

Clinical and Functional Outcome of Surgically Treated Cases of Lisfranc Fracture Dislocation: A Study of 25 Cases

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Abstract: *Aim and Objective: To study the clinical and functional outcome result of surgically treated cases of lisfranc fracture dislocation. Material and Methods: The prospective study will be done from july 2018 onwards. Sample will be taken from the patients treated in P. D. U. Medical College and Hospital diagnosed as a lisfranc fracture dislocation on basis of x-rays. Under general or spinal anesthesia, through and through k-wire fixation from metatarsal bone to tarsal bone after achieving anatomical reduction to align Tarso-Metatarsal joints under fluroscopy control. Follow up taken at the end of 3 weeks, 6 weeks, 3 months and 6 months. Results: in Our study of 25 cases of Lisfranc Fracture Dislocation, 12 (48%) cases achieved Excellent Result, 9 (36%) cases achieved Good Result and 4 (16%) cases achieved Fair Result. Conclusion: From our perspective, functional and clinical outcome of Lisfranc Fracture Dislocation by percutaneous k-wire fixation is simple technique which must get anatomical reduction to achieve good functional and clinical outcome. [1]*

Keywords: Lisfranc Fracture Dislocation, Anatomical Reduction

1. Introduction

Lisfranc Fracture dislocations are uncommon due to highly constrained configuration of the Tarsometatarsal joints which are secured by ligaments. They have low incidence as they are commonly missed. Lisfranc injuries commonly occur in high energy impact like motorvehicle accidents. Painful malunion with impaired functions may result if not treated adequately. Closed reduction and plaster immobilisation leads to unsatisfactory results and redisplacement of the joints. Anatomic reduction and internal fixation is recommended. [2]

The Lisfranc injury accounts for less than 1% of all fractures and is often missed at the initial assessment. In the pediatric population, incidence of this injury is anecdotal. The injury mechanism is similar to that in adults, with direct axial load or after an indirect rotational force on a foot in plantar flexion. Treatment must aim at anatomical reduction and stabilization. [3]

The mechanism of injury may be direct or indirect. The former is due to a dorsoplantar force exerted on the joint that results in atypical scattered fractures. The indirect mechanism, the most common one, is due to an axial load on the foot in plantar flexion. There are two indirect force patterns: hindfoot pronation with the forefoot fixed, and hindfoot supination with the forefoot fixed. Initially a fracture occurs on the second metatarsal bone leading to cuboid bone compression fracture. Metatarsophalangeal dislocation is associated to this injury and it frequently goes unnoticed. A metatarsal neck fracture is also associated to it.

2. Aims

To study the clinical and functional outcome result of surgical treatments of Lisfranc Fracture Dislocation.

3. Objectives

1. To assess the clinical outcome of operated case of Lisfranc Fracture Dislocation.
2. To assess the functional outcome of operated case of Lisfranc Fracture Dislocation.
3. To analyze the complications associated with the Lisfranc Fracture Dislocation post-operatively, during follow-up of the patient.

4. Literature Survey

Diagnosis and treatment of Lisfranc joint dislocations, and especially Lisfranc joint fracture dislocations (LFD), are still problems in trauma care and influence the functional outcome of the entire foot in the mid-and long-term follow-up. In particular, the Chopart-LFD results in a high degree of residual impairment [4]. However, even in this type of injury, an early anatomic open reduction and optimal internal stabilization have been found to improve the final outcome. Published results indicate 34–80% of LFD cases have good treatment outcomes.

In 1984, Hesp et al proposed a study which had analysed 24 cases. In the long run, functional and radiological results depended on the accuracy of reduction. For good anatomical results, immediate closed or, if needed, ORIF by percutaneous K-wires was paramount.

In 1988, **Perez-Blanco et al** proposed a study which said that Open treatment was recommended if minor displacement persisted. Routine Kwire fixation was advised for all cases. Results were evaluated in 28 patients with a mean age of 34 years and a mean follow-up of 6.3 years. Treatment included closed reduction, occasionally followed by K-wire fixation. If closed reduction was not achieved, ORIF was performed. Results were evaluated according to Hardcastle's scoring system. On that basis, 20 good, 5 fair, and 3 poor results were obtained and there was 1 early amputation. Good results were associated with an accurate reduction. [5]

In 2002, **Nunley and Vertullo** developed a new classification for subtle lesions of the Lisfranc joint, produced by a low-energy mechanism, typical of athletes who suffered an axial load on standing in plantar flexion and slightly rotated. According to these authors, three stages could be observed:

stage I, patients who could not practice sports, without displacement between the first and second metatarsals on weight-bearing radiographs but with a positive bone scintigraphy;

stage II, diastasis between the first and second metatarsals of 2 mm to 5 mm on the AP radiographs on weight-bearing but without loss of the medial longitudinal arch on lateral radiographs on weight-bearing;

stage III, diastasis > 5 mm and loss of the medial longitudinal arch, described as a decrease in the distance between the plantar border of the fifth metatarsal and the plantar border of the first cuneiform bone.

