Ankle Arthrodiastasis with Circular External Fixation for the Treatment of Posttraumatic Ankle Arthritis

Hani M. Badahdah, DPM, MD, MS, Thomas Zgonis, DPM*

KEYWORDS

• External fixation • Ankle arthrodiastasis • Distraction • Surgery
• Posttraumatic arthritis

KEY POINTS

- Ankle arthrodiastasis is indicated in the younger and active population.
- Ankle arthrodesis or ankle implant arthroplasty is usually reserved for the end-stage ankle arthritis.
- Concomitant osseous and soft tissues procedures are highly recommended to be performed before or at the same time of ankle arthrodiastasis.

INTRODUCTION

Posttraumatic arthritis of the ankle is a challenging pathologic entity for the treating physician and surgeon. As primary osteoarthritis is more common in the hip and knee joints, posttraumatic arthritis is found mostly in the ankle joint and is one of the main reasons for surgical intervention.[1] Posttraumatic ankle arthritis presents a unique challenge in the juvenile or younger and active population with or without the presence of a lower extremity deformity.[2–4] Ankle destructive procedures such as ankle arthrodesis or ankle implant arthroplasty are usually reserved for the older and less active population without any significant medical comorbidities.

Ankle arthrodesis is a joint destructive procedure and is considered by many investigators the gold standard for the end-stage posttraumatic ankle arthritis. In 2015, a retrospective study by Kawoosa and colleagues[5] studied the use of circular external fixation for a primary or revisional ankle arthrodesis in various ankle abnormalities. In their study, all 16 patients had a successful ankle union at an average of 14 weeks.

Disclosure: The authors have nothing to disclose.
Division of Podiatric Medicine and Surgery, Department of Orthopaedics, University of Texas Health San Antonio, 7703 Floyd Curl Drive, MSC 7776, San Antonio, TX 78229, USA
* Corresponding author.
E-mail address: zgonis@uthscsa.edu

Clin Podiatr Med Surg ■ (2017) ■–■
http://dx.doi.org/10.1016/j.cpm.2017.05.001 **podiatric.theclinics.com**

In another retrospective study by Mongon and colleagues,[6] all 17 patients with ankle arthrodesis for posttraumatic arthritis had an ankle union at an average of 16.6 weeks. In 2012, Gowda and Kumar[7] have shown successful ankle arthrodesis results in all 15 patients with posttraumatic arthritis by using the Charnley's external fixation system. The use of Taylor spatial frame for ankle arthrodesis in various ankle abnormalities was also studied by Thiryayi and colleagues,[8] where they found successful union in all of their 10 patients. However, long-term sequelae of ankle arthrodesis may include and are not limited to functional limitation, overload of the adjacent and contralateral foot and ankle joints with potential development of joint arthritis, nonunion, malunion, and infection, which usually will require a revisional surgery.

Ankle implant arthroplasty is an alternative to ankle arthrodesis with selective surgical criteria. Older patients without significant medical comorbidities, average body mass index, and low activity level with minimal or absent lower extremity deformity represent the ideal group for the ankle implant arthroplasty procedure.[3,9] Intermediate to long-term outcomes of 82 patients by using the Scandinavian Total Ankle Replacement by Nunley and colleagues[10] showed satisfactory results in improving the patient's function and quality of life while decreasing the level of pain. In another study by Saltzman and colleagues,[11] a comparison of early outcomes between an ankle arthrodesis and ankle implant arthroplasty of 138 patients showed similar results for an average follow-up of 4 years. In the same study, more complications that required surgical intervention were noted in the ankle implant arthroplasty group. In addition, Ellington and colleagues[12] in a retrospective study of 53 patients with a failed Agility total ankle implant have concluded that a revisional ankle implant arthroplasty may be considered instead of an ankle arthrodesis when dealing with failure of this particular ankle implant.

In lieu of the above potential devastating complications and strict selective surgical criteria with an ankle arthrodesis or ankle implant arthroplasty, ankle arthrodiastasis is a joint-sparing procedure that provides an alternative option for the treatment of posttraumatic ankle arthritis. Current literature has shown that ankle arthrodiastasis can relieve the patient's pain, improve function, and delay or exclude the need for the ankle joint destructive procedures.[9]

Paley and colleagues[13] in a review of 32 patients with ankle arthrodiastasis and concomitant osseous and soft tissue procedures found that 78% of their patients had satisfactory results maintaining their ankle range of motion. Zgonis and colleagues[14] have described the technique of a simultaneous ankle arthrodiastasis and subtalar joint arthrodesis for posttraumatic arthrosis, whereas Ramanujam and colleagues[15] described this technique with the addition of a talar dome resurfacing with the use of a collagen-glycosaminoglycan monolayer. Fragomen and colleagues[16] suggested that 5 mm of ankle arthrodiastasis was not enough to prevent contact of the ankle articular surfaces during weight-bearing in a cadaveric study of 9 specimens. However, a retrospective study of 29 patients by Nguyen and colleagues[17] found that ankle function had declined over time in patients with ankle arthrodiastasis for the treatment of end-stage osteoarthritis.

ANKLE ARTHRODIASTASIS

Arthrodiastasis promotes an optimal environment for cartilage repair through mechanical unloading of the ankle joint and restoration of intermittent intra-articular hydrostatic pressure.[18] Unloading the periarticular subchondral bone with ankle arthrodiastasis is an additional mechanism leading to cartilage repair. This continuous reparative process may interrupt the progression and deterioration of the ankle joint articular cartilage.[2,18]