Diagnosis and treatment of anterior ankle impingement: state of the art

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ABSTRACT

The aim of this paper is to discuss anterior ankle impingement (AAI) regarding diagnosis, interventions, techniques and future perspectives. AAI is a pain syndrome due to soft tissue or bony impingement. Impingement caused by soft tissues is frequently found in the anterolateral compartment of the ankle, whereas impingement caused by bony spurs is generally located in the anteromedial compartment. Typical complaints are chronic ankle pain, limited dorsiflexion and swelling. The most important feature is recognisable tenderness on palpation, which helps distinguish this condition from an osteochondral lesion, which is characterised with deep ankle pain. Although the diagnosis is mainly based on clinical assessment, imaging is helpful for differential diagnosis and preoperative planning. Standard X-rays, using anteroposterior, lateral and an anteromedial oblique view for detecting bony spurs, are sufficient to make the diagnosis. CT can be used to accurately assess the extent and size of a bony spur. MRI is useful to evaluate soft tissue lesions and exclude concomitant pathology, like osteochondral lesions or stress fractures. Conservative treatment is the first-line treatment. In cases where conservative treatment has been unsuccessful, surgery may be indicated. Arthroscopic debridement is considered the gold standard to treat AAI. Rehabilitation protocol includes full weight-bearing and exercises to stimulate active dorsiflexion-plantar flexion and avoid stiffness.

INTRODUCTION

Anterior ankle impingement (AAI) is characterised by anterior ankle pain, with or without restricted dorsiflexion.1,2 The true incidence of AAI in the general population is not known. A study by Stoller and colleagues3 found a 4% incidence of talar exostoses in a cohort of 100 asymptomatic subjects and a 59.3% incidence in 32 professional, or amateur, dancers.

Based on aetiology, this syndrome can be divided into bony and soft tissue impingement.4 Furthermore, anterior impingement lesions can also be classified into anterior, anterolateral and anteromedial impingement, according to location of pathological findings and symptoms.4 Anterolateral impingement is often due to soft tissue impingement, whereas anterior impingement and anteromedial impingement are mostly due to bony impingement.5 Regarding pathophysiology, AAI is thought to be a consequence of traction, trauma, recurrent microtrauma, chronic ankle instability and other mechanical factors.6-8

Anterior ankle impingement

AAI is less frequent than anterolateral impingement. It can have both osseous and soft tissue aspects and it is a cause of anterior ankle pain.9

Impinging structures in the ankle have been previously designated as osteophytes. The term ‘osteophytes’ is perhaps poorly chosen, even misleading, since osteophyte formation is attributed to an existing osteoarthritic process, which may not be present in an AAI syndrome.10 Naturally, the presence of osteophytes in an osteoarthritic ankle can also cause impingement; but the aetiology and expected treatment outcomes are different.11 In AAI it is perhaps more adequate to use the designation ‘bone spurs’.

AAI is a common cause of pain in athletes, like football players and ballet dancers, that perform repetitive dorsiflexion movements.4,12 Repetitive capsuloligamentous traction, as in repetitive kicking with the foot in full plantar flexion (figure 1), was hypothesised to cause traction spurs and be at the origin of this problem.13,14 Supporting this theory is the fact that these spurs are frequently seen in athletes who repetitively apply force to their ankle in hyperplantar flexion—these have been reported to be found in up to 60% of soccer players.15

This hypothesis, however, has been considered incorrect. Tibial spurs are located at joint level, and thus inferior to the joint capsule.16-19 Direct mechanical trauma and repeated microtrauma to the anterior ankle during forced dorsiflexion have been forwarded as explanations to the spur formation process. The anterior distal rim of the tibia and medial malleolus are covered with cartilage; repair of this cartilage and subchondral bone, often within recurrent injury, can result in fibrosis, calcification and eventually lead to spur formation.11

