Non-union of the Distal Tibia Due To Uncorrect Osteosynthesis. Management and Discussion

Rosario Spagnolo¹ and Fabrizio Pace²*
¹San Giovanni Bianco Hospital, ASST 43 Bergamo, Italy
²IRCCS Policlinico san donato, Milano, Italy

Abstract

Distal tibia fractures are 7–10% of all tibial fractures and they are caused both by high and low energy traumas with different fracture pattern. We present a case report of a 23 year old female affected by mental delay, who fall down in March 2014 reporting the fracture of the distal tibia. She has been operated in emergency with two elastic nails and a lag screw. Two months after she has been subjected to a second surgery for hardware removal and new fixation with medial LCP plate after fibular osteotomy. During the follow-up the fracture displaced in valgus malalignment and the patient arrived to the attention of the first author in June 2015. A new surgery was necessary to re-establish the correct axis of the leg, after hardware removal a new fibular osteotomy has been performed, the fracture has been fixed with lag screw and LCP plate and bone graft, Judet decortication and medullary canal opening were necessary to give biological stimuli for non-union healing. The possible causes of the non-union are analyzed, discussed and compared to literature. The correct indication for fracture fixation is mandatory to avoid complication which can lead to not acceptable malalignment and subsequently to revision surgery for the patient with more risks for the final result.

INTRODUCTION

Distal tibia and pilon fractures are 7–10% of all tibial fractures [1]; they are caused by high energy traumas. In these cases axial compression forces cause complex articular fractures with metaphisial impaction and bone loss. Low energy traumas, are caused by rotational forces with minimum axial load, with better prognosis [2,3]. Kellam and Waddel classification system [4] is based on pathogenetic criteria and it comprehends type A fractures in case of rotational forces, or B fractures in case of compression forces. Ruedl and Allgower [5] classification is based on comminution or displacement criteria.

Open reduction and internal fixation (ORIF), is affected by high complication rate due to the complexity of the periarticular lesion, bad vascularity, and lack of soft tissue envelope [6-8]. Intramedullary nail, if permitted by fracture pattern, reduces the risks of cutaneous and endosteal vascular lesions; however failures such as non union or mal union are possible [9-12]. This clinical case, describe a distal tibia fracture, classified as 42A3 according to AO’s classification and its evolution to mal-union.

CASE REPORT

A 23 year old female affected by mental delay, fall down in March 2014 reporting the fracture of the distal tibia. In emergency she has been operated and the fracture has been fixed with retrograde elastic intramedullary nails (Figure 1) and a cannulated lag screw. During the post-operative period a plaster cast has been used to protect the fracture site to prevent fragments composition, even if it was present since the first post-op x-ray. Two months after, it was decided to remove the intramedullary nails; an osteotomy of the fibula has been performed and the tibial fracture was fixed with a LCP medial plate and immobilized in a plaster cast. During the post-operative a progressive valgus malunion was evidenced (Figure 2) and pain during deambulation has been reported by the patient. In June 2015 the patient has been evaluated by the first author (R.S.) and it was performed a new surgery to correct the 20° valgus malunion. Time to fracture union, complication and outcomes were assessed with the American Orthopedic Foot and Ankle Society Ankle score at 12 months.

SURGICAL TECHNIQUE

The incision was performed on the old scar and surgery has been performed without using the tourniquet to evaluate bleeding and avoid vascular stress. A 1 cm subtraction fibular osteotomy was done, than the tibial hardware was removed. The bone was atrophic with low vascularity and a spvatuberosity harvesting was done; afterwards the medullary canal was opened with a 8 mm reamer to gain endosteal bleeding; decortication according to Judet has been done to favour periosteal bleeding. The fracture was fixed with a 3.5 mm lag screw and the correction of the deformity and osteotomy compression was checked with the image intensifier. The fracture stabilization was completed with a medial LCP plate with two proximal screws, two distal and one oblique screw (Figure 3). At the end of the procedure a lavage with rifampicine was done; the total time of surgery was 2 hours and the anti biotic prophilaxis has been prolonged for 3 days and EBPM administered for 4 weeks.

POSTOPERTIVE MANAGEMENT

The patient was discharged after one week and due to the lack of collaboration of the patient a femoro-podalic plaster cast was packaged and maintained for 40 days. Once the cast


*Corresponding author
Fabrizio Pace, IRCCS Policlinico san donato, Milano, Italy, Email: fabriziopacem@gmail.com
Submitted: 31 July 2017
Accepted: 28 August 2017
Published: 30 August 2017
ISSN: 2475-9112
Copyright © 2017 Pace et al.

OPEN ACCESS
was removed, physiotherapy for complete recovery of the joint motion was performed and deambulation with 10 Kg of weight bearing allowed. After 3 and 6 months the patient was evaluated clinically and with x-ray; a full weight bearing with complete range of motion was obtained and at 12 months the healing was completed (Figure 4) without malalignment; 1 cm of imposetria remains and was corrected with a 7 mm planter. The average American Orthopedic Foot and Ankle Society Ankle score at 12 months was 100.

DISCUSSION

Intramedullary nail is the golden standard for treatment of distal tibial fractures when compatible with the type of fracture; it reduces the risk of skin lesions and it respects biology of fracture and vascularization. With this technique non-union and mal-union has been reported [9-12]. Minimal invasive plate osteosynthesis can offer important biological advantages. Introduced by Helfet [13] in 1997 has developed in response to the attempt to reduce the complications that accompany traditional surgical techniques. As far as malalignment is concerned, it is more common when using intramedullary nail; Vallier et al. [9], examined 113 extra articular fractures treated in 67 cases with nail and in 37 cases with plates: mal-union was observed in 38% of the intramedullary cases and in 5,4% of plate group.

The difficulty of a proper alignment has also been reported with less invasive technique; malalignment more than 5° was reported in 20-35% of the cases. Pallister [14], Hazarika et al. [15], propose external fixation as the first surgical approach even in closed fractures, to achieve indirect fracture reduction and to protect soft tissues.

Faschingbauer [16], Kumar et al. [17], argue that the osteosynthesis of the fibula, as first surgical step, reduces the possibility of secondary malalignment. In the case described, the first synthesis chosen with the flexible nails technique and lag screw has led to the failure of osteosynthesis.

In the second surgery, the evolution to valgus malalignment is due to fibular osteotomy at the distal third, while an accurate calloclasia of the fibrous tissue and the stabilization with plate could have been the correct choice to gain fracture healing. The excessive number of screws causes too much stiffness of the system and consequently a low osteogenic stimulus.

The third surgery was resolutive, following the criteria for non-union treatment: fracture site reaming generated new bone and vascular ingrowth, Judet decortication gives peristoeal stimolous to new bone formation and compression osteosthisys with lag screw and plate stabilization permitted fracture healing. In post operative management, physiotherapy treatment must be scrupulous and with a dedicated physiotherapist, especially in poorly performing patients.

CONCLUSION

The case described shows an incorrect indication of the hardware in the first surgery; besides in revision osteostsisys with plate, fibular osteotomy and poor post-op management has led to severe axial defect and the need to a new surgery.

In conclusion, the indication of the synthesis must be respectful of the fracture pattern, and of the international indications and the experience of the orthopedic surgeon.

REFERENCES


Cite this article