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## Tibia malunion with angular deformity: Corrective osteotomy and intramedullary fixation

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### Abstract

Tibial malunions, which result in deformities such as shortening, lengthening, aberrant rotation, or angulation, are characterised by the healing of tibial fractures in an unacceptably abnormal alignment. These deformities can have adverse effects on patients, such as pain and gait disturbance, as well as long term development of post-traumatic arthritis. Treatment options included osteotomies, plate and screws, intramedullary nails, the Ilizarov fixator, and external fixators. As there are several surgical techniques to tibial malunion that have been proven to be effective in delivering great clinical results, surgical strategies should be tailored to each individual patient.

**Keywords:** Tibia, malunion, osteotomy, intramedullary nailing

### Introduction

#### Case Report

Mr. KN, a 17-year-old with a five-year history of left leg deformity, presented to us today. In 2017, he was engaged in a motor vehicle accident, which resulted in a fracture to his left tibia. He underwent closed reduction and casting followed by partial and full weight bearing subsequently. He subsequently failed to show up for the follow-up, though He asserts that, except from his bent leg, his ability to work as a labourer remained unaffected, and he was able to continue going about his everyday activities without any restrictions. He denied ever having a fever, discomfort, or leg sinus discharge in the past. On examination healed scar of 2x2 cm present over anteromedial aspect of his left ankle joint, with wasting of the calf muscle, with anterior lateral bowing and varus with shortening of 2 cms of left leg. No more callosities or irregularities may be seen along the plantar aspect of the metatarsal head. Additionally, the left distal third tibia and fibula both had clinically malunited fractures, and the leg's anterior lateral angulation measured 30 degrees on the goniometer. There was a 2 cm difference in limb length between the left and right. No distal neurovascular impairment existed in him. (Figure 1).



**Fig 1:** Pre-op clinical picture of left leg showing deformity

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**Fig 2:** PREOP x-ray of distal tibia with left ankle joint

The range of motion of his left knee was full. However, his left ankle's dorsiflexion was limited to 0 degrees, but its plantar flexion was complete. Despite all this, he can fully squat normally.

Anterior-posterior and lateral radiographs of the leg revealed anterior lateral angulated malunited fractures of the distal third of the tibia and fibula. (Figure 2).

**Preoperative planning for malalignment correction**

Angular deformity in frontal and sagittal plane was determined by standing face forward and lateral views, of the plain AP and lateral views radiographs of the tibia.

**Surgical Procedures**

The patient underwent a single-stage surgery to treat the deformity. The operation comprised fibula osteotomy [Fibulectomy] through a lateral longitudinal incision over the fibula, firstly k wires were passed above and below the deformity, later lateral closing wedge osteotomy at the tibia was done and osteoclasis of the tibial malunion through small antero-medial approach to the CORA. (Figure 3). The intraoperative findings were malunited tibia fracture with thick posterior and medial cortex, alignment achieved and the fibula was fixed with a Rush nail, later tibia closed reduction internal fixation by intramedullary nailing [9x320 mm] was done. Correction of deformity malalignment has been made. (Figure 4). Patient was advised Non weight bearing for 2 months. He was diagnosed with a superficial wound infection at two months during the follow-up period, and the lateral wound only had a small amount of serous discharge Intraoperatively, the infection appears to be low grade and superficial. We chose to keep the implant in place while using a suppressive antibiotic. After receiving an antibiotic, the condition was under control. His fracture healed after 5 month and he was able to continue his work as a labourer without limitation.



**Fig 3:** Intra-OP Images



**Fig 4:** Post OP X-ray of left tibia full length with ankle joint AP and lateral



Post-OP Correction of Malalignment

### Discussion

Chronic unease, contractures, early osteoarthritis, and aesthetically pleasing problems can all result from long bone malunion. Rotational osteotomies, opening or closing wedge osteotomies, or combinations of these are the mainstays of surgical therapy. Osteotomy of long bones to correct angular deformity is a time-honoured procedure although it may be a simple procedure, one of the main difficulties is the subsequent displacement of the bone fragments. There are two basic osteotomy types for angular deformity correction

1. Angulation-only osteotomies and 2. Angulation with translation osteotomies. Angulation only osteotomies may be opening wedge or closing wedge types. Angulation with translation osteotomies may be straight cut or circular cut (dome). Drawback of the open wedge osteotomy is that the gap that results may increase the likelihood of non-union and reoperation if the gap is filled with an avascular bone graft. The closed-wedge osteotomy, on the other hand, produces bone shortening. With multiplanar malunion, there is malalignment in the coronal, sagittal and transverse planes.

It is difficult to carry out the proper osteotomy and the following reduction and fixation, according to Blankevoort *et al.* [1].

