



Outcome after early open reduction and Kirschner wire fixation of Lisfranc joint injuries

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The study was a consecutive study conducted over a period of four years commencing in 2008 on Lisfranc joint injuries of feet. We studied the outcome of early open reduction and internal fixation of 20 cases of Lisfranc injuries using AOFAS-M score (American Orthopaedic Foot and Ankle Society-Midfoot score). Most patients were in the age group of 18-35 years. In our series the cause of injury was road traffic accidents in 50% cases followed by fall from height in 40% of cases. Most of Lisfranc fractures were of type B (60%) followed by type A. Most common associated injuries were metatarsal fracture (30% cases). The follow-up was 1-3 years with an average of 2 years. The mean AOFAS-M score was 78.36 with patients losing points to pain and decreased recreational function. Ours was not a comparative study but we strongly feel that early open reduction and Kirschner wire fixation of Lisfranc fracture dislocations within 24 hours of injury considerably improves functional outcome in these cases.

Key words: Lisfranc fracture, Kirschner wire

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The Lisfranc joint has been an eponym of tarsometatarsal joint injuries since Jacques Lisfranc, a field 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].

In the treatment of fracture dislocation of tarsometatarsal joints, early accurate diagnosis combined with prompt anatomic reduction and stable internal fixation provides optimal results [3]. Closed reduction and percutaneous Kirschner wire fixation has been advocated by some [4,5], but the trend is towards open reduction and screw/Kirschner wire fixation [6,7].

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

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Figure 1 X-ray right foot AP view showing C2 injury.

Materials and Methods

We performed a consecutive study of 20 patients with tarsometatarsal joint injuries at our hospital commencing in 2008 after approval by hospital ethics committee. An informed consent was taken from all the patients. Only those patients were included who presented < 24 hours of injury and were aged between 16 years and 65 years, the patients who were excluded from study were patients with open injuries, patients presenting > 24 hours of injury and polytrauma patients. The injuries were classified by Myerson's modification of Hardcastle classification [8].



Figure 2 X-ray right foot oblique view of same patient as Figure 1.

Surgical Technique

A dorsal longitudinal incision was made between the first and second metatarsal. The extensor hallucis longus tendon, deep peroneal nerve and dorsalis pedis artery were identified and retracted as a unit.

Small irreducible fragments were debrided from the joint. The first tarsometatarsal joint was aligned by reducing the medial border of medial cuneiform to the medial border of the first metatarsal. The planter medial aspect of the joint was directly visualized to ensure that there was no planter gap. The second metatarsal was then reduced to the medial border of middle cuneiform. The joints were fixed with Kirschner wires. In some cases a second longitudinal incision was made centered over the fourth metatarsal and the third metatarsocuneiform joint was reduced. 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.



Figure 3 X-ray foot AP View of same patient 8 weeks after fixation.

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 equally involved. Cause of injury were road traffic accidents in 50% cases (n=10), fall from height in 40% (n=8) and other causes in 10% (n=2).

Metatarsal fracture was the most common associated injury (30%, n=6). The injuries were classified by Myerson's modification of Hardcastle classification [8]. The majority of injuries (60%, n=12) were type B followed by type A (20%, n=4). All the operations were done within 24 hours of injury.



Figure 4 X-ray foot AP view of same patient 1.5 years after fixation.

Following surgery a posterior splint was applied and left in place for 10-14 days. During this period alternate wound dressings were done. Stitches were removed at around 14 days and short leg cast was given at the time of removal of stitches. K-wires were removed at 8 weeks. Full weight bearing was allowed at 10-12 weeks. Anatomical reduction was obtained in 19 patients (95%).

There was one case of loss of reduction in our study. There were two cases of superficial wound infection in our series both of them responded to antibiotics. Primary closure of skin was done in 90% cases (n=18) while in two patients delayed primary closure was done. There was no case of compartment syndrome of foot in our series. Good to fair results were seen in 90% cases (n=18).



Figure 5 X-ray foot Lateral view of the same patient after 1.5 years of fixation.

The mean AOFAS-M score in our study was 78.36 with most patients losing points to pain and decreased recreational function. Eighty percent of patients were able to return to their original occupation, including 10 household or office workers and six laborers.

Discussion

Lisfranc injuries 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]. The advantage of open reduction is that it allows direct visualization of the fracture dislocation for debridement of comminuted fracture fragments and osteochondral defects.

There is controversy about which method of fixation is best. There are proponents of k-wire fixation [10,11], while others rely on screw fixation [9,12]. In our study the age group ranged from 16-65 years with mean of 33.2 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 setup are household sedentary workers. Both right and left feet were equally involved in our study.

The mode of injury was road traffic accidents (RTA) in majority of patients (50%) followed by fall from height which was consistent with 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 Hardcastle type B followed by type A (20%). 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 fracture 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. There was no case of compartment syndrome in our study and primary closure was done in 90% cases. While two cases delayed primary closure was done. Complication in our study included loss of reduction in one case and two cases of superficial wound infection. Both cases occurred within one week of surgery and responded well to antibiotics and daily dressings. In Kuo et al series [16], there was no case of postoperative wound infection and one patient in their series required fasciotomy with split-thickness skin graft. There was one case of loss of reduction in our series.

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 (mean 8 weeks). Molded arch support was given to patients after three months, which was discarded at 6 months in 70% cases while as 30% cases felt its need up to one year. In our study good to fair results were seen in 90% cases as per scale used by Pereira et al [14], with mean

AOFAS score 78.23. Our mean AOFAS score was higher than Kuo et al [16], while as in Pereira et al [14] it was 77.36. Like this study most of our patients lost points to pain and decreased recreational function.

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

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