Anteromedial ankle impingement

The cause of anteromedial ankle impingement derives from recurrent acute ankle inversion injuries, frequently coupled with a rotational mechanism, which in turn leads to an abnormal soft tissue growth in the joint recess.9 Compression of tibiotalar ligaments between the medial malleolus and medial talar border, caused by ankle inversion, results in ‘kissing’ contusions and damage to these ligaments. Recurrent impaction trauma can stimulate bony spur growth in the anteromedial distal tibial rim, anterior aspect of the medial malleolus and talar neck.20-22

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Received 10 February 2020
Revised 30 April 2020
Accepted 26 May 2020
Published Online First 30 August 2020

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BMJ 295

Anterolateral ankle impingement

Entrapment of fibrotic tissue, synovitis or ligaments at the level of the anterolateral ankle is believed to be the cause of anterolateral ankle impingement (ALAI) symptoms. The primary aetiology of ALAI is damage to the lateral ligament complex by microtraumatic injuries or tears originated by inversion sprains. Although the initial ankle inversion sprain may be subclinical and in the majority of cases can be treated with adequate conservative treatment, approximately 20% will suffer from chronic ankle instability with a trend towards repetitive trauma. Chronic instability may contribute to ankle impingement by allowing excessive anterior displacement of the talus, resulting in excessive contact of the talar dome with the distal fascicle of the anterior inferior tibiofibular ligament (AITFL). ALAI accounts for about 3% of all ankle inversion injuries. About one-third of patients with chronic ankle instability suffer from ankle impingement.

A thickened inferior fascicle of the AITFL has been implicated as a cause of ALAI. However, when reviewing the literature different terminologies were found to have been used to describe the same structure: ‘AITFL’, ‘distal anterior tibiofibular ligament’, ‘accessory anterior inferior tibiofibular ligament’, ‘distal AITFL’ and ‘Basset’s ligament’. Dalmau-Pastor and colleagues performed an anatomical study in which they showed that the AITFL had a constant distal fascicle that touched the anterolateral corner of the talus in all examined ankles. The contact increases with plantar flexion of the ankle and vice versa. This ligament should not be misinterpreted as pathological. Although the ligament injury may not be severe enough to lead to chronic ankle instability, repetitive abnormal motion after incomplete healing can lead to a recurrent inflammatory process, with ensuing synovitis and formation of scar tissue.

A distal fascicle AITFL might be considered pathological when a prominent fascicle impinges against the talar dome with the ankle in full dorsiflexion or when it is bent on top of the anterolateral margin of the talus. Fibrous bands, which generally occur after traumatic injuries, can be another reason for soft tissue impingement. These, in conjunction with synovial hypertrophy, may limit plantar flexion. Soft tissue impingement can also be caused, although more rarely, by the existence of a congenital plica.

Other causes of soft tissue impingement include tibiotalar ligament inflammation, synovial and capsular thickening (with involvement of the anterior part of the AITFL) and the existence of a synovial fringe in the syndesmotic recess (which may lead to impingement pain during ankle motion).

Anterolateral bony impingement is less frequent and is mostly due to trauma. Anterolateral spurs should be termed as enthesophytes; these are caused by traction on the joint capsule or ligaments.

**CLINICAL FEATURES**

Patients, usually young and involved in sport activities, typically complain of chronic ankle pain, limited dorsiflexion and swelling after activity. A history of recurrent ankle inversion injuries may be present. Pain tends to occur during ankle dorsiflexion, possibly with concomitant inversion or eversion, or, in football players, while kicking a ball (ie, hyperplantar flexion). The distinction between deep and superficial pain is important, because deep ankle pain on weight-bearing is typically related to an osteochondral lesion.

Recognisable tenderness while palpat ing the anteromedial or anterolateral ankle joint line is the most important characteristic of this syndrome (figure 2). Another clinical diagnostic manoeuvre is the ‘impingement sign’, which is positive when pain is provoked by applying direct pressure over the anterolateral ankle, as the foot is placed in dorsiflexion. This test has a reported sensitivity of 94.8% and specificity of 88%. However, a negative impingement test does not rule out anterior impingement.