In 2018, **Kirzner et al** proposed a study of 108 patients were treated for a Lisfranc fracture-dislocation. Of these, 38 underwent trans-articular screw fixation, 45 dorsal bridge plating and 25 a combination technique. Injuries were assessed pre-operatively according to the Myerson classification system. Patients treated with dorsal bridge plating had better functional and radiological results than those treated with trans-articular screws or a combination technique. Significantly better functional outcomes were seen in the bridge plate group. Functional outcomes were dependent on the quality of the reduction. A trend was noted indicating that plate fixation is associated with a better anatomical reduction. Myerson types A and C2 significantly predicted a poorer functional outcome, suggesting that total incongruity in either a homolateral or divergent pattern leads to poorer outcomes. The greater the number of columns fixed, the poorer the outcome. [5]

5. Materials and Methods

The prospective study was conducted from September 2018 onwards. Sample was taken from the patients treated in P. D. U. Civil Hospital, Rajkot having Lisfranc radiographs. Evaluation was performed with patients' chief complaint, clinical examination, radiography (for diagnosis and to look for signs of tarsometatarsal arthritis on followup) and AOFAS midfoot score. The patient was followed up for 3 weeks, 6 weeks, 3 months and 6 months.

[10]

Inclusion Criteria: includes Patient having closed fracture with age between 18 to 60 years and not having any co-morbidities in same limb with Patient being diagnosed and treated surgically in our center for Lisfranc fracture dislocation.

Exclusion Criteria: includes patients having age <18 years and age >60 years and gave negative consent to participate in study, having Polytrauma, Neurovascular injury, pregnancy or having another pathological condition in same limb

The patients were identified; quick clinical assessment and proper histories were taken. After providing emergency care plane radiographs were obtained. The fractures were classified and treatment was planned.

The following features are noted in the radiographs.

- 1) Alignment of 2nd metatarsal base with respect to middle cuneiform bone in Anteroposterior view
- 2) Alignment of 4th metatarsal base with respect to cuboid bone in oblique view
- 3) Tarsometatarsal dislocation in lateral view

Materials

Following materials are used during operative procedures.

- Sterile drape and Gloves
- Scalpel with knife
- T-handle
- Multiple K-wires (1.5 mm, 2 mm, 2.5 mm)
- K-wire bender
- K-wire cutter
- Mini External Fixators
- Gauze piece
- Povidone iodine

Methodology

- **Anaesthesia:**

General anaesthesia or spinal anaesthesia or ankle block.

- **Trolley preparation:**

Trolley preparation for Lisfranc Fracture dislocations cases include multiple k-wires, T-handle, and other materials.



Patient Positioning

Supine Patient positioning and painting and draping was done with operating side knee was flexed for ease of operating procedures to be done in foot.

Surgical Technique

Antegrade kirshner wire fixation under radiological control.

Surgical Procedure

After painting and Drapping, first anatomical reduction was achieved for 2nd TMT joint by using k-wire with joystick technique, followed by 1.5/2 mm k-wire was used to take entry from distal end of respective metatarsals over dorsal aspect then k-wire was advanced into the respective tarsal bones to achieve Tarso-Metatarsal joint alignments.

For 2nd metatarsal-advance into middle cuneiform For 3rd metatarsal-advance into lateral cuneiform For 4th metatarsal-advance into cuboid bone.

Followed by k-wire was bent and cut by cutter and then sterile dressing was done and below knee slab was given.

AOFAS Midfoot Score

AOFAS-American Orthopaedic Foot and Ankle Score obeys following parameters...

