

Evaluation of the Result of Internal Lisfranc Fracture-Dislocations

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Abstract

Background: 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 functional 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.

Methods: The present study is a prospective study conducted in the Department of Orthopaedics in S.C.B Medical College & Hospital, Cuttack from January 2021 to December 2022 on patients presenting with Lisfranc Fracture-Dislocations.

Results: The findings showed that we achieved excellent in 10% of the cases. Good outcome in 85% of cases, Fair outcome in 5% of the cases and no patient had poor outcome in our study. Average AOFAS (American Orthopaedic Foot and Ankle Score) being 77.1.

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.

Keywords: Fracture, Bone Screws, Foot Joints, Kirschner Wires.

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Introduction

Due to the tightly constrained shape of the Tarsometatarsal joints, which are held in place by ligaments, Lisfranc fracture-dislocations are rare, occurring in 0.2% of all fractures and 1 in 55,000. Due to how readily they can be missed, they are uncommon. According to reports, males are 2-4 times more likely to develop these,

and the third decade of life is when incidence peaks. This part of the foot at the apex of the arch can be difficult to heal because a significant amount of stress passes through this area with weight bearing. Thus, it is important to understand the anatomy of TMT joint (Lisfranc joint) to achieve a correct diagnosis and proper

treatment of the injuries that occur at that level. [1]

When the dorsalis pedis artery is involved, a Lisfranc fracture-dislocation is an emergency due to the severe agony and vascular compromise it causes. Due to the severe swelling of the foot at the time of original presentation, open reduction and internal fixation is not advised as doing so could result in skin necrosis. Following closed reduction initially, percutaneous k-wires are given to maintain reduction and give time to allow for soft tissue healing and subsidence of skin swelling. This is marked by loss of shiny look of skin, appearance of wrinkles and healing of any blisters over the planned surgical field. Later, for persistent instability, internal fixation is done using trans articular screws and/or plates. [2]

There are many conflicting suggestions for surgical technique currently. The first, second, and third cuneiform-metatarsal joints' ideal anatomical alignment and stability are crucial for a positive result in Lisfranc injuries. In general, open reduction and internal fixation are favoured and can produce better results. Our study's objective is to assess the clinical and imaging outcomes of internal joint fixation for Lisfranc injuries. American Orthopedic Foot and Ankle Society measurements were the main result indicators (AOFAS). The secondary outcome measurements included osteoarthritis and incident rates (OA). [3]

Material and Methods

The present study is a prospective study conducted in the Department of Orthopaedics in S.C.B Medical college & Hospital, Cuttack from January 2021 to December 2022 on patients presenting with Lisfranc Fracture-Dislocations.

Ethical approval was obtained from the Institutional Ethical Committee [IEC No: 1021/04.02.2022]. 20 patients fulfilling the Inclusion and Exclusion criteria were included in the study after obtaining informed written consent.

Inclusion criteria: Patients aged > 18 years, with instability after closed reduction, failed closed reduction and missed Lisfranc injuries initially and presented later were included.

Exclusion criteria: Skeletally immature patients, patients with pre-existing foot deformity, compound/crush injuries of foot, ipsilateral limb long bone fractures were excluded

Statistical Analysis

The sample size was calculated using following formula, $N = \frac{Z^2(S.D)^2}{(C.I)^2}$ where, N= Sample size, Z= Z score, S.D = Standard deviation, C.I = Confidence interval.

Expected dropout rate taken as 20 percent, hence the total sample size was 20.

Results

The K-wires, 4 mm cc screws, and Lisfranc-specific plates used in this research were applied to a total of 20 cases of Lisfranc fracture-dislocations. The Midfoot Score of the AOFAS (American Orthopaedics Foot and Ankle Society) measures the clinical result. The chart below shows the mean Modified Midfoot score before surgery and after surgery at 3 months, 6 months, and 12 months of follow-up. The average AOFAS midfoot ratings for cases with Dorsal bridge plating and Trans-articular screw fixation are listed below. When plating was chosen over trans-articular screw placement, scores were higher.

Table 1: Complications

Complications	No. of Cases	Percentage
Infection	3	15
Neurovascular injury	0	0
Subluxation	1	5
Arthritis	2	10
Compartment syndrome	0	0
CRPS	0	0
Hardware Failure	0	0
Residual Deformity	0	0

Table 2: Clinical and Functional Outcomes

Clinical Outcome			
AOFAS midfoot score		Mean	
Preoperatively		29.25	
month postop		71.5	
6-month postop		75.75	
12-month postop		77.1	
Functional Outcome			
Score	Comment	No. of Cases	Percentage
85-100	Excellent	2	10
70-84	Good	17	85
50-69	Fair	1	5
<50	Poor	0	0

Radiological Outcome

At six weeks, three months, six months, and twelve months, radiographs were taken. With the exception of one patient, in whom the reduction of the first TMT joint was lost after three months, the radiographs verified maintenance of TMT joint reduction in all other patients. Radiological signs of post-traumatic arthritis affecting the TMT joints and a reduction in joint space were present in two cases. In one out of two patients, the radiological results did not translate clinically. At the most recent follow-up, there were no instances of device breakage or failure.