Pain during plantar flexion may be due to stretching of the joint capsule over the bony spurs. Usually, pain at the anteromedial aspect of the ankle is caused by bony impingement and anterolateral ankle pain is caused by soft tissue impingement.

Although the diagnosis is primarily clinical, imaging can be useful for preoperative planning and differential diagnosis. This condition can mimic osteochondral lesions, mechanical ankle instability, sinus tarsus syndrome and rupture, subluxation or tenosynovitis of the peroneal tendons.

**IMAGING**

Simple, weight-bearing, lateral view X-rays are useful in the initial assessment of ALAI.

Radiographs can be used to assess the presence of talar and tibial spurs and tibiotalar joint space status. If bony spurs are apparent in the lateral view X-ray, then we can assume these are located on the lateral aspect of the joint, because the anterolateral contour of the distal tibia is more prominent than the anteromedial. This means that anteromedial talar or tibial spurs can be overprojected by the lateral and anterolateral structures, namely the anterolateral distal tibia, or lateral part of the talar neck and body. For this reason, an oblique anteromedial impingement (AMI) X-ray view can be useful (See 27). To perform this radiographic view, the patient lies supine in the table, the X-ray beam is tilted in a 45° craniocaudal direction, while placing the leg in 30° of external rotation and the foot in plantar flexion.

A study
by Tol et al showed the AMI view can increase the sensitivity of simple X-rays to detect spurs in the distal tibia and talus from 40% and 32% to 83% and 73%, respectively.36 Still, advanced imaging is recommended because radiographs are unsuitable to evaluate for concurrent soft tissue pathology.

CT can accurately assess the extent and size of a bony spur (Figure 3).9 It can also be used to detect ossicles, loose bodies and osteochondral lesions (Figures 4–6).

Anterior tibial plafond spurs, or ossicles, in the lateral gutter on radiographs or CT in a patient with lateral ankle pain should suggest these may be implicated in anterolateral impingement symptoms.9

MRI is valuable in the evaluation of soft tissue injuries and exclusion of other joint problems, as osteochondral lesions or stress fractures.37 Sagittal T1 and fat-suppressed fluid-sensitive sequences are ideal for detection of bone tissue changes, and axial and sagittal fat-suppressed fluid-sensitive sequences are ideal to detect soft tissue lesions.9 In some cases, MRI may be able to make the diagnosis by evidencing a mass in the anterolateral gutter (Figure 7).

Although MRI is frequently used as a diagnostic support tool, reports of diagnostic accuracy vary widely and present conflicting results.2 As reported by Liu et al, routine MRI seems to have poor sensitivity and specificity, both set at 39% and 50%, respectively.38 This is below the corresponding values for clinical examination.31

Synovitis usual appearance is of a nodular, or mass-like, region of intermediate signal on fat-saturated fluid-sensitive sequences, and intermediate to low signal on T1 or non-fat-saturated proton-density MRI sequences.9 When found, it should prompt careful evaluation of adjacent ligaments, especially the ATFL, for trauma-related changes; these include thickening, signal heterogeneity, attenuation or complete disruption.

The results of other diagnostic tools, like ultrasound and CT arthrography, have also been subject of investigation.39 Ultrasound, which has been found, in the detection of soft tissue problems, to highly correlate with findings during arthroscopy, is of limited interest due to an inability to adequately evaluate intra-articular pathology.2 40 CT arthrography has been reported to be highly sensitive and moderately specific for the diagnosis of anterolateral impingement,41 but nevertheless is an invasive procedure and inadequate for an accurate assessment of soft tissue pathology.2

**CLASSIFICATION**

There is no currently established classification for AAI. While there is no radiological classification system for soft tissue impingement, three classifications have been proposed for bony impingement. Scranton and McDermott42 used spur size, location and presence of severe osteoarthritis (OA) to classify impingement cases into four types: type I, tibia spurs up to 3 mm; type II, tibial spur larger than 3 mm but no talar spur; type III, large tibial and talus spurs possibly with fragmentation; and type IV, generalised talocrural OA. The classification of Parma et al43 takes into consideration the extension of the anterior articular margin of the tibia with bony spurs and general cartilage status: A—focal, less than one-third of the distal tibia margin involved; B—wide, lesion from one-third to two-thirds of the distal tibia margin involved, possibly with talar bone spurs but no kissing...
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Figure 6 Fractured tibial spur.

