

Results of Displaced Lisfranc Injuries with Open Reduction and Fixation with K-Wires

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ABSTRACT

Background: The Lisfranc injury is an injury of the foot in which one or more metatarsal bones are displaced from the tarsal bones. Due to their low incidence and complexity, these injuries are often missed on initial evaluation. Prompt recognition and then anatomic reduction and stabilization gives best outcomes post treatment. **Aim:** The study aimed to compare short-term treatment results for tarso-metatarsal joint injuries with treatment outcomes and compare it with type of injury per classification. **Methods:** This was a prospective observational, analytical hospital based study. The subjects included in the study were classified according to radiological findings and treated with open reduction and K-wire fixation. Study subjects were immobilized for six weeks. Weight bearing was progressed slowly. Short term result was calculated by American orthopaedic foot and ankle society score (AOFAS) at six months. **Results:** Of the nine cases included in the study, low energy fall, five (55.55%) was commoner cause for injury followed by high energy road traffic accident (RTA) in four (44.44%) patients. Six fractures (66.67%) were of type A while, three (33.3%) were type B. Average day from injury to surgery was 3.11 (range 2-5). AOFAS Score calculated in six months average was 82.44(SD±12.79). In patients with type A injury mean AOFAS score was 89(SD±2.6), while in patients with type B injury had mean of 69.33(SD±15.82). The AOFAS score difference for the group A and B was statistically significant (P<0.05). **Conclusions:** Lisfranc injuries are life changing injuries as scores of AOFAS get lower even after 6 months of injury. Patients with type B injuries have poorer outcome than type A injuries.

Key words: K-wires, lisfranc injury, open reduction, type A, type B

INTRODUCTION

The Lisfranc joint, also referred to as the tarsometatarsal (TMT) joint complex, is named after Jacques Lisfranc (1790-1847), a French surgeon^{1,2}. Lisfranc injury is commonly used to describe injuries at the bases of the five metatarsals (MTs), their articulations with the four distal tarsal bones, and the Lisfranc ligament. Lisfranc ligament is a strong interosseous attachment located between the medial cuneiform and the second MT.

Lisfranc injuries account for 0.2% of all fractures². The reported incidence of this uncommon injury is approximately 1 per 55,000 persons per year. It can occur in all ages but is more common in the third decade and is more common in males³. Subtle Lisfranc sprain and diastasis have become more commonly diagnosed in athletes. Nearly 20% of these injuries are misdiagnosed or missed on initial radiographic assessment⁴.

Most injuries to the TMT complex can be designated as indirect or direct and low energy or high energy. In low-energy settings,

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TMT injuries are caused by a direct blow to the joint or by axial loading along the MT, either with medially or laterally directed rotational forces. In high-energy injuries, the energy absorbed by the articulations results in significantly more collateral damage to bony and soft-tissue structures, creating such injuries as MT fractures, cuneiform instabilities, and cuboid fractures^{3,4}.

In Nepal and specifically, in the western Terai belt, Lisfranc injuries are not common outpatient department diagnosis. However; these injuries do occur and patients are treated. This study primarily focused to find out the treatment outcome using open reduction and fixation with K-wires and also aimed to compare the treatment outcomes in low energy and high energy types of injuries. As per the author's knowledge this will be the first study of its kind in Nepal.

MATERIAL AND METHODS

This was a prospective, observational, analytical study done at Nepalgunj Medical College Teaching Hospital, Kohalpur from July 2012 to December 2014. Patients with displaced (more than 2mm) Lisfranc injury in standard AP, Lateral and oblique radiographs of the foot were included in the study which were nine in total. Pediatric population (age less than 14 years), open fractures and patient not willing to be part of study and patients losing follow up were excluded from the study.

