Indian Journal of Orthopaedics Surgery 2022;8(1):23–31

Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Orthopaedics Surgery

Journal homepage: https://www.ijos.co.in/

Original Research Article

# Operative outcomes of Lisfranc's fracture dislocation

**Aditya K Medhavi**[1,*], **E Venkateshulu**[1], **M Tamil Selvan**[1]

[1] *Dept. of Orthopaedics, Vijayanagar Institute of Medical Sciences, Bellary, Karnataka, India*

ARTICLE INFO

*Article history:*
Received 11-01-2022
Accepted 09-02-2022
Available online 24-03-2022

*Keywords:*
Fracture
Bone screws
Foot joints
Kirschner wires

ABSTRACT

Lisfranc joint injury is uncommon and can fail to notice at the initial assessment and treatment. Once ignored, late reduction is difficult and requires extensive dissection. Lisfranc joint injuries are known to result in unctional loss and chronic pain due to residual ligamentous instability, deformity, and/or arthritis; osteoporosis may also occur due to antalgic gait without weight bearing.

This recognition is important, as most of the injuries are either misdiagnosed or overlooked, such as in patients suffering from polytraumatic injuries, possibly becoming a permanent source of pain after the major fractures have healed.

**Materials and Methods:** A prospective study to be conducted at the Department of Orthopaedic Surgery, Vijayanagar Institute of Medical Sciences, Ballari from 2018 to 2020. This study consists of 30 cases of Lisfranc's Fracture Dislocation treated operatively by Cannulated Cancellous Screws and K wires (Kirschner Wires). The cases were selected according to inclusion and exclusion criteria. The functional outcome was evaluated using AOFAS score.

**Results:** In our study, we achieved Excellent in 10% of the cases. Good outcome in 73.33% of cases, Fair outcome in 13.3% of the cases and no patient had poor outcome in our study. Average AOFAS (American Orthopaedic Foot and Ankle Score) being 76.5.

**Conclusion:** It can be concluded from the present study that operative management with CC (Cannulated Cancellous Screws) Screws and K Wires is an effective means of treatment based on biomechanical principle with good functional outcome and minimum complication.



## 1. Introduction

The term 'Lisfranc injury' is an injury in which one or more of the metatarsals are displaced with respect to the tarsus. This name Lisfranc is attributed to a French surgeon and gynaecologist of the Napoleonic era who described the injury first in 1815 and to describe an amputation at that level.[1] The use of this term is broad and can refer to a high-energy lesion or a low-energy sports injury, as well as lesions that are purely ligamentous or those that are associated with metatarsal fractures, cuneiform bones, scaphoid bone or cuboid bone. Lisfranc injuries are infrequent, at approximately 0.2% of all fractures, although in 20% of cases they are not diagnosed or are diagnosed late.[2,3]

However, early and accurate diagnosis of Lisfranc's injuries are important for their appropriate treatment and to prevent delayed complications. Men are two to four times more prone to suffer a Lisfranc joint injury, possibly because they are more likely to participate in high-speed activities.

Since Lisfranc joint fracture–dislocations and sprains are known to carry a high risk of chronic secondary disability,[4] treating surgeon should maintain a high index of suspicion for these injuries in patients with foot injuries that are

* *Corresponding author*.
*E-mail address*: adityamedhavi@gmail.com (A. K. Medhavi).

https://doi.org/10.18231/j.ijos.2022.005

characterized by inability to bear weight, marked swelling and tarsometatarsal joint tenderness.

Most of the Lisfranc's injuries are unstable or displaced and mandate operative intervention.[5] The goals of treatment are to achieve a stable, painless, plantigrade foot, with return to its premorbid function.[6] Evidence suggests that maintenance of anatomical alignment is a critical factor in achieving a good functional outcome.[5,7–9] Traditionally, better results were obtained from open reduction and internal fixation (ORIF) with transarticular screws.[10] In this study, 30 cases of Lisfranc's fracture dislocation were studied, where results of functional outcomes obtained on treating patients by operative management.