Figure 7 Soft tissue anterolateral impingement.

lesions; C—complex, lesion with more than two-thirds of the distal tibia margin involved, possibly with kissing lesions, or multiple bone spurs.

A classification proposed by van Dijk et al. used plain radiographs to assess the presence of osteophytes and joint space narrowing in the ankle to assess the severity of OA and predict the outcome after arthroscopic surgery for AAI. Inexistence of OA is indicated by grades 0 and I. Grade 0 signifies a normal joint, possibly with subchondral sclerosis, and grade I denotes bone spurs in the absence of joint space narrowing. Grade II signifies the presence of joint space narrowing, with or without bone spurs. Grade III is characterised by (sub) total disappearance, or deformation, of the joint space. This classification was compared with the classification from Scranton and McDermott regarding prognostic value after arthroscopic treatment of AAI, and it was concluded that only the van Dijk classification was superior for outcome prediction.

CONSERVATIVE TREATMENT

Symptoms may be improved with rest, avoiding certain activities, physical therapy and non-steroidal anti-inflammatory medications. Symptoms may also be relieved by intra-articular cortisone injections.

Nazarian et al. treated soft tissue impingement with ultrasound-guided percutaneous needle fenestration followed by corticosteroid injection, using 1 mL of triamcinolone acetonide (40 mg/mL) and 1 mL of 0.25% bupivacaine. In a retrospective study with no control group, 49 ankles were treated with this procedure. Mean pain level, in a 10-point scale, before and after the procedure was 6.76 and 2.73, respectively. However, one in five patients ended needing surgical treatment. More studies about this treatment modality are needed.

A trial of conservative treatment should be attempted for at least 3–6 months. Surgical intervention may be indicated in cases where conservative treatment has failed.

SURGICAL TREATMENT

Although some authors have reported acceptable outcomes with open resection of bone spurs, traditional open arthroto-
mies are associated with significant complication rates. These complications include wound healing problems, hypertrophic scar tissue formation, injury to the extensor digitorum longus or extensor hallucis longus tendons, and cutaneous nerve entrapment. Nowadays, with the technical development and growing surgical experience, nearly all cases of ankle impinge-
ment are suitable for arthroscopic approach. In our experience, open surgery is reserved for those cases when, due to any specific concomitant pathology, an arthrotomy is required and enables complete access to the bony conflict. In these cases, using the same approach for both procedures should be privileged. Spur resection can be performed using small curved and straight osteotomes (5–7 mm) and small curettes for edge smoothing.

The arthroscopic approach has become the gold standard, due to a faster recovery and earlier return to sports in comparison with an open approach.

Preoperative planning

All osteophytes and ossicles and its location should preferably be identified in the preoperative imaging, as visualisation during arthroscopy may not always be easy. This can be attributed to anatomical variations, or coverage of bone spurs by an inflamed synovium or scar tissue. Furthermore, detection of bone spurs in preoperative radiographs is correlated with improved outcomes, which emphasises the importance of removing all tissues causing impingement.

Distraction technique

Historically, orthopaedic surgeons used routine distraction tech-
niques in ankle arthroscopy. A sterile strap is placed on the ankle and attached to a sterile belt around the surgeon’s waist. In this way, distraction can be applied to the joint by leaning backward. Routine joint distraction, however, is currently deemed unnecessary in ankle arthroscopy, although it can be used, for example, to improve access to a more posterior osteochondral lesion.

Applying distraction can tighten the joint capsule and diminish the anterior working area, making treatment of AAI more
Figure 8  Arthroscopic view of anterior bony impingement (A) aggravated in full dorsiflexion with soft tissue entrapment (B). Removal of the spur from proximal to distal at the tibia (C) and distal to proximal in the talus (D). Final result after spur removal (E) using arthroscopic two-portal technique (F).

