Arthroscopic-Assisted Open Reduction Internal Fixation

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KEYWORDS

• Ankle • Arthroscopy • Fracture • Fracture fixation • Fracture reduction • Trauma

KEY POINTS

- Arthroscopy is a valuable tool to assist in fracture reduction and fixation by permitting direct visualization of the articular surface in addition to preserving the soft tissues.
- Standard ankle and subtalar portals for delivery of the instrumentation through the surgical wound are the most commonly used approaches. Gravity inflow for visualization and a high-speed shaver for preliminary debridement are key steps to allow for intra-articular fracture assessment.
- Intraoperative arthroscopy should always be used in conjunction with fluoroscopy to achieve reduction and assess implant placement.
- Reduction is achieved with reduction clamps, K-wires, or both.
- Arthroscopic technique is largely surgeon dependent. A surgeon should be comfortable with arthroscopy and techniques for fracture fixation and stabilization. This is not recommended for the novice arthroscopist.

INTRODUCTION

The term "arthroscopy" was first coined by Nordentoft in 1912.[1] Joint arthroscopy was then introduced in 1918 with a cadaveric knee joint by Takagi using a cystoscope.[2] In 1931, Burman attempted to insert an arthroscope in a cadaveric ankle. After his attempts, he concluded that the ankle joint was unfit for arthroscopy.[3] Later, Watanabe, a protégé of Takagi, furthered intrigue with newer devices and the concept of triangulation.[1,4] As instrumentation improved over the years, the interest in arthroscopy

Disclosure: The authors have nothing to disclose.
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Clin Podiatr Med Surg ■ (2017) ■–■
https://doi.org/10.1016/j.cpm.2017.12.004
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gained steam. The first reports of arthroscopy in the ankle were in the 1980s, followed by subtalar arthroscopy in 1985.[5–8] Its use has expanded in the body and is well documented throughout the biomedical literature.[9] Arthroscopy has now been used for many years in the foot and ankle, to diagnose and treat many conditions. Its role has also evolved over time and continues to expand. Current accepted uses for arthroscopy in the foot and ankle include osteochondral defects, synovitis, arthrofibrosis, soft tissue and osseous impingement, osteophytosis, and arthrodesis.[10–12] More recently, the application of arthroscopy in the foot and ankle has been used in acute trauma, to aid in the reduction of intra-articular fractures, as well as to visualize and potentially treat posttraumatic articular defects.[13–17] Traditionally, treatment of displaced, intra-articular fractures of the foot and ankle has required open techniques, where the fragments are reduced and internal fixation is delivered. Large surgical approaches do however carry risk. They can potentially disrupt the osseous blood supply and in turn hinder or delay fracture healing. These larger surgical exposures also have higher risks of wound complications, infection, delayed union, and nonunion. Smaller incisional approaches and the decreased overall morbidity associated with them have led to an expanded role for arthroscopy in the foot and ankle. Arthroscopic-assisted open reduction internal fixation (AA-ORIF), or arthroscopic reduction internal fixation, provides an added tool with low complication rates and may lead to earlier patient mobilization.[18] This technique also allows for direct visualization of the articular surface with the associated fracture lines and provides the surgeon the opportunity to gain precise reduction through a minimal soft tissue window.

Indications for Arthroscopic-Assisted Open Reduction Internal Fixation

- Ankle fractures: Weber type A fibula fractures, Weber type C fibula fractures, medial malleolus fractures, displaced bimalleolar and trimalleolar ankle fractures
- Pilon fractures
- Talus fracture
- Calcaneal fractures
- Tillaux fractures
- Triplane fractures

Contraindications for Arthroscopic-Assisted Open Reduction Internal Fixation

- Grossly contaminated or infected soft tissue
- Severe comminution requiring open reduction
- Severe joint arthritis
- Medical comorbidities making surgery unsafe

PATIENT WORKUP

Initial patient workup includes a physical examination and appropriate imaging of the extremity. Frequently, 3 views of the foot and ankle and 2 views of the leg are required for full examination. A thorough history should be obtained regarding any pertinent fracture mechanics. Closed reduction of any fracture or dislocation is performed expeditiously, and a well-padded splint is placed to the injured extremity. There are two windows to surgically fix the injury: the early and late periods. The early period is within 6 hours of the injury, whereas the late period is typically between days 6 and 12 after injury, once the soft tissue edema has settled. Incising the injured area between these two periods may increase the likelihood of wound problems. Certain fracture patterns require advanced imaging, such as computed tomography (CT), for a more thorough evaluation of the injury and to assist in surgical planning. A CT scan is commonly