

Early microsurgical reconstruction in Gustilo Type III B fracture of Distal Tibia. A case report

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ABSTRACT

Introduction Gustillo Anderson Type IIIB is injury involving high intensity, extensive periosteal stripping and require soft tissue coverage. It is associated with high morbidity and long hospital stay. Early management of fracture and soft tissue defect results in lower morbidity and shorter hospital stay. We present a case of 43-year male who successfully underwent definitive fixation of fracture and soft issue coverage within 72 hours of injury with free latissimus dorsi flap.

INTRODUCTION

Gustilo's classification of open fractures is widely used, Type I and II categorize the wound less than 1 cm with minimal contamination or muscle damage, and 1-10 cm with moderate soft tissue injury respectively. Type III A refers to a wound more than 10 cm with high energy extensive soft tissue damage, contaminated but with adequate tissue for flap coverage, and Type III B involves extensive periosteal stripping and wound requiring soft tissue coverage. Type III C includes vascular injury requiring repair regardless of the degree of soft tissue injury.¹

Gustilo I to III A fractures can be successfully treated with early wound debridement, internal fixation, and wound closure, whereas Gustilo III B and III C fractures require complex soft-tissue coverage, and are associated with complications such as infection, non-union, eventual amputation, prolonged hospitalization, time lost from work, and strain on financial resources.² The unique anatomy of tibia with its associated soft tissues and their vulnerability to injuries give ground to develop most of these problems therefore giving rise to a treatment challenge.³

CASE SUMMARY

A 43-year-old male from Pokhara, with an alleged history of a road traffic accident (RTA) that occurred 3 hours prior was rushed to the Emergency department, with an impact over the left leg and an open wound with active bleeding over the left ankle and leg.

On regional examination, a wound of 12 x 9 cm size with contamination and degloved soft tissue was present on the medial and posterior aspect of the left ankle and leg. The posterior tibial artery and dorsalis pedis artery were palpable.

X-ray of the left leg was ordered revealing left tibial pilon fracture. Immediate resuscitation and wound debridement was performed on the same day. On the third day of admission, after a joint decision from the orthopedics and plastic surgery specialty, definitive fixation of the fracture by minimally invasive technique (MIPPO) along with microsurgical reconstruction with myocutaneous latissimus dorsi free flap was performed. The flap size of 14×11.5×5 cm was designed and harvested by mid-axillary

incision. Donor vessels were thoracodorsal artery and vein while the recipient vessel was posterior-tibial artery and venous comitante repaired with 10-0 nylon.

The postoperative period was uneventful. On the 14th Postoperative day, the patient was discharged with advice of ambulation with crutches and physiotherapy. The patient was kept on regular follow up. After 2 weeks, the back slab was discontinued and on the 4th week gradual weight bearing was started.



Fig 1 Wound over medial malleolus after fracture fixation with exposed implant.



Fig 2 Post microsurgical reconstruction with myocutaneous latissimus dorsi free flap.



Fig 3 Demonstrating the range of motion of plantar flexion of 40 degrees and Dorsi flexion of 10 degrees by 12th postoperative week.

DISCUSSION

A severe, open fracture is the result of high impact injury, and the resulting wound is usually contaminated, therefore may threaten the survival of the injured leg.³ The overall amputation rate in open tibia fractures during the index hospitalization is 2.2% (n=3769) and rate of amputation varied based on fracture site, associated neuromuscular injury, medical co-morbidities, and hospital location.⁴ Thorough debridement of soft tissue and early skeletal stabilization and soft tissue coverage are the mainstay of the initial treatment with appropriate antibiotics and tetanus prophylaxis. This provided better bone union, infection rate, early mobilization and return to work.^{2,5} Delay in soft tissue reconstruction leads to additional loss of soft tissue and bone.⁶ With the development of biological techniques in plate fixation and the design of implants which has least possible interference with the periosteal blood supply, the use of plates and screws for stabilization of open tibial fractures has been enhanced and can be achieved with minimally invasive percutaneous plate osteosynthesis (MIPPO) rather than external fixation which is associated with chronic pin site infection and malunion.^{3,5} Similarly, primary MIPPO group has a significantly lower infection rate than the staged MIPPO group. The treatment of very severe open fracture of tibia injuries by an aggressive combined orthopedic and plastic surgery approach provides good results; immediate internal fixation and healthy soft-tissue cover with a muscle flap is safe. Indeed, delay in cover (>72 hours) is associated with most of the complications.³

The general rule of thumb in managing leg soft tissue injuries recommends the pedicled gastrocnemius for proximal third leg defects, the soleus for middle third defects, and free flaps for distal third defects.⁷ Using Free flaps provide additional advantage of infection prevention, restoration of function, better aesthetic outcome in lower limb reconstruction and usually indicated in complex, large surface area wound.⁵ There are many free flap options, however there are few workhorse flaps used frequently. Most commonly used ones are the anterolateral thigh flap, radial artery forearm free flap, latissimus dorsi flap, and gracilis muscle flap

with each of them having distinct advantages and disadvantages over the another.⁸ Watson et al. introduced the first free microvascular transfer of the latissimus muscle which obtains its blood supply from thoracodorsal artery, as well as from perforator from branches of posterior intercostal arteries.⁹ The major advantage of the latissimus as a lower extremity free flap is its versatility, it can also be combined with other flaps and shaped to any size or shape along with having robust vasculature, loss of latissimus dorsi results in minimal functional deficit (7%).¹⁰

A severe open fracture results from high-energy injury such as road traffic accident, fall injury, gunshot injury and burn. Early definitive fixation of fracture followed by microsurgical reconstruction with myocutaneous latissimus dorsi free flap is a very well established management for Gustilo Anderson type IIIB fracture of distal tibia but is not commonly practiced in all the centers in Nepal. A joint effort from the department of orthopedics and plastic surgery at Pokhara Academy of Health Sciences, a tertiary center of Gandaki Province (for the first time) Pokhara resulted in early recovery with functional preservation and decreased duration of hospital stay. This created a positive outcome reflecting the importance of timely debridement, broad-spectrum antibiotics use, aggressive fix and flap microsurgical reconstruction and early soft-tissue cover. And, joint efforts involving inter-departmental approach should be followed for the better outcome of the patients wherever possible.

CONCLUSION

Gustilo Anderson Type IIIB fracture of distal third tibia is major challenge to both orthopedic and plastic surgery team. Early Debridement, bone fixation and soft tissue coverage with latissimus dorsi free flap can be safely performed to achieve early wound coverage, decreased infection rate, early mobilization and better bone union.

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