

Health-related quality of life in trauma patients who sustained a calcaneal fracture



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ABSTRACT

Background: Calcaneal fractures are known to cause a considerable long-term disability; disability influences the public health negatively in terms of personal suffering and monetary losses. Health-related quality of life (HRQoL) in general is influenced by various patient-specific factors, and possibly trauma and fracture characteristics. Previous studies might have underestimated the impact of this injury because of several injury and patient specific exclusion criteria. In this study we provide an overview of the patient characteristics and outcome of patients with a calcaneal fracture in a Dutch level I trauma population.

Methods: We have performed a retrospective cohort study in a trauma level 1 centre. All patients who sustained a calcaneal fracture and were 16 years or older at time of admission were included. We have retrieved the relevant patient and fracture characteristics from the medical status and evaluated current health status with a questionnaire. We have used the EQ-6D for quantification of the HRQoL. Moreover, the patient's capability to work was evaluated.

Results: 125 patients with 151 calcaneal fractures were identified of which 93 patients with 114 calcaneal fractures participated in this study. The median EQ-5D index value is 0.78. All dimensions of the EQ-6D are affected in particular the dimensions 'mobility', 'pain/discomfort' and 'usual activity'. 85% is capable to work. Female patients or patients with a relevant comorbidity or a psychiatric history have a significantly lower HRQoL score. In this study population no difference in HRQoL results was demonstrated among different socio-economic status, associated injuries, or severity of injury.

Conclusions: This study demonstrates that patients who sustained a calcaneal fracture have a significantly lower HRQoL than the Dutch reference population and suffer from a chronic disability. Moreover, patients that have a comorbidity, a relevant psychiatric history or are female have significantly lower HRQoL scores. Furthermore, this study shows that socio-economic status, associated injuries, or severity of injury did not influence the HRQoL in this study population.

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Introduction

Calcaneal fractures are a relatively uncommon injury; the reported incidence varies from 11.5 to 13.7 per 100,000 persons per year [1–3]. This fracture is known to influence the daily activities of patients negatively and to affect their quality of life substantially [4–6]. Moreover, this fracture has an adverse

economic impact. Buckley et al. [4] showed that approximately 20% of these patients will not return to work after 1 year.

In order to evaluate the severe consequences of the disabilities, several authors have studied and quantified the impact of this injury [5,6]. The literature shows that the impact of a displaced intra-articular calcaneal fracture (DIACF) or other ankle pathology can be evaluated with a health related quality of life (HRQoL) instrument [7–9].

A lot of studies address the HRQoL in patients with a DIACF [4–6,10]. In these patients the quality of life might be influenced by comorbidities, socio-economic status, concomitant injuries, age or the classification of the calcaneal fracture [11–14]. We have reviewed and evaluated the current literature and have demonstrated that in a significant number of these studies some of these

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factors are poorly or not reported [15]. Moreover, patients who are likely to have worse outcomes, e.g. patients with open fractures, or with concomitant injuries, are excluded in these studies [4–6,15–18]. Therefore, these studies might underestimate the impact of a calcaneal fracture on the HRQoL.

The aim of this study is to evaluate the HRQoL in patients after a traumatic calcaneal fracture, extensively describe the patient characteristics of the included patients, and quantify the impact of this fracture in specific patient groups.

Materials and methods

Hospital setting

This study was performed at the University Medical Centre Utrecht (UMCU) in the Netherlands. UMCU is a Level I trauma centre and an academic teaching hospital located in the central region of the Netherlands.

Study design

This is a retrospective study and is performed according to the criteria of Efficace et al. [17] for evaluating HRQoL studies, and approved by the medical ethics committee of the UMCU.

The patients were retrieved from the Dutch National Medical registration [19]. This registry is a national database in which all hospital admissions are collected with the concomitant diseases or injuries, and coded according to the International Classification of Diseases [20].

All admitted patients with a calcaneal fracture aged 16 years or older at the time of admission at UMCU in the period 2000 to 2010 were included.

