We treated 52 patients with impingement of the anterolateral soft tissues of the ankle by arthroscopic debridement. All had a history of single or multiple inversion injuries, without instability. One half had negative stress radiographs (stable group), while the others were positive (unstable group). Their mean age was 31 years and there were 35 men and 17 women. The results were assessed at a mean follow-up of 30 months.

Three patients (6%) had a fair result, while 49 (94%) had an excellent or good outcome. No difference was found in the final results between the two groups (p > 0.05). We conclude that anterolateral impingement of the ankle should be considered in a patient with chronic anterolateral pain after an injury, regardless of the stability of the ankle.

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Impingement of the soft tissues in the anterolateral gutter of the ankle can occur after one, or more often, repeated inversion injuries and is a common, but frequently neglected, cause of chronic pain.1-7 The association between this condition and instability of the ankle has not been established. We have analysed the effect of instability on the results of arthroscopic treatment.

Patients and Methods

We treated 52 patients with impingement of the anterolateral soft tissues of the ankle by arthroscopic debridement. They had localised pain in the anterolateral aspect of the joint after injury. We excluded ankles with a chondral lesion of the medial dome of the talus, intra-articular loose bodies, osteoarthritis, rheumatoid arthritis, an avulsion fragment of the anterior talofibular ligament, previous fracture or functional instability. Patients with a history of bilateral ankle injury were also excluded as radiographs of the contralateral side could not be used for comparison.

There were 35 men and 17 women with a mean age of 31 years (16 to 49). All had suffered inversion injuries; ten reported a single episode while the other 42 had multiple episodes. The mean time between the initial injury and treatment was 2.9 years (10 months to 5 years 4 months). Of the 52 patients, 16 sustained their injuries during sporting activities, four in basketball, four in soccer, three in tennis, two in volleyball, two in rugby and one in gymnastics. The remaining 36 patients were not regular athletes; of the 16 who were, seven were in the stable group and nine in the unstable group. Initially, all patients had received conservative treatment including non-steroidal anti-inflammatory drugs, physiotherapy and a local injection of steroids on one or two occasions. Surgery was considered after the failure of conservative treatment for six months.

All patients had pain in the region of the anterolateral aspect of the ankle on prolonged walking, running or sport. Localised tenderness was noted in the area of the antero-inferior tibiofibular ligament in nine (17%), the anterior talofibular ligament in 26 (50%), and in both in 17 (33%). Tenderness in the anteromedial region was noted in six patients. Plain radiographs were normal in 46 patients, while the remaining six had small osteophytes on the anterior tibial margin. Of the 52 ankles, 26 (50%) had normal stress radiographs using a Telos device (Acufex, Andover, Massachusetts) (stable group) while the other 26 (50%) had increased anterior translation or talar tilt on the stress films (unstable group) compared with the opposite ankle. In these ankles the mean increase in talar tilt was 6.9° (3 to 13) and of anterior translation 8.4 mm (2 to 17) compared with the opposite side. All radiological evaluations were carried out on the PACS (Picture Archiving and Communication System) monitor (2048 × 1536 pixels; Siemens, Munich, Germany).

Arthroscopic debridement was performed under spinal or general anaesthesia. The patient was supine with the ankle over the edge of the operating table to allow free movement during surgery. A 2.7 mm arthroscope was introduced through a standard anteromedial portal. After routine diagnostic examination, an anterolateral portal was used as a
working portal and all hypertrophic synovium and scar tissue were removed with a 3.5 mm shaver. An abnormally thickened distal fascicle of the anteroinferior tibiofibular ligament was also excised. After complete debridement, a mixture of bupivacaine and morphine was injected into the joint. Following skin closure, a bulky compression dressing was applied. Physiotherapy started on the second postoperative day, with gentle movement, muscle strengthening, proprioceptive balancing exercises and weight-bearing as tolerated.

The results were assessed after a mean follow-up of 30 months (25 to 45), according to the protocol of Liu et al.\textsuperscript{4} Return to work or previous level of athletic activity was recorded using four grades; grade 0, no limitation of athletic activities and return to previous employment; grade I, no limitation of athletic activities despite mild pain, with some discomfort at work; grade II, moderate limitation of athletic activities or moderate limitation at work; and grade III, inability to return to athletic activities or employment.

### Statistical analysis
With a significance level of 0.05 and a power of 0.8 an adequate number of patients for comparing the results of the groups was 26 for each group, if the difference of the mean Liu scores between the two groups was assumed to be 0.75 and the common standard deviation was 1.0 (Mann-Whitney U test; nQuery Advisor 3.0, Statistical Solutions Ltd, Cork, Ireland). We used the Mann-Whitney U test to evaluate the difference in the ankle score and return to activities between the stable and unstable groups. Differences were considered to be significant at a probability level of 95% ($p < 0.05$).

### Results
The mean ankle scores were 9.19 (SD 1.17) in the stable group and 9.15 (SD 1.26) in the unstable group which was not significant ($p = 0.976$). Overall, 40 ankles (77%) were rated as excellent, nine (17%) good and three (6%) fair. There were no poor results. In the stable group, 20 patients (77%, 95% CI 56 to 91) had excellent results, five good and one fair. In the unstable group, 20 patients (77%, 95% CI 56 to 91) had excellent results, four good and two fair (chi-squared test, $p = 1.00$). After arthroscopic treatment, no patient had a further injury. There was no significant difference between the two groups ($p = 0.713$) in return to activity. In the stable group, 17 patients (65%, 95% CI 44 to 83) returned to work or sporting activities (grade 0 return), and seven were classified as grade I and two as grade II. In the unstable group, 18 (69%, 95% CI 48 to 86) were classified as grade 0, seven as grade I and one as grade II (chi-squared test, $p = 0.77$).

