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Original article

Tibiofemoral syndesmosis injury treated by temporary screw fixation and ligament repair

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ABSTRACT

Introduction: Tibiofemoral syndesmosis injuries are common but have not been extensively researched. The primary objective of this study was to evaluate the outcomes after temporary screw fixation with ligament repair of these injuries. The secondary objective was to look for factors that could impact these outcomes. We hypothesised that this double fixation (screw + suture) would lead to good outcomes with minimal secondary opening of the syndesmosis upon screw removal.
Material and methods: This was a retrospective study of 285 patients with a tibiofemoral syndesmosis injury (01/2004–12/2011) who were treated by temporary tricortical or quadricortical screw fixation and ligament repair. The operated leg was unloaded for 6–8 weeks postoperative with the patient wearing a walking cast. The screw was removed in all patients before weight bearing was allowed. At follow-up, the range of motion, return to sports, pain, and functional scores (AOFAS and OMAS) were determined, and a radiological assessment was performed.
Results: One hundred twenty-six patients were reviewed after a mean follow-up of 5.9 ± 5.7 years (2.9–10.5). Mean plantarflexion was 95% of the contralateral side and mean dorsiflexion was 93%. Return to sports occurred after a mean of 10 weeks; 83% of patients returned to their pre-injury level of participation. Pain on VAS was 0.8/10 on average. The mean AOFAS and OMAS scores were both above 90 points. At the review, 4% of screws had broken. Diastasis was found in 5.6% of cases, osteoarthritis in 6.3% and an osteophyte in 11.1% of cases, but with no clinical repercussions. No risk factors were identified.
Discussion and conclusion: Treatment by temporary screw fixation and ligament repair leads to good objective results, confirming our hypothesis. However, there is little published data and no consensus on the fixation method or the need to remove the screw.
Level of evidence: IV, retrospective, non-comparative.

1. Introduction

Ankle fractures are a common condition with many anatomical variations. Gerber et al. [1] believed that tibiofemoral syndesmosis damage is underestimated. This was confirmed by Rammelt et al. [2] and Dubin et al. [3], who observed a 1–18% rate of distal tibiofemoral joint (DTFJ) injury in conditions labelled as ankle sprains. Damage to the DTFJ has been found in 23% of malleolar fracture cases [4] and makes these fractures more difficult to treat [1,4]. But there is no consensus as to the need for surgical treatment or the need to suture the anterior talofibular ligament (ATFL). The medium-term results of surgically treated acute DTFJ injuries are satisfactory, but very few studies have been done on this topic and their follow-up is short [5,6].

The primary objective of our study was to determine the outcomes after open surgical treatment of DTFJ injuries by temporary screw fixation and ATFL repair. The secondary objective was to look for factors that could impact these outcomes. We hypothesised that the radiological and clinical outcomes would be good, highlighting the need to repair the ligament and use temporary screw fixation, with minimal secondary opening of the syndesmosis after the screw is removed.

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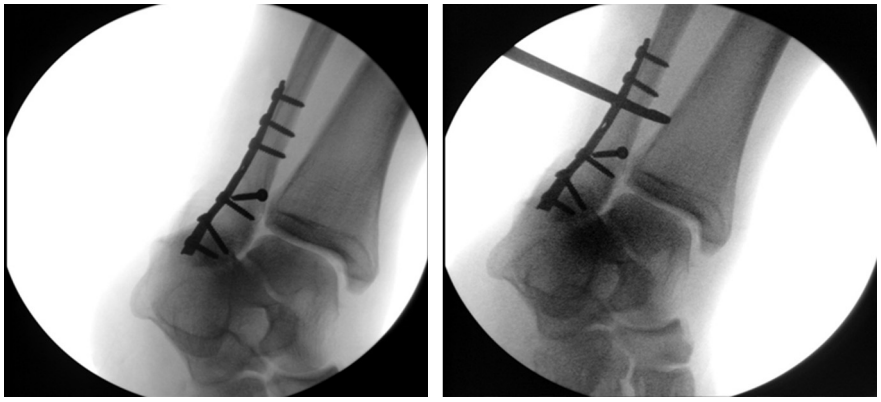

Fig. 1. Intraoperative testing.