## 2. Materials and Methods

1. To study various surgical procedures over Lisfranc's Fracture Dislocation.
2. To clinically evaluate the results of the various surgical procedures over Lisfranc's Fracture Dislocation and to assess the functional outcome of the procedures using AOFAS Scoring system.
3. To discuss the outcomes of the various surgical procedures over Lisfranc's Fracture dislocation.

### *2.1. Source of data*

This is an hospital based prospective study conducted in Vijayangara Institute of MedicalSciences, Ballari, during the period from October 2018 to October 2020.

### *2.2. Method of collection of data*

This study consists of 30 cases of Lisfranc's Fracture Dislocation treated operatively by Cannulated Cancellous Screws and K wires. The cases were selected according to inclusion and exclusion criteria. The functional outcome was evaluated using AOFAS score.

### *2.3. Inclusion criteria*

1. Patients of age more than or equal to 18
2. Patients of both sexes are included in the study
3. Patients with traumatic Lisfranc's fracture dislocation

### *2.4. Exclusion criteria*

1. Patients with preexisting foot deformity
2. Patients not willing to participate in the study
3. Patients medically unfit for surgery
4. Patients with type IIIC wound

### *2.5. Sample size estimation*

A total of 30 consecutive adults of both sexes with age above 18 with Lisfranc's Fracture Dislocation from the period between December 2018 and November 2020, who were willing to participate in the study were taken as study subjects.

$n = \frac{z^2 \times \widehat{\rho}\,(1-\widehat{\rho})}{\varepsilon^2}$

where

z is the z score

$\varepsilon$ is the margin of error

N is population size

$\widehat{\rho}$is the population proportion

### *2.6. Study period*

Time period of 2 years, between 2018 to 2020.

### *2.7. Evaluation*

The results are evaluated with AOFAS Score.

### *2.8. Investigations*

All the patients included in the study are investigated thoroughly with Routine blood investigations, HbsAg, HIV, Radiological examination pre operatively are done.

X-ray foot AP(Anteroposterior), Lateral and Obique views.

Written/informed consent was obtained from each patient/legal guardian before subjecting the patients for investigations and surgical procedures. Patients was followed up at 6 weeks, 12 weeks, 6 months and at 12 months.

### *2.9. Operative procedure*

Once the patient was admitted in the hospital, the patient details regarding name, age, sex, occupation and address were recorded. All the patients were enquired about mode of injury and duration were recorded. Haemodynamically unstable patients were stabilized and thorough wound wash and IV (Intravenous) antibiotics and tetanus immunoglobulin were given to patients with open fractures. Thorough general and clinical examination was carried out and radiologically evaluated with anteroposterior, lateral and oblique views of the foot preoperatively. In presence of a dislocation, it was reduced and a below knee slab was applied and strict limb elevation was maintained regularly monitoring the foot for any evidence of compartment syndrome.

All patients were kept under antibiotic coverage and were operated within one week to 10 days of admission.

Operative procedure was done under spinal anaesthesia. Under IV antibiotic coverage, parts were painted and draped. Open wounds were thoroughly washed with normal saline and debrided to remove any contaminants, comminuted bony fragments and necrotic tissue. Then new set of drapes, scrubs and gloves would be used for the fracture fixation. Patient was positioned supine on the operating table. Tourniquet was not applied as a routine.

Parts were painted and draped again. Reduce the First tarsometatarsal joints and fix it from the dorsal aspect of the metatarsal to the medial cuneiform to stabilize the first tarsometatarsal joint. If closed reduction is possible, under fluoroscopic guidance a towel clip is used to achieve reduction between the medial cuneiform and the base of second metatarsals in order to reconstitute the Lisfranc's ligament then a K wire (preferred in an open fracture) or a guide wire is passed from the medial cuneiform to the base of second metatarsal then a 3.5 mm drill bit is passed over the guide wire and drilled till the base of second metatarsal. Then a 4mm Cannulated Cancellous screw is passed over the guide wire along with a washer if necessary and is tightened till the reduction is achieved. If reduction is not achieved by closed technique then the fracture site is opened using a longitudinal incision between the 1st and 2nd metatarsal, soft tissues separated and dorsalis pedis artery was identified and retracted medially or laterally depending on the site of interest, then the bony fragments that come in the way of reduction are debrided and then the towel clip is used to reconstitute the Lisfranc's ligament. Similarly, screws can be used to fix the 2nd and 3rd tarsometatarsal joints where the screw is passed dorsally into the metatarsal and passed through the tarsometatarsal joint. For any instability of the 4th and 5th tarsometatarsal joint, K wires are used, as screws have known to produce poor results. After fixation the stability of the Lisfranc's joint is assessed through fluoroscopy by applying stress forces by the surgeon. After confirming the stability of the fixation, the operated site is washed with normal saline. Skin is closed using non absorbable sutures, sterile bulky dressing was done. A below knee plaster slab was applied for post-operative immobilisation.

