

# Outcome after Fluoroscopic Guided Closed Reduction and Percutaneous Kirschner Wire Fixation of Lisfranc Joint Injuries

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## Abstract

Twenty patients of Lisfranc joint injuries managed by fluoroscopic guided closed reduction and percutaneous K-Wire fixation were evaluated for functional results with average follow up of 24 months. Males were 80% of total cases and road traffic accident represented cause of injury in 55% cases rest being due to fall. Majority of injuries were type B as per Myersons classification.

The average AOFAS-M score was 78 with 80% patients returning to their original occupation.

Early fluoroscopic guided closed reduction and K-Wire stabilization of Lisfranc injuries is effective easy and reliable method of Lisfranc joint injury treatment with no secondary surgical procedure needed for implant removal and no cosmetic problem of scar formation

**Keywords:** Lisfranc fracture dislocation; Tarsometatarsal joint injuries; Closed reduction; Percutaneous pinning

## Introduction

The tarsometatarsal joint injuries are also named as Lisfranc joint injuries after Jacques Lisfranc, a surgeon in Napoleon's army described an amputation through the joint for gangrenous injuries of the forefoot [1]. Fracture dislocations of the Lisfranc (tarsometatarsal) joints of foot are uncommon but serious injuries, with high potential for chronic disability. These injuries can easily be missed in the emergency department as radiographs may show only subtle incongruity of the joint [2] (Figures 1 and 2).

The satisfactory outcome of fracture dislocation of tarsometatarsal joints depend on early accurate diagnosis with prompt anatomic reduction, and stable internal fixation [3]. Thorough understanding of mechanism of injury combined with advances in technology, various options for surgical management range from percutaneous Kirschner wire (K-wire) fixations to primary arthrodesis. Several implants currently being utilized for fixation of these injuries include K-wires, screws, plates and suture anchors. Although the current trend for management of these fractures is towards open reduction and screw/Kirschner wire fixation [4,5]. Closed reduction and percutaneous Kirschner wire fixation has been reported in literature with acceptable outcomes [6,7].

The purpose of this study was to evaluate the functional outcome of patients with Lisfranc joint injuries treated with fluoroscopically guided closed reduction and internal fixation with Kirschner wires within 24 hours of injury.

## Materials and Methods

We performed a consecutive study of 20 patients with tarsometatarsal joint injuries at our hospital commencing in 2012 after approval of C-Arm for our emergency operation theatre. An informed consent was taken from each patient. Only those patients were included in this study that presented less than 24 hours of injury and were aged between 18 years and 50 years. The patients who were excluded from study included patients with open injuries, patients presenting more than 24 hours of injury, severe swollen feet requiring fasciotomies, difficult cases needing open reduction and polytrauma patients. All patients were evaluated by radiographs which included anteroposterior, oblique and lateral view of both feet and the injuries were classified as per Myerson's classification [8].

## Surgical Technique

After appropriate anesthesia and draping closed reduction was achieved by holding fore foot and metatarsals and applying traction with assistant holding ankle/distal leg for countertraction. Valgus or varus manipulation was done for proper reduction of fracture along with dorsoplantar manipulation each guided by initial radiograph and subsequent fluoroscopic images. When satisfactory reduction in anteroposterior, lateral and oblique was confirmed kirschner wires were introduced percutaneously to hold the reduction. Main focus was laid on second metatarsal cuneiform and first metatarsal, second cuneiform bones and the third metatarsocuneiform joint. The second metatarsal was reduced to the medial border of middle cuneiform; the joints were fixed with kirschner wires. The fourth and fifth metatarsals usually reduced once the above three reductions were achieved and were held with one or two transarticular K-wires from the base of 5th metatarsal to the cuboid. After satisfactory reduction and kirschner wire fixation pin site antiseptic dressing was done. A posterior plaster of Paris splint was applied in all caeses, which was converted to short leg cast after one week to avoid any cast complication that may arise due to postoperative swelling. K-wires were removed at 8 weeks. Full weight bearing was allowed at 10-12 weeks (Figures 3 and 4).

