

# ARTHROSCOPIC ANKLE ARTHRODESIS PRELIMINARY REPORT

L. DE VRIESE, G. DEREYMAEKER, G. FABRY

**A review of the first 10 arthroscopic ankle fusions at our institution was performed. Union was obtained in 7 of the 10 ankles with an average time to fusion of 4 months. There were 3 nonunions. Arthroscopic ankle fusion is less invasive than open techniques and less painful for the patient. However, there is a learning curve, and the arthroscopic technique is time-consuming. Arthroscopic ankle fusion has restricted indications, as patients with significant angulation, rotatory malalignment and extensive avascular necrosis of the talus can only be treated with open techniques.**

**Keywords :** ankle ; arthroscopy ; tibiotalar arthrodesis.  
**Mots-clés :** arthroscopie ; cheville ; arthrodèse tibio-tarsienne.

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## INTRODUCTION

Since the first description late in the 19th century (2), tibiotalar arthrodesis has become a time-tested method of surgical management for patients with advanced ankle osteoarthritis. No fewer than 30 techniques have been described to achieve solid fusion. This multiplicity in fusion methods is explained by the high potential of complications from these procedures. Depending on the patient population studied, important variations in delayed union, nonunion, malunion, neurovascular problems and infection have been reported (1, 3, 7, 8, 9). The overall complication rate of up to 60% (12) has led to a continuous search for better techniques.

The use of compression as a means of achieving solid fusion was described by Charnley using external fixation clamps (4). However the results have not been universally successful.

Rigid internal fixation has been used in an effort to prevent some of the problems associated with external fixation devices, and it presents several potential advantages: earlier mobilization and weightbearing, patient convenience and avoidance of pin tract problems (10).

Over the last decade arthroscopy has become a well accepted technique in treating complex ankle problems, and technical refinements have allowed more extensive arthroscopic debridement.

Arthroscopic debridement of degenerative ankle disease with rigid internal fixation, arthroscopic ankle arthrodesis, seems to offer an ideal combination, and the authors review the first ten cases using this technique at their institution.

## MATERIALS AND METHODS

Between 1990 and 1992, 10 patients underwent arthroscopic ankle arthrodesis. Clinical charts, and pre- and postoperative radiographs were reviewed. The mean age of the patients was 39 years. There were 7 males and 3 females. Four patients underwent arthrodesis for posttraumatic osteoarthritis; there were also 1 polio patient with ankle degeneration, 3 patients with rheumatoid arthritis, 1 hemophilic patient and 1 patient with osteochondritis dissecans. The mean duration of preoperative symptoms was 4 years and 10 months. Six patients had previous operative treatment: open reduction and internal fixation of fractures in 4 cases,

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arthroscopic debridement for degenerative ankle disease in 2 patients.

### Surgical technique

The arthroscopic procedure is performed under general or spinal anesthesia with the patient in a supine position. A pillow is placed beneath the buttock and leg with the foot lying in a neutral position, easily accessible anteriorly and posteriorly. Preoperatively the anatomic landmarks including tendons and neurovascular structures are identified and marked.

A standard 4-mm 25° arthroscope is brought in through the anterolateral and anteromedial portals. Posterior portals are not used. Exact positioning of the portals is important as extensive instrumentation is necessary.

In all procedures the Charnley external fixation clamps were used as a distraction device: one pin is fixed through the distal tibia and one distal pin through the talus anteriorly to the tip of the medial malleolus. In this manner the subtalar joint is not distracted and a well centralized distraction force of the tibiotalar joint is obtained. Using the Charnley external fixator the distraction force cannot be measured but the amount of distraction (mm) can and, as the Steinman pins can easily be bent, excessive distraction is prevented.

The initial view of these degenerative joints is often poor and only after thorough anterior debridement can the joint space be visualized. Next the talus is debrided using a motorized shaver, curettes and rongeurs. As debridement is progressing, the visualization improves and the posterior part of the ankle joint will become visible. Using high-speed burrs there is a tendency to remove too much bone in one place creating an uneven surface. This should be smoothed with rasps. Next, the distal tibia and medial and lateral gutters are curetted and debrided. Smooth bleeding surfaces of cancellous bone should be obtained (fig. 1).

The arthrodesis is fixed under compression using a cannulated screw system. The guide pins are placed under direct arthroscopic view and fluoroscopy. If necessary the Charnley external fixator can be used as a temporary compression device while the cannulated screws are inserted.