Regular dressing was done on alternate days taking strict aseptic precautions. Sutures were removed at 12th – 14th post-operative day. Patient was advised strict non weight bearing for 6 weeks. Slab was removed after 4 weeks. K wires were removed after 6 weeks. Patients were regularly followed of to look for any signs of infection and implant failure. AOFAS was used to assess the final outcome at 6 weeks, 12 weeks, 6 months and 12 months follow-up.

### *2.10. Postoperative care*

A bulky dressing and posterior splint are applied postoperatively. At 7 to 10 Days These are converted to a short leg, non–weight-bearing cast. Weight bearing may be allowed at 6 to 8 weeks, and laterally placed Kirschner wires are removed at 6 to 8 weeks. Medial screws are removed at 4 to 5 months.

## 3. Results

The study consisted of 30 cases of Lisfranc's Fracture Dislocation treated by Surgical Procedure during the

**Fig. 1:** Draping and positioning of the patient

**Fig. 2:** Exposing the fracture site to remove any intervening bony fragments

**Fig. 3:** C arm image showing the passing of 4.5mm CC screw over the guidewire to achieve reduction at the Lisfranc's ligament

**Fig. 4:** Final C arm image after fixing the Lisfranc's fracture dislocation


**Fig. 5:** Case 1: Pre-operative x-ray

period November 2018 to October 2020. The following observations were made in the present study.

**Table 1:** Distribution of study population according to age

| S.No. | Age groups | Frequency (n=30) | Percentage (%) |
|---|---|---|---|
| 1 | <20 years | 4 | 13.33% |
| 2 | 21-30 years | 8 | 26.67% |
| 3 | 31-40 years | 11 | 36.67% |
| 4 | 41-50 years | 5 | 16.67% |
| 5 | 51-60 years | 2 | 6.67% |
| Total | Total | 30 | 100% |


**Fig. 6:** Case 1: Immediate post-operative x-ray


**Fig. 7:** Case 1: Follow up x-ray after 12 months

**Fig. 8:** Case 1: Follow up clinical pictures after 12 months


**Fig. 9:** Case 2: Pre-operative X-ray

In our study among 30 patients, the youngest was 18 years and the oldest was 60 years old. Mean age being 34.67 years. The highest incidence of 11 patients (36.67%) was noted in the 31 to 40 years age group (4th decade). The lowest incidence of 2 patients (6.67%) was noted in the older age group of 51 to 60 years.

**Table 2:** Distribution of study population according to gender

| S. No. | Sex | Frequency | Percentage |
|---|---|---|---|
| 1 | Male | 24 | 80% |
| 2 | Female | 6 | 20% |

In our study, we found male preponderance with 24 patients (80%) being male and 6 patients (20%) being female.

**Table 3:** Distribution of study population according to side affected

| S. No. | Side | Frequency | Percentage |
|---|---|---|---|
| 1 | Left | 14 | 46.67% |
| 2 | Right | 16 | 53.33% |

In our study, 16 patients (53.33%) were affected on the right side while 14 patients (46.67%) were affected on the left side.

