Knee Surg Sports Traumatol Arthrosc (2007) 15:1235–1239
DOI 10.1007/s00167-007-0349-1

ANKLE

Benefits of arthroscopic tuberculoplasty in posterior ankle impingement syndrome

Marc Tey · Joan C. Monllau · Josep M. Centenera · Xavier Pelfort

Received: 16 February 2007 / Accepted: 4 April 2007 / Published online: 23 June 2007

Abstract The purpose of this work was to describe the posterior ankle impingement syndrome related to the posterolateral tubercle of the talus bone and to present a retrospective analysis of our results after arthroscopic plasty of the tubercle in 15 ankles with a mean 3-year follow-up. Fifteen cases of posterior ankle impingement (PAI) underwent arthroscopic excision of an impinging bone spur. All the patients (13) were retrospectively evaluated at an average of 36 months after index surgery. There were seven women (bilateral in two of them) and six men. Ten were involved in different kinds of sport and three were professional ballet dancers. Preoperative symptoms included pain localized in the posterior ankle, limitation of motion, weakness and swelling. All patients had failed a course of conservative therapies. Surgery was performed through posterolateral and posteromedial portals as described by van Dijk. After soft tissue debridement, partial resection of the posterolateral process was performed until there was complete plantar flexion without bone impingement. Postoperatively, all patients followed the same rehabilitation protocol. Improvement in their impingement symptoms was recorded in all of them according to AOFAS score. One of them (7%) still had occasional discomfort. The results suggest that arthroscopic bone decompression of the posterolateral tubercle in cases of PAI resistant to non-surgical therapies is an effective treatment.

Keywords Ankle · Arthroscopy · Os trigonum · Sports · Talus

M. Tey (✉) · J. C. Monllau
Knee and Arthroscopy Unit,
Department of Orthopaedic Surgery, ICATME,
Institut Universitari Dexeus, Iradier 3,
08017 Barcelona, Spain
e-mail: mtey@eactua.com

M. Tey · J. M. Centenera
Department of Orthopaedic Surgery, ICOT Girona,
Clínica Quirúrgica Onyar, Heroines Sta. Bàrbara 6,
17004 Girona, Spain

J. C. Monllau · X. Pelfort
Department of Orthopaedic Surgery, Hospital IMAS,
Passeig Maritim 29, 08003 Barcelona, Spain

Introduction

Posterior ankle impingement (PAI) is a syndrome characterized by posterior chronic ankle pain. PAI is a common complaint in athletes who are involved in activities that require forced plantar flexion. Pain is usually referred to the posterolateral part of the joint in cases of bony impingement. However, when pain is also present in the posteromedial aspect of the ankle, concomitant tendonitis of the flexor hallucis longus (FHL) must be suspected.

Surgical treatment is usually performed through a posterolateral or posteromedial approach and includes either a release or resection of the injured soft tissues as well as the bony involvement [13]. Satisfactory results have been reported with this treatment when symptoms persist after a course of conservative measures including anti-inflammatory drugs and physical therapy [5, 7, 9, 13, 15].

There's limited experience in arthroscopic treatment of PAI syndrome [8]. This consists in debridement of soft tissue and excision of bone fragment or an os trigonum when present. However, a plasty of the tubercle may be needed, specially in cases of impingement without any bony abnormality. The plasty must be enough to allow for complete plantar flexion without impingement. This can be

assessed during the arthroscopic procedure since no distraction device is used.

The aim of this work is to present the arthroscopic technique and mid-term results in posterior ankle decompression with plasty of the posterolateral talus tubercle. The less invasive technique and quick recovery suggest that the arthroscopic treatment of PAI syndrome offers better options than open surgical decompression.

Materials and methods

We retrospectively reviewed the charts of all patients who underwent arthroscopic treatment for PAI syndrome from 2000 to 2004 at our institutions. Diagnosis of PAI syndrome was established in patients with posterior ankle pain that increases with forced plantar flexion. Inclusion criteria included patients with PAI syndrome with or without FHL tendonitis who failed a 3-month program of conservative treatment with NSAID and physical therapy. During this time, 13 consecutive patients (15 ankles) were operated on for PAI syndrome. The series included seven women and six men. Ten of the patients were involved in recreational sports (soccer, six; other, four) and three were professional ballet dancers. There were 11 right ankles and 4 left ankles. The average age of the patients at the time of surgery was 21 years (range 14–35). The average follow-up was 36 months (range 15–63). Past history showed ankle sprain in five cases and repetitive minor traumatism in ten.

