

## Approach to Multiple Injuries of Foot and Ankle (Single stage procedure for lisfranc injury, pan metatarsal fractures with distal tibia fracture and medial malleolus fracture): A rare case report

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### ABSTRACT

#### Objectives:

- Outlines the necessity of early diagnosing and management of lisfranc injury and metatarsal fracture to avoid chronic instability.
- Advantages of plate fixation for (proximal) fifth metatarsal fracture in addition to k-wire.
- To assessing the functional outcome and duration of union using MIPPO technique in the management of distal third tibia fracture.

#### Materials and Methods:

**Case Report:** We report a case of 32 year old man presenting with multiple injuries to foot and ankle diagnosed as comminuted distal third tibia fracture (with medial malleolus fracture) with panmetatarsal fracture with lifranc dislocation of right lower limb. A single stage procedure done for fixation of all these injuries.

**Result;** The patient follow up for one year, mean duration union of all fractures noted radiologically by 11±2 weeks. Patient allowed to weight bear after 3 months, Functional range of motion improved from the end of 3 months to 8 months. Prospective functional evaluation of this patient assessed by American orthopaedic foot and ankle society score (AOFAS) 96/100 at the end of 6 months and Pain relief is evaluated periodically by visual analogue scale.

**Conclusion:** Best results are obtained by immediate anatomical reduction and fixation of lisfranc injuries. In addition to k-wire, plate fixation for fifth metatarsal provides alignment with high union rate, especially when the fracture is comminuted. MIPPO technique is reliable fixation in fracture of distal tibia preserving most osseous (periosteal) blood supply and haematoma in fracture site and in turn provides more biological repair.

**Keywords:** Lisfranc injury, pan metatarsal fracture, MIPPO, fifth metatarsal fracture

### BACKGROUND AND INTRODUCTION

Forefoot with midfoot (complex) injuries of foot with lisfranc dislocation is relatively uncommon, but it can lead to chronic disability. Lisfranc injuries occur in 1:55000 persons per year in US approximately 0.2% of all fracture<sup>[1]</sup>. Metatarsal fracture contributes 3 to 7% of all fractures, MIPPO techniques for distal tibia fracture using LCP is an improving technique than the already existing. Subtle changes in radiographs represents significant ligament injuries. Swelling in the midfoot with the presence of plantar ecchymosis should be

considered as Lisfranc injury. Forefoot provides two important purposes during gait. Broad plantar surface for sharing load and its mobility allows head of metatarsals to accommodate uneven ground [2]. It is very tough to correct displacement in sagittal plane and excessive shortening in any metatarsals, resulting in metatarsalgia [3]. The aim of this study to analysis the results and functional outcome of single stage surgical procedures for this rare multiple injury to foot and ankle.

## MATERIALS AND METHODS

### CASE REPORT

A 32 year old man had admitted in the emergency ward, Rajah Muthiah Medical College Hospital, Chidambaram on 17/6/2020 with alleged history of fall from height (from tree approximately around 8 feet) had sustained injury to right lower limb with swelling, deformity and abnormal mobility of right ankle, mid and forefoot, presented with plantar ecchymosis, necessary radiographs taken and diagnosed as comminuted distal one third tibia fracture (with medial malleolus fracture) with pan metatarsal fracture with Lisfranc dislocation of right lower limb. We wait until the edema regresses for surgery for two weeks, in order to reduce the risk of developing compartment syndrome.

A single stage procedure done for all these complex injuries by fixing the distal tibia fracture and medial malleolus fracture by distal tibia locking plate. Lisfranc dislocation fixed with 4mm CC screws from medial side of medial cuneiform towards the base of second metatarsal, base of first metatarsal fixed with mini (2.7 system) L plate, second to fifth metatarsal fracture fixed with k-wire, fifth metatarsal found highly comminuted so augment with 3.5 system recon plate, patient discharged after one week with short leg cast with window, advised with strict non weight bearing. Serial radiographs were taken, look for evidence of callus formation, union, sagittal and coronal plane angulation of metatarsal fracture.