Box 1  Key articles


Box 2  Validated outcome measures and classifications

► Classifications: osteoarthritis scale from van Dijk et al.¹¹ Scranton and McDermott¹² and Parma et al.¹³.
► Generic outcome measures: Foot and Ankle Outcome Score*, 36-Item Short Form Survey (SF-36)*, American Orthopaedic Foot and Ankle Society scale, visual analogue scale.
► Specific to anterior ankle impingement syndrome: none reported.

*Approved by the ISAKOS scientific committee.

difficult.⁵⁷ In addition, there is a risk of anteriorly located loose bodies ‘falling’ into the posterior compartment of the ankle.⁵⁸

Dorsiflexion technique

The dorsiflexion technique was previously described by van Dijk and Scholte.⁵⁹ In an anatomical study by de Leeuw and colleagues it was shown that the dorsiflexion technique provides an increased anterior working space in comparison with the distraction technique.⁶⁰ Furthermore, the same study has also shown that distraction increases the risk of damage to the anterior neurovascular bundle, by increasing its tension and pulling it towards the joint line. By contrast, dorsiflexion causes the anterior neurovascular bundle to relax and move away from the joint, making it less prone to injury.

Regional differences

Some regional differences have been reported throughout time and should be considered, even if such differences seem to be progressively fading.⁵⁸ Classically, in the USA, teaching of ankle arthroscopy involved the use of fixed distraction. This method involves a non-invasive distraction device which is fixed to the operating table, for at least part of the procedure.⁵⁶ Some surgeons prefer to start with a diagnostic workup of the joint with the ankle in fixed distraction; after inspection is concluded, the distraction device is removed and treatment of AAI is performed using a dorsiflexion technique. However, other surgeons use ankle joint distraction throughout the whole procedure.⁵⁷

In Europe, South America and Asia, surgeons tend to rely on the dorsiflexion technique, avoiding fixed distraction.⁵⁷ ⁵⁸ Preoperative diagnosis is emphasised. After removal of bony spurs, ossicles, loose bodies and soft tissue impediments, some surgeons will make use of a soft tissue distractor for inspection of cartilage in the joint surface.
Surgical technique

The patient is placed in the supine position, with a support placed at the level of the contralateral hip joint (thus enabling safe slight sideward tilting of the operative table). A sandbag is put underneath the ipsilateral buttock to place the operative limb in neutral rotation. The heel should rest on the edge of the operative table (this enables the surgeon to achieve full ankle dorsiflexion by leaning against the foot). A thigh tourniquet is typically applied to improve visibility and thus reduce operative time. Tourniquet pressure should be the lowest necessary to maintain adequate haemostasis, and kept for the minimum possible duration. We use a gravity system fluid management, because the use of a pump system may increase compartment pressure and lead to ischaemia.

Invasive distraction is not used. Bony spurs needing removal can be found inferior to the joint capsule. The distraction technique causes tightening of the joint capsule over bony spurs, which makes their complete removal troublesome due to limited visibility. It is easier to reach, and completely remove, a bony spur by using a dorsiflexion technique. Ankle dorsiflexion relaxes the joint capsule, making the top of the bony spur accessible with shaving. This is a better option than starting removal at the articular side of a bony spur, if full visualisation and removal during arthroscopy is to be ensured.

The medial portal is made first and initially used for viewing. This portal is created with the ankle in dorsiflexion, medial to the tibialis anterior tendon and at the joint level. In this position, an anterior working chamber is created and the talar dome cartilage is protected under the tibial plafond. Only the skin is incised. In order to prevent damage to nerves and vessels, a nick-and-spread technique is used to develop the portal.

