

Lisfranc Injuries Often Missed and Poorly Managed



Simran Shah (Physiotherapist)
BPHTY (Hons)
Masters of MSK candidate

**Between 20-30% of Lis Franc
Injuries are initially missed.**

**What can we do not to add to that
%?**

It's not a LisFranc Injury, It's Just A



Midfoot sprain

Navicular or cuboid fracture

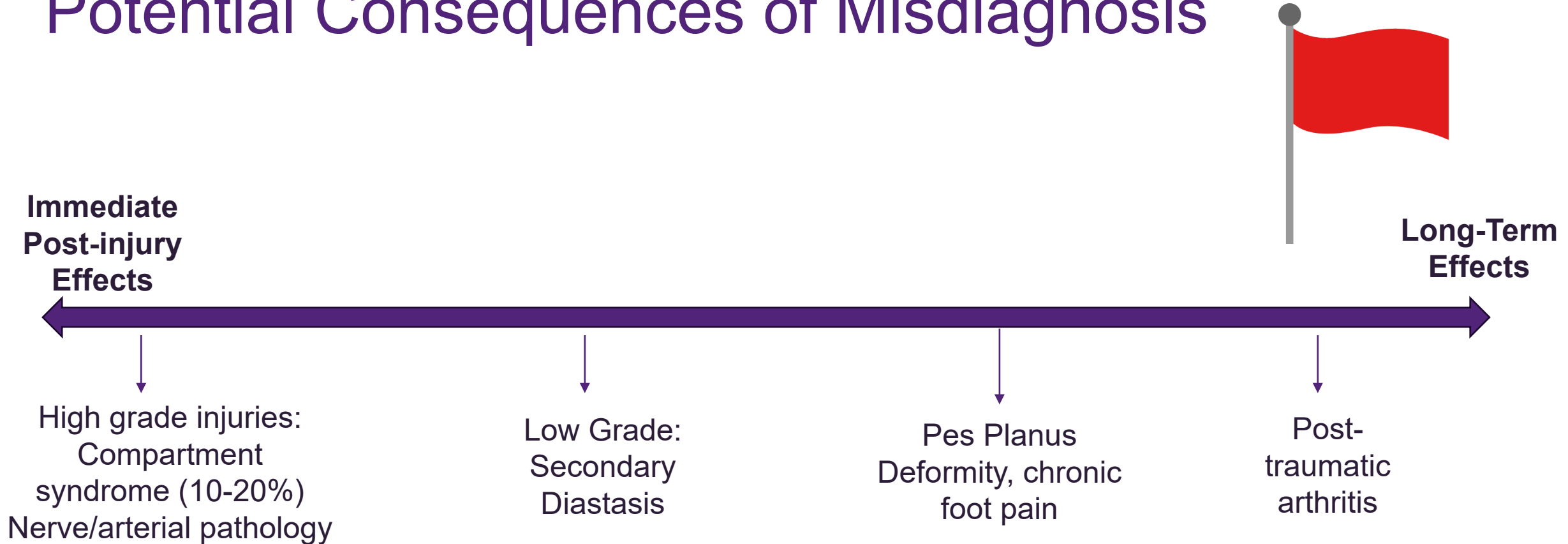
Tibialis Posterior Injury

Isolated Metatarsal fractures

High-grade lateral ankle sprain

(Reischl et al 2006)

Potential Consequences of Misdiagnosis

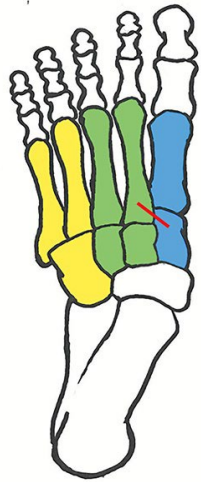


(Graef et al 2021, Mayich et al 2012, Moracia-Ochagavia 2019, RACGP 2017)

