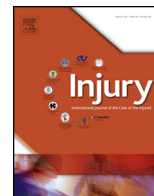




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The role of outpatient visit after operative treatment of ankle fractures

Mikko T. Ovaska, MD, PhD*, Timo Nuutinen, BM, Rami Madanat, MD, PhD,
Tatu J. Mäkinen, MD, PhD, Tim Söderlund, MD, PhD

Department of Orthopaedics and Traumatology, Helsinki University Hospital, Helsinki, Finland

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ABSTRACT

It is a common practice that patients have a scheduled follow-up visit with radiographs following ankle fracture surgery. The aim of this study was to evaluate whether an early outpatient visit (<3 weeks) after ankle fracture surgery resulted in a change in patient management. For this study, 878 consecutive operatively treated ankle fracture patients with an early outpatient clinical-radiological visit were reviewed. The outcome measure was a change in treatment plan defined as any procedure, medication, or surgical intervention that is not typically implemented during the uncomplicated healing process of an acute fracture.

A change in treatment plan was observed in 9.8% of operatively treated ankle fracture patients. The mean age of the patients was 48 years and the mean follow-up time was 64 months. Of the changes in treatment plan, 91% were exclusively due to clinical findings such as infection. Only three of 878 patients required a change in their treatment plan based merely on the findings of the radiographs taken at the outpatient visit. Only 37% of the patients requiring a change in their postoperative management had solicited an unanticipated visit before the scheduled outpatient visit due to clinical problems such as infection or a cast-related issue.

Our study showed that every tenth operatively treated ankle fracture patient requires a change in their treatment plan due to a clinical problem such as infection or a cast-related issue. Although at hospital discharge all patients are provided with written instructions on where to contact if problems related to the operated ankle emerge, only one third of the patients are aware of the clinically alarming symptoms and seek care when problems present. Our findings do not support obtaining routine radiographs at the early outpatient visit in an ankle fracture patient without clinical signs of a complication.

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Introduction

Ankle fractures represent approximately 10% of all fractures and are among the most frequently surgically treated fractures [1,2]. Surgical treatment of ankle fractures may be accompanied by several complications [3,4], and the most frequently encountered complications are related to wound healing and surgical-site infections [1,4,5]. Although the incidence of malreduction observed in postoperative radiographs leading to early reoperation is low [6], it is a common practice that patients have a scheduled follow-up visit to an outpatient clinic together with radiographs following acute fracture surgery [7].

Recent studies have questioned the justification of routine radiographs obtained at the early outpatient visit [3,7], as the

majority of these radiographs do not result in a change in patient management [7]. However, due to the high number of postoperative complications observed in ankle fracture patients, radiographs may be still indicated if the clinical picture necessitates them [3]. A recent study evaluating acute fractures in various anatomic locations showed that only a few patients require a deviation from the standard postoperative care at the first outpatient visit, and that the deviation is not based on the radiographs but rather on patient history and physical examination [7].

The first purpose of this study was to evaluate whether an early outpatient visit after ankle fracture surgery resulted in a change in patient management. The second goal was to assess how often the radiographs or the physical examination at the first outpatient visit after ankle fracture surgery resulted in a change in patient management. We hypothesized that the radiographs would not result in a change in patient management. However, the early outpatient visit might reveal problems related to wound healing in

* Corresponding author at: Department of Orthopaedics and Traumatology, Helsinki University Hospital, Topeliuksenkatu 5, 00260, Helsinki, Finland.
E-mail address: mikko.ovaska@hus.fi (M.T. Ovaska).

patients with ankle fracture surgery, and thus could not be totally abandoned.

Materials and methods

We performed a chart review of 878 consecutive operatively treated ankle fracture patients with an early (<3 weeks) outpatient clinical-radiological visit at a level-I trauma centre from January 1st 2010 through December 31st 2011. Our hospital is located in an urban area with a catchment population of 1.9 million persons. All patients who had undergone operative treatment for an ankle fracture were identified by querying the hospital surgical procedure database for diagnoses coded using the International Classification of Diseases, Tenth Revision (ICD-10) as fibular fracture (S82.4), medial malleolar fracture (S82.5), lateral malleolar fracture (S82.6), bimalleolar or trimalleolar fracture (S82.8), and with the procedure code for internal fixation of an ankle fracture. Approval from our institutional review board was obtained prior to the beginning of the study. Eligible operations were restricted to those performed primarily at our institution and in patients 16 years of age or older and all fractures were definitively treated with open reduction and internal fixation (ORIF). Altogether, 61 surgeons performed all the ankle fracture operations during the 2-year study period.