Patients were either seen in the emergency or outpatient department of Nepalgunj Medical College Teaching Hospital. After clinical examination and clearance for any major head, chest, and abdominal trauma standard views of the foot were

done. The fracture were classified according to Myerson classification of Lisfranc injury which were classified as Type A; total incongruity of the Tarsometatarsal joint, Type B1; partial medial incongruity, Type B2; partial lateral incongruity and Type C1 and C2; a divergent pattern, with partial or total displacement. A temporary posterior slab was applied and patient admitted in ward with elevation with Bohler Braun splint. When swelling subsided and wrinkle were present patient were planned for surgery.

A standard open approach between first and second metatarsal was used for open approach of the injury under tourniquet. Dorsalis pedis artery was isolated and protected. After clearing the injury site second metatarsal was well reduced in the recess. If first metatarsal was found unstable pinning with 2 mm k-wire was done from first metatarsal to medial cuneiform. Second metatarsal after reduction was stabilized with two 2mm k-wires one orienting from second metatarsal to middle cuneiform and other from second metatarsal to medial cuneiform. If the other metatarsals are also dislocated then appropriate stabilization was done with k-wires. All wires are placed outside the skin for later easier removal.

Patients were placed in posterior slab with elevation and non weight bearing. In two weeks stitches are taken out and patient is placed in a boot cast. Serial examination and x rays are done in two weeks, six weeks, and twelve weeks. In twelve weeks the k-wires were removed and weight bearing is started and increased as tolerated. Patient is reevaluated in 4 months to make sure he is off crutches and continuing physical therapy and muscle strengthening program. Patients were evaluated in 6 months and scoring was done. American orthopedic foot and ankle score system (AOFAS) score for the midfoot (score 0-100) was done that included Intensity of pain, Activity limitations, Footwear requirements, Walking distance depending on the quality of the walking surface, Foot axis.

RESULTS

There were total nine patients in the study group. Male to female ratio was 3:1. male were (66.66%) and female were (33.33%) of total. Among the females two were housewife and one was a student, all had Type A injury of Lisfranc joint. Average age of patients in our group was (N=9) 31.22 yrs, SD 8.422, variance of 70.944. Average age in female (N=3) is 35.33 yrs and male (N=6) is 29.1 yrs. Right to left ratio was 7:2 so 77.77% was right and 22.2% was left foot.

There was one male and one female patient with the left foot. 33.33% of female and 16.66% of male patients had left foot involvement. Low energy fall was the cause for 5 (55.55%) of patients and high energy Road Traffic Accident (RTA) accounted for 4(44.44%) of patients. 33.33% of females had RTA while 50% of male had RTA. All left foot fractures were due to RTA. 6 fractures (66.67%) of fractures were type A and other 3(33.3%) were type B injuries. All female patients had type A injury.

Two out of six (33.3%) of type A injuries were caused by RTA while 4 out of six (66.67%) were due to fall injury. One third of type B injury was due to fall and other two third was due to RTA.



Figure 1 a, b : Pre Operative

No	Age (yrs.)	Sex	Slide	Mode of injury	Type	Occupation	Day from trauma to operation	AOFAS mid foot scale at 6 month
1	22	F	R	Fall	A	Student	3	93
2	36	F	R	Fall	A	Housewife	3	90
3	39	M	R	Fall	A	Electrician	2	88
4	48	F	L	RTA	A	Housewife	4	90
5	23	M	R	Fall	A	Student	2	88
6	29	M	R	Fall	B	Plumber	2	52
7	30	M	R	RTA	B	Student	3	73
8	25	M	L	RTA	A	Travel guide	5	85
9	29	M	R	RTA	B	Student	4	83

