

## Spontaneous Bone Regeneration after Traumatic Bone Loss in Young Patient: A Case Report

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### ABSTRACT

*Bone loss represents both clinical and technical challenge for orthopedic surgeons. There are several surgical options for the treatment of these patients, but currently no specific guidelines on the best management of these injuries are available.*

*We present the case of a young male patient (12 years old) diagnosed with an open distal tibial fracture with bone loss (about 8 centimeters), a closed distal fibula fracture and posterior tibial nerve and posterior tibial arterial injuries, due to a high energy road trauma. The orthopedic surgery team scheduled tissue debridement and nerve repair, followed by the positioning of a monoaxial external fixator. Surprisingly, an x-ray performed 30 days after the surgical treatment showed a spontaneous improvement in terms of bone regeneration. Orthopedic surgeons decided to have a “wait and see approach”. A clinical follow up was scheduled in the following months and, after a year, bone was completely regenerated.*

### Keywords

Bone regeneration, Tibial fractures, Orthopedic surgery, Fracture fixation, Case reports.

### Introduction

Management of bone loss is a big challenge in orthopedic surgery, representing a potential minefield for clinicians. Its management requires a careful clinical planning, a highly qualified technical approach and, not last, a lot of compliance by the patient. Segmental bone loss may occur following a high energy trauma. Tibia is the bone most frequently involved: the soft tissue covering its surface is very thin, making the bone susceptible to open fracture and bone extrusion [1]. These patients have a high risk of vascular and infectious complications, so careful treatment of these types of injuries is necessary. Nowadays, several surgical techniques are available, but no specific guidelines have been established [2,3]. We report the case of a young patient with tibial bone loss after a high energy road trauma, in whom spontaneous bone regeneration

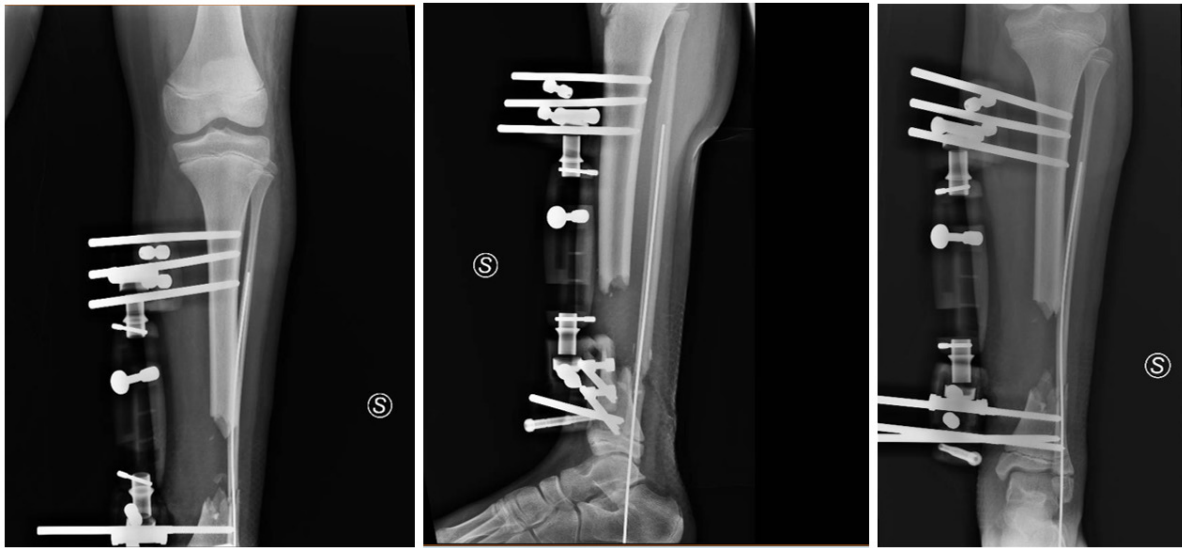
occurred, asking ourselves if a wait-and-see approach could be a weapon in the hands of surgeons in the treatment of this type of injury.