Surgery was performed by three different surgeons with the same surgical technique and postoperative protocol.

All patients were evaluated pre- and postoperatively by history, physical examination, clinical ankle rating system (AOFAS score) [10]. All patients were assessed with a plain X-ray as well as an MRI [1, 2]. In case of diagnostic doubt, a ^{99}TC bone scintygraphy was performed.

Since all the patients followed arthroscopic treatment, results were compared to published reported results.

Surgical technique

After undergoing either spinal or epidural anesthesia, the patient was placed in the prone position with the foot hanging free. A thigh tourniquet was applied. A 4.5 mm 30° arthroscope was regularly used. Manual traction allowed adequate visualization of the posterior compartment. Therefore, no distraction device was used in this series. According to van Dijk et al. [14] a standard posterolateral portal was established. Ninety degrees insertion of a blunt trochar helped in establishing the posteromedial portal thus avoiding any neurovascular damage. Once the Flexor Hallucis Longus tendon (FHL) was identified (Fig. 1), the soft tissue surrounding the posterolateral tubercle was

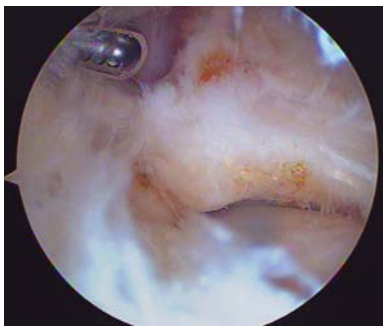

Fig. 1 Identification of FHL tendon

Fig. 2 Debridement of posterolateral process

debrided with a shaver (Fig. 2). In the case of os trigonum or a Sheperd's fracture, the bone fragment was removed with the burr or excised with grasping forceps (Fig. 3). The remaining posterolateral tubercle is progressively eliminated with the burr until there is no impingement at forced plantar flexion with the posterior tibial aspect (Figs. 4, 5). In the case of signs of thickening or symptoms of tendonitis of FHL tendon, its sheath is released.

After surgical procedure, a compressive bandage was applied and weight bearing restricted for 1 week postoperatively. Figures 6, 7 show pre- and postoperative radiology of case.

All ankle arthroscopies were done as an outpatient procedure. Patients were sent for postoperative physical therapy that included range of motion and muscle strengthening exercises.

Results

All patients were available for a follow-up examination (see Table 1). Preoperative symptoms included activity-limiting pain in all cases. There were varying amounts of stiffness, weakness or swelling. Activities noted to worsen symptoms included jumping, shooting (soccer) and point work (dancers). According to the AOFAS, the preoperative medium score was 84.4 (range 72–87).

Fig. 3 Bone fragment removed

Fig. 4 Plasty of tubercule after removal of bone fragment

Fig. 5 Plasty of tubercule after removal of bone fragment

Sheperd's fracture (fracture of posterolateral process) and os trigonum can usually be assessed with conventional radiology. In sagittal sequences, magnetic resonance imaging (MRI) demonstrated abnormal bone marrow signal (edema) in this area that was consistent with bone contusion or overload. Furthermore, in three cases, fluid accumulation in the FHL sheath was observed. Bone scintigraphy was carried out on four patients due to a diagnostic doubt. It constantly revealed an uptake of the

Fig. 6 Preoperative X-Ray

Fig. 7 Postoperative X-Ray

tracer on the posterior aspect of the talus. There where ten cases of impingement (one case with Stieda tubercle), four of Sheperd's fracture and one os trigonum.

All of the patients had been treated conservatively with various modalities including heat, ice, massage, ultrasound, strengthening and propioception exercises, nonsteroidal anti-inflammatory drugs and local corticosteroid injections (maximum three).

The average treatment course before surgery was 4 months (range 3–12). All patients failed to achieve sufficient relief of symptoms with these conservative therapies and were unable to participate in competitive activities.