In our study, 20 patients (66.67%) had sustained a direct injury, whereas, 10 patients (33.33%) had sustained an

**Fig. 10:** Case 2: Immediate post-operative X-ray

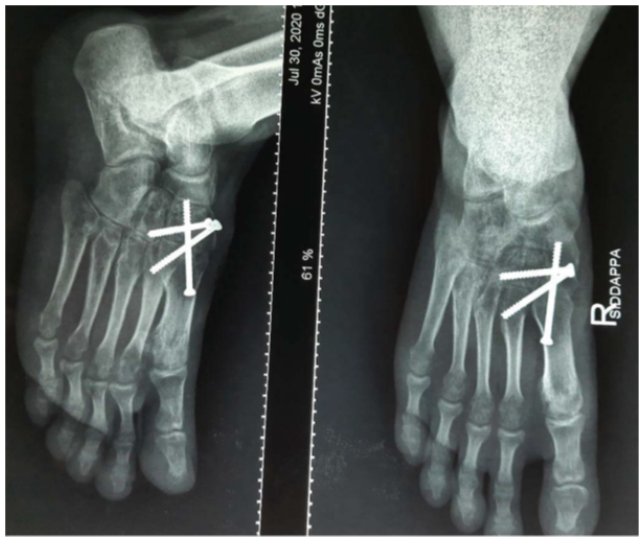


**Fig. 11:** Case 2: Follow up x-ray after 12 months

**Fig. 12:** Case 2: Follow up clinical pictures after 12 months

**Table 4:** Distribution of study population according to mechanism of injury

| S. No. | MOI | Frequency | Percentage |
|---|---|---|---|
| 1 | Direct | 20 | 66.67% |
| 2 | Indirect | 10 | 33.33% |

indirect injury.

**Table 5:** Distribution of study population according to mode of injury

| S. No. | Mode of Injury | Frequency | Percentage |
|---|---|---|---|
| 1 | RTA | 21 | 70.00% |
| 2 | Self-Fall | 9 | 30.00% |
| 3 | Sports Injury | 0 | 0.00% |
| 4 | Assault | 0 | 0.00% |

In our study, the most common mode of injury was Road Traffic Accident which was sustained by 21 patients (70%). Second most common mode of injury was self-fall which was sustained by 9 patients (30%). We didn't encounter any patients with sports injury or assault.

**Table 6:** Distribution of study population according to type of fracture

| S. No. | Type of Fracture | Frequency | Percentage |
|---|---|---|---|
| 1 | Closed | 15 | 50% |
| 2 | Open | 15 | 50% |

In our study, we noticed that there were equal number of open and closed cases of Lisfranc's Fracture Dislocation.

In our study, we noticed that on clinical examination we were able to appreciate ecchymosis at the plantar aspect of the midfoot in about 10 patients (33.33%) of Lisfranc's Fracture Dislocation.

In our study, we noticed that on radiological examination we were able to appreciate Fleck's Sign i.e. an avulsed fracture fragment attached to the Lisfranc's ligament in 19 patients (63.33%).

**Table 7:** Distribution of study population according to presence of ecchymosis

| S. No. | Ecchymosis | Frequency | Percentage |
|---|---|---|---|
| 1 | Present | 10 | 33.33% |
| 2 | Absent | 20 | 66.67% |

**Table 8:** Distribution of study population according to presence of Fleck sign

| S. No. | Fleck's Sign | Frequency | Percentage |
|---|---|---|---|
| 1 | Present | 19 | 63.33% |
| 2 | Absent | 11 | 36.67% |

**Table 9:** Distribution of study population according to presence of tarsometatarsal displacement in lateral view of X-ray

| S No. | Tarsometatarsal Displacement | Frequency | Percentage |
|---|---|---|---|
| 1 | Present | 18 | 60% |
| 2 | Absent | 12 | 40% |

In our study, we noticed that on radiological examination of lateral view of the foot, we were able to appreciate a significant step or displacement at the Tarsometatarsal junction in about 18 patients (60%).

**Table 10:** Distribution of study population according to Myerson's classification of Lisfranc's fracture dislocation

| S. No. | Myerson's Classification | Frequency | Percentage |
|---|---|---|---|
| 1 | A | 6 | 20.00% |
| 2 | B1 | 10 | 33.33% |
| 3 | B2 | 9 | 30.00% |
| 4 | C1 | 3 | 10.00% |
| 5 | C2 | 2 | 6.67% |

In our study, we have made use of the Myerson's classification for Lisfranc's Fracture Dislocation to assess the fracture patterns. We noticed that the most common type was B1 in about 10 patients (33.33%). Rarest fracture pattern being C2 in about 2 patients (6.67%).

