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Anterior ankle pain in sports medicine: Aetiology and indications for arthroscopy

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Summary. Persistent pain and swelling in the anterior part of the upper ankle are encountered very frequently in sports traumatology. Classically, in the patient with a long history of typical anterior ankle pain there is no instability, but pinching effects, a sense of impingement, blocking and a feeling of unsteadiness combined with a certain restriction of movement due to the pathology. By analogy with the anatomical structures, various pathologic changes can lead to the classic clinical symptoms: adhesions, cicatrices, meniscoid-type lesions, osteophytes with synovitis, folds, fibrotic subcutaneous fatty tissue, free arthroliths, osteochondral lesions and arthrotic changes. When long-term conservative therapy has not provided a cure for the clinical syndrome surgical intervention becomes necessary. Arthroscopic interventions were carried out in a total of 21 patients, with follow-up times between 6 and 36 months. About two-thirds of all the patients showed good or very good results, while in one-third the results were unsatisfactory, mainly because of degenerative changes. An precise diagnosis is essential, but the significance of a pathologic change as the cause of symptoms can be problematical.

Persistent pain and swelling in the anterior part of the upper ankle are encountered very frequently in sports medicine. Because these symptoms often have a long history, and, especially, because they have often failed to respond to various conservative treatments, these symptoms frequently represent a chronic problem and prove a stumbling block both to the athletes themselves and to the therapists, in regard to the restoration of full sporting fitness and performance. Many different causes can be responsible for the triggering and continuation of these complaints, and consequently case histories and previous treatment can vary considerably.

Anatomically, the anterior joint cavity is formed by the anterior edge of the tibia with the cartilaginous covering on its lower surface, the anterior two-thirds of the trochlea of the talus, and the neck of the talus. While the whole trochlea is covered with cartilage, where it meets the neck of the talus the cartilage is replaced by a synovial layer. Half a centimetre beyond the limit of the bone cartilage the anterior joint capsule, which at the same distance also inserts onto the anterior edge of the tibia, begins [6]. Physiologically, capsular fat and synovial folds are present on the distal inner surface of the capsule. Further to the side, the lateral and medial portions of the talomalleolar joint form the end of the anterior joint cavity. The anterior talofibular ligament lies outside the joint, on the joint capsule, and can be seen arthroscopically through a synovial impression. The calcaneofibular ligament always lies outside the joint and is not visible. On the medial side the deep layer of the deltoid ligament is to be seen. Proximal to this, the anterior tibiofibular ligament (anterior syndesmosis) is anatomically important as a possible site of pathology.

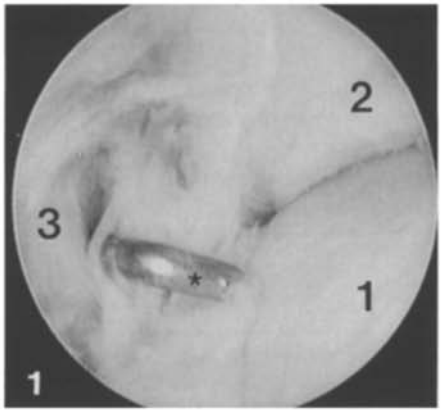
Aetiology and pathology

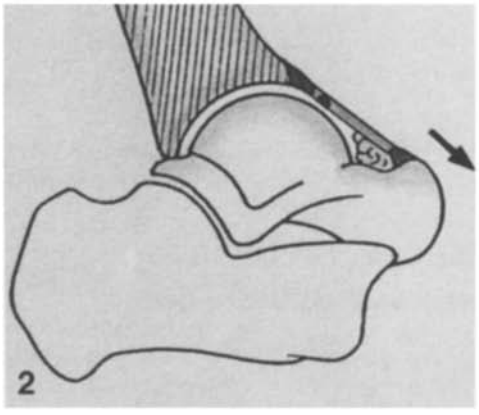
Classically, in the patient with a long history of typical anterior ankle pain there is no instability; however, sudden pain occurs when the foot is placed in a certain position, and also pain and discomfort after sporting activities. These are often combined with an effusion, swelling and some restriction of movement by the pathological condition. Pinching effects, in the form of an impingement, blocking or the fear of blocking, and a feeling of unsteadiness are frequently reported.

