Grade 3 Lisfranc Ligament Sprain Treated with a Single Screw Internal Fixation in a 21-year-old Male Football Athlete: A Case Study

Rouleau, N.: Springfield College Athletic Training Program
Springfield, Massachusetts

Background Information

- The Lisfranc ligament complex acts as a stabilizer for the arch and aids in transferring force from the ankle to the forefoot as well as maintain anatomical alignment between the tarsals and metatarsals (1)
- Lisfranc ligament (LL) sprains occur from a low-velocity indirect force while in ankle is in a plantarflexed position (1)
- A Grade 3 sprain of the LL is typically characterized by tenderness to palpation at the tarsometatarsal joint and the first and second metatarsal. (2)
- Grade 2 and 3 Lisfranc sprains are treated surgically with an internal fixation followed by medial arch training whereas grade 1 sprains are treated conservatively (1)

Figure 1: Highlighted lisfranc ligament and anatomy
Retrieved from https://www.theinjurysource.com/post/lisfranc

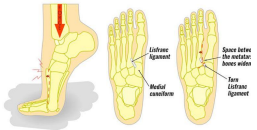

Figure 2: Diagram of Lisfranc Mechanism and Anatomy
Retreived from https://www.sportsinjuryclinic.net/sport-injuries/foot/midfoot-pain/lisfrancs-injury

Case Presentation

- 21-year-old male football athlete complained of pain in the midfoot following a game in 2019.
- The patient reported sharp pain in the left foot following a play in which his plantar flexed ankle was rolled on by an opposing player.
- Initial x-rays revealed no separation of the lisfranc complex
- Weightbearing x-rays revealed a 3 millimeter diastasis of the first and second metatarsal
- The chosen surgical intervention utilized a single drilled screw thru the medial cuneiform and 2nd metatarsal

Intervention

- Surgically drilled screws were used to pin the medial cuneiform to the second metatarsal as well as pinning of a plate
- Use of walking boot or cast for 6-12 weeks took place in accordance to the literature (1)
- Failure of the screw lead to conservative exercise plan aided with custom orthotics to support the medial arch
- Patient will undergo medial arch training as well as a gait progression

Conclusion

- Full recovery allowing return to sport may take place 9-27 weeks post injury (2)
- The use of an internal fixation followed by arch training is supported in the literature for the care of grade 3 LL sprains (1)

Diagnostic Imaging

- The patient received x-rays throughout the treatment duration

Figure 3: Patient pre-surgical Weight Bearing X-ray

Figure 4:Patient postsurgical intact fixated screw & plate

Figure 5: Patient postsurgical broken screw & plate

Clinical Bottom Line

- The chosen surgical intervention had the possibility to fail therefore a more thorough surgical method should be explored
- Internal fixations of the lisfranc complex commonly utilize multiple plates and fixated screws (1)
- Exercise rehabilitation will be needed whether or not a surgical approach is taken
- Rarity of this injury leads lisfranc ligament sprains as one of the most misdiagnosed foot injuries (4)
- Secondary weight bearing imaging is necessary to ensure the presence of a lisfranc ligament sprain (3)

Figure 6: Multi screw internal fixation of lisfranc complex
Retrieved from https://www.braceability.com/collections/lisfranc-injury-treatment

References

Nunley, J., & Vertullo, C. (2002). Classification, investigation, and management of midfoot sprains: lisfranc injuries in the athlete. *American Journal of Sports Medicine, 30*(6), 871-878. (1)

Spapiro, M., Wascher, D., & Finerman, G. (1994(. Rupture of lisfranc's ligament in athletes. *American Journal of Sports Medicine, 22,* 687-691. *(2)*

Goossens, M., Connell, D., & Nockos, D. (1990). CT evaluation of tarsometatarsal fracture-dislocation injuries. American Journal of Roentgenology, 5, 154-162. (3)

Kalraiya, A., Vanhegan, I., Cheung, A., % Rudge, B.(2014). A rare lisfranc-type injury involving dorsal dislocation of the intermediate cuneiform. *British Medical Journal, 1,* 1-10 (4)

SPRINGFIELD COLLEGE