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Mid-term results of ankle fractures with and without syndesmotic rupture

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ABSTRACT

Backgrounds: This study investigated the effect of short term removal of syndesmotic screws on the ankle function after 6 years, as there still exists controversy on the duration of screw stabilization.
Methods: Patients with an ankle fracture who received surgery between 1998 and 2004 were reviewed. One group was composed of patients with an ankle fracture needing a syndesmotic repair with screws. The second was composed of operated patients that did not need syndesmotic repair. The primary scoring used was the Olerud–Molander Ankle Score (OMAS).
Results: A total of 59 patients were studied with comparable characteristics, with no significant difference on the OMAS after 6 years between the repair group (81.9) and the non-repair group (90.4). On additional clinical scoring groups remained the same. Joint degeneration was seen in both groups (86.7% vs. 55.5%).
Conclusions: Patients with ankle fractures using syndesmotic repair and screw removal after 8 weeks and operated patients without syndesmotic injury have comparable results after 6 years.

1. Introduction

The standard treatment for unstable ankle fractures is open reduction and fixation. If the syndesmosis is ruptured, syndesmotic screws are used to stabilize the joint. Several controversies exist; the number of screws used, the number of cortices engaged and the need for removal as well as timing of removal [1–9]. Removal of the screws after 6–8 weeks is standard level of care in our region. A number of retrospective studies showed limited ankle function after ankle fractures on the mid-term [10]. Even less is known whether temporarily syndesmotic repair sufficiently restores mid- and long-term ankle function. Therefore, we questioned if the mid-term ankle function after a fracture with treated syndesmotic disruptions would be similar to treated fractures without syndesmotic disruption and temporarily fixation.

1.1. Patients and methods

Patients with a closed ankle fracture (Danis–Weber classification type B and C) between 1998 and 2004 were identified by operation records. Data was collected from reviewing operative and clinical files and radiographs. Fractures on immature skeletons or multi-trauma patients were excluded.

The patients were recruited and examined as part of the standard local follow-up protocol and after informed consent patients were primarily assessed by the Olerud–Molander Ankle Score (OMAS) questionnaire [11]. In addition, patients were invited for further investigation by physical examination and radiographs. During this meeting, patients were assessed with the American Orthopedic Foot and Ankle Society Ankle–Hindfoot Scale (AOFAS-AHS) and standing radiographs (anterior–posterior AP and mortise view) were taken in a standardized way.

1.2. Operation technique

All operations were performed in our hospital by experienced trauma surgeons (orthopedic trauma surgeons having a Dutch trauma qualification and more than 5 years of experience). After fixation of the fibula and (if necessary) medial malleolus, the syndesmosis was tested and evaluated on both mortise and true AP while tilting the image intensifier. This was done by the hook test where lateral traction is given on the fibula by a bone hook, when more than 2 mm is given, the test is positive [12]. Widening of the syndesmosis on an AP radiograph suggests the need for a screw

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[13]. If this test was positive or evident widening was found of the tibiofibular space on the pre-operative radiographs, syndesmotic disruption was diagnosed. Therefore, one or two screws were placed transsyndesmotically. This was either through three or four cortices. The choice for the number of screws and cortices depended on the surgeon's preferences. All the malleolar fractures were reduced by plate or screws according to the Arbeitsgemeinschaft für Osteosynthesefragen (AO) standards [14].

1.3. Post-operative protocol

After surgical repair, every patient received 2 weeks of non-weight bearing cast followed by 4 weeks weight bearing as tolerated in a circular cast with two crutches. After a 6–8-week interval, the syndesmotic screws were removed by a minimal invasive procedure independent of the allowed mobilization. This protocol was the same for the non-syndesmotic repair patients, although no screws were removed in this case.

1.4. Radiologic review

The initial radiographs were collected and reviewed for type of fracture and number of inserted screws. The follow-up radiographs were taken in anterior–posterior and mortise view. They were blinded and analyzed by an experienced investigator for medial clear space, tibiofibular clear space and overlap in a standardized way according to literature [15–18].

Follow-up radiographs were reviewed for osteoarthritis (OA); the grading was done with use of the van Dijk scale. Here, 0 indicated: Normal joint or subchondral sclerosis, I: Osteophytes without joint space narrowing, II: Joint space narrowing with or without osteophytes, III (Sub)total disappearance or deformation of the joint space [19,20].