The anterolateral portal is created under transillumination, lateral to the peroneus tertius or the extensor digitorum longus tendons, and used initially for instrumentation. The lateral branch of the superficial fibular nerve is at risk during portal creation. This nerve can be visualised in 30% of the ankles by applying combined ankle plantar flexion and inversion. It should be noted that the nerve tends to move laterally with ankle dorsiflexion. The skin is incised and the subcutaneous tissue is divided by blunt dissection using a mosquito clamp, in a similar fashion to the medial portal. A probe is then introduced, and the anterior borders of the distal tibia and talar neck are palpated. The probe can also be used to elevate the joint capsule if needed. If necessary, accessory portals can be created anteriorly to the tips of the medial and lateral malleolus.

A standard 4 mm 30° arthroscope is used. A 5.0 mm shaver is suitable for removal of synovial tissue and bony spurs. After portal creation, ankle joint exploration and assessment is begun. Relevant associated pathology should be diagnosed and treated accordingly. Assessment includes evaluation of cartilage status, syndesmotic laxity and presence of bony impingement (figure 8). The lateral gutter is then inspected to look out for pathological findings, such as: filling of the gutter with fibrotic or synovitic tissue, an impinging ATITFL against the talar dome or presence of synovial tissue behind this ligament. The ATITFL should be partially resected in the following scenarios: if touching the talar dome while beginning plantar flexion or inversion; when contact is increased with dorsiflexion in the presence of localised chondral abrasion; or in the presence of an elongated ATITFL overhanging on the lateral aspect of the talus.

Removal is initiated by shaving the tissue covering the bony spurs and visualising the anterior border of the distal tibia. After fully identifying the spur, it can be removed using the shaver or a 4 mm chisel. By using a chisel, the spur can be detached in one piece using a self-retaining forceps.

Box 3 Key issues of patient selection
- Activity-associated anterior ankle pain.
- Recognisable tenderness on palpation.
- Standing X-ray for detection of any joint space narrowing.
- Anteromedial impingement (AMI) view or CT when indicated for anteromedial impingement.
- Detection of joint space narrowing is important for prognosis. Joint space narrowing is a sign of worse prognosis when compared with a situation in which there is a normal joint space.

Box 4 Essential surgical equipment
- Standard 4 mm 30° arthroscope.
- 5.0 mm shaver blade.
- 4 mm chisel thanks to the Portuguese Foundation for Science and Technology for iBB funding (UID/BIO/04565/2020).

Box 5 Tips and tricks
- The portals should be made in the neutral position or in slight dorsiflexion, to minimise risk of damage to the underlying structures.
- The tibial spur is removed from superior to inferior and the talar spur is removed from distal to central to fully control the bone morphology.

Box 6 Major pitfalls
- Failing to identify associated pathology in the ankle.
- Too aggressive removal of bone in the distal tibia may increase focal contact pressure.
- Iatrogenic damage to cartilage and neurovascular structures.

Box 7 Future perspectives
- Further studies on the outcomes of conservative treatment interventions.
- Determining the role of chronic ankle instability in the treatment outcomes of anterolateral soft tissue impingement.

Box 8 Take home messages
- Recognisable tenderness on palpation on the anterior joint line confirms the diagnosis of anterior ankle impingement.
- Routine radiographs demonstrate if the impingement is caused by bone or by soft tissue.
- For anteromedial ankle pain, an oblique anteromedial impingement (AMI) view is mandatory to demonstrate osteophytes or other pathology.
- If no osteophytes are visible on the radiographs, soft tissue impingement is confirmed.
piece and removed with the aid of a grasper. Spur remnants can be smoothed with the shaver. Tibial spurs are removed from top to bottom; talar spurs from distal to central. Only impinging tissue should be removed, as minimising surgical aggression will foster an earlier recovery and avoid secondary instability, or cartilage deterioration, due to a diminished articular contact surface area.

COMPLICATIONS
Complication rates up to 19.9% for arthroscopic surgery have been previously reported, with this procedure being considered technically demanding.