**Table 11:** Outcomes based on AOFAS score at 12 months follow up

| S.No. | AOFAS | Outcome | Frequency | Percentage |
|---|---|---|---|---|
| 1 | 85-100 | Excellent | 3 | 10.00% |
| 2 | 70-84 | Good | 22 | 73.33% |
| 3 | 50-69 | Fair | 4 | 13.33% |
| 4 | <50 | Poor | 0 | 0.00% |

In our study, at the 12 months follow up, functional outcome of 3 patients (10%) was excellent, 22 patients

(73.33%) was good and 4 patients (13.3%) was fair and no patient had poor outcome. At 12 months follow up, minimum AOFAS was 62, maximum AOFAS was 89 and average AOFAS being 76.5.

**Table 12:** Distribution of study population according to complications

| S. No. | Complications | Frequency | Percentage |
|---|---|---|---|
| 1 | Infection | 2 | 6.67% |
| 2 | Chronic Pain | 5 | 16.67% |
| 3 | Medial Arch Collapse | 0 | 0% |
| 4 | Gait Disturbance | 2 | 6.67% |

In our study, we noticed that chronic pain was the most common complication seen in about 5 patients (16.67%). 2 patients (6.67%) had post-operative wound infection which was subsided with intravenous antibiotics and regular dressing. None of the patients had Medial Arch Collapse as a complication. 2 patients (6.67%) had gait disturbance even after completing physiotherapy.

In our study, we noted that most of the complication were seen in open reduction. In patients who underwent ORIF with CC screws 1 patient had infection of post-operative wound and 1 patient had chronic pain at the fracture site. In patients who underwent ORIF with CC screws and K wires 1 patient had infection of post-operative wound, 4 patients had chronic pain at the fracture site, 2 patients had gait disturbances. None of the patients had Medial Arch Collapse as a complication.

## 4. Discussion

These injuries have been rarely reported in orthopaedic literature with the current trend of incidence standing at a debatable 0.2% of all fractures.[11] This is despite the understanding that a fifth of all such injuries is missed on initial assessment.[12] Considering the chronically debilitating sequelae and complications of mismanaged or missed Lisfranc injuries such as foot instability, pain, vascular compromise, malunion, deformity and arthritis, it is essential to have a high degree of suspicion in all cases of foot pain following trauma, irrespective of the mode of injury.[13] An X-ray series of the foot in the AP, oblique, lateral (preferably weight-bearing) generally reveals diastasis between the first and second metatarsal. Modalities such as the CT(Computerized Tomography) scan and MRI(Magnetic Resonance Imaging) are even more sensitive in diagnosing undisplaced fractures, stress fractures or isolated Lisfranc ligament injury.[13]

High-energy trauma is more often than not, the cause for Lisfranc fracture dislocations and it is often accompanied by considerable soft tissue insult. RTA and crush injuries account for the maximum number of such cases with the latter leading to more severe injuries.[13] Although closed injuries constitute the majority of the cases, open injuries require more aggressive management.

The advent of casting died down owing to the loss of reduction upon subsidence of swelling. K wiring reinforcement remained the preferred choice for some time until reports of early removal causing collapse and recurrence of dislocation surfaced.[12] This was pioneered by the study of Arntz et al. in 1988 who suggested the use of screw (3.5mm or 4mm) fixation, to obtain better mechanical stability.[14] This result was reinforced by multiple studies that followed in the literature. As anatomical reduction has widely been considered to be paramount in achieving the good final functional outcome, we tried to achieve the same in all our patients.[15] We managed to achieve anatomical reduction in our patients.

We noted that highest incidence of 36.67% of patients was noticed in the age group of 31-40 years (4th Decade) and was predominant in male patients (80%). Both sides were almost equally affected, however right side (53.33%) was slightly more commonly affected than left side (46.67%) of patients. Mechanism of injury was direct in (66.67%) of patients and indirect in 33.33% of patients. Road Traffic Accident was the most common mode of injury in our study group comprising of 21 patients (70%) followed by self-fall (30%) being 2nd most common mode of injury. None of the patients in the study group had a sports injury or an injury by assault. We noticed that equal number of cases had open (50%) and closed (50%) injury. About 33.33% of Patients presented with ecchymosis on the plantar aspect of the affected foot and it was absent in 66.67% of the cases.