1.5. Clinical review

For the primary outcome, the OMAS was used which evaluates the functional status [11]. The following fields are covered: pain, stiffness, swelling, stair-climbing, running, jumping, squatting, supports and work and activities. The maximum score is 100 points. Secondary the AOFAS-AHS score was taken. This is a valid test that evaluates pain and function alignment [21]. All tests were blinded for method of treatment through performance by independent assessors.

1.6. Statistical analyses

The chi-squared test was used for nominal data. For other data the student *t*-test was used, as they were normally distributed. The Mann–Whitney test compared those variables which were not normally distributed. All tests were performed using SPSS 16.0 for windows. *P*-values less than 0.05 were considered significant with a 95% confidence-interval and were calculated when relevant.

2. Results

Between 1999 and 2004, 117 operated ankle fractures (Danis–Weber type B, C) were reported. Medial malleolar and posterior tibial fractures were reduced and fixated if needed. Only for 75 patients sufficient data was found for potential reviewing. For treatment allocation, see Fig. 1. Twenty-six patients with an ankle fracture combined with syndesmotic disruption, needing syndesmotic screws, with mid-term follow-up could be retraced. Nine patients were lost to follow-up. After an average of 7.8 weeks the syndesmotic screws were removed that time. Of a group of 40 operated patients with stable ankle fractures, 33 were retraced. The remaining seven patients were lost to follow-up. Both groups had comparable mean age and sex and were treated in the same period. Our series contained no chaput or wagstaffe fragments suitable for bony fixation. The syndesmotic screw was the sole syndesmotic stabilization in our study. Of the screw group the majority had a Weber C fracture. This was significantly less in the non-screw group (Table 1).

Main results are listed in Table 2. Some patients were not able or willing to be additionally reviewed. Therefore, of the 21 patients in the screw group, the AOFAS-AHS, radiographs and clinical examination were performed. This was the same for 27 in the non-screw group. The non-screw group had better scores on both OMAS and AOFAS-AHS; this was not significant. The follow-up was in both groups more than 6.5 years.

The tibiofibular clearspace was significantly diminished on the radiographs of the syndesmotic screw group. Half of all patients had a degree of OA, no differences were seen between groups. A few typical radiographs of both groups are added. Figs. 2 and 3

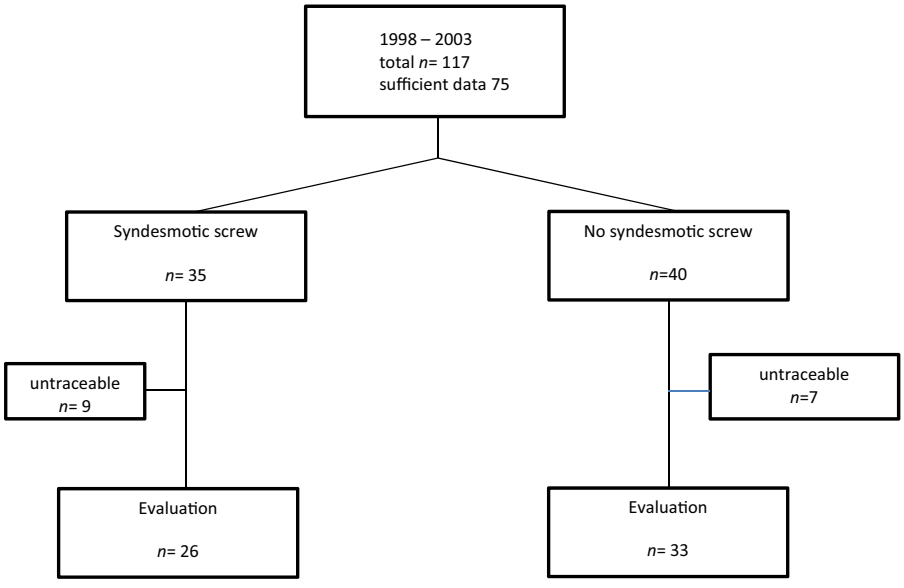

Fig. 1. Allocation of patients with ankle fractures needed surgery, Weber type B and C.