

A PROSPECTIVE STUDY OF THE FUNCTIONAL OUTCOME OF OPEN REDUCTION AND INTERNAL FIXATION IN LISFRANC FRACTURE DISLOCATION

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**Abstract**

Background: Lisfranc injuries are fracture–dislocations of the tarsometatarsal joint complex. The study was aimed to determine the functional outcome of tarsometatarsal joint fracture-dislocation and to evaluate the incidence of complications in these fracture dislocation as a result of open reduction and internal fixation. **Materials and Methods:** The Department of Orthopaedics at the Government Medical College in Thiruvananthapuram conducted the prospective study. The study population consists of all patients with lisfranc fracture dislocation admitted to the study setting between February 2014 and January 2016. The sample size was determined to be 45 using a consecutive sampling technique. X-ray was examined during the follow-up period and functional evaluation was carried out by American Orthopaedic Foot and Ankle Society (AOFAS) midfoot score system. Analysis of variance was used to test the different types of Myerson classification. **Result:** All patients were followed up for a minimum period of 6 months(6 months – 12 months). 55.6% of patients had only isolated lisfranc injury, others had associated other long bone fractures or spinal/pelvic injuries. 80% of study subjects underwent surgery within the first 24 hours. 71.1% of study subjects were free of any specific complications associated with lisfranc injury or its surgical management. Rest of the patients had infection, compartment syndrome or hardware failure. Average AOFAS score of cases with pain score less than 3 was 77.67±3.7 and that of the cases with pain score greater than 8 was 58±1.. There was statistically significant relationship between complications and AOFAS score. **Conclusion:** Poor results in the functional outcome and health related quality of life measurements were due to occurrence of complications, inability to pursue their original occupations and the perception of ‘being ill’ clinging to their minds. These can be tackled through meticulous attention to surgical details, patient education or counselling as needed and compliance with rehabilitation.

INTRODUCTION

Tarsometatarsal joint complicated fracture-dislocations are known as Lisfranc injuries.^[1] Low energy sports injuries to high intensity crush injuries are on the injury spectrum. The identical variability explains the severity of the injury, which may be only ligamentous or accompany metatarsal, cuneiform, navicular, and cuboid fractures. Due to advancements in diagnosis, we now understand these injuries better and have more effective treatment options.^[2] Over the past 10 years there has been a renewed interest in learning more about it. One of the reasons for this is the fact that it has been reported as an uncommon lesion, it is frequent than assumed and claims that about 20% of cases go unnoticed, especially in patients with poly trauma.^[3]

According to widespread agreement, anatomical reduction and stabilization of the Lisfranc joint are essential for positive results. There does not seem to be a benefit to conservative care with closed reduction and plaster immobilization because the initial reduction is sometimes lost as soft tissue swelling goes down, surgery plays an important role in the current management of Lisfranc injuries. For these injuries, a number of treatments have been recommended. While some surgeons favor internal fixation and open reduction, others choose closed fixation with percutaneous wires and/or screws.^[4] Once the missed, Lisfranc injuries cause malunion and traumatic of the tarso metatarsal joint, it will affect the stress transduction in the foot and result in abnormal gait, with symptoms of pain and permanent disability. Therefore, therapeutic requirements and difficulties are high.^[4]

Over the years, there has been considerable debate and controversy surrounding the management of Lisfranc injuries, and there is no evidence that it is about to end. Probably the primary cause for the dispute is that a Lisfranc injury is a member of an extremely broad and ill-defined spectrum of injuries.^[5] There can never be a single treatment solution for all Lisfranc injuries because not all of them are equal. Even while lisfranc injuries are not frequent, they can nevertheless result in morbidity and disability if they go unrecognized, undiagnosed, or poorly managed.

MATERIALS AND METHODS

The Department of Orthopaedics at the Government Medical College in Thiruvananthapuram conducted the prospective study. The study population consists of all patients with lisfranc fracture dislocation admitted to the study setting between February 2014 and January 2016. The sample size was determined to be 45 using a consecutive sampling technique.