Discussion

RTA-related, fall-from-height, and inversion-related Lisfranc fracture-dislocations are serious injuries because they cause substantial morbidity and have an adverse impact on quality of life. In order to achieve a stable, pain-free foot

without a deformity, anatomical reduction and rigid internal fixation are prioritised in the treatment of these kinds of injuries. The best treatment options are still open reduction and anatomic reduction with internal fixation, and many writers have reported positive outcomes [4, 5]. Our research also demonstrated positive outcomes following ORIF, with an overall average AOFAS score of 77.1 and 70% of participants able to resume their regular activities. [6-9]

2 (10%) of 20 patients had radiological signs of secondary osteoarthritis, but only one of these two patients had symptoms, including some midfoot discomfort. Our findings were in line with those of other studies that reported functional effects following ORIF. Out of the 20 cases, one had subluxation of the first TMT joint on radiographs but no obvious clinical deformity. 3 out of the total number of 20 patients had some infection (wound discharge, unhealthy skin) at 6 weeks

follow-up which were treated with debridement, dressing, higher antibiotics and observation. All of them showed significant improvement at 3 month follow-up and none of them had any residual infection at 6 month follow-up. [10]

Our research demonstrated that ORIF can be effective even when there is only mild secondary osteoarthritis. One of the two patients who had radiological signs of secondary osteoarthritis progression was clinically symptomatic at the most recent follow-up. There is no agreement on the fixing technique. Trans articular screw fixation of the midfoot has been the traditional preferred surgical technique up until the use of bridge plating. The drawback of the Trans articular screw fixation is damage of the articular surface caused by the screw. It is also associated with screw breakage and implant failure, but we did not encounter such problems in our study. There can be loss of position on screw removal and potential fracture after screw removal. [11]

We believe that dorsal bridge plating has a significant advantage in cases where the metatarsal base has been reduced because it can bridge the fracture site and assist in anatomical reduction. With trans articular screw fixation, it would be challenging to attain the same level of stability, particularly when there is intraarticular comminution. The Dorsal bridge plating method can sustain the reduction in instances of ligamentous injury without fracture without breaching or harming the articular surface. [12-15]

In our research, we discovered that Myerson type B injuries are more frequent than other kinds, and that Myerson type A and C injuries have the worst prognoses. Better results than Trans-articular screw fixation were linked to dorsal plate fixation. At the conclusion of a 12-month follow-up, the average AOFAS midfoot score was 82.8 for dorsal plating and 75.2 for transarticular screw fixation. We also

draw the conclusion that the severity of the original injury, multiple column involvement, and fixation technique all contributed to the lower scores. [16-20]

At the final follow-up in our research, there were no implant breakages or failures. It is challenging to gauge and forecast how ligaments will recover from pure ligamentous injuries. Additionally, we believe that using Dorsal plates in instances of purely ligamentous injuries is beneficial because it not only effectively maintains the joint in its anatomical position but is also a very strong construction that does not fail or break even in the absence of any ligamentous healing. [21,22]

The fact that all patients received the same course of treatment and that a sizable number (20) were accessible for follow-up evaluations is the study's strength. To evaluate our clinical outcomes, we used the AOFAS midfoot scoring method as a standard. With a mean AOFAS midfoot score of 77.1 that is comparable to other series, the majority of our patients had satisfactory functional and clinical outcomes. [23]

Conclusion

Lisfranc injuries are uncommon and frequently overlooked, particularly when they only affect the ligaments. Because of the tarsometatarsal joint's complexity, the phrase "Lisfranc injury" refers to a broad range of injuries. If the injuries are not detected during the initial evaluation or are not properly identified and treated, this happens more frequently. These frequently cause instability and deformity, which accelerate articular ageing and cause persistent pain. The more delicate ligamentous injuries, the more frequently this occurs. Hence high index of suspicion is essential for prompt diagnosis. Weight-bearing radiographs should be undertaken to accurately diagnose these injuries early. There should be low threshold for doing a CT scan if the patient is unable to weight

bear or MRI scan when purely ligamentous injury is suspected. Undisplaced injuries may be treated conservatively, whereas all other injuries require surgical interventions.

The ORIF procedure is currently the most popular intervention, and obtaining anatomical reduction is essential for a successful long-term result. By using ORIF and, ideally, joint-sparing surgery with Dorsal bridge plating, good functional outcomes can be attained. The severity of the original injury and the precision of the reduction both affect the prognosis. Overall good functional outcome can be expected for most patients with this injury. In our study 70% of our patients were able to return back to their preinjury level of function and work. However, a proportion of these injuries will lead to secondary midfoot OA and some residual symptoms. Primary arthrodesis has been proposed for some complex injuries with severe intra-articular damage or complete ligamentous disruption.

In conclusion, bridge plate fixation offers a superior functional result and quality of reduction for Lisfranc injuries than trans-articular fixation. Independent of the fixation method, anatomical reduction results in a better functional outcome. For more severe injuries, such as Myerson types A, C2, injuries with higher degrees of comminution, and severe ligamentous injuries, primary arthrodesis may be the preferred treatment choice.

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