## Results

Most patients (70%, n=14) were in age group of 18-35 years with a mean 33.2 years. Males (80%, n=16) outnumbered females (20% n=4). Both right and left foot were almost equally involved. Cause of injury were road traffic accidents in 55% cases (n=11), fall from height in 45% (n=9). Metatarsal fracture was the most common associated injury (30%,

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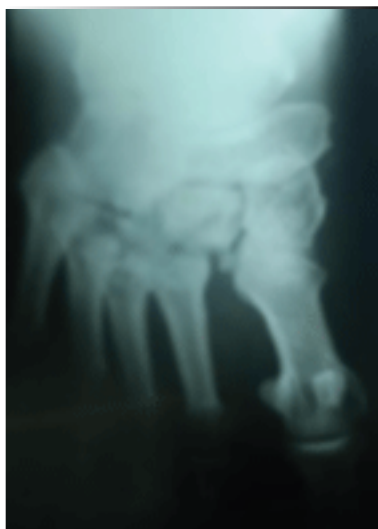


Figure 1: Preoperative radiograph.

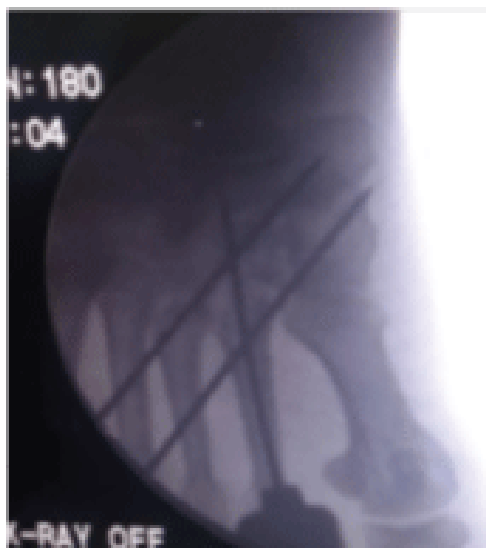


Figure 2: Fluoroscopic assisted reduction and fixation.

n=6). The injuries were classified by Myerson's classification [8]. The majority of injuries (60%, n=12) were type B followed by type A (30%, n=6). All the operations were performed within 24 hours of injury; with follow up from 9 months to 34 months with 12 (60%) having final follow up of more than 22 months. Anatomical reduction was obtained in 19 patients (95%). There was one case of loss of reduction and two cases of superficial pin site infection in our series both of them responded to oral antibiotics. There was no case of compartment syndrome of any foot in our series. Good to fair results were seen in 90% cases (n=18). The mean AOFAS-M (American Orthopaedic Foot and Ankle Society Midfoot) score in our study was 78 with most patients perceiving mild chronic pain and decreased recreational activities. Eighty percent of patients were able to return to their original occupation, including 10 household or office workers and six laborers.

## Discussion

Lisfranc injuries usually result from high-energy injuries, in our

study motor vehicular accidents were the most common cause of injury, a finding consistent with the already available literature. Anatomic reduction and internal fixation has become standard principle governing treatment of tarsometatarsal fracture dislocations. Most authors agree stable anatomic reduction leads to optimal results [9]. Controversy continues for method of fixation in Lisfranc joint injuries with proponents of both K-wire fixation [10,11], and screw fixation [9,12]. In our study the age ranged from 18-50 years with average age of 33 years. In Goossens et al study [13], age groups ranged from 10-52 years with mean of 34 while as reported in Pereira et al [14], age group ranged from 17-50 years with mean of 31.53. The mean age group in our study was close to the study of Goossens et al. [13]. Males outnumbered females in our study with ratio of 4:1 while as in Hesp et al. [15], the male to female ratio was 2.3:1. The reason for higher male to female ratio in our study may be due to the fact that most of females in our part of world are household workers. Both right and left feet were equally involved in our study (Figures 5 and 6).

