Injury, Int. J. Care Injured 48S3 (2017) S7–S11

Contents lists available at ScienceDirect

Injury

journal homepage: www. elsevier.com/locate/Injury

Outcome of distal tibia physeal fractures: a review of cases as related to risk factors

Fabio D'Angelo[a,*], Giuseppe Solarino[b], Davide Tanas[a], Alessia Zani[a], Paolo Cherubino[a], Biagio Moretti[b]

[a]Division of Orthopaedics and Traumatology, Department of Biotechnology and Life Sciences (DBSV), University of Insubria, Varese, Italy
[b]Department of Basic Medical Sciences, Neuroscience and Sense Organs, School of Medicine, University of Bari "Aldo Moro", Bari, Italy

KEYWORDS

Premature physeal closure
Distal tibia physeal fractures
Displacement

ABSTRACT

Introduction: The physeal fractures represent the 20–30% of all fractures of the child. The distal tibial physis is the third most frequently injured. The most important complication is the premature physeal closure (PPC). Aim of this study is to evaluate risk factors that can influence the outcome like fracture pattern, fracture displacement, mechanism of injury and treatment method.
Materials and Methods: The records of 46 patients treated for distal tibia physeal fractures between 2003 and 2013 were reviewed. Initial injury radiographs were categorized according to Salter-Harris and Dias-Tachdjian classifications and the initial and post-treatment fracture displacement was measured. Any complex fractures had preoperative CT for additional assessment. Three different types of treatment were compared: closed reduction and casting versus closed reduction and percutaneous pinning versus ORIF.
Results: There was significantly less residual displacement in patients who had ORIF versus those who had closed reduction and percutaneous Kirschner wires or plaster only. In fractures with an intact fibula, we found significantly less initial and residual displacement. The Dias-Tachdjian classification is significantly correlated with the displacement. Patients studied with CT show a less degree of post reduction displacement. At the final follow-up we found only one PPC as complication.
Conclusion: The physeal fractures are very common in children and the main goal is to avoid any complications. It is clear that the development of complications after distal tibial fractures is due to multiple contributing factors like skeletal maturity, severity of injury, fracture type, degree of comminution and displacement as well as adequacy of reduction. A premature physeal closure is the most common complication. The fibula fracture can play an important role in initial displacement. The presence of an intact fibula and a good anatomical reduction have a significant positive influence on fracture outcome.

© 2017 Elsevier Ltd. All rights reserved.

Introduction

The physeal fractures are typical of childhood and are the 20–30% of all fractures of the child. The distal tibial physis is the third most frequently injured physis and constitutes 11% of all physeal injuries [1–3]. The most important complication is the premature physeal closure (PPC). The incidence of PPC in distal tibia physeal fractures is from 2% to 43% [4–6]. Factors that influence PPC include fracture pattern, fracture displacement (initial and post reduction), number of manipulations, interposed periosteum, mechanism of injury and treatment method [2,7–9].

Aim of this study is to evaluate risk factors that can influence the outcome like fracture pattern, fracture displacement, mechanism of injury and treatment method.

Materials and methods

We retrospectively analyzed 46 patients with diagnosis of distal tibial physeal fracture from 2003 to 2013. Data recorded included gender, age and the external cause of injury.

Thirty-four patients (73.9%) were male and twelve (26.1%) females; the average age at the time of the trauma was 11 years (range 2–16 years). The peak incidence occurred at the age of 14 years for males and at the age of 12 for females. Twenty fractures were left-sided and twenty-six were right-sided.

The more common causes of injury were non-specific falls (45%), playing soccer (15%), motor vehicle accidents (12%), biking (8%), playing basketball (5%) and others (15%). There was a seasonal variation in the incidence of tibial fractures with peaks during summer months.

* Corresponding author at: Prof Fabio D'Angelo Division of Orthopaedics and Traumatology, Department of Biotechnology and Life Sciences (DBSV), University of Insubria, Viale Borri 57, 21100 Varese, Italy, Tel: +390332 278 824, Fax: +390332278825.
E-mail address: fabio.dangelo@uninsubria.it (F. D'Angelo).

0020-1383 / © 2017 Elsevier Ltd. All rights reserved.

Initial X-ray were categorized according to Salter-Harris (SH) [10] and Dias-Tachdjian (DT) [11,12] classifications. In respect to Salter-Harris' classification we recorded: 3 type I (6.5%), 30 type II (65.2%), 7 type III (15.2%), 6 type IV (13.0%); none was classified as type V.

According to Dias and Tachdjian's classification, based on the injured mechanism, we identified: 11 fracture in supination-inversion (23.9%), 10 in supination-plantar flexion (21.7%), 9 in supination-external rotation (19.6%), 14 in pronation-eversion-external rotation (30.4%), 1 Tillaux's fracture (2.2%) and 1 tri-planar fracture (2.2%). Fracture displacement was also recorded in millimeters, measuring the largest displacement between the epiphysis and metaphysis on the anteroposterior or lateral X-ray. The association with a concomitant fibula fracture was observed in 25 cases (54.3%). Two cases (4.3%) were open fractures. In 12 cases (26.1%) a CT study was made for additional assessment and better definition of the fracture lines in order to plan the correct treatment (Figure 1).

The methods of treatment were closed reduction and casting, closed reduction and percutaneous pinning or ORIF. Reduction was made if the displacement was greater than 2 mm for both intra-articular and extraarticular fractures. Closed treatment with cast was routinely performed under sedation in the operating room. Pinning treatment was adopted to maintain a closed reduction when fracture was unstable and therefore the risk of secondary displacement was considered high. Open reduction was performed if an adequate reduction could not be obtained. During open surgery, interposed periosteum was removed if necessary. In the post-operative period, all the patients follow the same protocol and were instructed to maintain non-weight-bearing and were secured in a long-leg cast for at least four weeks.

At follow-up evaluations, patients underwent anterior/posterior and lateral X-ray to check any complications such as premature or asymmetrical physeal closure, leg length difference, angular deformity and joint discrepancy. All the X-rays were evaluated by two observers not involved during surgery. The minimum follow up was 48 months.

We performed a statistical analysis of the value of displacement and the following factors: type of fracture according to SH and DT classifications, CT, fracture of fibula and type of treatment. The data were statistically analyzed using the R software with the Kruskal-Wallis test. The level of significance was set at $p < 0.05$. All the statistical analysis was performed by an observer not involved in the surgery.

Fig. 1. (A,B) X-ray of a SH IV type fracture; a fibula fracture is also present. (C,D) The CT is useful to better define the pattern of the fracture and to plan the treatment.

Download English Version:

https://daneshyari.com/en/article/5652546

Download Persian Version:

https://daneshyari.com/article/5652546

Daneshyari.com