On radiological examination we noticed that Fleck's Sign was evident in 63.33% of the cases and was absent in 36.67% of the cases. We also found that tarsometatarsal displacement on the lateral view of X-ray was evident in 60% of the cases and was not evident in 40% of the cases. We noted that based on Myerson's classification 33.33% of the patients had Type B1 injury followed by 30% having Type B2 injury. The least common being Type C2 injury with only 6.67% patients being affected. Most common associated injury was found to be metatarsal fractures seen in 46.67% of cases in our study. Most of the patients underwent ORIF with CC Screws and K wires (43.33%). None of the patients had poor outcome.

In our study, we noticed that the average AOFAS Score at the 6th week follow up was 55.1, which increased to 64.6 at the 12th week follow up, improved further to 68.4 at the 6th month follow up and reached its maximum to 76.5 at the 12 months follow up. There was a steady improvement in the functional outcome of the operated foot over one year. 3 patients (10%) had Excellent outcome with AOFAS score more than 85. Good outcome in 22 patients (73.33%), Fair outcome in 4 patients (13.3%) and no patient had poor outcome in our study. Average AOFAS being 76.5.

6.67% of the patients had post-operative wound infection that subsided on intravenous antibiotics. 16.67% had complaints of chronic pain and 6.67% had gait disturbances. All patients had a stable foot and ankle with good range of motion with no report of osteomyelitis or cosmetic derangement. We evaluated our results and compared with those obtained by various studies.

**Table 13:** Comparison of distribution of age with other studies

| S. No. | Series | Average age | Sample Size |
|---|---|---|---|
| 1 | Kirzner[16] | 39.4 | 108 |
| 2 | Demirkale[17] | 34.5 | 32 |
| 3 | Wagner[18] | 36.2 | 22 |
| 4 | J Kumaran[19] | 31 | 15 |
| 5 | Nunley[20] | 21 | 15 |
| 6 | Sameer[21] | 38.5 | 10 |
| 7 | Present Study | 34.67 | 30 |

In the present study of 30 patients, the average age of the patients was 34.6, which is comparable to the results obtained by Kirzner[16] who had conducted a study on 108 patients with the average age of 39. Nunley[20] had conducted a study on 15 patients and the average age was 29. Sameer[21] had conducted a study on 10 patients and his average age was 38.5. J Kumaran[19] had conducted a study on 15 patients and his average age was 31. Wagner[18] had conducted study on 22 patients and the average age was 36.2. Demirkale30 had conducted a study on 32 patients and his average age was 34.5.

**Table 14:** Comparison of distribution of gender with other studies

| S. No. | Series | Male % | Female % | Sample Size |
|---|---|---|---|---|
| 1 | Kirzner[16] | 72.22 | 27.78 | 108 |
| 2 | Demirkale[17] | 65.62 | 34.37 | 32 |
| 3 | Wagner[18] | 54.54 | 45.45 | 22 |
| 4 | J Kumaran[19] | 73.33 | 26.67 | 15 |
| 5 | Nunley[20] | 86.67 | 13.33 | 15 |
| 6 | Sameer[21] | 70 | 30 | 10 |
| 7 | Present Study | 80 | 20 | 30 |

In the present study 80% of the patients were male and 20% were female. The injury seems to me more common in the males probably owing to more encounters with contact sports and more commonly involved in road traffic accidents. The results were comparable to those obtained in other similar studies.

Kirzner[16] studied 108 patients and found that the injury was right sided in 52.78% and left in 47.22% of cases.

In the present study of 30 patients 53.3% of the patients were affected on the right side. Whereas 46.67 percent of patients were affected on the left side. However, study conducted by Sameer[21] on 10 patients shows that 40% of the patients were injured on the right side and 60% on the left. Whereas J Kumaran[19] studied on 15 patients found that

**Table 15:** Comparison of distribution of side with other studies

| S.No. | Series | Right % | Left % | Sample Size |
|---|---|---|---|---|
| 1 | Kirzner[16] | 52.78 | 47.22 | 108 |
| 2 | J Kumaran[19] | 60 | 40 | 15 |
| 3 | Sameer[21] | 40 | 60 | 10 |
| 4 | Present Study | 53.33 | 46.67 | 30 |

60% of the patients were injured on the right and 40% to the left foot.