Postoperative immobilization was 10 days in average (range 7–15). A program of physical therapy was started immediately afterwards and lasted for an average of 5 weeks (range 2–12). All the patients were able to return to full performance without restriction at an average of

Table 1 Demographic data and clincal evaluation (AOFAS score)

Case	Age	Sport	Diagnostic	AOFAS preop	AOFAS postop
1	20	Professional dance	Impingement	85	100
2	20	Professional dance	Impingement	87	100
3	20	Professional dance	Impingement	85	100
4	20	Professional dance	Impingement	85	100
5	16	Basketball	Fr. Sheperd	72	100
6	24	Football	Impingement	85	100
7	17	Football	Os trigonum	87	100
8	15	Basketball	Impingement	85	100
9	29	Football	Impingement	85	100
10	32	Football	Impingement	85	100
11	14	Basketball	Fr. Sheperd	85	100
12	17	Snowboard	impingement	85	77
13	24	Football	Fr. Sheperd	85	100
14	20	Football	Fr. Sheperd	85	100
15	18	Football	impingement	85	100

3 months (range 1.5–9) after index surgery. All the patients had normal plantar flexion after surgery. The postoperative AOFAS score was 98.5 (range 77–100).

No major complications related to the procedure were recorded. One patient developed a transient sensory neurapraxia of the posterior tibial nerve after surgery. This sensory deficit gradually returned to normal over time.

Discussion

PAI seems to be caused by chronic injury to the posterior talar process and soft tissues between the calcaneus and the posterior edge of the tibia on plantar flexion [9]. Therefore, activities requiring repetitive forced plantar flexion are more prone to develop the syndrome [5, 7]. In the present series, two-thirds of the cases were attributed to a repetitive minor trauma (soccer and basketball players) and the rest to an overuse syndrome (ballet dancers).

Although PAI is known in ballet dancers [5, 6], it has also been recognized in those patients involved in sports activities like soccer, basketball or other athletic activities [3, 11, 15]. Several causes have been suggested, including: (a) a prominent posterior process of the talus (known as Stieda's process since his description in 1869), a downward sloping posterior lip of the tibia or an os trigonum (an accessory bone of the lateral tubercle of the talus that may persist unfused into adulthood, described by McDougall in 1965), (b) a fracture of the posterior talus process (described by Sheperd in 1882 based in a cadaver study) that usually developed into pseudoarthrosis. This has been reported as the most frequent cause by others [9], but in our series it represented only 27% (four cases), (c) chronic soft tissue overuse caused by maximum plantar flexion or the ''equinus position'', observed in classic ballet dancers and soccer players [5, 12].

Clinical findings include pain in the posterior aspect of the ankle that increases with forced plantar flexion. Radiology can be normal in cases with a fracture of the posterolateral tubercle. MR imaging and bone scanning are particularly valuable in the assessment of the soft-tissue and osseous abnormalities implicated in the clinical setting of PAI [1, 2].

Most cases of PAI respond to conservative treatment. After the failure of non-operative treatment, open surgical excision has been recommended [6, 7]. The aim of surgery is the resection of inflammatory soft tissues and bone spurs to allow complete plantar flexion without impingement. Complete visualization of the ankle's movement is necessary to assess adequate bone resection.

Journel and Tourné have recently published their experience in PAI syndrome with an open technique where remodelation of the posterior malleolus of the tibia was performed in 9% of their series [9]. After soft tissues resection, we can observe the residual bone impingement during forced plantar flexion since we operated without a distraction device and the ankle joint was totally free. We performed a plasty of the posterolateral tubercle until complete plantar flexion without impingement was achieved. It allowed a complete decompression of the posterior ankle space as in the case of subacromial decompression.

Dijk shows us the advantages of using 2-portal endoscopic hind foot approach in the treatment of posterior ankle pathologies [15]. Golano et al. in an anatomic investigation concluded that posterolateral approach is more suitable than other arthroscopic approaches of the posterior region of the ankle [4]. There are few papers showing the results of arthroscopic treatment of this syndrome [3, 8, 11, 12, 14].

The results of the current work suggest that an arthroscopic approach to the hind foot in cases of PAI syndrome allows for both a correct visualization of the posterior ankle and subtalar joints. The release or debridement of chronically injured soft tissues and bone spurs can also be performed. In the present series, there were three cases with associated tendonitis of the FHL. The tendon sheath could be safely released under arthroscopic control leaving the tendon free.