The mode of injury was road traffic accidents (RTA) in majority of patients (55%) followed by fall from height which was consistent with



Figure 3: Percutaneous K-wire fixation.

Hardcastle et al [8], 40.3% RTA and Kuo et al. [16], with RTA 42%. In our study most of the Lisfranc injuries (60%) were type Myerson type B followed by type A (30%). In Enríquez et al. [17] series type B injuries were most common Lisfranc injuries (50%), while as in Pereira et al series [14], type B Lisfranc joint injuries constituted 80.94 percent of Lisfranc fracture dislocations. Metatarsal fractures were the most common associated injury in our study in 30% cases. In Goossens et al., series [13] metatarsal injuries were also the most common associated injuries (40%).

The mean duration of hospital stay in our series was three days. K-wire were removed at mean of 8 weeks in our study while as in Kuo et al. [16] K-wires were removed at 6-8 weeks. Complication in our study included loss of reduction in one case and two cases of superficial pin site infection. Both cases occurred within one week of surgery and responded well to antibiotics and daily dressings. The percentage of loss of reduction with K-wires was less in our series as we immobilized the foot for longer duration in short leg cast (average 8 weeks). Molded arch support was given to patients after three months, which was discarded

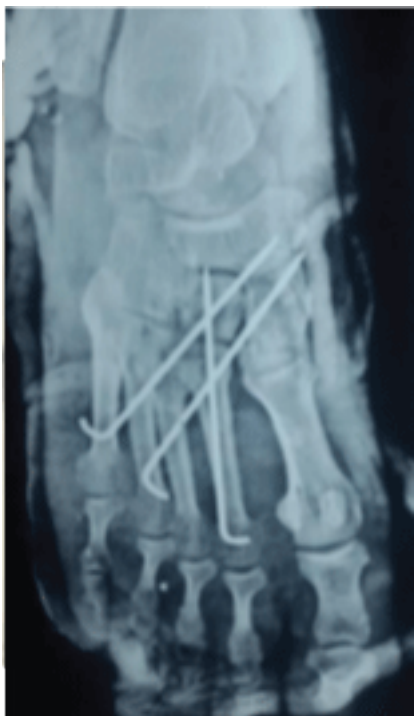


Figure 4: Postoperative antero-posterior radiograph.



Figure 6: Final lateral foot radiographs

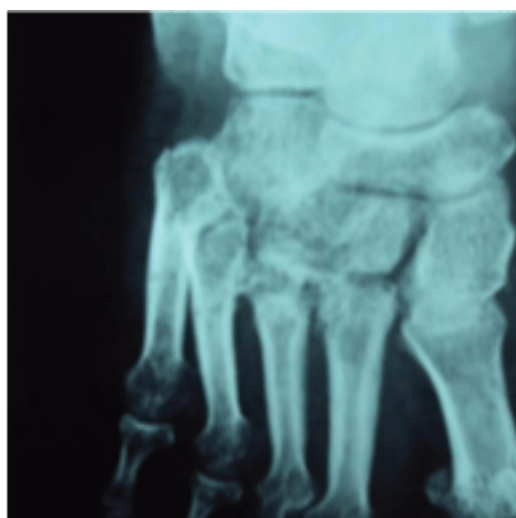


Figure 5: Final antero-posterior radiograph

at 6 months in 70% cases while as 30% cases felt its need up to one year. Good to fair results were seen in 90% cases as per scale used by Pereira et al. [14], with average AOFAS score 78, most of our patients

lost points to pain and decreased recreational activities.

We believe that early closed reduction and K-wire fixation considerably improves the functional outcome in these injuries. There is an added advantage that there is no scar related discomfort and cosmetic concern and no second surgery for removal of hardware is required. The disadvantage is that this method needs longer period of immobilization in a cast and chances of less precise anatomical reduction of Lisfranc joint. The limitation of our study is that there was no control group so that we could compare our results.

Further studies with large sample size and comparative studies are needed for definitive conclusions.

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