**Table 16:** Comparison of resultant average AOFAS score with other studies

| S. No. | Series | AOFAS | Sample Size |
|---|---|---|---|
| 1 | Kirzner[16] | 71 | 108 |
| 2 | Wagner[18] | 94 | 22 |
| 3 | J Kumaran[19] | 76.5 | 15 |
| 4 | Sameer[21] | 92.2 | 10 |
| 5 | Present Study | 76.5 | 30 |

In the present study the average AOFAS score was 76.5 at 12 Months follow up. Which was comparable to the results obtained by similar studies. In a study by M.Richter, H.Thermann et al.[22] summarised that early open anatomic reduction and optimal internal stabilisation improved the final outcome which concurred with our study. In another study by S. Rammelt, W. Schneiders,[23] the authors say that primary treatment by open reduction and internal fixation leads to significant better functional results than does secondary corrective arthrodesis for malunited fracture dislocations. In the study by Xiao Yu, Qing-Jiang Pang et al.[24] the authors conclude that surgical treatment is essential for anatomic reduction. Our study is limited by the small sample size which may indicate how rarely this injury occurs and the lack of a long-term follow-up of these patients to study the role of degeneration or spontaneous fusion of the joints as a result of these injuries. The fact that foot is one of the toughest parts of the body to achieve soft-tissue coverage following such compound injuries, did not considerably hinder our totalitarian management of this condition. We did not have sufficient sample size or follow-up period to ascertain prognostic factors associated with the good and bad prognosis.

## 5. Conclusion

CC screws and K wire fixation provides more than adequate maintenance of alignment of the three columns of the foot even if the fractures are comminuted. A stable, painless foot can be obtained using just CC Screws and K wires with timely intervention and good pre-operative and post-operative management. In cases of open injuries, swift action is needed to diagnose the condition using clinical evaluation and confirmation by the available imaging

modalities. If present, they are to be treated at the earliest with aggressive soft-tissue management as it holds the key for the final outcome.

We noticed a steady improvement in AOFAS score in operated cases over one year and reached 76.5 average AOFAS.

We noticed that chronic pain was the most common complication. Other complications we encountered included gait disturbances and post-operative wound infection which subsided with intravenous antibiotics and regular dressing.

We suggest that orthopaedic surgeons should suspect Lisfranc injuries when a patient presents with post-traumatic pain in the midfoot and forefoot irrespective of it being an open or a closed injury.

## 6. Source of Funding

None.

## 7. Conflict of Interest

The authors declare no conflict of interest.

