



Prognostic factors of health-related quality of life in patients after tibial plafond fracture. A pilot study



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ARTICLE INFO

Article history:

Accepted 9 June 2015

Keywords:

Tibial plafond fracture
Pilon fracture
Quality of life

ABSTRACT

Background: Tibial plafond fractures are a uncommon injury, and the outcomes described in literature are generally poor. The purposes were to determine the effect of the tibial plafond fractures on general health-related quality of life, and to examine the factors that influence these outcomes.

Methods: Retrospective study of 43 patients with average age of 45.6 (range 18–69) years who were also invited for a clinical and radiological reassessment. The primary outcome measure was quality of life assessed by the Short Form-36 questionnaire. Visual analogue scale for pain, and motion of both ankle and subtalar joints were also assessed. Radiological evaluation was performed to assess bone healing, fracture reduction quality, and tibial alignment.

Results: The mean follow-up at last visit was 8.1 (range, 4–12) years. Patients who had suffered plafond fracture had significantly poorer quality of life compared with age- and gender-matched general population of our country regardless of the treatment method used. Multivariate analyses showed that the age had influence on the emotional outcomes, educational level and fracture pattern on physical outcomes, and marital status, fracture reduction quality, and ankle motion on both physical and mental component summaries.

Conclusion: Tibial plafond fractures have a significant negative impact on general health-related quality of life regardless of the operative treatment used which reflects injury severity. In addition, psychosocial characteristics of patients may influence the outcomes.

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Introduction

Tibial plafond fractures are uncommon, and are difficult to manage [1]. These fractures are usually the result of high energy injury, and are typically associated with joint surface comminution, significantly displaced fracture fragments, and often with severe soft tissue closed or open trauma [2]. Various treatment strategies have been proposed for their treatment but no specific method has demonstrated its superiority as compared with others [3]. However, the two-staged procedure, with the use of the external fixation in the first stage and the open reduction and internal fixation in the second, has been widely applied in the treatment of these fractures [4]. Outcomes after tibial plafond fractures depend on multiple factors, such as severity of the trauma, soft tissue conditions, comorbidities, and quality of

reduction [3,5]. Treatment of these fractures is challenging because poor functional outcomes have generally been reported in the literature, although with a broad range of results [1]. While successful outcomes can be expected in nearly 80% of low energy fractures, successful outcomes are often less than 60% for high energy fractures [1].

Several studies have investigated the clinical outcomes after tibial plafond fracture but most of them focused on a specific operative technique or complications such as infection, bone healing or posttraumatic osteoarthritis [4,6,7]. However, few studies have focused on the quality of life after these fractures using validated outcome measures to assess specifically the patient's perspective in relation to their health status [2,8,9]. The Short Form-36 Health Survey (SF36) [10] is a validated instrument of general health assessment, and to assess the effect of the fracture on physical and emotional health [11].

The purpose of this study was to determine the effect of the tibial plafond fractures on general health-related quality of life, and to examine the factors that influence these outcomes.

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Materials and methods

A retrospective study was designed to assess quality of life after tibial plafond fracture. Selected patients were also invited for a clinical and radiological additional assessment. The study was approved by our institutional ethics committee, and informed consent was required. All consecutive patients who had been treated for a tibial plafond fracture at our centre between January 2002 and December 2010 were eligible for study. The inclusion criteria were age 18 years or older, unilateral tibial plafond fracture, AO/OTA [12] type 43-A, 43-B or 43-C, displaced fracture surgically treated, and postoperative follow-up for at least 2 years. No other exclusion criteria were considered because of the low prevalence of patients with this fracture.

Forty-three patients met the inclusion criteria, and their characteristics are shown in Table 1. All patients had injury radiographs and CT scans which were reviewed to identify the fracture patterns. Medical charts were used to identify patient characteristics on admission, and operative procedures. All patients had routine clinical and radiological evaluations for at least 2 postoperative years. The average age at surgery was 45.6 (range, 18–69) years. There were 30 males and 13 females. Regarding marital status, 25 were married, 13 unmarried, and 5 divorced or widowed. Educational levels were bachelor's degree in 22 patients, high school diploma in 16, and elementary studies in 5. The cause of injury was a fall from a height in 28 patients, traffic accident in 12, and crushing injury in 3. According to Gustilo system [13], there were 9 open fractures (3 grade-I, 1 grade-II, and 5 grade-III). According to AO/OTA system [12], there were 6 type-A fractures, 19 type-B, and 18 type-C. Nine patients had other associated injuries.