When it comes to external fixation, the Ilizarov procedure is very effective in correcting deformities. However, this course of therapy causes quite a bit of discomfort for the patients, and it also has certain built-in issues with external fixation, such as pin track infection, joint infection, refracture, greater incidence of delayed union, non-union, and malunion, and pin breakage. Tendon Trans fixation; and vascular and nerve injury Kurtulmus [2].

Advances in operative treatment have provided the some required answer to the bony and soft tissue challenges of post traumatic lower limb deformities. There are two surgical options available: immediate surgical correction and fixation, often via distraction histogenesis by external fixation with corticotomy to achieve progressive correction. In some cases, amputation also ought to be as a mode of treatment if patient come with severe deformity and significant co-morbidities Dim *et al.* [3]. Osteotomies have advanced from uniplanar

opening and closing wedges, which could correct some angular deformity in a single plane to being able to correct multiplanar deformities.

In the study by Daolagupu AK, *et al.* [4], observed that complication delayed union, malalignment, knee, and ankle stiffness. However, a higher rate of infection which was found in plating patients. C Mauffrey [5] in their study observed similar complication rate, but a higher re-operation rate with plating. In a Cohort study done by Barcak, *et al.* [6], 86 patients treated with either Plating or Intramedullary nailing were compared clinically and radio graphically. Complications including malalignment, non-union and infection rates were also similar between the two groups. In addition, individuals with a concomitant rotational or angulated malunion are even more prone to suffer ipsilateral ankle osteoarthritis because of their altered biomechanics and the resulting altered joint surface contact.

Radiologically accepted parameters of malunion of the tibia are greater than 5-10 degree angulation, 1-2 cm shortening, 10-15 degree IR and 10-20 degree ER. A patient that has deformity that is significantly larger than these parameters will likely be symptomatic.

The osteotomy approach combined with an intramedullary device allowed us to treat tibia mal-union while maintaining a biological stimulus to the bone and restoring mechanical alignment, creating the ideal environment for fracture repair without the need of bone grafts However, the possibility of wound disintegration and superficial infection must be taken into account because of the tibia's thin soft tissue surround. Consider using this surgical procedure as one of your options for treating distal third tibia mal-union. Van der Schoot *et al.* and Tarr *et al.* reported that angular deformity significantly increased the likelihood of a patient experiencing ipsilateral knee and ankle degenerative changes and osteoarthritis [7, 8]. Tarr *et al.* found that more distal deformities led to more unequal contact of the tibiotalar joint, which is likely to lead to uneven wear and ultimately arthritis [8].

### References

1. Blankevoort L, Streekstra GJ, Dobbe JGG, Pre KJ, Kloen P. Computer-assisted oblique single-cut rotation osteotomy to reduce a multidirectional tibia deformity: case report. *Strategies in Trauma and Limb Reconstruction*. 2017;12(2):115-120.
2. Kurtulmus T. A novel intramedullary nail for use in the treatment of supramalleolar malunion and non-union: A preliminary report of three cases. *Acta Orthopaedica Et Traumatologica Turcica*. 2016;50(5):6-11.
3. Dim EM, Itie JC, Inyang UC, Nwashindi A, Ugbeye ME, *et al.* CA SE REP ORT Post traumatic anterior angulation of the distal tibia following malunion: A case report of management in a resource constrained setting. *Asian Journal of Medical Sciences*. 2015;6(1):108-111.
4. Daolagupu AK, Mudgal A, Agarwala V, Dutta KK. A comparative study of intramedullary interlocking nailing and minimally invasive plate osteosynthesis in extra articular distal tibial fractures. *Indian J Orthop* 2017;51:292-8.
5. Mauffrey C, McGuinness K, Parsons N, Achten J, Costa ML. A randomised pilot trial of "Locking Plate" fixation versus intramedullary nailing for extra-articular fractures of the distal tibia. *The Journal of bone and Joint Surgery British*. 2012;94(5):704-8.
6. Barcak E, Collinge CA. Metaphyseal Distal Tibia Fractures: A Cohort, single-surgeon study comparing

- outcomes of patients treated with minimally invasive plating versus intramedullary nailing. *Journal of orthopaedic trauma*. 2016;30(5):e169-74.
7. van der Schoot DK, Outer AJD, Bode PJ, Obermann WR, Van Vugt AB. Degenerative changes at the knee and ankle related to malunion of tibial fractures. 15-year follow-up of 88 patients. *J. Bone Jt. Surg. Br.* 1996;78:722-725. [Google Scholar], [CrossRef]
  8. Tarr RR, Resnick CT, Wagner KS, Sarmiento A. Changes in tibiotalar joint contact areas following experimentally induced tibial angular deformities. *Clin. Orthop. Relat. Res.* 1985;199:72-80. [Google Scholar], [CrossRef]

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