2. Material and methods

2.1. Patients

All patients between January 1, 2004 and December 31, 2011 with an ankle fracture or isolated DTFJ injury who were treated with temporary screw fixation (3.5 mm) and ATFL repair were included. Over this period, 1394 patients were treated because of an ankle fracture; 285 of them had a DTFJ injury (20.5%). The diagnosis of syndesmosis damage was made using standard A/P and lateral views, and more specifically using a "surgical" A/P view with 20° internal rotation. The Harper and Keller X-ray diagnostic criteria for a positive diagnosis were applied [7]: tibiofibular gap > 6 mm or > 44% of fibula width, 1 cm above the tibial pilon. The most reliable measurement is that of the tibiofibular gap, as it is independent of the leg's position during X-rays [8].

Patients were excluded if their medical records were incomplete ($n = 3$, 1%), they had a confounding lower limb injury ($n = 4$, 1.4%), or their surgical report did not specifically mention ATFL repair ($n = 85$, 30%). In all, 57 patients were lost to follow-up (28.5%), three died (1.5%) and six (3%) did not want to participate in the study. One patient with dementia (0.5%) was excluded because the clinical evaluation could not be carried out.

The analysed cohort consisted of 126 patient records: 77 men (61%) and 49 women (39%) with an average age of 45 ± 15.7 at the time of surgery (16–86.5). Ninety-two patients (73%) were amateur athletes. The injury mechanism was low-energy trauma in 91 cases (72.2%) and high-energy trauma in 35 cases (27.8%). A fracture–dislocation was present in 19 cases (15%). There were 26 cases (21%) of isolated malleolar fracture (with medial ligament damage in 20 of these cases [77%]), 65 cases (52.5%) of bimalleolar fracture, 19 cases (15.3%) of trimalleolar fracture and 14 cases (11.2%) of Maisonneuve fracture.

2.2. Surgical technique

The malleolar fractures were secured first. Involvement of the DFTJ was confirmed intraoperatively by performing a hook test under fluoroscopy (Fig. 1). The ankle was held at 90° and the ankle mortise stabilised with pointed clamps [9,10]. The ATFL was reattached through bone tunnels with absorbable suture. A 3.5-mm screw was inserted in the reduced position, 2–4 cm above the joint line and parallel to it [9,10]. The screw had purchase in three cortices in 87 cases (69%) and four cortices in 39 cases (31%) (Fig. 2). Postoperatively, non-weight-bearing was prescribed for 6–8 weeks with use of a walking cast and preventative heparin therapy. The screw was removed in all patients at the end of the immobilisation period and rehabilitation initiated; patients were allowed to bear weight as tolerated and underwent physiotherapy. Nearly 20 different surgeons performed these surgical procedures during the study period.

Fig. 2. Right supra-tubercular bimalleolar fracture: a: preoperative; b: note the slightly low position of the syndesmosis screw, which was imposed by the fracture's location relative to the hole in the plate (upper hole is at end of fracture).

2.3. Assessment method

The following were evaluated: weather-related pain, pain on a visual analogue scale (0 to 10), plantarflexion (PF), dorsiflexion (DF), objective feelings of ankle stiffness, AOFAS [11] and OMAS [12] scores, and return to sports (time/level). Immediate postoperative and follow-up radiographs were used to evaluate the quality of the reduction, presence of secondary displacement, screw position, secondary diastasis, signs of tibiotalar osteoarthritis, presence of synostosis and time to fracture union. The screw height was measured from the tibial pilon to the middle of the screw (mm). Any complications were recorded.

2.4. Statistical analysis

The raw data for the quantitative variables were described with mean values (± standard deviation, min–max). The sample size and percentage distribution were calculated for the qualitative variables. Inferential statistical analysis was carried out using Bayesian methods [13]. Calculations were performed with the R 3.0.1 and JAGS 3.4.0 software packages. Note that Bayesian methods do not generate *P*-values.

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