Developments in arthroscopic techniques and equipment have led to a decrease in complications. A paper by Zengerink and van Dijk published in 2012 reported a complication rate of 3.5% in 1305 procedures. Most complications were temporary, having resolved within 6 months. The key step in reducing complications of ankle arthroscopy was abandoning fixed distraction.

Neurological injury is the most frequent complication. Other complications include: synovial fistula, infection and vascular injury. Complications such as ligament injuries, pin track infections and stress fractures are related to the use of invasive distraction.

REHABILITATION
This procedure can be performed as day surgery. The patient is discharged with a compression bandage around the ankle. Partial weight-bearing for 3–4 days is encouraged. It is of importance that controlled dorsiflexion–plantar flexion exercises are started immediately on the postoperative period to avoid stiffness.

Complete recovery and return to activity may be possible at 4–6 weeks.

RESULTS
As many authors report, the success rate of arthroscopic debridement is 75%–96% in the treatment of soft tissue impingement. Liu et al. published in 1994 the outcomes of 55 anterior arthroscopies for ALAI. Average follow-up was 2.6 years. Good to excellent results were found in 87% of patients, with a satisfaction rate of 98%. At final follow-up, 84% of patients had returned to their previous level of activity.

A case series of 60 athletes suffering from chronic soft tissue impingement was published by DeBerardino et al. in 1997. These patients had a history of an ankle sprain and were treated on average 23 months after injury. At an average follow-up of 27 months (range: 6–64 months), good to excellent results were found in 97% of patients.

Branca and colleagues reported the outcomes of 67 patients treated for chronic anterolateral fibrous impingement induced by an ankle sprain. They reported good to excellent outcomes on radiographs, despite the substantial improvement in the Foot and Ankle Score. Location of bony spurs and extension of fibrous impingement was considered to be significantly correlated with clinical outcomes.

van Dijk et al. published a prospective study evaluating the prognostic factors related to arthroscopic treatment of AAIs in 62 patients. Overall, 73% of patients experienced good to excellent outcomes. The authors found that patients without joint space narrowing had 86% good to excellent results. In these patients, essentially normal joint remains after removal of bony spurs. In patients with joint space narrowing outcomes were less predictable, with good to excellent outcomes in 50% of patients. In these cases, the main issue may be a degenerative process of the joint, with secondary osteophyte being present, instead of bony spurs. Patients treated for anteromedial impingement had statistically superior results when compared with patients treated for anterolateral impingement.

Walsh et al. reported an 84% recurrence rate of bony spurs on radiographs, despite the substantial improvement in the Foot Function Index. There seems to be no correlation between this type of recurrence and clinical manifestations. Recurrence of bony spurs has been reported in up to two-thirds of patients with grade I OA on medium to long-term outcome. However, most of them remained asymptomatic in either partial or complete osteophyte reformation. Moreover, as long as no relevant joint space narrowing is observed, good outcome is to be expected if revision surgery (by arthroscopic debridement) is required in symptomatic patients.

There is no wide agreement on whether concurrent ankle instability has a detrimental effect on outcomes. In patients treated with arthroscopic debridement of soft tissue impingement, Jerosch and colleagues found worse results in patients suffering from ankle instability. Despite limited evidence, it has been previously stated that a combined lateral and medial ankle instability can be effectively approached by an arthroscopic all-inside repair of the lateral and medial ligaments of the ankle, even combined with ankle impingement.
CONCLUSION
AAI is defined as an activity-related anterior ankle pain, which can be reproduced by palpation of the joint line. With good outcomes and low complication rates, arthroscopic removal of impinging tissue is currently the gold standard. Future studies should focus on studying the outcomes of conservative treatment procedures and on determining the role of chronic ankle instability in outcomes.

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Contributors PD performed a literature systematic review and contributed to writing the final text. DAS performed separately a literature systematic review and also contributed to writing the final text. JPB has contributed with revisions and figures of the final text. NA has contributed with revisions in the text. JPB and NA have actively participated in organising the content. HP has organised the content of the text as well as the team for preparing the manuscript; wrote several parts of the text, participated in all revisions and contributed with original figures of the final text.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article.

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