THE JOURNAL OF FAMILY PRACTICE

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The authors reported no potential conflict of interest relevant to this article.

Assessment steps and treatment tips for ankle arthritis

The tibiotalar joint's unique biomechanics and associated structures carry management implications that vary from those in knee or hip arthritis.

PRACTICE RECOMMENDATIONS

› *Always ask that the foot be included in ankle x-rays to aid in identifying malalignment, deformity, or joint arthritis.* (C)

› *Use anti-inflammatory medications, orthotic devices, and footwear modifications, as needed, for ankle osteoarthritis.* (C)

› *Avoid ankle immobilization except, perhaps, during arthritic flare.* (C)

Strength of recommendation (SOR)

(A) Good-quality patient-oriented evidence

(B) Inconsistent or limited-quality patient-oriented evidence

(C) Consensus, usual practice, opinion, disease-oriented evidence, case series

CASE ▶ A 57-year-old man had been experiencing intermittent pain in his left ankle for the past 2.5 years. About 6 weeks before coming to our clinic, his symptoms became significantly worse after playing a pickup game of basketball. At the clinic visit, he reported no other recent injury or trauma to the leg. However, 15 years earlier he had fractured his left ankle and was treated conservatively with a short period in a cast followed by a course of physical therapy. After completing the physical therapy, he noted significant improvement, although he continued to have minor episodes of pain. He felt no instability or mechanical locking but did note a decreased ability to move the ankle. And it felt much stiffer than his right ankle.

Examination of his left ankle revealed tenderness over the anterior aspect at the tibiotalar joint. He also exhibited decreased dorsiflexion and was unable to perform a toe raise. There was no tenderness over the major ligaments, and results of anterior drawer and talar tilt tests were normal. X-rays revealed tibiotalar joint arthritis (**FIGURE**).

How would you proceed if this were your patient?

Arthritis of the tibiotalar joint, which has an estimated prevalence of approximately 1%, occurs much less frequently than arthritis of the knee or hip joints.[1] This low prevalence is primarily due to the ankle joint's unique biomechanics and the features of the cartilage within the joint, including its thickness.[2]

Specifically, the hip and knee joints have greater degrees of freedom than the tibiotalar articulation, which is significantly constrained. The bony congruity between the talus, tibia, and fibula provides inherent stability to the ankle joint, thus protecting against primary osteoarthritis (OA).

Additionally, the large number of ligamentous structures and overall strength of the ligaments provide significant supplemental stability to the ankle joint articulation. Articular cartilage within the ankle joint is thicker than that of the knee and

FIGURE

Post-traumatic arthritic changes at the tibiotalar joint

IMAGES COURTESY OF: JOHNNY LIN, MD

Weight-bearing x-rays of the left ankle show post-traumatic arthritic changes at the tibiotalar joint (**red arrows**) with narrowing of the native joint space, osteophyte formation, and cystic changes in the distal tibia and talus. A tibiofibular synostosis (**yellow arrows**) is seen at the level of the proximal syndesmosis.

hip (1-1.7 mm). This cartilage also tends to retain its tensile strength with age, unlike cartilage in the hip; the ankle is therefore more resistant to age-related degeneration.[3]

Metabolic factors also protect against arthritis. Chondrocytes in the ankle are less responsive to inflammatory mediators, including interleukin-1 (IL-1), and therefore produce fewer matrix metalloproteinases.[1,2,4] There are also fewer IL-1 receptors on ankle chondrocytes.

The role of trauma in ankle OA. Given the ankle joint's inherent stability, the most common cause of ankle OA is trauma,[4] mainly ankle fracture and, less commonly, ligamentous injury.[5,6] Other rarer causes of ankle arthritis include primary OA, crystalline arthropathy, inflammatory disease, septic arthritis, neuroarthropathy, hemochromatosis, and ochronosis.

The ankle's characteristics that protect it against primary OA may facilitate the pathogenesis of post-traumatic OA through 2 main mechanisms. First, direct trauma to the chondral surfaces can hasten the onset of progressive degeneration. Second, articular incongruity from a fracture can lead to insidious deterioration. The stiffer cartilage layer may be less adaptable to malalignment, and incongruity may cause secondary instability and chronic overloading. Ultimately, the joint breaks down with associated cartilage wear.[6,7]

The importance of the normal ankle's congruity and stability became clear in the landmark study by Ramsey and colleagues,[8] showing that the contact area between the talus and the tibia decreases as talar displacement increases laterally. This innate stability explains why the contact area of the ankle joint can bear loads similar to those of the hip and knee, yet does not experience primary OA nearly as often.