Although, some authors expressed concerns about the safety and reliability of the posterior medial portal due to the vicinity of the neurovascular bundle, no such complications have been observed in the present series except for one patient with transient neuroapraxia of the posterior

tibial nerve. The systematic use of the 2-portal posterior endoscopic technique, as reported by Van Dijk et al., might have contributed to these results.

The arthroscopic technique is currently thought to be less aggressive than open surgery. As a result both the recovery time and the scar formation might be improved. In the present series, a course of 10 days' partial rest with weight bearing as pain tolerance was followed. On the other hand, an open approach to PAI required 3 weeks of immobilization in a cast and no weight bearing in the series of Jourdel et al. [9]. Specific sport abilities, one of the most important points for an athlete, have been reported to be restored after arthroscopic surgery at an average of 6–12 weeks [6] (present series). On the contrary, in the series of Hamilton et al., even with an aggressive rehabilitation approach, full recovery lasted an average of 6 months. Furthermore, this surgery can be carried out on an outpatient basis due to the few postoperative analgesic requirements. On the other hand, scar size might be important since it is located in the area where the shoe contacts the hind foot and thus a hypertrophic skin scar might be painful.

Conclusions

An arthroscopic approach to the PAI syndrome is a good option since it offers a safe and dynamic visualization of the area to be treated.

The two portals described by Van Dijk seem to be the best option for arthroscopic treatment of the PAI syndrome.

Other concomitant pathologies, like tendonitis of FHL tendon can be treated with the same approach.

Plasty of the posterolateral process restores plantar flexion of the ankle and allows complete decompression of posterior ankle space.

References

1. Bureau NJ, Cardinal E, Hobden R, Aubin B (2000) Posterior ankle impingement syndrome: MR imaging findings in seven patients. Radiology 215:497–503
2. Cerezal L, Abascal F, Canga A, Pereda T, García-Valtuille R, Pérez-Carro L, Cruz A (2003) MR Imaging of ankle impingement syndromes. AJR 181:551–559
3. Ferkel RD, Scranton PE Jr (1993) Arthroscopy of the ankle and foot. J Bone Joint Surg 75A:1233–1242
4. Golano P, Mariani PP, Rodriguez-Niedenfuhr M, Mariani PF, Ruano D (2002) Arthroscopic anatomy of the posterior ankle ligaments. Arthroscopy 18(4):353–358
5. Hamilton WG (1982) Stenosing tenosynovitis of the flexor hallucis longus tendon and posterior impingement upon the os trigonum in ballet dancers. Foot Ankle 3:74–80
6. Hamilton WG, Geppert MJ, Thompson FM (1996) Pain in the posterior aspect of the ankle in dancers. Differential diagnosis and operative treatment. J Bone Joint Surg 78A:1491–1500
7. Hedrick MR, McBryde AM (1994) Posterior ankle impingement. Foot Ankle Int 15(1):2–8
8. Jerosch J, Fadel M (2006) Endoscopic resection of a symptomatic os trigonum. Knee Surg Sports Traumatol Arthrosc 14(11):1188–1193
9. Jourdel F, Tourné Y, Saragaglia D (2005) Posterior ankle impingement syndrome: a retrospective study in 21 cases treated surgically. Rev Chir Orthop 91:239–247
10. Kitaoka HB, Patzer GL (1997) Analysis of clinical grading scales for the foot and ankle. Foot Ankle Int 18(7):443–446
11. Lohrer H, Arentz S (2004) Posterior approach for arthroscopic treatment of posterolateral impingement syndrome of the ankle in a top-level field hockey. Arthroscopy 20(4):15–21
12. Philbin TM, Lee TH, Berlet GC (2004) Arthroscopy for athletic foot and ankle injuries. Clin Sports Med 23(1):35–53
13. Sopov V, Liberson A, Groshar D (2000) Bone scintigraphic findings of os trigonum: a prospective study of 100 soldiers on active duty. Foot Ankle Int 21(10):822–824
14. Van Dijk CN, Scholten PE, Krips R (2000) A 2-portal endoscopic approach for diagnosis and treatment of posterior ankle pathology. Arthroscopy 16:871–876
15. Veazey BL, Heckman JD, Galindo MJ, McGanity PL (1992) Excision of ununited fractures of the posterior process of the talus: a treatment for chronic posterior ankle pain. Foot and Ankle 13:453–457