Table 1
Characteristics of patients.

	Overall	External fixation	Internal fixation	<i>p</i> -value*
<i>n</i>	43	17	26	
Age (yr)**	45.6 (16–69)	47.2 (24–65)	46.4 (16–69)	0.921
Male/Female	30/13	12/5	18/8	0.599
Marital status				0.834
Married	25	9	16	
Unmarried	13	6	7	
Divorced	5	2	3	
Education				0.746
Bachelor	22	9	13	
School	16	5	11	
Elementary	5	3	2	
Injury				0.384
Fall	28	4	8	
Traffic	12	11	17	
Other	3	2	1	
AO fracture				0.437
A	6	4	2	
B	19	6	13	
C	18	7	11	
Gustilo				0.012
Open	9	7	2	
Closed	34	10	24	
Complications				0.211
Skin necrosis	4	1	3	
Infection	5	1	4	
Bone healing				
Union time (w)**	12.1 (5–56)	11.7 (6–28)	12.3 (5–56)	0.894
Delayed union				0.419
Malunion	7	2	5	0.640
	2	1	1	
Arthrosis	2	1	1	0.640

* Comparing both treatments.

** Continuous variables as average (range).

On admission, tibial fractures were initially treated with plaster splint (4 patients) or external fixation (39 patients). The definitive tibial stabilisation was external fixation in 17 patients, and open reduction and internal fixation (locking plates and screws) and bone grafts when necessary in 26 patients. In these last patients, the definitive stabilisation was performed when the skin condition has improved with an average time from injury to operation of 7.9 (range, 6–14) days. Early complications were seen in 9 patients (21%), including skin necrosis in 4, wound superficial infection in 3, and deep infection in 2. There was no significant difference in complication rate between the two treatment methods ($p = 0.211$). All fractures healed in an average time of 16.3 (range, 7–38) weeks. Delayed unions were seen in 3 patients. There was no significant difference for average time to union regarding operative treatment option ($p = 0.894$). Seven tibial malunions and one posttraumatic osteoarthritis were observed in each of the methods of treatment. There was no ankle fusion due to posttraumatic osteoarthritis.

Evaluations

All 43 patients who met inclusion criteria were contacted and were invited to return for clinical reassessment. All patients accepted and they signed an informed consent. A clinical and radiological examination including CT scan was performed at this last visit. The primary outcome measure was the Short Form-36 (SF36) health survey questionnaire validated for our country [14]. The SF-36 is one of the most widely used and evaluated generic health-related quality of life questionnaires. It is a 36-item auto-administered questionnaire that produces scores in eight domains relating to the patient's quality of life. These are physical functioning, role limitation due to physical problems, bodily pain, general health perception, emotional vitality, social functioning, role limitation due to emotional problems and mental health [10]. To calculate every item score, the raw scores were coded and recalibrated following the standard guidelines [15], and then they were transformed to 0 (worst health) to 100 (best health) scale. The SF36 results in each category were compared with gender- and age-matched reference values at our country [16]. Physical and mental component summary scores were also used to identify risk factors for poorer quality of life. Furthermore, a visual analogue scale (VAS) (0: pain-free; 10: worst possible pain) was used. Motion of both the ankle (dorsiflexion and plantar flexion) and subtalar (inversion and eversion) joint was measured bilaterally with a goniometer. Subtalar motion was assessed by the technique described by McMaster [17].

Standard radiographs (anteroposterior, mortise and lateral views) were taken in each visit during the period of followup. At last visit, radiographs and CT scans of both ankles were taken. Quality of reduction was classified as successful or unsuccessful based on the radiological criteria of Teeny and Wiss [5]. Successful reduction was defined as less than 2 mm of joint incongruity and less than 5° of varus/valgus angulation in any plane. Fracture union was defined as radiological callus in two planes. All measurements were performed on digital radiographs using the computed measurement tools, and all were performed by the same observer to minimise error.

Statistical analysis

Statistical analysis was performed using SPSS software v. 10.0 (SPSS Inc., Chicago, USA). In all analysis, statistical significance was considered for *p* values less than 0.05. Normality was assessed by Smirnov–Kolmogorov test. Preliminary bivariate analyses included parametric and nonparametric two-tailed tests were conducted to examine the primary outcomes according to the patient

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