Epidemiology of open tibia fractures in a population-based database: update on current risk factors and clinical implications

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Abstract

Background. Open tibia fractures usually occur in high-energy mechanisms and are commonly associated with multiple traumas. The purposes of this study were to define the epidemiology of open tibia fractures in severely injured patients and to evaluate risk factors for major complications.

Methods. A cohort from a nationwide population-based prospective database was analyzed (TraumaRegister DGU®). Inclusion criteria were: (1) open or closed tibia fracture, (2) Injury Severity Score (ISS) ≥ 16 points, (3) age ≥ 16 years, and (4) survival until primary admission. According to the soft tissue status, patients were divided either in the closed (CTF) or into the open fracture (OTF) group. The OTF group was subdivided according to the Gustilo/Anderson classification. Demographic data, injury mechanisms, injury severity, surgical fracture management, hospital and ICU length of stay and systemic complications (e.g., multiple organ failure (MOF), sepsis, mortality) were collected and analyzed by SPSS (Version 23, IBM Inc., NY, USA).

Results. Out of 148,498 registered patients between 1/2002 and 12/2013, a total of 4,940 met the inclusion criteria (mean age 46.2 ± 19.4 years, ISS 30.4 ± 12.6 points). The CTF group included 2000 patients (40.5%), whereas 2940 patients (59.5%) sustained open tibia fractures (I*: 49.3%, II*: 27.5%, III*: 23.2%). High-energy trauma was the leading mechanism in case of open fractures. Despite comparable ISS and NISS values in patients with closed and open tibia fractures, open fractures were significantly associated with higher volume resuscitation (p < 0.001), more blood (p < 0.001), and mass transfusions (p = 0.006). While the rate of external fixation increased with the severity of soft tissue injury (37.6 to 76.5%), no major effect on mortality and other major complications was observed.

Conclusion. Open tibia fractures are common in multiple trauma patients and are therefore associated with increased resuscitation requirements, more surgical procedures and increased in-hospital length of stay. However, increased systemic complications are not observed if a soft tissue adapted surgical protocol is applied.

Keywords. Open long bone fracture · Tibia · Polytrauma · Complications · Trauma registry

Introduction

Tibia fractures represent the most common long bone fracture. Furthermore, a high number of these fractures are associated with open soft tissue injuries due to a limited soft tissue envelope [1–3].

Open fractures are considered as an orthopedic emergency even in isolated injuries. General management principles of these injuries include early antibiotic coverage, meticulous debridement and lavage, classification of the soft tissue injury, temporary or definitive skeletal stabilization and soft tissue coverage or reconstruction [4–8]. However, treatment of open fractures in multiple trauma patients