Arthroscopic findings in Maisonneuve fractures

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Abstract

Background. A Maisonneuve fracture consists of a proximal fibular fracture with associated syndesmotic ligament disruption and injury to the medial ankle structures. The treatment outcome is good in most cases, although poor results have also been reported. The purpose of this study was to investigate intra-articular lesions in Maisonneuve fractures.

Methods. The subjects consisted of four patients (four ankle joints) who had suffered a Maisonneuve fracture and had undergone surgical treatment between June 2005 and November 2005. The mean age was 24.2 years. At the time of surgery, we performed ankle arthroscopy and determined the presence of tibiofibular syndesmosis disruption, cartilaginous damage, and ligament damage. Lesions of the articular cartilage were graded by depth as determined by inspection and probing.

Results. All four of the cases had cartilaginous damage to the medial section of the talar dome. Lateral lesions were not observed. Chondral debris and hemarthrosis were noted in virtually all cases, and each ankle had a tear on the anterior inferior tibiofibular ligament and interosseous tibiofibular ligament. No patients had a tear of the posterior inferior tibiofibular ligament.

Conclusions. Arthroscopy was useful in identifying associated intra-articular lesions in Maisonneuve fractures.

Introduction

The Maisonneuve fracture was first described by Maisonneuve in 1840. It consists of a proximal fibular fracture with an associated syndesmotic ligament disruption and injury to the medial ankle structures. It is uncommon and is often deemed to be one of the most unstable ankle injuries. The accepted mechanism of injury is an external rotation force applied to the ankle with the foot in either supination or pronation. The relevance of the foot position is as yet unclear. The treatment of the Maisonneuve fracture varies widely. No definite criteria appear to be commonly accepted. Although the treatment outcome is usually successful, negative results have been reported. Loren et al. described that ankle fractures have a high incidence of concomitant intra-articular pathology. The existence of a lesion in the ankle joint is considered to indicate poor results, so the information provided by arthroscopy of Maisonneuve fractures is useful in avoiding poor results. There are no studies reporting the arthroscopic findings in Maisonneuve fracture. The purpose of this study was to investigate intra-articular lesions in order to provide insight into the causes of the resulting disability in Maisonneuve fracture.

Methods

Four men with a Maisonneuve fracture were treated surgically between June 2005 and November 2005. The mean age was 24.2 years (range 20–36 years). The mechanism of fracture was sports related in two patients and a traffic accident in two patients. Arthroscopy was carried out under general or regional anesthesia and tourniquet control, prior to the placement of cortical screws proximal to the distal tibiofibular joint. The patients were supine with the knee flexed to about 45°. A noninvasive ankle distractor was applied and saline (15 ml) was injected to inflate the ankle joint. Arthroscopy was performed using a 2.7-mm arthroscope at 30° with standard anteromedial and anterolateral portals, based on ease of access and site of the presumed lesion. A systematic examination as described by Ferkel and Fasulo was used to inspect the internal structures. The lesions of the articular cartilage were graded according to depth as determined by inspection and probing. The lesions were graded as described by Hintermann et al. In grade 1 the lesions were superficial;
in grade 2 there was fissuring or degeneration of less than 50% of the thickness of the articular cartilage; in grade 3 these changes involved more than 50% of the thickness; in grade 4 there was erosion of the cartilage down to the subchondral bone. Intra-articular ligament and syndesmosis stability were evaluated arthroscopically. A stress test of the distal tibiofibular joint was performed by moving the ankle from internal rotation to external rotation. Study approval was obtained from our hospital board and patients consented fully.

**Results**

There were no complications as a result of arthroscopy. All patients had a tear on the anterior inferior tibiofibular ligament (AITFL) and interosseous tibiofibular ligament (Fig 1, Table 1). No patients showed tearing of the posterior inferior tibiofibular ligament (PITFL). The confirmation of the AITFL condition was possible from the anteromedial portal, and PITFL was accessed from the anterolateral portal. In all four cases, the instability of the distal tibiofibular joint was recognized in the stress test. The injury of the interosseous ligament could be observed from the anterolateral portal when the stress test was applied to the distal tibiofibular joint. The syndesmosis was stabilized with two syndesmotic screws engaging four cortices. Both screws were 3.5-mm fully threaded cortical screws. The distal screw was placed at the proximal end of the syndesmosis and the proximal screw was placed approximately 1.5 cm proximal to the first screw. The ruptured AITFL was not repaired in any of the cases. In the medial aspect, a deltoid ligament rupture was seen in three cases and a medial malleolus fracture was observed in one case. The deltoid ligament injury was not sutured in three cases. Fracture of the medial malleolus was fixed with a 4-mm cancellous screw.

Chondral debris and hemarthrosis were noted in virtually all cases and cleared by lavage and gentle debridement. Lesions of the cartilage were found in all four ankles. The talus was involved in all four cases while the tibia was not involved. The talar lesions were in the posteromedial aspects of the talar dome, not in the lateral aspects. Three ankles had grade 4 cartilage damage of the talar dome and one case had grade 2 damage. There was no correlation of the type of medial injury and degree of cartilage injury. In the grade 4 cases, where the lesions of cartilage demonstrated the adherence of blood clots, no treatment was performed.

All patients were immobilized with a short leg cast for 3 weeks, and were non-weight-bearing for 6 weeks.

**Fig. 1.** Case 2: arthroscopic findings of the left ankle joint. A Tear of the anterior inferior tibiofibular ligament with arthroscopy performed from the anteromedial portal. B Tear of the interosseous ligament with arthroscopy performed from the anterolateral portal. C Cartilage damage of the talar dome in the medial aspect

**Table 1.** Summary of operative findings

<table>
<thead>
<tr>
<th>Case</th>
<th>Sex</th>
<th>Age (years)</th>
<th>Anterior tibiofibular ligament</th>
<th>Interosseous ligament</th>
<th>Posterior tibiofibular ligament</th>
<th>Deltoid ligament or medial malleolus</th>
<th>Articular cartilage grade</th>
<th>Talar dome damage</th>
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<tr>
<td>1</td>
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<td>20</td>
<td>R</td>
<td>R</td>
<td>I</td>
<td>Fracture</td>
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<td>21</td>
<td>R</td>
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<td>R</td>
<td>I</td>
<td>R</td>
<td>2</td>
<td>Medial</td>
</tr>
</tbody>
</table>

R, Rupture; I, intact