### Case Report

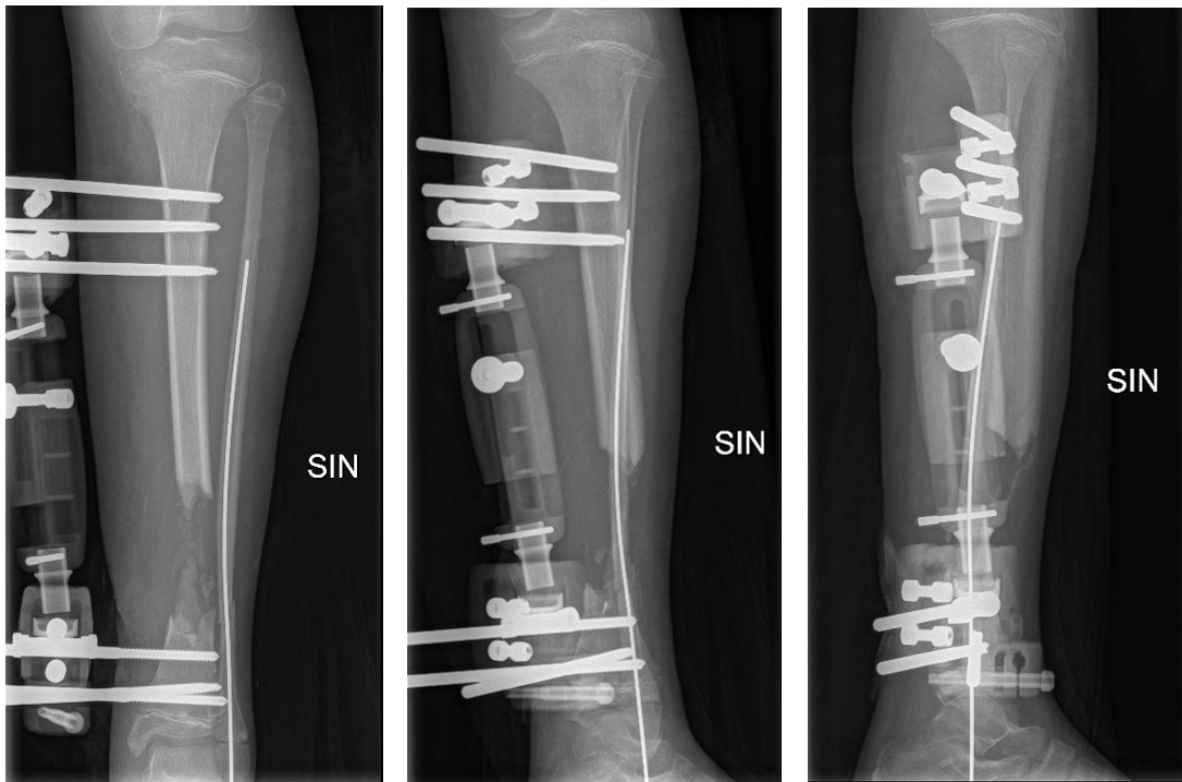
A 12 years-old male patient was admitted to our Emergency Department (ED) following a high energy road trauma. He arrived conscious (GCS 15) with stable vital signs. He presented an open fracture of the distal portion of left tibia with bone loss. Lacking bone was collected on the trauma scene, but it was highly contaminated, and it could not be used for bone replantation. Deep irrigation of the wound was performed immediately in the ED. Clinical history was collected, and blood lab tests were executed. Prompt antibiotic therapy was started. Whole-body computed tomography (CT) scan with contrast was performed, confirming the presence of a type III C Gustilo tibial fracture with bone loss (about 8 cm), highlighting a closed distal fibula fracture, with posterior tibial nerve and posterior tibial arterial injuries. Immediately, the patient was transferred to the operating room for wound

revision and debridement, nerve injury repair and positioning of monoaxial external fixator with 6 screws (3 in diaphyseal tibia and 3 in calcaneus) [Image 1]. At the same time the vascular surgeon repaired the posterior tibial arterial injury. The post-surgery period was uneventful. X-ray was performed after two weeks [Image 2] and thirty days [Image 3] from the traumatic event, the patient was re-evaluated, and complete wound healing was evident at physical examination. Surprisingly, diagnostic images showed initial spontaneous bone regeneration.