A standardized operative and postoperative protocol was used during the study period. ORIF was performed based on AO-principles and a tourniquet was applied depending on personal preferences of the treating surgeon. The wound was closed in three layers (peroneal fascia, subcutaneous layer, skin). Postoperatively, a cast was applied to all patients either in the operating room or during the following postoperative days and postoperative radiographs were obtained. Before hospital discharge all patients were provided with written instructions on where to contact if problems related to the operated ankle emerged, and an early scheduled outpatient visit within 3 weeks after surgery was appointed. Sutures or staples were removed and radiographs (antero-posterior, mortise, lateral) were taken at the early outpatient visit from all patients. After the first visit the patients were allowed to begin active ankle range of motion exercises. Full weight bearing was allowed at four weeks. At six weeks the patients had another outpatient visit, radiographs were taken, and the cast was removed.

Medical, operative, and radiological records of all 878 patients were reviewed in order to identify various characteristics of the patients and their injuries as well as possible changes in patient management. We collected the demographic data of the patients and the fracture type (Danis-Weber classification; uni-, bi-, or trimalleolar fracture; fracture-dislocation; open fracture). The medical and microbiological records were reviewed for recorded signs and symptoms for surgical site infection. We classified infections as deep when all three of the following criteria were met at the same time: clinical signs of a surgical site infection (redness, swelling, drainage, or dehiscence), positive bacterial cultures taken from the wound, and osteosynthesis material visible or palpable in the wound [8]. The remaining infections were considered as superficial.

Data concerning postoperative treatment plan were obtained by reviewing the physician's dictated clinic notes and radiographs from the first postoperative visit. Changes in normal postoperative management were defined as any procedure, medication, or surgical intervention that is not typically implemented during the uncomplicated healing process of an acute ankle fracture. These changes include local wound treatment or debridement, application of negative-pressure wound therapy, prescription of oral antibiotics, administration of intravenous antibiotics, unexpected changes in standard weight-bearing instructions, unexpected

remodeling of the cast, removal of hardware excluding elective scheduled syndesmotic screw removal, and loss of fracture reduction requiring reoperation. We collected the number of patients who required a change in their treatment plan due to the findings of the first postoperative visit, and the causes for the change were divided into 1) clinical, 2) clinical and radiological, 3) radiological only. The exact causes for the change in the treatment plan were analyzed. The number of patients who required an unanticipated visit already before the scheduled outpatient visit was recorded and the causes for that visit were noted. The mean follow-up time was 64 months.

Results

The mean age of the patients was 48 years (range 16–91 years) and 60% of the patients were women. The basic fracture characteristics are presented in Table 1. Altogether, 86 of 878 (9.8%) patients required a change in treatment plan due to the findings of the first outpatient visit including 18 patients requiring surgical treatment in the operating theatre (Fig. 1). Of these 86 patients, 32 (37%) patients had solicited an unanticipated control visit prior to the scheduled outpatient visit due to emerging clinical problems related to the ankle fracture surgery (Fig. 2). Therefore, of the 86 patients requiring a change in postoperative management, 54 (6.2%) patients required a change merely based on the findings of the scheduled early outpatient visit (Fig. 1).

Interestingly, 91% of the causes for a change in treatment plan were exclusively due to clinical findings such as infection or cast-related problems (Figs. 1 and 2). Only three (0.3%) patients of cohort of 878 ankle fracture patients required a change in their treatment plan based merely on the findings of the radiographs taken at the early outpatient visit; in one of these three patients the cause was an undiagnosed medial malleolar fracture leading changes in weight-bearing. In the two other patients a partial loss of reduction of the medial malleolus without a need for reoperation was observed resulting in further restrictions in weight-bearing.

At the first outpatient visit, 78 (8.9%) of 878 patients showed signs of infection. According to our previously defined criteria, 28% (22 of 78) of these infections were classified as deep and the remaining 72% were classified superficial infections. By the time of last control visit, 70 (8%) of 878 patients had eventually been treated for problems related to deep surgical site infection.

Table 1

Fracture characteristics of the patients with an early outpatient visit following ankle fracture surgery (n = 878).

Characteristics	n (%)
Weber classification	
A	11 (1)
B	605 (69)
C	234 (27)
Other ^a	28 (3)
Fracture type	
Unimalleolar	308 (35)
Bimalleolar	236 (27)
Trimalleolar	334 (38)
Fracture-dislocation	411 (47)
Open fracture	32 (4)

^a isolated medial (n = 23) or posterior (n = 2) malleolar fracture, medial malleolar fracture associated with posterior malleolus (n = 2) or chaput-tillaux fragment (n = 1).

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