Data collection

All data were extracted from the patient's medical record. We have collected age, gender, trauma mechanism, type of calcaneal fracture (open/closed, bilateral/unilateral), fracture classification by Sanders, concomitant injuries, Injury Severity Score (ISS), comorbidities, socio-economic status, occupational status and relevant psychiatric history [11–13,21–24]. Patients with a bilateral fracture with one open and one closed fracture were categorised in the open fracture group. The Sanders classification was only determined if CT-images of the fracture was available. The socio-economic status was determined by the highest level of education a patient had received. The comorbidities were categorised according to the ASA Physical Status Classification System [25]. All patients with a psychiatric history, who were treated with psychiatric medication, or psychotherapy were identified as patients with a relevant psychiatric history.

Follow-up

Follow-up data was retrieved from the electronic patient data (EPD) management system. A questionnaire was sent to all identified patients, along with an informed consent form. After four weeks a reminder was sent to all non-responders. At last, all patients were contacted by phone to collect missing data or non-registered comorbidities. Furthermore, all non-responders were asked one more time for their consent to participate in the study (performed by G.A.).

Outcomes

To our knowledge, there is no validated patient-reported outcome measurement available for foot and ankle disorders

specifically. In addition, the validity, responsiveness and reliability of the EQ-5D, a standardised generic measure of HRQoL, has been tested in studies for other extremity morbidities [26–30]. Therefore, the EQ-6D, an extended version of the EQ-5D, was chosen as primary outcome [31].

The EQ-6D consists of six dimensions: 'mobility', 'self-care', 'usual activities', 'pain/discomfort', 'depression/anxiety' and 'cognition'. All the dimensions questions have three response opportunities: no problems, some problems, and severe problems. Based on these answers the EQ-5Di can be calculated; the additional dimension in the EQ-6D 'cognition' was ignored for the calculation of the EQ-5Di. The EQ-5Di ranges from –0.33 to 1.00 [26,31]. The best health state is represented by 1.00, 0 represents a health state comparable to death, and a negative score represents a health state worse than death.

In addition, the EQ-VAS, a visual analogue scale, measures the self-rated health status of the participant. This scale ranges from 0 (the worst imaginable health state) to 100 (the best imaginable health state).

Statistical analysis

At first, we have compared the patient and injury characteristics of the eligible and the participating population. For continuous variables the Student's *t*-test, Kruskal–Wallis test or Mann–Whitney *U*-test was used, and for categorical variables the Chi-square test. A post hoc analysis was performed when indicated [32]. The Kolmogorov–Smirnov test was used to evaluate the distribution of a variable. A *p* value lower than 0.05 was considered statistically significant Fig. 1.

To express the value of differences between health states a tariff is used; a tariff is culture-dependent. We have used the Dutch tariff for the calculation of the EQ-5Di, a difference of ≥ 0.032 points was considered a clinically relevant difference [33]. The correlation between EQ-VAS and EQ-5Di was established using Pearson's correlation. In addition, the EQ-5Di scores were compared with the Dutch reference population. We have used the EQ-5Di United Kingdom (UK) tariff for this, because the scores of the Dutch reference population are derived with the UK tariff. At that time the Dutch tariff was not available in literature [12,34]. The two-sample *T*-test was used to calculate statistical significance in this comparison.

In line with the EQ-6D study of the Dutch reference population, the outcomes per dimension were dichotomised into problems vs. no problems [12].

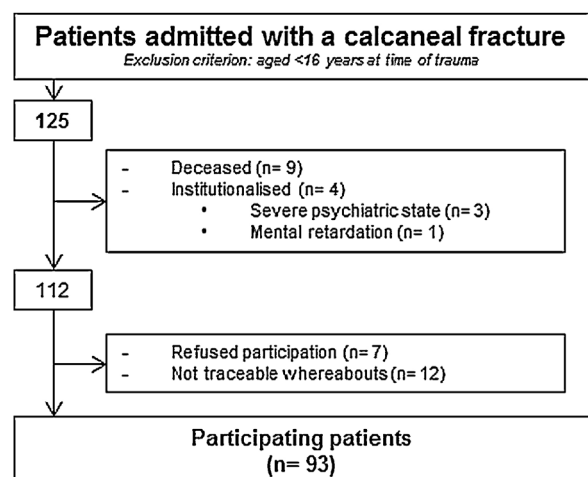


Fig. 1. Flow-chart.

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