A stepwise diagnostic appraisal

Ask these questions. Since most ankle pain results from trauma, ask about any recent or remote injury to the affected ankle. Knowing the type of injury that occurred and the exact treatment, if received, may shed light on the relationship between the injury and

Pain experienced walking down stairs likely indicates posterior ankle injury; pain going up stairs is likely anterior injury.

TABLE 1

Subacute and chronic ankle pain? Possible diagnoses, based on location

Anterior	Lateral	Medial	Posterior
Osteochondritis dissecans	Lateral ankle sprain	Medial ankle sprain	Achilles tendinopathy
Anterior impingement	Distal fibular fracture	Distal tibia fracture	Flexor hallucis dysfunction
Tibiotalar arthritis	Peroneal tendinopathy	Posterior tibialis subluxation	Os trigonum syndrome
Tibialis anterior tendinopathy	Peroneal tendon subluxation	Posterior tibialis tendinopathy	
Syndesmotic sprain	Peroneal nerve entrapment	Tarsal tunnel syndrome	

The evidence does not support the use of glucosamine or chondroitin for use in ankle arthritis.

current symptoms. Acute traumatic events can cause fractures or injury to various soft-tissue structures traversing the ankle joint. Ankle ligament sprains or tendon strains may result after abnormal rotation of the foot. Alternatively, chronic overuse injuries may lead to tendinopathy in any of the tendons that control motion throughout the foot and ankle or degenerative changes within the tibiotalar joint. Knowing the exact location of pain may also help identify the pathology (**TABLE 1**).

The patient in our case had not suffered a recent injury, so it was important to learn as much as possible about his prior fracture. Was the injury treated conservatively or surgically? If management was conservative, the type and duration of treatment could offer clues to the mechanism underlying symptoms. If a patient has undergone surgery, knowledge of the exact procedure could suggest specific problems. For example, surgical fixation would likely indicate there was ankle instability, thus altering the normal biomechanics in the injured tibiotalar joint.

Other key questions to ask. Most patients with ankle pain also complain of limitations in their usual activities. Ask about the duration and type of pain and other symptoms. Also ask about the position of the foot and ankle when the pain is at its greatest, which will provide insight into likely areas of pathology. For example, if pain arises when the patient navigates uneven ground, subtalar pathology is highly likely. If the patient complains of pain while walking down stairs, suspect injury to the posterior (plantar flexed) ankle; pain while walking up stairs more likely indicates anterior (dorsiflexed) pathology.

Finally, ask about nonorthopedic medical problems and all medications being taken. Systemic conditions, too, can lead to ankle pain—eg, inflammatory arthropathies, infections, and crystalline arthropathy.

Physical examination. Observe the patient's gait to assess any functional or range-of-motion limitations or abnormal loading throughout the foot and ankle.[9] With the patient standing, evaluate any malalignment from the foot through the knees and to the hips. Evaluate the skin for any lesions, wounds, or evidence of trauma or surgery. Next, with the patient seated, examine carefully for neuropathy or vascular abnormalities. Evaluate the ankle's range of motion and assess for any mechanical locking, clicking, or crepitus. Palpate all bony and ligamentous landmarks to reveal areas of tenderness or swelling. Perform anterior drawer and varus tilt tests to determine overall ligamentous stability of the ankle, and compare your findings with test results of the opposite, uninjured ankle.

Diagnostic imaging. Order weight-bearing radiographs of the foot and ankle. Including the foot allows you to identify additional potential concerns such as malalignment, deformity, or adjacent joint arthritis. Look particularly for joint space narrowing, malalignment, post-traumatic changes, or implanted hardware. Advanced imaging studies—computerized tomography, magnetic resonance imaging, bone scan—are reserved for cases that necessitate

TABLE 2
Sequential management options for ankle arthritis

Initial	Secondary	Surgical
Weight loss	Intra-articular corticosteroid injection	Arthroscopy (loose bodies, chondral defects)
Activity modification	Rocker-bottom sole shoe	Realignment osteotomy
Physical therapy	Solid ankle cushion heel shoe	Arthrodesis
NSAIDs	Lace-up ankle support	Arthroplasty
	Ambulatory assist device	
	Polypropylene ankle-foot orthosis	

NSAIDs, nonsteroidal anti-inflammatory drugs.

ruling out alternative diagnoses, or for preoperative evaluation by an orthopedic surgeon.