Midfoot Scale (100 Points Total)	
Pain (40 points)	
None	40
Mild, occasional	30
Moderate, daily	20
Severe, almost always present	0
Function (45 points)	
No limitations, no support	10
No limitation of daily activities, limitation of recreational activities, no support	7
Limited daily and recreational activities, cane	4
Severe limitation of daily and recreational activities, walker, crutches, wheelchair	0
Maximum walking distance, blocks	
Greater than 6	5
4-5	4
1-3	0
Less than 1	0
Footwear requirements	
Fashionable, conventional shoes, no insert required	5
Comfort footwear, shoe insert	3
Modified shoes or brace	0
Walking surfaces	
No difficulty on any surface	10
Some difficulty on uneven terrain, stairs, inclines, ladders	5
Severe difficulty on uneven terrain, stairs, inclines, ladders	0
Gait abnormality	
None, slight	10
Obvious	0
Alignment (15 points)	
Good, plantigrade foot, midfoot well aligned	15
Fair, plantigrade foot, some degree of midfoot malalignment observed, no symptoms	8
Poor, nonplantigrade foot, severe malalignment, symptoms	0
Total=	100

American Orthopaedic Foot and Ankle Society
From: <http://www.aofas.org/14a/pages/index.cfm?pageid=3494>

6. Results and Discussion

In our study, 80% patients had Lisfranc fracture dislocation due to Road traffic accidents, 16 % due to Fall from height, 4 % due to Athletic injury. The average age of patients was found to be 34.6 years with Standard Deviation of 9.6 with maximum number of patients seen between 18-29 years of age. Out of 25 patients 88 % were male and rest female. In our study youngest patient was 20 years of age and oldest was 55 years of age. Out of all, 64 % patients appeared to have fracture on right side while rest had left sided. In our study, 60 % were of Quenu and Kuss-Homolateral type followed by Quenu and Kuss-isolated type (28 %) followed by Quenu and Kuss-Divergent type (12 %). In our study, functional and clinical outcome of surgery is assessed by AOFAS Midfoot Score. The functional outcome by AOFAS Midfoot Score is divided into 4 type..... Excellent (90-100), Good (80-90), Fair (70-80), Poor (<70) depending upon Pain, Function and Alignment criteria of AOFAS midfoot score. In our study, 48% patients get Excellent functional outcome, 36% get good functional results and 16% get fair functional outcome.



Figure 1: Preoperative Radiograph



Figure 2: Immediate Postoperative Radiograph



Figure 3: Radiograph at 6 Months Follow Up

Table 1: Clinical and Functional Outcome of Lisfranc Fracture Dislocation

Clinical and Functional Outcomes	AOFAS Midfoot Score	
	No. Of Patients	% Of Patients
Excellent	12	48
Good	9	36
Fair	4	16
Poor	0	0
Total	25	100

Based on our study we came to know that the patients treated for lisfranc fracture dislocation almost half percentage of cases 48% get Excellent result and 36% get good result.

Complications

In our study, Most common complication in Lisfranc fracture Dislocation is Post Traumatic Arthritis (16%) followed by Malunion (8%).

In this study, Maximum post traumatic arthritis is most commonly seen in Quenu and Kuss-Divergent type. Malunion was also most commonly seen with Quenu and Kuss-Divergent type. Both could be seen with Homolateral variety also, but most common with Divergent variety. [15]

Table 2: Complication of Radial Head Fracture in Our Study

Complication type	Lien et al. 1 [21]	Our study
Post-traumatic Arthritis	4	4
Mal-union	2	2
Non-union	1	0

7. Conclusions

The Lisfranc injury is a serious condition, showing impairing complications, with the most important one being the post-traumatic osteoarthritis, which can evolve with pain and significant functional restraints. No different results were found between those treated later compared to the ones submitted to treatment at the admittance, reinforcing the idea that the key is a quality Anatomic reduction and not the early treatment. However,

we regard an early surgical treatment as very important in preventing and/ or treating any foot compartmental syndrome, which is the most frequent and feared complication. It seems that a correlation exists between multiple-trauma patients and worse results, reflected on AOFAS score. The AOFAS score seems to be a good analysis parameter for Lisfranc fracture dislocation treatment, requiring a prospective assessment and/ or a bigger sample to provide a more significant analysis of the effectiveness of its use.

In this study, Lisfranc fracture dislocations were treated at emergency within 24 hrs with kirschner wire stabilization. Kirschner wire stabilization done by closed technique under c-arm control. The treatment modality was good, achieving good fracture union, decreased incidence of pain and achieve good range of movements with minimum complication.

In this study, we have achieved good union and excellent functional outcome at end of follow up. AOFAS Midfoot score was used to assess the functional outcome.

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