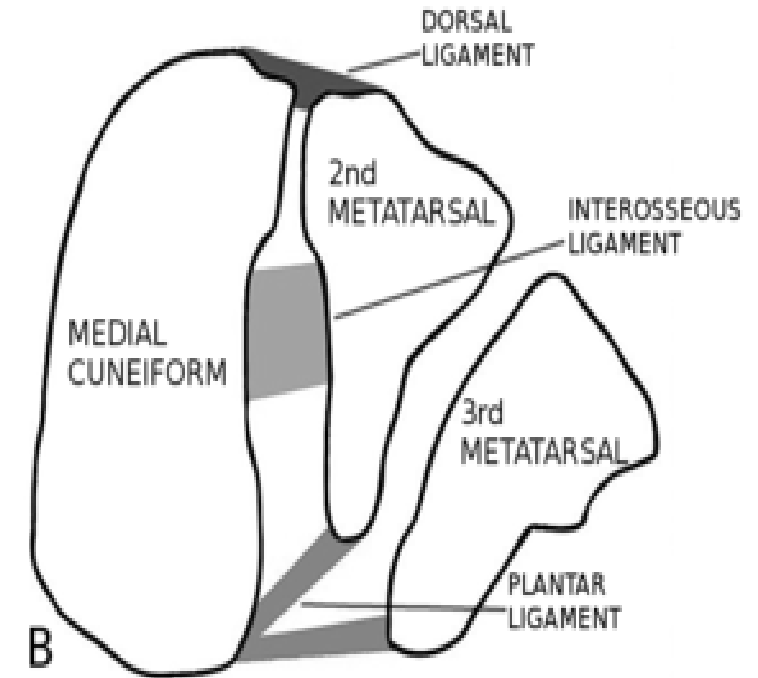
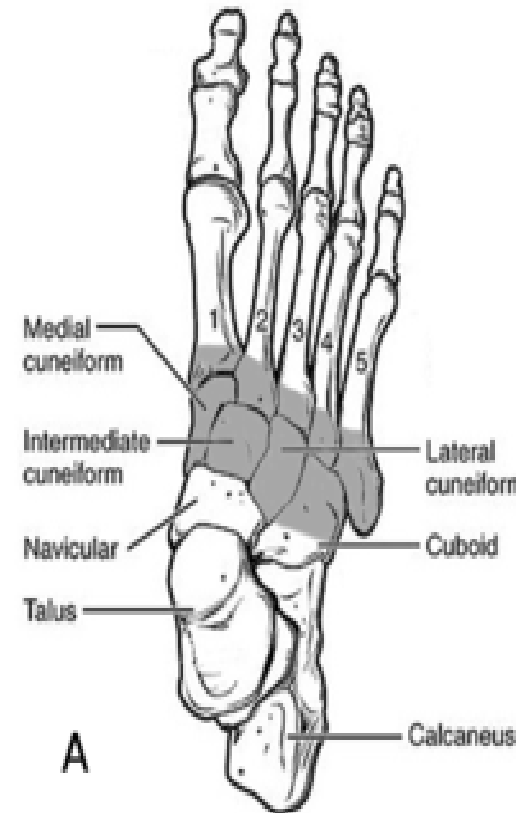
Lis Franc Joint and Ligamentous Complex Anatomy

3 Longitudinal Columns:

- Medial: Medial cuneiform, 1st metatarsal (blue)
- Central: Intermediate/lateral cuneiform, 2-3rd metatarsal (green)
- Lateral: Cuboid, 4-5th metatarsal (yellow)