The foot is positioned in neutral dorsiflexion, 0 to 5° of hindfoot valgus and 5° of external rotation, two cannulated screws are introduced directly 45° to the sagittal and frontal planes (fig. 2a, 2b). Great care is taken not to penetrate the subtalar joint. Skin closure is followed by application of a posterior plaster splint. Full weight bearing starts after 4 weeks.

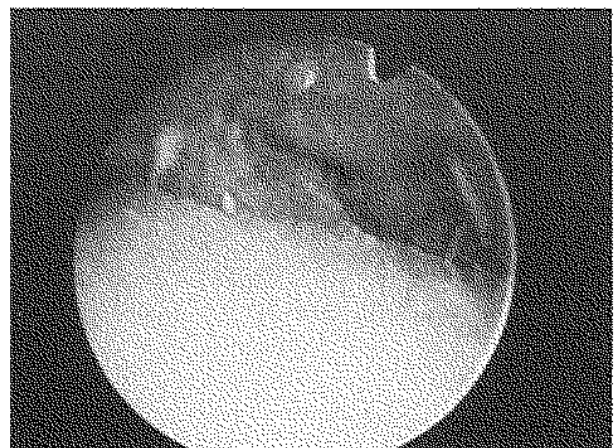
## RESULTS

Bony fusion was achieved in 7 of the 10 ankles. The average time to fusion was 4 months (range: 3 to 6 months). Fusion was considered as the moment the patient was allowed to resume full physical activities and the radiographs showed a solid fusion mass with bone trabeculae across the arthrodesis and no further radiological evolution.

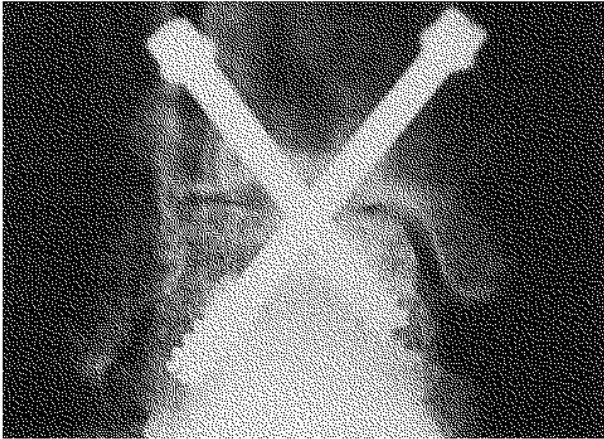
The average period of immobilization of the patients who showed solid consolidation was 10 weeks; this was the moment at which there was a clear evolution to fusion considered as sufficient to allow progressive weight bearing without protection. The average period of work incapacity in these patients was 5 months, 2 weeks.

There were 3 nonunions: 2 patients with post-traumatic osteoarthritis and one polio patient. Patients with rheumatoid arthritis showed the most straightforward evolution to consolidation.

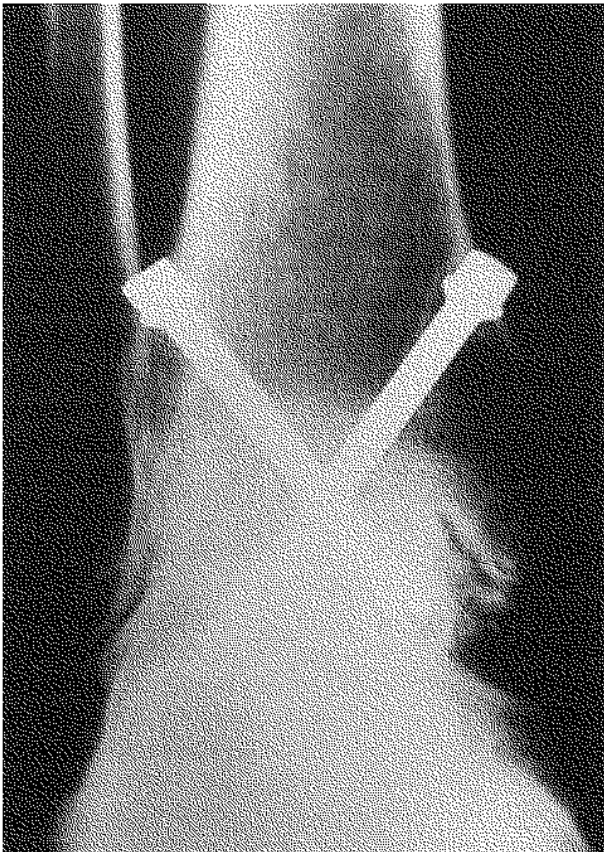
In one patient with nonunion the arthrodesis was fixed in equinus position. In one patient a cannulated screw penetrated the subtalar joint. There was one broken pin, but as the fragment was lying intraosseously this did not cause any further problems. There were no wound problems, infections or neurovascular complications.