Inclusion Criteria

Patients with skeletal maturity. Patients willing to give consent. Patients willing for surgery. Patients willing to do investigations and but implants. Patients fit for giving anaesthesia.

Exclusion Criteria

Patients with associated talus, calcaneum and ankle injuries and associated chest/abdominal/head injuries. Patients in shock.

Methodology

A pretested Semi structured questionnaire along with clinical evaluation and hospital records along with radiological evaluation was done. Pain was assessed through a visual analogue scale. The patients were followed up at regular intervals of 6 weeks, 3 months and 6 months postoperatively.

Statistical Analysis

The statistical analysis was performed using SPSS for windows version 25.0. The findings were present in number and percentage analyzed by frequency, percent. Chi-square test was used to find the association among variables. The critical value of P indicating the probability of significant difference was taken as <0.05 for comparison.

RESULTS

As per [Table 1] there were 45 cases, and 88% of them were men. The majority of patients (60%) were between the ages of 25 and 50, with a mean age of 40.2 years. The oldest and youngest patients were both 80 years old.

As per [Table 2] it was seen 57.8% of the study subjects sustained injury due to road traffic accident and 40.0 % gave history of fall from height. 77.8% of the cases had closed injury pattern. Majority of patients (66.7%) were left sided individuals.

Table 1: Gender wise distribution of subjects

Sex	Frequency	Percent
Male	40	88.9
Female	5	11.1
Total	45	100.0

Table 2: Distribution of Mode of Injury

Mode of injury	Frequency	Percent
Road traffic accident	26	57.8
Fall from height	18	40.0
Sports injury	1	2.2
Total	45	100.0

Table 3: Distribution of Polytrauma

Poly trauma	Frequency	Percent
Isolated lisfranc injury	25	55.6
Other long bone fracture	18	40.0
Spinal/pelvic injury	2	4.4
Total	45	100.0

55.6% of patients had only isolated lisfranc injury, others had associated other long bone fractures or spinal/pelvic injuries. 80% of study subjects underwent surgery within the first 24 hours.

Table 4: Distribution of Complications following surgery

Complication following surgery	Frequency	Percent
Nil specific	32	71.1
Infection	8	17.8
Compartment syndrome	3	6.7
Hardware failure	2	4.4
Total	45	100.0

As per [Table 4] it was seen that 71.1% of study subjects were free of any specific complications associated with lisfranc injury or its surgical management. Rest of the patients had infection, compartment syndrome or hardware failure. Only 26.7% of the study subjects were diabetic. Only 28.9% of patients were smokers.

Table 5: Distribution of Pain and Stiffness

Pain scale	Frequency	Percent
<3	24	53.3
4-7	16	35.6
>8	5	11.1
Total	45	100.0

Majority of patients (53.3%) had only mild pain after 6 months. 17.8% of study subjects had mild and 22.2% had severe stiffness of joints after 6 months of follow up study.

Table 6: Comparison of score based on Pain

Pain	N	AOFAS SCORE				F	P
		Mean	Sd	Minimum	Maximum		
<3	24	77.67	3.773	73	85	33.977	<0.001
4-7	16	67.63	7.915	44	74		
>8	5	58.00	1.000	57	59		
Total	45	71.91	8.696	44	85		

Table 7: Comparison of score based on Function

Function	N	AOFAS SCORE				F	P
		Mean	Sd	Minimum	Maximum		
Normal	24	77.63	3.820	73	85	80.882	<0.001
Acceptable	13	70.69	3.497	62	74		
Limited	8	56.75	5.392	44	62		
Total	45	71.91	8.696	44	85		

Table 8: Comparison of score based on Complications

Complication	N	AOFAS SCORE		T	P
		Mean	Sd		
Absent	32	75.94	4.846	7.100	<0.001
Present	13	62.00	8.185		