## References


1. Cassebaum WH. Lisfranc fracture-dislocations. *Clin Orthop Relat Res*. 1963;30(30):116–29.
2. Desmond EA, Chou LB. Current concepts review: Lisfranc injuries. *Foot Ankle Int*. 2006;27(8):653–60.
3. Myerson MS, Cerrato R. Current management of tarsometatarsal injuries in the athlete. *Instr Course Lect*. 2009;58:583–94.
4. Englanoff G, Anglin D, Hutson HR. Lisfranc fracture-dislocation: a frequently missed diagnosis in the emergency department. *Ann Emerg Med*. 1995;26(2):229–33.
5. Stavlas P, Roberts CS, Xypnitos FN, Giannoudis PV. The role of reduction and internal fixation of Lisfranc fracture-dislocations: a systematic review of the literature. *Int Orthop*. 2010;34(8):1083–91.
6. Watson TS, Shurnas PS, Denker J. Treatment of Lisfranc joint injury: current concepts. *J Am Acad Orthop Surg*. 2010;18(12):718–28.
7. Schildhauer TA, Nork SE, Sangeorzan BJ. Temporary bridge plating of the medial column in severe midfoot injuries. *J Orthop Trauma*. 2003;17(7):513–20.
8. Puna RA, Tomlinson MP. The role of percutaneous reduction and fixation of Lisfranc injuries. *Foot Ankle Clin*. 2017;22(1):15–34.
9. Hong CC, Pearce CJ, Ballal MS, Calder JD. Management of sports injuries of the foot and ankle: an update. *Bone Joint J*. 2016;98-B(10):1299–1311.
10. Kuo RS, Tejwani NC, Digiovanni CW, Holt SK, Benirschke SK, Hansen ST, et al. Outcome after open reduction and internal fixation of Lisfranc joint injuries. *J Bone Joint Surg [Am]*. 2000;82(1):1609–18.
11. Aitken AP, Poulson D. Dislocations of the tarsometatarsal joint. *J Bone Joint Surg Am*. 1963;45-A:246–60.
12. Myerson MS, Fisher RT, Burgess AR, Kenzora JE. Fracture dislocations of the tarsometatarsal joints: end results correlated with pathology and treatment. *Foot Ankle*. 1986;6(5):225–42.
13. Stavlas P, Roberts CS, Xypnitos FN, Giannoudis PV. The role of reduction and internal fixation of Lisfranc fracture-dislocations: a systematic review of the literature. *Int Orthop*. 2010;34(8):1083–91.
14. Arntz CT, Veith RG, Hansen ST. Jr Fractures and fracture-dislocations of the tarsometatarsal joint. *J Bone Joint Surg Am*. 1988;70(2):173–81.
15. Henning JA, Jones CB, Sietsema DL. Open reduction internal fixation versus primary arthrodesis for Lisfranc injuries: a prospective randomized study. *Foot Ankle Int*. 2009;30(10):913–22.
16. Kirzner N, Zotov P, Goldbloom D, Curry H, Bedi H. Dorsal bridge plating or transarticular screws for Lisfranc fracture dislocations: a retrospective study comparing functional and radiological outcomes. *Bone Joint J*. 2018;100(4):468–74.
17. Demirkale I, Tecimel O, Celik I. The effect of the Tscherne injury pattern on the outcome of operatively treated Lisfranc fracture dislocations. *Foot Ankle Surg*. 2013;19(3):188–93.
18. Wagner E, Ortiz C, Villalón I, Keller A, Wagner P. Early Weight-Bearing After Percutaneous Reduction and Screw Fixation for Low-Energy Lisfranc Injury. *Foot Ankle Int*. 2013;34(7):978–83.
19. Kumaran J, Neelakrishnan R, Bharathiselvan V, Rao A. A study of functional outcome of lisfranc fracture dislocations managed by various operative methods in rural south Indian population. *Nat J Clin Orthop*. 2018;2(4):85–9.
20. Nunley JA, Vertullo CJ. Classification, investigation and management of midfoot sprains: Lisfranc injuries in the athlete. *Am J Sports Med*. 2002;30(6):871–8.
21. Haveri S, Hanchnal P, Mittal AR. Management of open lisfranc joint injuries: A prospective study. *Int J Orthop Sci*. 2020;6(3):73–7.
22. Richter M, Thermann H, Huefner T, Schmidt U, Kretter C. Aetiology, treatment and outcome in Lisfranc joint dislocations and fracture dislocations. *Foot Ankle Surg*. 2002;8(1):21–32.
23. Rammelt S, Schneiders W, Schikore H, Holch M, Heineck J, Zwipp H. Primary open reduction and fixation compared with delayed corrective arthrodesis in the treatment of tarsometatarsal (Lisfranc) fracture dislocation. *J Bone Joint Surg Br*. 2008;90(11):1499–1506.
24. Sun J, Yu X. The surgical treatment for fresh tarsometatarsal joint fracturedislocation. *Pak J Med Sci*. 2014;30(4).


## Author biography


**Aditya K Medhavi,** Senior Resident https://orcid.org/0000-0002-5207-674X

**E Venkateshulu,** Professor and Unit Chief

**M Tamil Selvan,** Senior Resident


**Cite this article:** Medhavi AK, Venkateshulu E, Selvan MT. Operative outcomes of Lisfranc's fracture dislocation. *Indian J Orthop Surg* 2022;8(1):23-31.