Orthopedic surgeons opted for a wait-and-see approach. Monthly x-rays and clinical check were scheduled and performed. Weight – bearing was not allowed for the first six months. Then, partial weight - bearing was permitted, keeping the external fixator. During the following months a constant augment of regenerated bone was observed. After 12 months, x- rays showed complete bone regeneration and the external fixator was removed [Image 4]. After two years, the patient had an excellent functional recovery [Image 5] and was satisfied with the clinical results.



**Image 1:** Immediately post orthopedic surgery (July 2019).



**Image 2:** Two weeks post surgery.

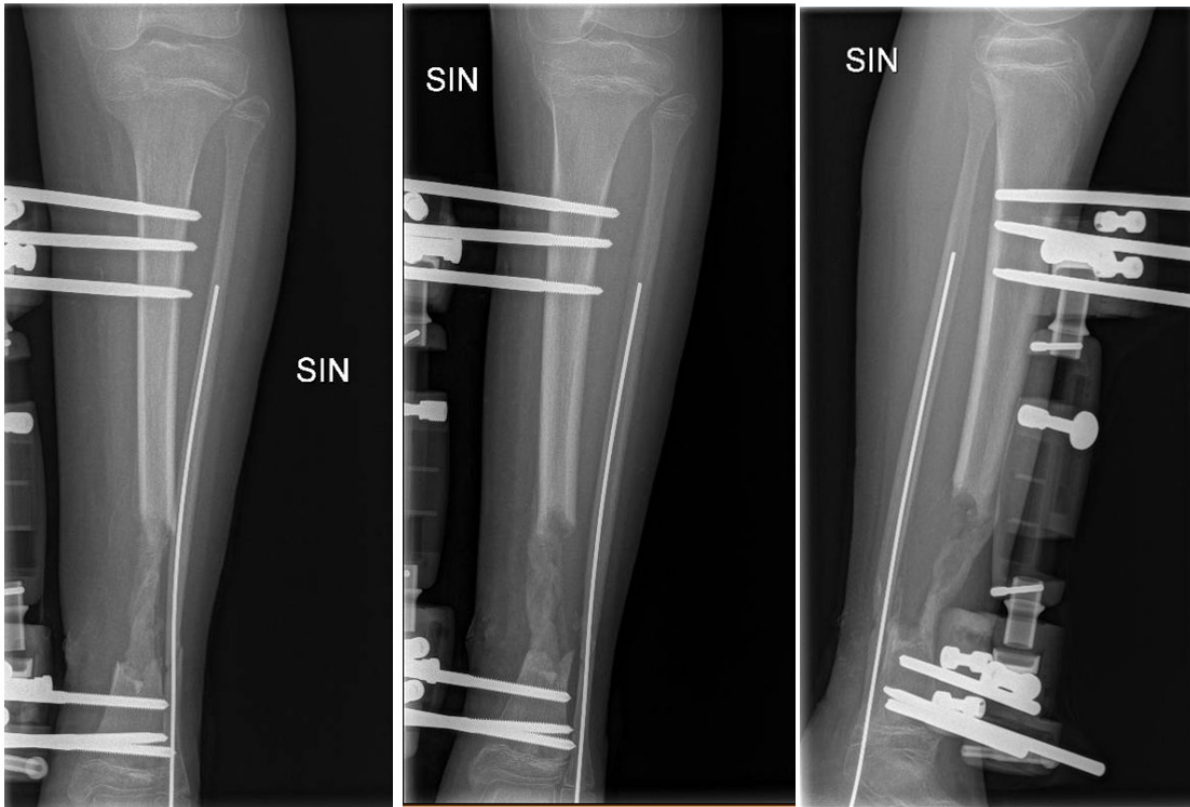


Image 3: A month post-surgery.