Management: Make use of multiple modalities

Conservative management options for ankle OA are limited, and high-quality evidence of efficacy is lacking. Surgical alternatives, however, are invasive and yield modest outcomes. Therefore, unless specific indications for surgery are present (discussed on following page), exhaust conservative options (**TABLE 2**) before considering referral.

Weight loss is important for those who are overweight—as with knee OA management—to decrease the reactive forces within the ankle joint and to decrease pain. Weight loss will also enhance the outcomes of other treatment modalities and improve overall health.[10,11]

Activity modification is usually required, even though this may make weight loss more difficult. Avoiding vigorous activities, restricting work-related movements that place high-impact stress on the ankle, and decreasing overall walking time often reduce the severity of symptoms and improve functioning in other activities. Use of assistive-devices, such as a cane, can decrease the weight-bearing load on the affected joint.[10,11]

Physical therapy has not been shown to alleviate pain in ankle arthritis, although stretching, joint mobilization, and gait training may help prevent further progression of arthritis and improve function.[11] The strength of dorsiflexion and plantar-flexion muscles is often decreased in individuals with ankle arthritis. Strengthening exercises may be indicated in individuals exhibiting deficits.

Prescriptive conservative management. Begin with a combination, as needed, of anti-inflammatory medications, orthotic devices, and footwear modifications.

Nonsteroidal anti-inflammatory agents are generally safe, but long-term use requires monitoring. Intra-articular steroid injections have some supporting evidence of effectiveness, but any benefit is short-lived.[12] Glucosamine and chondroitin, although unlikely to cause harm, are not supported by the evidence for use in ankle arthritis. Intra-articular viscosupplementation is controversial, and evidence is limited regarding its efficacy.[13-15] And currently, insurance will not cover viscosupplementaton for any joint other than the knee.

Adding a rocker-bottom sole and a solid ankle cushion heel to a shoe helps decrease heel strike impact in individuals with decreased ankle motion, and they aid in the transition from the heel strike to the push-off during level walking.[11] If the arthritic joint is unstable, a lace-up ankle support may help with proprioception and stability. A polypropylene ankle-foot orthosis, custom leather ankle corset, or a double-upright brace with a patellar-tendon-bearing support are options to restrict ankle motion and decrease weight-bearing forces.[10,11]

Immobilization is not recommended except for short-term use during an arthritic flare. Limiting ankle motion reduces pain, but the downside tradeoff is acquired stiffness and weakness that accompanies prolonged periods of immobilization. A controlled ankle motion walking boot or walking plaster

cast are both reasonable options for the short term.

Consider surgical referral for specific indications such as osteophytes, loose bodies, and chondral defects, which may be treated with arthroscopy. Patients with large areas of exposed chondral bone or rapid onset of degeneration have poorer outcomes with conservative management and should also be referred to a surgeon earlier. Otherwise, consider surgical referral only after a full trial of conservative management.[11]

Surgical options vary in scope and effectiveness and include osteotomy, arthrodesis, and arthroplasty. Osteotomies can be performed in early OA to correct bony alignment deformities. Arthrodesis in neutral dorsiflexion with roughly 5 degrees of external rotation is reserved for end-stage ankle OA to allow for near normal gait and pain relief. Total ankle arthroplasty is an emerging option for severe ankle OA, resulting in improved pain relief, gait, and patient satisfaction, but potentially has a higher reoperation rate when compared with arthrodesis.[1,2]

CASE ▶ We prescribed short-term immobilization with a controlled ankle motion boot and administered an intra-articular corticosteroid injection. At the patient's follow-up visit 6 weeks later, he reported only moderate improvement in pain. We then advised physical therapy at a specialty ankle rehabilitation program to focus on mobilization, strengthening, and gait training. Nearly one year after his initial visit to our clinic, he is doing well. He understands, however, that the nature of his ankle arthrosis may necessitate surgical intervention in the future. JFP

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