Arthroscopic findings included synovial hypertrophy in the area of the anterior talofibular ligament in all patients (Fig. 1). Four patients showed an abnormal band-like structure along the anterior capsule. A hypertrophic distal fascicle of the anteroinferior tibiofibular ligament was found in six patients, four of whom had a chondral lesion on the anterolateral aspect of the dome of the talus. These lesions were round, soft, swollen and 5 to 10 mm in diameter. The depth of the chondral lesion was grade II to IV. It made contact with the hypertrophic distal fascicle of the anteroinferior tibiofibular ligament during dorsiflexion. Meniscoid lesions were found in four patients, and consisted of flat scar tissue between the lateral malleolus and talus. An arthroscopic translation test of the distal tibiofibular joint was carried out in all patients. While holding the distal one-third of theibia with one hand, the lateral malleolus was moved backwards and forwards. A translation of more than 3 mm was regarded as abnormal movement of the syndesmosis. Of the 52 patients, 15 (28.8%) had a positive arthroscopic translation test. All six patients who had a hypertrophic distal fascicle of the anteroinferior tibiofibular ligament showed a positive test. Only three of the 15 patients with a positive test showed abnormal scar tissue in the syndesmosis itself. The other 12 had an empty syndesmosis with only a little local granulation tissue. In three patients, the distal fascicle of the anteroinferior tibiofibular ligament was avulsed from the tibial attachment.

### Discussion
The results of arthroscopic treatment of anterolateral soft-tissue impingement have been reported as uniformly successful.\textsuperscript{1-9} Wolin et al\textsuperscript{8} reported a meniscoid lesion as a cause of chronic pain after an injury. Excision of a mass of hyalinised connective tissue from the anteroinferior side of the talofibular joint capsule relieved the symptoms. Ferkel et al\textsuperscript{1} reported good or excellent results in 85% of the patients. There is some confusion about the diagnostic criteria and the role of a chondral lesion in this condition.
In the report of Ferkel et al., any patient with anterior laxity of the ankle was considered not to have anterolateral impingement and was excluded from the study. All of the patients had stress radiographs of the ankle, which did not reveal instability. Of 29 patients reported by Meislin et al., three had associated instability, as demonstrated clinically by an anterior drawer test, and radiologically, by significant talar tilt and anterior translation. These three patients had fair results and eventually required reconstruction on the lateral side of the ankle. All the others had excellent or good results. Liu et al. described 55 patients with anterolateral impingement of which 14 (25%) had an increased anterior drawer sign and inversion laxity but did not have increased laxity on stress radiographs with the Telos apparatus. Their report included a mixed group of patients; 60% had instability and 22% had undergone previous ankle surgery. After a mean follow-up of 2.6 years, 87% of the patients had good or excellent results and 11% fair results. Only one patient (2%), from the group with recurrent ankle injuries, had a poor result and had a lateral ligament reconstruction 20 months after the arthroscopy. Recently, DeBerardino, Arciero and Taylor reported 60 patients with soft-tissue impingement. All had a stable ankle with a normal preoperative radiograph, including negative stress radiographs.

Usually, patients with anterolateral impingement have a stable ankle with negative anterior drawer and talar tilt tests. In our study, there was no difference in the outcome between the groups with positive and negative stress radiographs. No further ankle injury had occurred in those with positive stress radiographs. This suggests that ankle pain in these patients is not caused by instability, but by soft-tissue impingement.

We believe that those patients who have symptoms of soft-tissue impingement and positive stress radiographs, should be treated as having anterolateral impingement if they have been functionally stable for at least six months.

Impingement by the anteroinferior tibiofibular ligament was first described by Bassett et al. A thickened distal fascicle of the anteroinferior tibiofibular ligament was found in seven patients who had an inversion injury of the ankle. Five of these had an abraded chondral lesion on the anterolateral aspect of the talus. This finding was consistent with our study. In six patients with a hypertrophic distal fascicle of the anteroinferior tibiofibular ligament, four had a chondral lesion on the anterolateral aspects of the dome.

In many of our cases, impingement by the anteroinferior tibiofibular ligament was associated with impingement by the torn anterior talofibular ligament. We found that 17% of the patients had isolated tenderness over the anteroinferior tibiofibular ligament, while 33% had tenderness over both this and the anterior talofibular ligament. Arthroscopy showed that of the six patients with thickened anteroinferior tibiofibular ligaments, five also had synovial hypertrophy in the area of the anterior talofibular ligament. We believe that impingement by the anteroinferior tibiofibular ligament occurs less commonly as an isolated entity. This lesion is more usually associated with the impingement by the hypertrophic scar tissue of a torn anterior talofibular ligament.

At heel strike during the gait cycle, the ankle is in dorsiflexion and varus for a very short time. During the subsequent foot flat phase, it progresses to a valgus position. In a patient with a history of inversion sprain, we believe that the ankle may have subtle instability, resulting in anterolateral rotary instability at heel strike, in which the talus is subluxed anterolaterally and reduced during the foot flat phase. The repetitive rotary movement of the talus during walking causes impingement of the anterolateral corner of the talus with the distal fascicle of the anteroinferior tibiofibular ligament.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References