Surgical Treatment of Lisfranc Ligament Injuries : A Case Series

P. Wylie Burge, DPM[1,2]; Vincent Inglima, DPM[1]; Zachary Cohen DPM[1]; Travis Motley, DPM[3]

[1]Resident Foot and Ankle Surgeon, John Peter Smith Hospital, Fort Worth, TX
2Master Chief Resident Foot and Ankle Surgery, John Peter Smith Hospital, Fort Worth, TX
[3]Attending Foot and Ankle Surgeon, Department of Orthopedics, John Peter Smith Hospital, Fort Worth, TX

Introduction

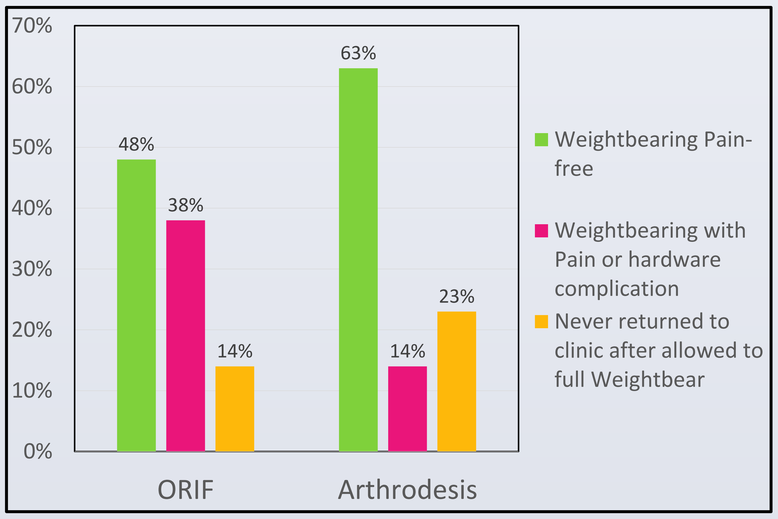
Lisfranc injuries are a common ailment encountered by the foot and ankle surgeon. Characterized by disruption of the ligamentous attachment which provides stability to the medial cuneiform and second metatarsal base articulation, these injuries often cause concomitant disruption of adjacent tarsometatarsal joint articulations with injuries ranging from mild sprains to severe dislocations. Injuries are highly variable and can present as purely ligamentous to severely comminuted fracture dislocations. Understanding of the various injury patterns plays an essential role in the decision-making process regarding management options in order to provide the patient with the best functional outcome. Depending on the severity of the patient's injury, the long-term sequela may include severe midfoot arthritis, instability, and residual functional limitations. There is debate in the literature regarding primary arthrodesis versus open reduction internal fixation as the preferred surgical management for these injuries, specifically concerning the high incidence of posttraumatic arthritis. This study aims to review outcomes of open reduction and internal fixation (ORIF) versus primary arthrodesis as management of Lisfranc injuries at a Level 1 Trauma Center over a 5 year period.

Methods

- 118 patients underwent either Lisfranc ligament ORIF or arthrodesis by five surgeons from 2014 to 2019
- 40 patients were excluded from the case series. Criteria for exclusion included:
  - Injuries resultant from Charcot Neuroarthropathy
  - Cases in which the Lisfranc complex was not addressed by surgical intervention
  - Patients lost to follow-up prior to initiation of weight bearing
  - Surgical intervention for non-acute injury
- Pre- and post-operative radiographs were reviewed to confirm acute Lisfranc injury, as well as evaluate surgical procedure used for treatment
- Outcomes were measured by the initiation of protected weight-bearing, clinical result at last clinic follow-up, and need to undergo surgical revision

Results

- A total of 78 patients were included in the case review
- 29 patients underwent Lisfranc ORIF
- 49 patients underwent Lisfranc arthrodesis
- Protected weight-bearing initiated at an average of 8.1 weeks in the ORIF group, and 8.3 weeks in the arthrodesis group
- Eight patients who underwent Lisfranc ORIF required a second surgery secondary to persistent pain associated with internal hardware (28%)
- Two patients (7%) who underwent Lisfranc ORIF required a subsequent Lisfranc arthrodesis secondary to pain and instability. Both had resolution of symptoms after undergoing arthrodesis
- One patient (2%) who underwent Lisfranc arthrodesis required hardware removal with subsequent resolution of symptoms