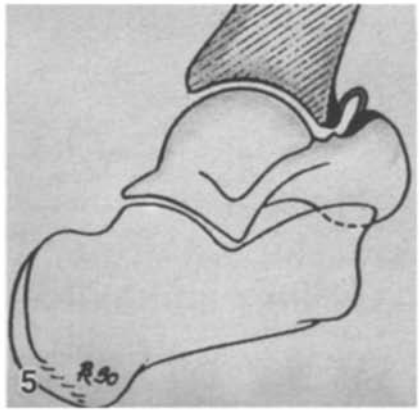
In correspondence with the anatomical structures described above, various pathological changes can lead to the classical clinical symptoms:

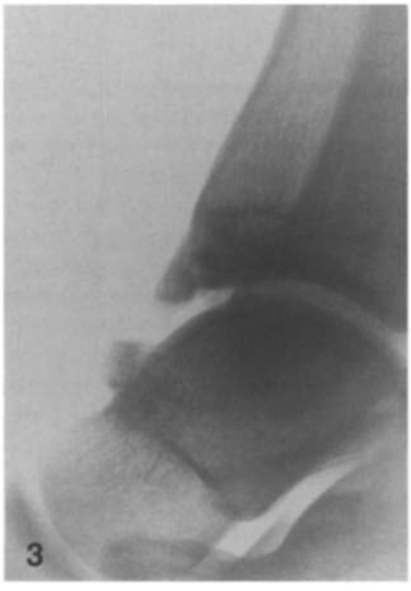
1. Adhesions, cicatrices. Practically all forms of trauma in the area of the upper ankle can lead to cicatrices and/or adhesions on the various structures within the joint. This hypertrophic synovial tissue then causes the painful restrictions of walking and movement. Typically, conventional radiographs and scintigrams are unremarkable. Magnetic resonance imaging (MRI) can show specific increases of substance.

2. Meniscoid-type lesions. This type of injury, first described by Wolin in 1950, is manifested by cicatrices following damage to the lateral capsular ligament [8]. Occurring mostly in young patients, the post-traumatic formation of such an adhesion between the lateral cheek of









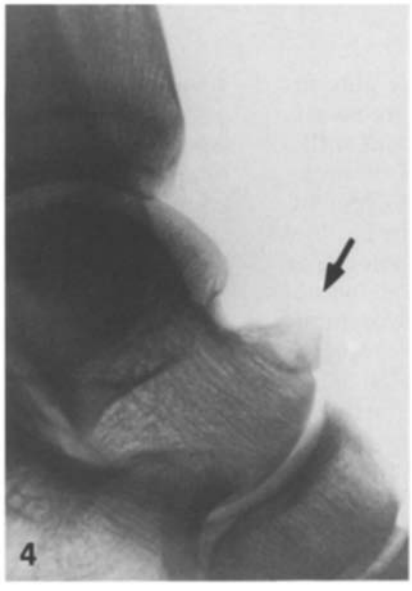


Fig. 1. Scar tissue between the talus *(1)*, the anterior edge of the tibia *(2)* and the lateral malleolus *(3)*. *, Probe hook

Fig. 2. Recurrent microtrauma of the anterior joint capsule due to excessive tensile strain

Fig. 3. Opposing osteophytes which on dorsiflexion of the ankle cause pinching of the capsule

Fig. 4. Distal osteophyte *(arrow)* at the transition to the talonavicular joint

Fig. 5. The anterior joint structures are pinched between osteophytes

the talus and the fibular cartilage can lead to pain. In most such cases concomitant chronic synovitis is equally the reason for the resistance to conservative therapy (Fig. 1).

3. Osteophytes/exostoses with synovitis. Again through concomitant synovitis, repeated trauma to the anterior joint capsule can lead to symptoms in the anterior part of the joint. The typical pinching effects observed here are caused by the formation of bony excrescences or osteophytes. These may develop as a result of recurrent microtraumas to the joint capsule with maximum plantar flexion of the foot (e.g. in football; Figs. 2, 3). The exostoses are formed, like the calcifications, by minute tears in the area of the anterior edge of the tibia and the neck of the talus. More distally on the talus, bony appositions can form in the area of the talonavicular joint (Fig. 4). Through pinching effects in compression trauma or a sprain, such osteophytes can cause injury to the synovia. With maximally loaded dorsiflexion the same symptoms are then manifested by impingement on the altered soft-tissue structures by the exostoses, in a nutcracker effect (Fig. 5). Such pathological changes are among the most frequent causes of anterior ankle pain in sports medicine and are responsible for the symptoms described above.

4. Folds, fibrotic subcutaneous fatty tissue. As a result of direct contusion trauma to the anterior joint capsule, the subcutaneous fatty tissue lying on the neck of the talus can be injured and may, through fibrosis, become painful. Simultaneous increase in the volume of the tissue and reduction of its elasticity may in turn lead to symptoms of pinching. A similar pathological process is responsible for traumatic changes in the folds that are normally present at the point of transition to the distal anterior wall of the capsule.