### RESULTS

After 8 weeks of surgery, x-ray foot shows callus formation, we removed the k-wires and patient allowed to weight bear after 3 months. Prospective evaluation of outcomes through American orthopaedic foot and ankle society score (AOFAS) at the end of 6months (approx 96/100). Pain is evaluated periodically by VAS. Duration of union for all fractures 11+\_2 weeks. Functional range of motion improved from the end of 3 months to 8 months. There is no complication like superficial or deep infection, ankle stiffness, hardware irritation, malleolar skin irritation or foot paresthesia.

### Pre op x-rays



**Pre op Images**



**Post op X-Ray**



**Follow up x-ray at 1year**



### Clinical images



### DISCUSSION:

The injuries to the tarsometatarsal joint are rather infrequent, but causes severe pain and permanent disability because of their location and high demand when standing and walking<sup>[4,5,6,7]</sup>. Occasionally present as less radiological significance, but injury to Lisfranc ligament produces different degree of dislocation and radiographic diastasis, both of which bring about severe disability<sup>[8,6,9,10,11,12]</sup>. Longer the period of delay the lower the functional outcome. People with associated injuries chiefly in lower limb also present a more unfavourable prognosis due to long period of immobilisation<sup>[10]</sup>, non weight bearing and longer rehabilitation delay, the important prognostic factor is proportional to attaining anatomical reduction. Adequate anatomic reduction obtain a high score in AOFAS functional scale and present a low prevalence of post traumatic arthritis<sup>[13]</sup>. To achieve this aim we perform surgical procedure with open reduction and internal fixation with 2.7 system mini plate and 4 mm cannulated cancellous screw for fixing Lisfranc injury. Osteoarthritis occurs even in patients with anatomic reduction and more common among in those were reduction not attained.

Anatomic reduction with respect to Lisfranc fracture dislocation 2 mm for Meyerson<sup>[14,15]</sup> and 1.5 mm for Hardcastle. Though it has been widely agreed that a diastasis of over 5 mm in between first and second metatarsals associated with sinking plantar arches bring about unfavourable outcome, we obtained the most favourable functional results in this case anatomical reduction obtained through open method and screw placement.

Management of distal tibia pilon fracture remains debate due to the limiting factors like sparse covering with soft tissues, subcutaneous on location and with decreased blood supply<sup>[16,17,18]</sup>. The cross sectional area of distal tibia is circular with thin cortex when compared to triangular in diaphysis with thick cortical bone. So, IMIL nail designed for diaphysis cannot give same and adequate stability to distal fractures. Other potential adverse outcome of IMIL nailing like malunion and implant failure can occur. ORIF with conventional plating needs stripping of periosteum, it is not ideal for subcutaneous bone which depends 2/3<sup>rd</sup> of its blood supply from periosteum. Non union and infection are reported with ORIF with emerging of technique of MIPPO with LCP which preserve extra osseous blood supply, respect the osteogenic fracture haematoma. Biological friendly and stable fixation method is available for distal tibia fracture. Indirect reduction method and subcutaneous tunneling of plate and application of locking screws, with small skin incision in MIPPO technique prevent iatrogenic injury to vascular supply. LCP is a friction independent self stable construct which provide both angular and axial stability and minimize the risk of secondary loss of reduction<sup>[19]</sup>.

Fixation of pan metatarsal fracture anatomically is very important to maintain the plantar arches and prevent the complication like flat foot, metatarsalgia etc, fracture of fifth metatarsal fracture compose of 70% of all metatarsals fracture<sup>[20]</sup>, 80% of which are proximal the main complication of casting is nonunion, but there are other sequelae need to be considered such as refracture, joint stiffness and muscular atrophy.

In this study that plate fixation can be best used for proximal, displaced, multifragmentary fracture of fifth metatarsal fracture for achieving anatomical reduction and stable fixation provides high union rate<sup>[21]</sup>. Care should be taken to avoid injury to sural nerve.

## CONCLUSION

- Best results are obtained by immediate anatomical reduction and fixation of Lisfranc injuries.
- In addition to K-wire, plate fixation for fifth metatarsal provides alignment with high union rate, especially when the fracture is comminuted.
- MIPPO technique is reliable fixation in fracture of distal tibia preserving most osseous (periosteal) blood supply and haematoma in fracture site and turns provides more biological repair.

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