Conclusions

Procedure selection for Lisfranc injuries is multifactorial. Preoperatively surgeons must take into consideration the level of comminution of adjacent metatarsal bases, the degree of ligamentous injury to adjacent tarsometatarsal joints and severity of dislocation. Midfoot injuries with significant comminution and dislocation often require more extensive plating. We found that patients who underwent ORIF more frequently experienced symptoms that required surgical revision to remove painful hardware or achieve arthrodesis. Our results show that patients had a higher rate of pain-free ambulation at final follow-up in the arthrodesis group compared to the ORIF group. Moreover, the higher rate of patients not returning to clinic once they were cleared to ambulate further supports that patients had less functional pain following arthrodesis and thus felt less inclined to return for further evaluation.

Our case series may aid in guiding clinicians as they make recommendations to patients in regards to surgical procedure selection for Lisfranc injuries. We found that isolated Lisfranc injuries with mild displacement can be adequately treated with ORIF. However, when considering ORIF, patients need to be aware of the high rate of revision surgery, including hardware removal and arthrodesis. Lisfranc injuries with significant tarsometatarsal dislocation or comminuted metatarsal base fractures had better subjective and functional outcomes when undergoing arthrodesis as a definitive procedure.

When having preoperative discussions with patients, it is important they are aware of long-term sequela of these injuries. Both procedures were shown to allow protected weight-bearing at approximately eight weeks, but the long-term differences in function make these injuries such that the patient and clinician must come together in forming appropriate treatment plans.

References

1. Aitken AP, Poulson D. Dislocation of the tarsometatarsal joint. J Bone Joint Surg Am 1963;45:246–260.
2. Pinzur MS, Lomasney L, Mahoney L, Havey R. Functional outcome following anatomic restoration of tarsal-metatarsal fracture dislocation. Foot Ankle Int 2002;23:922–926.
3. Buzzard BM, Briggs PJ. Surgical management of acute tarsometatarsal fracture dislocation in adult. Clin Orthop Relat Res 1998;353:125–133.
4. Desmond EA, Chou LB. Current concepts review: Lisfranc injuries. Foot Ankle Int 2006;27:653–660.
5. Mulier T, Reynders P, Dereymaeker G, Broos P. Severe Lisfrancs injuries: primary arthrodesis or ORIF? Foot Ankle Int 2002;23:902–905.
6. Hardcastle PH, Reschauer R, Kutscha-Lissberg E, Schoffmann W. Injuries to the tarsometatarsal joint. J Bone Joint Surg Br 1982;64:349–356.
7. Komenda GA, Myerson MS, Biddinger KR. Results of arthrodesis of the tarsometatarsal joints after traumatic injury. J Bone Joint Surg Am 1996;78:1665–1676.
8. Kuo RS, Tejwani NC, Digiovanni CW, Holt SK, Benirschke SK, Hansen Jr ST, Sangeorzan BJ. Outcome after open reduction and internal fixation of Lisfranc joint injuries. J Bone Joint Surg Am 2000;82:1609–1618.
9. Lewis C, Mauffrey C, Dickenson E. Open reduction and internal fixation compared with primary arthrodesis of Lisfranc injuries: a systematic review of the literature. Curr Orthop Pract 2012;23:595–600.
11. Henning JA, Jones CB, Sietsema DL, Bohay DR, Anderson JG. Open reduction internal fixation versus primary arthrodesis for Lisfranc injuries: a prospective randomized study. Foot Ankle Int 2009;30:913–922.
12. Ly TV, Coetzee JC. Treatment of primarily ligamentous Lisfranc joint injuries: primary arthrodesis compared with open reduction and internal fixation. J Bone Joint Surg Am 2006;88:514–520.
14. Qiao YS, Li JK, Shen H, Bao HY, Jiang M, Liu Y, Kapadia W, Zhang HT, Yang HL. Comparison of arthrodesis and non-fusion to treat Lisfranc injuries. Orthop Surg 2017;9:62–68.
15. Smith N, Stone C, Furey A. Does open reduction and internal fixation versus primary arthrodesis improve patient outcomes for Lisfranc trauma? a systematic review and meta-analysis. Clin Orthop Relat Res. 2016;474:1445–1452.