5. Free arthroliths. If there has been a recent, undetected lesion, chondral or osteochondral fragments can spread through the joint. By subsequently increasing in size, these can later lead to pinching or blocking. Except in the case of a chondral lesion (haemarthrosis following recent trauma), diagnosis is not difficult.

6. Osteochondral lesions of the talus. An injury is to be found in the case histories of more than 80% of patients with osteochondral lesions of the talus [2, 8, 11]. These lesions are classified among the classicial concomitant injuries in the region of the supination line. Condral and osteochondral fractures are recent acute lesions; where there are chronic symptoms, especially those involving

the talus, posteromedial osteochondrosis dissecans is present in most cases. Classification, which usually follows the four stages of Berndt and Harty [2], has significance for the subsequent therapy. Conventional radiography, tomography and computed tomography are usually sufficient for diagnosis; in a few cases, however, technetium scintigraphy or MRI have to be used.

7. Ostoechondral lesions of the tibia. These occur in the form of a dorsal compression fracture with maximum dorsiflexion in the upper ankle, and are classified according to the usual classification for osteochondral lesions [6, 11].

8. Arthrotic changes. Advanced degenerative changes are easy to diagnose, clinically and radiologically. The symptomatology is usually very advanced, with chronic pain and marked loss of function.

Differential diagnosis

A number of other clinical conditions can also result in symptoms involving the anterior part of the upper ankle, and these must be taken into account in the diagnosis of anterior ankle pain. Particularly to be mentioned are fatigue fractures (fibula, tibia, talus, navicular, etc.), alterations of the extensor retinacula and chronic tendinitis of the extensor tendons.

Therapy

Typically, long-term conservative therapy has not provided a cure in the clinical syndrome described here. In view of the patient's wish to quickly regain his or her full sporting capability, surgical intervention therefore becomes necessary.

In place of arthrotomy, as practised hitherto, a great many indications for arthroscopic treatment have been mentioned in the literature [1–11]: free arthroliths, chondral and osteochondral lesions, ablation of osteophytes, cicatrices and adhesions, hypertrophic synovial villi, synovitis, synovial folds, meniscoid cicatrices, blocking, haemarthrosis, empyema, biopsy, persistent pain, and removal of metal; arthroscopy is also recommended as an alternative to arthrotomy biopsy.

In our patients the decision to perform arthroscopic intervention in the upper ankle was made with great caution. This was, first, because such a procedure requires considerable experience with arthroscopic interventions in other joints and, secondly, the findings can be so difficult to interpret. The problem lies in correctly interpreting the arthroscopic findings and then identifying a definite connection between the symptoms and arthroscopic findings judged to be pathological. This requires both a good knowledge of the normal findings in the upper ankle and some experience of the open treatment of pathological alterations.

Fig. 6. Operation site with the arthroscope in the anterolateral access. Landmarks (lateral to medial): lateral malleolus, tendon of the extensor digitorum communis muscle *(continuous line)*, dorsalis pedis artery *(dotted line)*, tendon of the anterior tibial muscle *(continuous line)*, medial malleolus with saphenous vein (not visible in figure)

Technical procedure

Arthroscopy of the upper ankle is performed with the patient supine and the lower leg placed horizontally. In order to create conditions of optimal safety (also in therapeutic surgery) a tourniquet is applied to the thigh, which in turn necessitates regional or insufflation anaesthesia. After the "landmarks" have been correctly marked, the joint is first filled by means of an anterolaterally inserted injection cannula with about 20 cm^3 Ringer's solution. The arthroscope is then inserted from the side (Fig. 6). After the upper ankle has been filled with liquid the anteromedial access can be selected with an injection needle. After this, it is possible to insert all the necessary instruments and the optical equipment at both access points.

Indications for arthroscopy in sports medicine

Free arthroliths. Arthroscopic removal of a small fragment is technically relatively easy. For a good result, however, there must be only an isolated lesion with concomitant degenerative changes [3, 6, 8, 10, 11].

Cicatrices, adhesions, meniscoid lesions. These changes in the anterior part of the ankle can be easily diagnosed by arthroscopy. The treatment is carried out using power-driven instruments, with which the lesions are removed. In most cases partial synovectomy has to be performed. The results are very satisfactory [1, 3, 8, 9, 11]; this is also true for ablation of fibrotic folds and fatty villi.