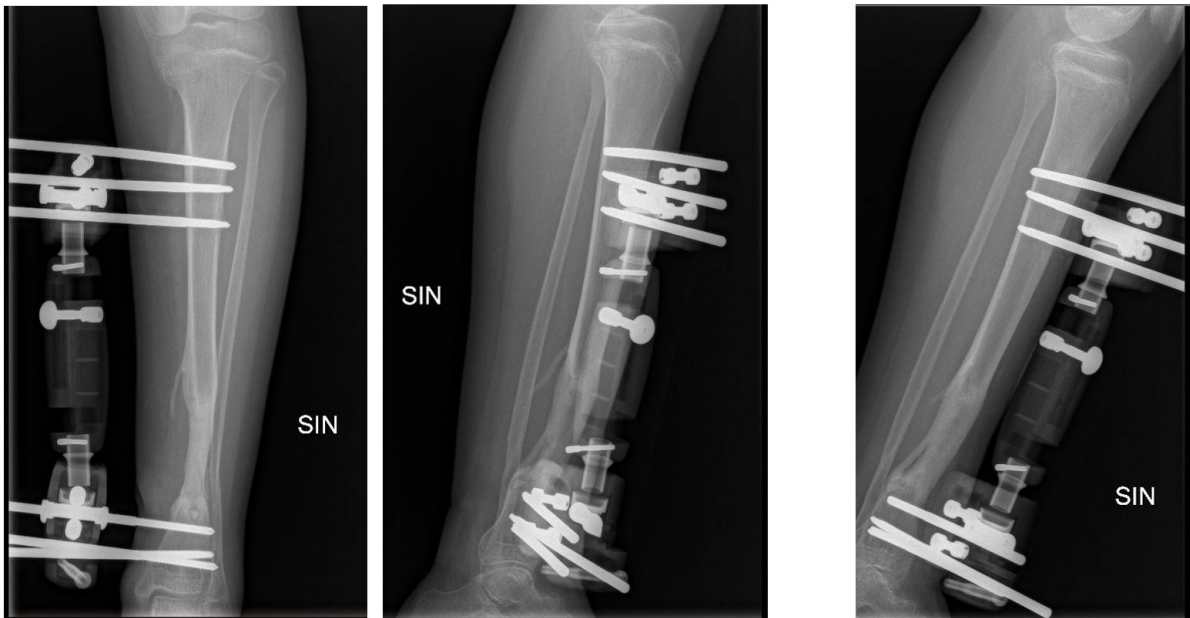


Image 4: A year post surgery.



**Image 5:** Two years post surgery.

## Discussion

Bone loss represents both clinical and technical challenge for orthopedic surgeons. Several surgical options for the treatment of these injuries exist [4,5,6] but, currently, no specific guideline on their best management is available. Currently, the surgical approach is recommended for adult patients and for young patients in the age of growth, with post-traumatic bone loss. Non-operative management may be indicated as a first therapeutic approach in young patients in whom skeletal maturity has not been reached. To apply safely a “wait and see approach”, it is recommended a close clinical monitoring to detect earlier complications.

We used a “wait and see approach” in our patient, encouraged by the radiological images acquired after primary surgery, hypothesizing the presence of residual periosteum which would have allowed complete bone regeneration. We showed that this conservative approach may be an alternative method for the treatment of these injuries, avoiding repeated surgery and, consequently, reducing the risk of complications, such as acute blood loss and surgical site infection [7,8] and permitting a full recovery of functional capability. Wait and see approach could be a good option in young patient.

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