ARTHROSCOPICALLY ASSISTED ANKLE ARTHRODESIS

An Essay

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Abstract

Ankle arthrodesis is considered to be the “gold standard” treatment for a painful degenerated ankle. Arthroscopic ankle arthrodesis has been shown to be an effective technique to achieve ankle arthrodesis.

Arthroscopic technique is preferable to open techniques for many reasons: limited incisions, less invasive, no periosteal stripping, low risk of infection, low morbidity, shorter time for fusion, shorter hospitalization, earlier weight-bearing and better cosmetic outcome.

Keywords:

- Ankle
- Arthroscopy
- Arthrodesis

AIM OF THE WORK

The aim of this essay is to review the literature and to give an overview of the role of arthroscopy in ankle arthrodesis.

This essay will discuss the gross and arthroscopic anatomy of the ankle joint, biomechanics of the ankle, indications for ankle arthrodesis, setup and instruments for ankle arthroscopy, the surgical technique for arthroscopically assisted ankle arthrodesis and the results of this procedure and its complications.

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INTRODUCTION

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Ankle arthrodesis is a surgical procedure designed to induce bony ankylosis of a diseased ankle joint, and is indicated for treatment of a variety of degenerative and neuromuscular foot disorders. Since 1879, when Albert first published a paper describing ankle arthrodesis, a variety of surgical approaches, resection methods, and fixation techniques have been described for ankle fusion. It has been hypothesized that the wide variety of procedures used to achieve surgical fusion of the ankle may reflect the difficulty in fusing the small contact area between the talus and the tibia, because this interface is subject to high stresses related to the long lever arms of the foot and tibia [1].

For many years, the most frequent indication for surgical arthrodesis of the foot and ankle was the treatment of flaccid paralysis resulting from a variety of neuromuscular conditions, particularly poliomyelitis. As techniques evolved and the success rates for arthrodeses increased, surgical indications expanded accordingly to post-traumatic osteoarthrosis, Charcot-Marie-Tooth disease, osteonecrosis, clubfoot deformity, sequelae of posterior tibial tendon dysfunction, diabetic neuropathy, and cerebral palsy [2].

Arthrodesis of the ankle is a well-established and efficient treatment for painful ankle osteoarthritis. The techniques of open arthrodesis are plagued with complications like wound healing problems, infections and delayed unions, as the procedures require extensive approaches with concomitant soft tissue stripping and interference with blood supply to bone. The use of power tools for sawing and shaving without irrigation leads to more or less marked thermal bone necrosis. The indications for ankle arthroscopy, which was mainly limited to the

removal of the osteochondral lesions, loose bodies, adhesions, and synovectomies, have been extended to arthrodeses since first reported by Schneider in 1983 [3].

Arthroscopic ankle arthrodesis requires specialized equipment, instruments, and arthroscopic experience, and the procedure may be technically more demanding than open arthrodesis. After arthroscopic ankle debridement and excision of articular cartilage through anteromedial and anterolateral portals, fixation is achieved using two or three cannulated screws placed separately from the tibia and the fibula to the talus. If additional intraoperative or postoperative fixation is required, a Charnley clamp may be used to supplement tibiotalar screw fixation [4].

Advantages of the arthroscopic technique over open techniques include low postoperative morbidity and absence of limb-threatening complications, less blood loss, shorter hospital stay, faster rehabilitation and mobilization, a low complication rate, and decreased time to union. The arthroscopic technique has the advantage of not compromising the soft-tissue envelope, and it can be done even in patients with both poor skin and wound healing potential which would be a contraindication to the open technique [5].

The time until fusion and thus the immobilization time is, on average, 4–8 weeks less than with open methods of arthrodesis. This is a distinct advantage in many respects. It allows patients to return to their previous level of independence much more quickly, and it cuts down on the time out of work for those whose jobs require ambulation. The significantly shorter time to fusion is a distinct advantage to certain physically disabled patients, such as those with rheumatoid arthritis, who have difficulty ambulating with upper extremity walking aids.

The reason for the shorter time to fusion is speculative. The most likely basis is that minimal interruption of the soft tissue structures around the ankle preserves the blood supply to the bones and soft tissue envelope. An intact blood supply enhances the fusion process. It is also possible that the original contour of the bony surfaces is better maintained with the arthroscopic technique, given the precise removal of bone using an arthroscopic burr. This may lend added stability to the fusion construct and leave a larger surface area of bony contact, allowing more rapid fusion [6].

Initially arthroscopic ankle arthrodesis was felt to be an in situ fusion and no, or only minimal deformity could be corrected. With greater experience, increasing deformities have been attempted and currently an upper limit of 10° to 15° deformity is accepted. Ankles with deformities of 25° and greater have been arthroscopically fused based on the pre-operative ability to place the forefoot square to the ground and then dealing with residual hind-foot deformity by means of a calcaneal osteotomy [7].

The most frequent complications reported with arthroscopically assisted ankle arthrodesis has been nonunion and painful hardware requiring removal. Other major sequelae included delayed union (8–20 months), subtalar pain, subtalar joint penetration, cutaneous nerve injury, infection, malunion, dorsalis pedis pseudoaneurysm and broken drill bit. The rates of these complications are generally not higher than those reported with open techniques [8].

To avoid complications, care must be given to patient selection, careful preoperative evaluation, including skin, nerve, and vascular status, careful physical examination and radiologic evaluation, thorough knowledge of foot and ankle anatomy and practicing with sawbones and cadaver specimens, meticulous distraction placement, careful portal