Chronic synovitis, osteophytes, exostoses, calcifications. These changes are mostly to be found in combination. From the therapeutic point of view it is important, with arthroscopy, to deal with both the primary causes (exostosis, osteophyte, calcification) and the sequelae (synovitis). Through alternate anterolateral and anteromedial

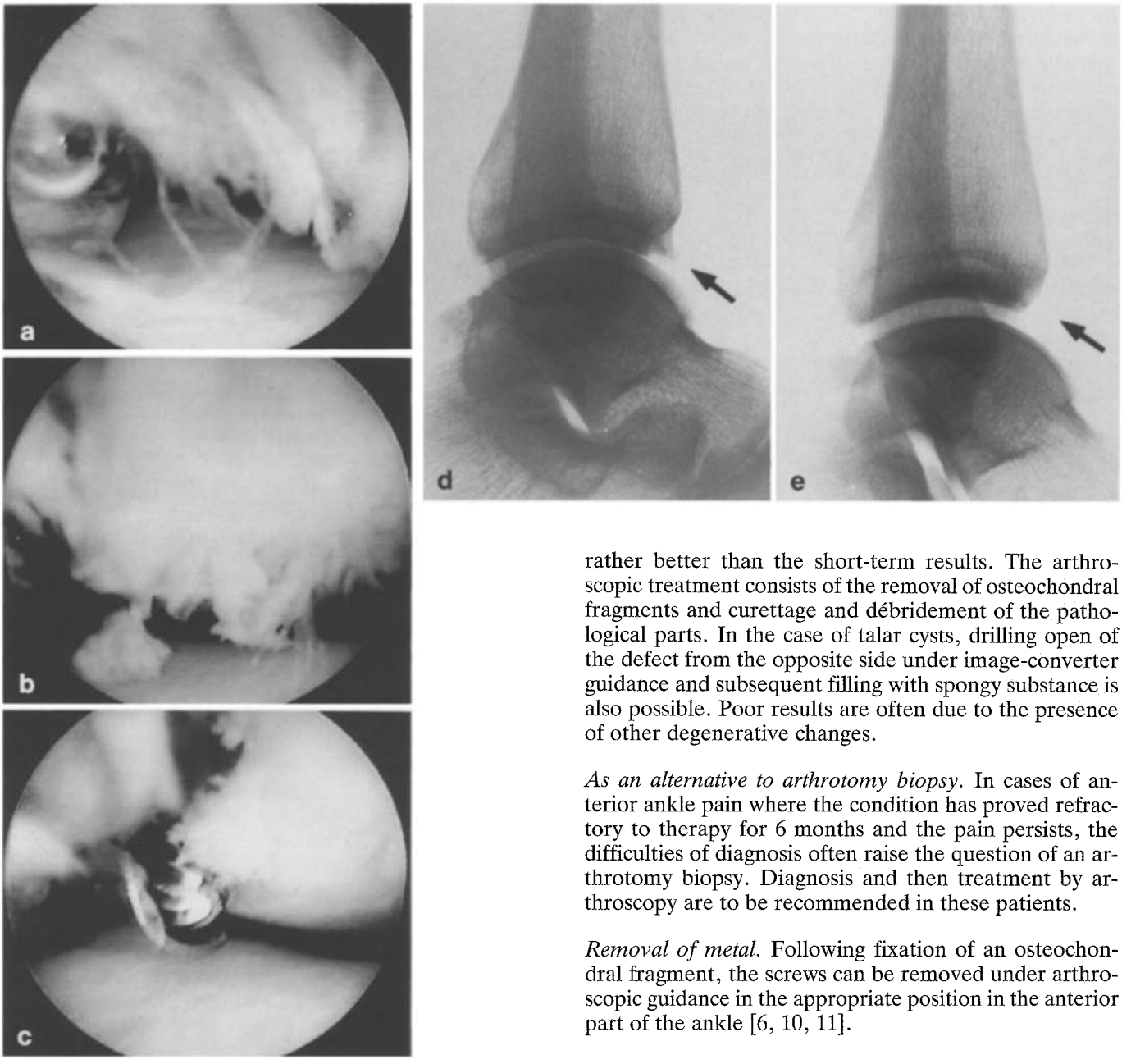


Fig. 7a–e. Arthroscopic and radiographic images of the left ankle of a 28-year-old footballer with the typical symptomatology of anterior ankle pain. **a** Chronic synovitis with the talus visible below. **b** Prominent osteophyte on the anterior edge of the tibia. **c** Arthroplasty drill inserted anteromedially for ablation of the osteophyte. **d** Preoperative radiograph with osteophyte (compare with **b** and **c**). **e** Postoperative radiograph

access, the whole anterior joint cavity can be examined and treated. The synovectomy can be performed with the shaver, while osteophytes can be completely removed with the arthroplasty drill (Fig. 7).