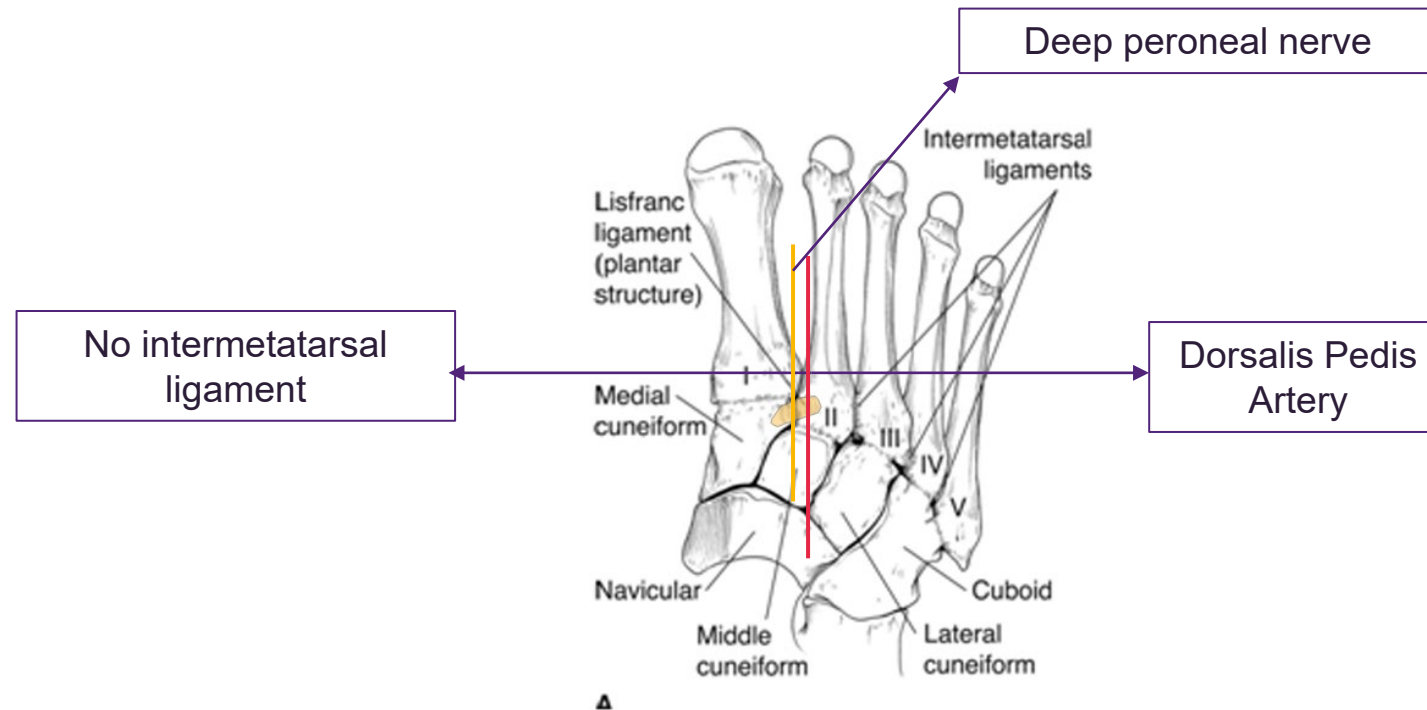


(RACGP, 2017)



(Buchanan et al, 2023)

Key Anatomical Considerations



Purpose:

- ❖ Stabilization of arch for push-off phase during gait
- ❖ Transfers loads from lower leg i.e. calf – foot walk/running

(Buchanan et al, 2023)

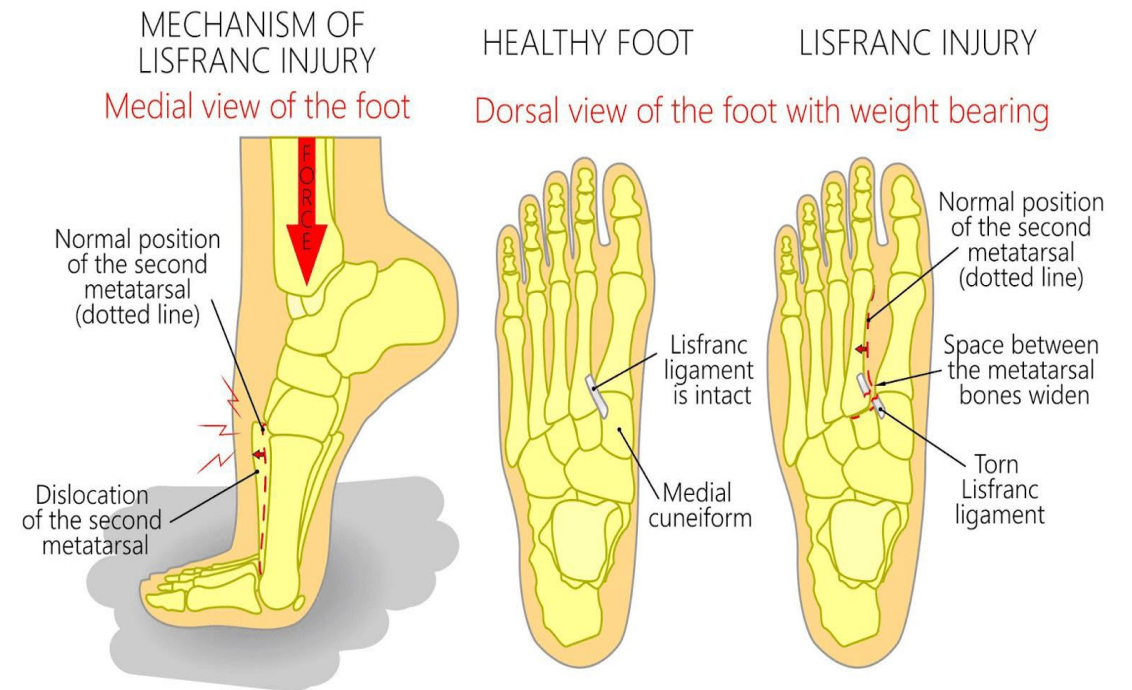
Mechanism of Injury

1. Low-energy Lisfranc Injury

- ❖ Pushing off and impact pressure to midfoot
- ❖ Most common in high-impact sports
- ❖ 30-40% of Lisfranc injuries

