



Patient reported health related quality of life early outcomes at 12 months after surgically managed tibial plafond fracture



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ABSTRACT

Introduction: Tibial plafond fractures represent a small but complex subset of fractures of the lower limb. The aim of this study was to describe the health related quality of life, pain and return to work outcomes 12 months following surgically managed tibial plafond fracture.

Methods: The Victorian Orthopaedic Trauma Outcomes Registry (VOTOR) database was used to identify patients with tibial plafond fractures. All patients captured by VOTOR with a tibial plafond fracture between September 2003 and July 2009, were identified consecutively and comprised the initial cohort. The radiographs of all identified patients were classified using the AO/OTA fracture classification. A review of the included patient's medical records was performed. Data were collected on the injury event, management and complications. Outcomes at 12 months were prospectively collected by telephone interview and included return to work, a numerical rating scale for assessment of pain and the Short Form 12 (SF-12).

Results: There were 98 unilateral tibial plafond fractures; 91 fractures were managed operatively, 4 non-operatively and 3 underwent amputation. The 91 operatively managed patients were the focus of this study. A two-stage management approach, involving temporary external fixation, followed by definitive open reduction and internal fixation, was the most common operative treatment. The follow-up rate at 12 months was 70%. 57% had returned to work by 12 months post-injury, the median (IQR) pain score was 2 (0–5) and 27% reported moderate to severe persistent pain. Mean PCS-12 scores were significantly lower than Australian norms ($p=0.99$), 38.2 for males and 37.5 for females.

Conclusions: The presence of persistent pain, loss of physical health and a low return to work rate highlights the profound impact of tibial plafond fractures on patients' lives. Although this study looked at the early 12 month results, it is expected these outcomes will continue to improve over time. Further studies, with larger patient numbers, must focus on how to improve not only the operative management of these fractures, but also patient's mental and overall physical health in the long term. Improved management techniques and early identification of injury patterns known to perform poorly may help long-term outcomes.

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Introduction

Tibial plafond fractures are associated with a high degree of morbidity. Frequently the soft tissue envelope surrounding the

distal tibia is severely compromised [1]. Many authors have identified complications and poor outcomes associated with tibial plafond fractures [1–9]. When the complications associated with tibial plafond fractures occur, they can be severe and lead to a prolonged treatment course and repeat hospitalizations [1].

Clinical outcomes such as ankle function, range of motion, clinical ankle scores and post-traumatic osteoarthritis have been the focus of many papers [7,9–14]. There is however a potentially

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significant financial and social burden placed on patients who sustain a tibial plafond fracture. Very little research has investigated the impact of tibial plafond fractures on patients' lives [12–14].

Deficiencies in the literature on tibial plafond fractures include studies on long-term clinical results and health related quality of life outcomes. The social and mental health impact associated with tibial plafond fractures and the predictors of these outcomes requires further investigation. Three papers have been published over the last 10 years focusing on these outcome measures by Marsh et al. and Pollak et al. in 2003 and Marsh et al. in 2010 [12–14]. These papers report on the North American experience, with many patients having been operatively managed with external fixation. This study focused on defining the Australian experience and represents a variety of operative management approaches. The aim of this study was to investigate the 12-month health-related quality of life, pain and return to work outcomes of patients with tibial plafond fractures.

Materials and methods

Study design

A retrospective observational cohort study was undertaken.

Participants

Ethics approval was granted for this project from the Alfred Health ethics committee, Melbourne Health ethics committee and Monash University Human Research Ethics Committee.

The Victorian Orthopaedic Trauma Outcomes Registry (VOTOR) captures information about orthopaedic trauma patients in Victoria using a sentinel site approach, with four hospitals included. VOTOR collects data about all adult patients with orthopaedic and/or spinal injuries admitted to these hospitals for >24 h [15]. Admissions to the two major adult trauma services in Victoria, The Alfred hospital and the Royal Melbourne Hospital, were included in this study.

Inclusion criteria

All patients captured by VOTOR with a tibial plafond fracture between September 2003 and July 2009, were identified consecutively and comprised the cohort. The International Classification of Disease – Edition 10 Australian Modification (ICD-10 AM) codes indicating a fracture of the distal tibia was used to identify cases from the VOTOR database. The ICD-10-AM codes used were S82.3 (Fracture lower end of tibia) and S82.31 [Other fracture of lower end of tibia with fracture of fibula (any part)]. There is no specific ICD-10 AM code for tibial plafond fractures.

There were 273 cases with a 'Fracture of the lower end of the tibia' (S82.3) and 123 cases with 'other fracture of the lower end of the tibia with fracture of the fibula' (S82.31). Of the 396 cases identified within the VOTOR database, 277 cases were from the two major adult trauma centres and were therefore to be considered for inclusion in this study. Patient radiographs of all these cases were reviewed by two orthopaedic surgeons. Where the two orthopaedic surgeons did not agree, a third orthopaedic surgeon reviewed the films. A consensus of two out of three orthopaedic surgeons was required to confirm the final recorded classification. The Muller AO (Arbeitsgemeinschaft für Osteosynthesefragen)/Orthopaedic Trauma Association (AO/OTA) classification system, code 43A/B/C was used [16].

Exclusion criteria

Distal tibial fracture cases not classified as tibial plafond fractures were excluded from the study. Pathological and *peri*-prosthetic fractures were excluded.

Procedures

Relevant data were extracted from the VOTOR database, and the medical records of the included cases. Specific information collected from the medical record review focussed on the injury event, fracture details including whether the fracture was open or closed and classified according to the Gustilo-Anderson classification system, management and complications [17]. A two-stage management approach, involving temporary external fixation, followed by definitive open reduction and internal fixation, was the most common operative treatment. For the purposes of statistical analysis, the definitive operative fracture management was defined as open reduction internal fixation (ORIF), limited open reduction and internal fixation (ORIF) with external fixation (EF) and limited open reduction and internal fixation with external fixation (EF) fine wire. The VOTOR prospectively collects post-discharge data using a standardised telephone interview at 6 and 12 months post-injury [15].

The 12-item Short Form Health Survey (SF-12) Version 1.0 is a reliable generic health status instrument that has been validated for use within the Australian population [18] and trauma patients [19]. It consists of a Physical Component Summary (PCS-12) score and a Mental Component Summary (MCS-12) score, which have a mean score of 50 and standard deviation of 10 for the Australian population [18]. Higher scores represent better physical and mental health. The Standardised Mean Difference (SMD) of both the MCS-12 and PCS-12 provides an additional method to compare with standardized age and gender norms for the Australian population, where a value of 0.8 or greater from the norm is considered to be large [20].

The patient reported outcomes included in the VOTOR telephone interview were:

- i SF-12
- ii Return to work (RTW)
- iii Pain, assessed using a Numerical Rating Scale (NRS) ranging from 0 (no pain at all) to 10 (worst possible pain) [18].

Data analysis

Summary statistics were used to describe the profile of participants and responder vs. non-responder analysis (for VOTOR data, defined as followed-up and lost to follow-up), their injuries, management and outcomes. For continuous variables, the mean and standard deviation (SD) were reported for normally distributed variables. Where the data were not normally distributed, the median and interquartile range (IQR) was used. Independent *t*-tests were used to compare the mean PCS-12 and MCS-12 scores with Australian population norms.

The key outcomes of interest for this study were:

- i SF-12 mental (MCS-12) and physical (PCS-12) component summary scores at 12-months post-injury
- ii Return to work at 12-months post-injury (if working prior to injury)
- iii Presence of moderate to severe persistent pain (NRS > 4) at 12-months

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