Osteochondral lesions. Changes classified as grade 2 or 3 are good indications for arthroscopic treatment. Good results can be obtained in about 90% of cases [8]. It has been shown [10, 11] that the long-term results are even rather better than the short-term results. The arthroscopic treatment consists of the removal of osteochondral fragments and curettage and débridement of the pathological parts. In the case of talar cysts, drilling open of the defect from the opposite side under image-converter guidance and subsequent filling with spongy substance is also possible. Poor results are often due to the presence of other degenerative changes.

As an alternative to arthrotomy biopsy. In cases of anterior ankle pain where the condition has proved refractory to therapy for 6 months and the pain persists, the difficulties of diagnosis often raise the question of an arthrotomy biopsy. Diagnosis and then treatment by arthroscopy are to be recommended in these patients.

Removal of metal. Following fixation of an osteochondral fragment, the screws can be removed under arthroscopic guidance in the appropriate position in the anterior part of the ankle [6, 10, 11].

Complications

If the arthroscopy is performed correctly, with appropriate marking of the different orientation points and landmarks, the operation is largely free from complications. Theoretically, the following lesions are possible: vasomotor nerve lessions and chondral lesions due to incorrect handling of the instruments, emphysema due to gaseous filler medium, soft tissue swelling due to liquid filler medium, compartment syndrome, infection, and postoperative haemarthrosis due to inadequate Redon drainage.

Postoperative care

Arthroscopic interventions can be performed both on an outpatient and on an inpatient basis. If the patient is to

be discharged on the same day, two Redon drains are inserted to prevent postoperative haemarthrosis and the operation is performed under brief anaesthesia. One drain is removed before the patient is discharged and the other is left in place for one more day. After spinal or epidural anaesthesia the patient is mobilized on the 1st postoperative day, with sole contact up to a load of 20 kg for 2–7 days, depending on the type and severity of the operation. The crutches can be dispensed with after about 1 week, provided the joint is free from effusions and there is no longer any swelling. Physiotherapy starts from the 1st day after the operation, with both anti-swelling therapy and movement according to the pain threshold. Strengthening and coordinating exercises complete the after-care program until the patient is free from pain and fully mobile. Sports activities (swimming, cycling, etc.) can normally be resumed from the 2nd week. More demanding sports (e.g. football) sometimes require a rehabilitation period up to 4–6 weeks.

Results

Arthroscopic interventions on the upper ankle were carried out in a total of 21 patients. In 81% synovectomy was performed and in 53% osteophytes or exostoses were removed at the same time. Also in 53% adhesions and cicatrices were removed. This shows the combined presence of different pathological conditions at the same time in most patients. The average patient age was 25.2 years. The follow-up time was between 6 and 36 months, with an average of 18 months.

Because of the small number of patients and the frequent multiple diagnoses (e.g. synovitis with osteophytes, adhesions with osteochondral lesions etc.), the results presented here can be taken as showing only as trends. The best results were obtained in chronic synovitis with cicatrices or adhesions. Satisfactory results were observed with the removal of osteophytes and after the smoothing of grade 2 osteochondral lesions. The results in the treatment of degenerative joint changes are not encouraging.

To sum up, it can be said that about two-thirds of all the patients showed a good to very good result, while in one-third the results were unsatisfactory (Table 1). These patients had mainly degenerative changes, for which arthroscopy evidently did not provide the ideal treatment. Otherwise, our results are comparable to those reported in the literature [1, 10, 11].

Table 1. Results of treatment (classification to [8])

	Excellent	Good	Fair	Poor
Pain	None	Mild	Moderate	Severe
Swelling	None/ minimal	With exercise	Mild, normal daily living	Severe
Siffness	None/ minimal	Mild deficit	Painful deficit	Minimal mobility
Activity	No restriction	Minor restriction	Moderate restriction	Limited to normal daily living

Conclusion

In very carefully selected patients, with appropriate indications, treatment by arthroscopy is a very helpful and elegant procedure. An exact diagnosis is essential; in this, the relation between symptoms and observed pathology can be problematical. The advantages of arthroscopic treatment are that it carries a low morbidity and rehabilitation is faster, it provides a very good overview of the whole joint, the hospital stay is shorter, an osteotomy which might otherwise be necessary can be avoided, there is less pain for the patient, and, last but not least, the psychological effect on the patient is better.

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