view showing the muscle belly of FHL.

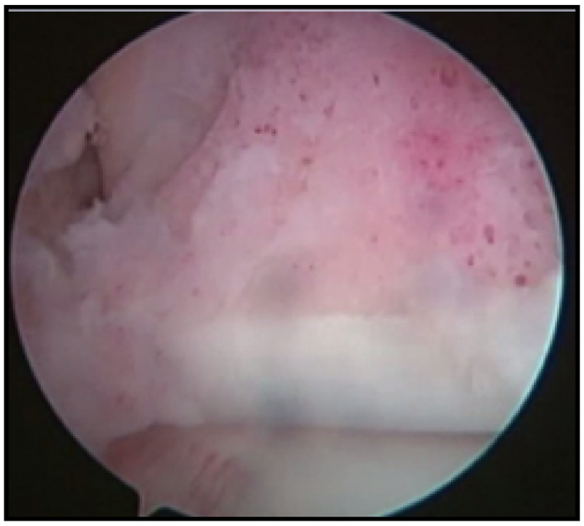

Fig. 5. Endoscopic view after removal of os trigonum.

portals were closed using 2-0 non absorbable sutures and a compressive well padded ankle dressing was applied. Dressing was changed at 48 h. Stitches were removed at 10 days post op. Aggressive rehabilitation was started as per the protocol mentioned below in the table (Table 1).

At the end of 14 weeks the patient's AAFOS score was 100. The NPS score was 1/10.

The patient had achieved full range of pain free ankle ROM. The patient was able to return to active sports with no complaints of discomfort on kicking activities. On subsequent follow up at the end of 24 weeks and 52 weeks the patient was symptom free and able to play competitive football.

3. Discussion

PAIS is an ankle pathology more frequently seen in professionals involved in repeated ankle forced planter flexion activities.[8] Os trigonum leading to PAIS is one of the most common etiologies.[5,8] Secondary ossification center at the posterior lateral process of talus appears at the age of 8–10 yrs in girls and 11–13 years in boys. It fuses with the rest of talus in the same year. Some times after fusion there is formation of a large posterolateral process of talus known as Steida's process. Os trigonum develops as a result of failure of fusion of the secondary ossification centre at the poster lateral talar process.[6,7] The ossified bone is connected to

Fig. 6. Fluoroscopic view after removal of os trigonum.

Table 1
Rehab protocol after surgery.

Phase	Goal of phase	Time post surgery	Physiotherapy treatment and exercise program	Functional/sport related activity
Phase 1	WBTT – FWB Eliminate swelling Scar resolution	0–2 weeks	Ice packs Compression Gait training (with elbow crutch)Gentle ROM exercise Core exercise	None
Phase 2	No swelling Full active ROM Unrestricted walking	2–6 weeks	Ice packs (post ex) Compression Manual therapy – Joint mobilization TC/StJ/ Mid foot/1st MtP Gait reeducation Exercise Progression(increase active and passive ROM ex; Intrinsic muscle ex; Core ex; Glutei ex; calf ex; theraband ex) Scar mobilisation	Stationary bike hydrotherapy
Phase 3	Close to full strength (at least 4/5 on MMT)	6–10 weeks	As above + Walking aids Balance and proprioceptive ex	Intermittent jogging
Phase 4	Full ROM Full strength and power Return to restricted sports specific drill	10–14 weeks	OKC & CKC exercises Jogging/gradual return to running Low grade plyometrics Advanced balance ex	Sport specific running and agility drills Plyometrics Jumping
Phase 5	Return to full training/competition	14 weeks +	As above + (run/jump drills revisiting technique)	Unrestricted training/ competition

Ex = exercise, FWB = full weight bearing, MtP = metatarsophalangeal joint, PF = plantar flexion, WBTT = weight bearing to tolerance, ROM = range of motion, TC = talocrural joint, StJ = subtalar joint.

Table 2
Comparison of outcome of open vs arthroscopic/endoscopic (arthro/endo) technique for PAIS surgery in adolescents.

Author	Sport	Surgery	Number of patients	Outcome and complications	Average Return to sports(RTS) in weeks
Hamilton[12]	Dance	Open	7	2 poor, 1 fair, 1 good, 3 excellent	25 3/7 did not return to ballet dance
Spicer[13]	Dance	Open	21	86% good/excellent results	RTS 11 weeks
Soucanye de Landevoisin[14]		Open	5	No complications	RTS 13 weeks
Richards[15]	Soccer	Arthro/endo	1	No complications	RTS 6weeks
Noguchi[16]	Soccer	Arthro/endo	6	1 sural nerve neuropraxia	RTS 6 weeks (range 3–8)
Smyth[17]	Soccer	Arthro/endo	7	AOFAS avg preop/postop 61/92	RTS 11 weeks (range 9–12)

the poster lateral talar process with a fibrocartilagenous tissue. The Steida's process or a fracture of the same may also give rise to symptoms of PAIS similar to os trigonum. Movements involving extreme ranges of plantar flexion cause bony impingement of the os trigonum between the posterior malleolus of tibia and the poster lateral aspect of talus also known as the nut cracker effect.[6]The os trigonum may also cause soft tissue impingement due to formation of scar tissue because of repeated friction in that area. Also the tendon of flexor hallucis longus may experience symptoms of impingement leading to frequent tendinitis due to the mechanical friction from the bony overgrowth.[6,7,8]

Conservative treatment methods may work for patients with limited active lifestyle but usually those professions needing repeated forced plantar flexion like ballet dancers, gymnasts and footballers fail to respond to the conservative treatment to their satisfaction.[9,10]

Operative techniques aim at removing the impinging pathology. Traditionally open techniques have been used to remove the impinging lesion. For open surgery the approach is either posteromedial or posterolateral.[5]Ribbans et al. in their review article have mentioned that the overall complication rate was 7–3.9% for the medial approach and 14.7% for the lateral approach (Chi squared, $p < 0.001$). The overall nerve injury incidence was 4.2% with a lower incidence for the medial approach (1.6%) compared to the lateral approach (12.9%). The sural nerve injury rate was 10.8% using a lateral approach and the wound complication rate was 2.8%.[5]

Recent advances in minimally invasive procedures have allowed the use of endoscopic technique to give equal functional results with better cosmesis, more wholesome addressing of the pathology and early return to work for patients with physically demanding lifestyle.[11] Evidence based studies over the last decade summarizing the outcome of surgical management of PAIS in adolescents have been summarized in the Table 2.

The patient in our case report showed a similar improvement as has been documented in studies before. He was able to return to sports at the end of 14 weeks. His AAFOS score improved from 73 to100. His NPS score improved from 7/10 to 1/10. He retained full active and passive pain free ankle plantar flexion. There were no morbidities related to the surgical scar.

4. Conclusion

This case report documents the successful use of minimally invasive technique of endoscopic excision of os trigonum lesion in PAIS cases. Although the technique is technically demanding and has a learning curve, the positive results and good patient satisfaction warrants the use of this technique more often.

Conflict of interest

None.

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