Ankle Arthritis

Review of Diagnosis and Operative Management

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KEYWORDS

• Ankle • Arthritis • Diagnosis • Operative management

KEY POINTS

- The current standard of care for nonoperative options include the use of nonsteroidal anti-inflammatory drugs, corticosteroid injections, orthotics, and ankle braces. Other modalities, including hyaluronic injections, physical therapy, transcutaneous electrical nerve stimulation units, massage therapy, lack high-quality research studies to delineate the appropriateness and effectiveness of their use.
- The gold standard for operative intervention in end-stage degenerative arthritis remains arthrodesis, but evidence for the equivalence and perhaps even superiority in functional outcomes of total ankle arthroplasty is increasing.
- The next few years will enable us to make more informed decisions, and, with more prospective high-quality studies, the most appropriate patient population for total ankle arthroplasty can be identified.

INTRODUCTION

The ankle joint is the most commonly injured joint in the body and absorbs more force per square centimeter than any other joint. However, the incidence of ankle arthritis is 9 times less common than symptomatic arthritis in the knee and hip.[1] Unlike arthritis in the knee and hip joint, ankle arthritis is most commonly posttraumatic, and primary arthritis remains uncommon. Saltzman and colleagues[2] reported 7.2% of primary ankle arthritis compared with 70% of posttraumatic arthritis, in a sample of 639 patients across a 13-year period. Rheumatoid arthritis was seen in 11.9% of patients.[2]

ANATOMY/PATHOPHYSIOLOGY

Trauma to the ankle joint, including Weber A to C fractures, pilon fractures, and osteochondral injuries to the talus (osteochondritis dissecans [OCD]) as well as lateral ankle

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ligament sprains/laxity, are the most common contributing factors to the development of ankle arthritis.[1] A rate of 14% of posttraumatic ankle arthritis can be seen with ankle fractures.[3] Weber C fractures can be associated with up to 33% incidence of degenerative changes and the presence of a posterior malleolar fracture, and any associated fracture type increases the risk of arthritis development. Anatomic alignment during reduction decreases the risk for development of arthritis significantly.[3] In an experimental study, sectioning of the deltoid ligament was found to decrease contact area by 15% to 20%, and therefore increase the contact force per area.

Pilon fractures are high-energy intra-articular ankle fractures with a high degree of comminution (**Fig. 1**). These fractures are also associated with the development of ankle arthritis, and damage to the articular cartilage. Open fractures can lead to an additional increased risk of infection and posttraumatic arthritis (**Fig. 2**).[4] Treatment of choice is open reduction internal fixation, but even with an anatomic reduction, this type of injury is associated with a high incidence of degenerative changes.[5] The mean latency time for the development of posttraumatic arthritis was 20.9 years in 1 study.[6] Patients' age (ie, older patients) as well as complications during the treatment of the fracture were related to a shorter latency in the onset of arthritis.[6]

Talar neck fracture can also lead to the development of tibiotalar arthritis, with rates of 47% to 97% described in the literature.[7] Osteochondral injuries to the talus (OCD lesions), whether acquired at the time of an ankle fracture dislocation or of idiopathic origin, predispose patients to the development of ankle arthritis. These lesions are best diagnosed with magnetic resonance imaging (MRI) scans.

It is estimated that symptomatic ankle arthritis is encountered 8 to 9 times less when compared with knee osteoarthritis.[1,8] This estimate translates to 24 times more total knee replacements being performed in the United States compared with total ankle arthroplasty.[1] In a cadaver study using 50 samples, grade 2, 3, or 4 degenerative changes were found in 76% of ankles, compared with 95% of knees.[9]

There are also differences in cartilage properties between different joints. Ankle cartilage is thinner compared with hip or knee cartilage.[10] It ranges from less than 1 mm to approximately 2 mm.[11] The surface contact area for the ankle is also smaller (350 mm^2),[12] compared with that of the knee and hip, at 1120 mm^2 and 1100 mm^2, respectively.[1] Most of the load is transmitted over the superior portion of the talus, and the ankle joint experiences loads up to 5 times of a person's body weight.[13] In dorsiflexion, the contact area across the talus is largest, and it decreases by 18% in plantarflexion. This finding is associated with an increase in force per unit area.[14]

Fig. 1. Anteroposterior radiograph of comminuted, high-energy pilon fracture.