Table 9: Comparison of Score based on Duration of hospital stay

Duration of hospital stay	N	AOFAS SCORE		T	P
		Mean	Sd		
<1 week	42	72.38	7.805	1.369	.178
>1 week	3	65.33	18.583		

As per [Table 6] Average AOFAS score of cases with pain score less than 3 was 77.67 ± 3.7 and that of the cases with pain score greater than 8 was 58 ± 1 . Cases with severe pain have significantly less functional outcome score than the less pain cases. Average functional score of mild stiffness was 78.63 ± 5.3 and that of severe stiffness cases were 60.4 ± 8.4 . Mild stiffness cases have significantly higher functional outcome than the severe stiffness cases ($p < 0.05$).

As per [Table 7] Average functional outcome score among the cases with normal function was 77.63 ± 3.82 and that of the limited function cases was 56.75 ± 5.3 . Limited function cases have significantly lesser functional outcome score than the normal ($p < 0.05$).

As per [Table 8] Average AOFAS score among cases with associated complications was 75.9 ± 4.8 , and in cases with no complications was 62.0 ± 8.1 . There was statistically significant relationship between complications and AOFAS score. AOFAS score in cases with diabetes mellitus was 73.33 ± 8.8 when compared to those without diabetes was 68.0 ± 7.0 . There was no statistically significant relationship.

As per [Table 9] AOFAS score among cases with hospital stay less than 1 week was 72.38 ± 7.8 , when compared to those with more than 1 week stay, which was found to be 65.33 ± 18.5 . There was no statistically significant co-relation between AOFAS and days of hospital stay.

DISCUSSION

This study was undertaken in Government Medical College, Thiruvananthapuram, to study about the functional outcome in patients who has undergone open reduction and internal fixation in lisfranc fracture dislocation. During the initial evaluation, many Lisfranc fracture-dislocations are misdiagnosed or overlooked. This necessitates an early and correct diagnosis before these injuries may be managed effectively to prevent functional impairment and long-term consequences.

According to widespread agreement, a successful outcome depends on the Lisfranc joint's anatomical reduction and stabilization. Because the initial

reduction is frequently lost as soft tissue swelling subsides, conservative care, which includes closed reduction and plaster immobilization, does not appear to have a function in the treatment of Lisfranc injuries in modern medicine. For these injuries, a number of treatments have been recommended.^[6-8]

The surgical target is different because of different structure and function in “three columns” theory in tarsometatarsal joint.^[8,9] From the anatomical and functional view, the medial and intermediate columns play predominant roles in maintaining the inelasticity of foot and absorbing shock compared with the lateral column in balancing the weight-bearing on forefoot. Therefore, we used screw fixation in the medial and intermediolateral columns to reduce the effects of increased activities on mechanical transduction in midfoot. While in the lateral column, Kirschner wire was used to avoid joint stiffness postoperatively.^[10,11] Additionally, patients with comminuted articular facet always struggle with it. The plate, which is appropriate for patients with comminuted articular facet, can correct this flaws.^[12]

In this study, 3 cases were concomitant with fractures in head or diaphysis of metatarsals, 4 patients were concomitant with unstable intercuneiform articulations, and 2 patients were concomitant with unstable cuneonavicular joint. The initial injuries of the 9 patients were relatively serious. We also carried out fixation for the injuries as mentioned above respectively during the fixation for tarsometatarsal joints, after follow-up, traumatic arthritis in tarsometatarsal joints was detected in three patients, but cuneonavicular joint or intercuneiform articulations was not obviously involved. This shows that timely surgical intervention may still improve the the prognosis in these patients with serious initial injuries.^[13,14]

CONCLUSION

Poor results in the functional outcome and health related quality of life measurements were due to occurrence of complications, inability to pursue their original occupations and the perception of ‘being ill’ clinging to their minds. These can be tackled through meticulous attention to surgical details, patient education or counselling as needed and compliance with rehabilitation.

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