**Fig. 1.** Talar body after abrasion: smooth bleeding surface as should be obtained.



*Fig. 2a.* — Immediately postoperative x ray: in arthroscopically performed ankle fusion the joint line often remains clearly visible.



*Fig. 2b.* — 3 months postoperatively: bony fusion with complete obliteration of the joint space.

## DISCUSSION

The arthroscopic technique offers an attractive method to achieve ankle fusion: compared to open techniques, arthroscopic arthrodesis is less invasive, requires less periosteal stripping and the normal contours of the ankle joint are preserved. These factors should have a positive influence on union rates. Myerson (13) found a significantly shorter time to consolidation in the arthroscopically treated group. However, comparison of ankle fusion techniques is difficult and different patient groups may explain the difference in outcome and time to fusion.

Arthroscopic ankle fusion is technically demanding and, as any arthroscopic technique, carries a significant learning curve. The technique is more time consuming than open procedures and there are several technical pitfalls such as screw positioning, malposition of the fused ankle, insufficient debridement of the articular surfaces, and nerve lesions.

Arthroscopic ankle fusion has restricted indications and significant angulation. Rotatory malalignment or extensive avascular necrosis of the talus should be considered as contraindications.

Postoperatively patients are clearly less uncomfortable than in open fusion techniques and this can result in a shorter hospitalization period.

Several authors (6, 11, 12) have reported excellent union rates of 95 and 100%. We have not been able to reproduce their union rates. There were 3 nonunions among 10 arthroscopically performed techniques. In one patient nonunion was clearly due to insufficient debridement. For the other patients with nonunion there was no clear explanation and tomography was warranted to confirm nonunion as a cause of their pain symptoms. Recently Dent *et al.* (15) found clinical ankylosis in 8 cases they performed, but there was radiological evidence of bone fusion in only 4 ankle joints.

Patients with rheumatoid arthritis showed the most straightforward evolution to fusion in our series. The nonunion of posttraumatic cases could be explained by the posttraumatic sclerosis or relative avascularity resulting in insufficient bleeding surfaces after arthroscopic debridement.

In conclusion, our nonunion rate is relatively high compared to other series. With more experience a higher fusion rate should be obtained, but in the future the use of bone grafts after arthroscopic debridement will be considered.

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## SAMENVATTING

*L. DE VRIESE, G. DEREYMAEKER, G. FABRY.*  
*Arthroscopische arthrodesse van de enkel.*

De resultaten van de eerste 10 arthroscopische tibio-talare fusies in de orthopedische dienst werden nagegaan. Beenderige fusie werd bekomen en 7 van de 10 gevallen met een gemiddelde tijd tot consolidatie van 4 maand. Er waren 3 non-unions.

Arthroscopische enkel arthrodesis is minder invasief dan open technieken en minder pijnlijk voor de patiënt. Er is evenwel een leercurve en de arthroscopische techniek is tijdsbestedend. Arthroscopische enkelfusie heeft beperkte indicaties en uitgebreide avasculaire necrose van de talus, belangrijke angulatie of rotatie-afwijking dienen als contra-indicaties voor deze techniek beschouwd.

## RÉSUMÉ

*L. DE VRIESE, G. DEREYMAEKER, G. FABRY.*  
*Arthrodesse de la cheville par arthroscopie.*

Les auteurs présentent leur expérience de l'arthrodèse tibio-astragalienne par technique arthroscopique. Ils ont obtenu dans 7 cas sur 10 une fusion osseuse après 4 mois en moyenne. Les 3 autres cas étaient des échecs. L'arthrodèse tibio-astragalienne par technique arthroscopique est moins invasive et moins douloureuse pour le patient que par technique chirurgicale classique. Elle comporte cependant une courbe d'apprentissage et la technique demande beaucoup de minutie et de patience. Par ailleurs, ses indications sont limitées : la technique chirurgicale classique s'impose lorsqu'il existe une angulation significative, un trouble de rotation ou une nécrose avasculaire étendue de l'astragale.