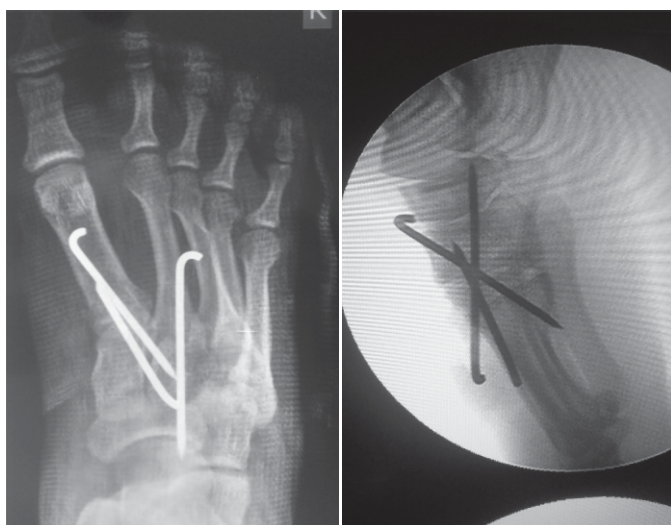


Figure 2 a, b: Post Operative

Average day from injury to surgery was 3.11 days ranging from 2-5 days. AOFAS Score calculated in 6 months average was 82.44 with standard deviation of ± 12.79 . For the patients with group A type injury mean of AOFAS score was 89 and standard deviation of ± 2.68 . In contrast to that patients with type B injury had mean of 69.33, variance of 250.33 and standard deviation of 15.821. The AOFAS score difference for the group A and B is statistically significant (P value less than 0.05).

DISCUSSION

Injuries to the TMT joint complex occur in 1 per 55,000 persons each year in the United States, accounting for approximately 0.2% of all fractures³. Low energy trauma accounts for approximately one third of all Lisfranc injuries⁵, with the remainder typically the result of high-energy forces sustained in motor vehicle accidents, industrial accidents, and falls from a height⁶. In the present study of 9 patients, more than 50% of our patients had sustained injury due to fall, which was a significant cause for an unstable Lisfranc injury.

Loh SY, Soon JL et al.⁷ evaluated 18 patients who underwent open reduction and internal fixation with 4.5mm screws and 1.6mm K-wires for tarsometatarsal joint injuries. The outcome of functional and anatomical reduction were assessed by AOFAS score, which was 81.4 points. Yang Y, Yu G et al.⁸ evaluated 47 patients treated with open reduction and internal fixation with plates, screws, staples, and K-wires. The results were excellent in 9, Good in 16, fair in 4 and poor in 3 according to AOFAS midfoot score system, The excellent and good rate was 78.

Ly TV, Coetzee JC et al.⁹ evaluated open reduction and screw fixation in 20 patients. At two years postoperatively, the mean AOFAS midfoot score was 68.6. Stavlas P, Roberts CS et al.¹⁰ evaluated eleven articles, reporting data for the management of 257 patients. Injuries of the first three rays were treated by closed reduction and internal fixation screws in 16.3% of patients, Open reduction and internal fixation with screws in 66.5% and Open reduction and internal fixation with K-wires in

17.1% of the patients. Screw related complications were common and was reported in 16.1% of the cases. The mean AOFAS score was 78.1. Post traumatic radiographic arthritis was reported in 49.6% of the patients. They concluded that open reduction and internal fixation with screws was a reliable method for the management of Lisfranc injuries. This can be complemented by K- wires in other rays if needed.

In the paper by Marta Tarczyńska et al¹¹ named comparison of treatment results of acute and late injuries of the Lisfranc joint they found delayed treatment had worse prognosis and similar to our study type B had more chances of worse prognosis. Hence people with Lisfranc injuries treatment is better with earlier and type A injuries. In this present study where all the 9 consecutive patients underwent open reduction and internal fixation with 2.0mm K-wires and assessed at six months of follow up by AOFAS midfoot scoring system, which was 82.4.

CONCLUSION

Lisfranc injuries occur in prime life time of patients. They are missed in many cases so we have to be vigilant for the diagnosis. According to the type, type B injuries do poorly than Type A injuries. Early surgery with K-wires fixation scores equally well in comparison to the fixation with plates and screws; but anatomical reduction of the Lisfranc joint is mandatory. Thus patient counseling is essential about these life changing injuries and should not be taken lightly.

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