2. High-energy Lisfranc Injury

- ❖ Trauma-related i.e. MVA
- ❖ 60-70% of Lis Franc injuries



(Buchanan et al, 2023)

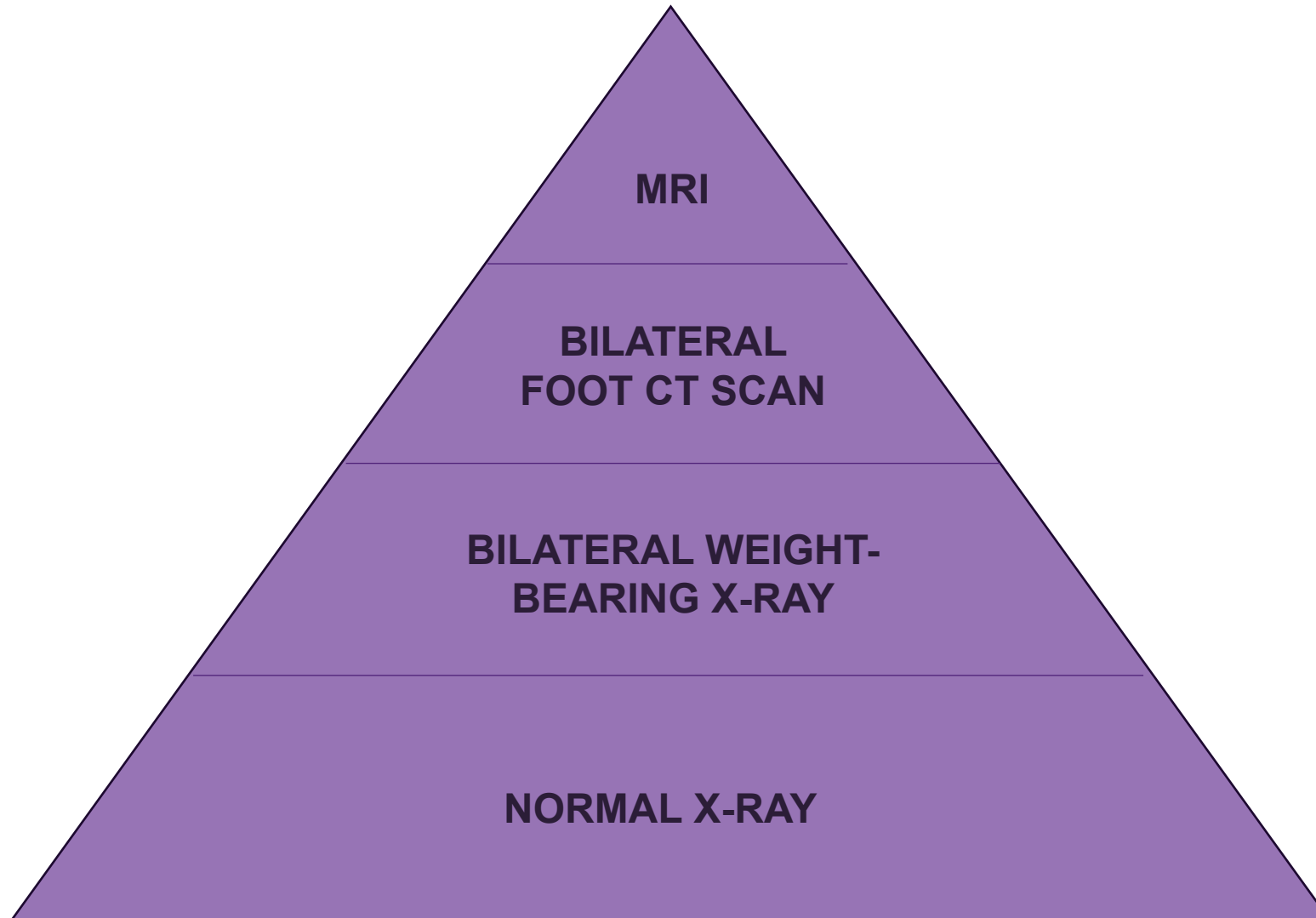
Key Examination Signs

Patient Interview	Physical Exam
Difficulty weight-bearing	Tender on palpation @ proximal 1-2IM space
Oedema/swelling over dorsal foot	Compression across width of foot
Plantar midfoot ecchymosis	*Piano key test
Midfoot pain	



(Buchanan 2023, Carter et al 2023, Chen et al 2020, Moracia-Ochagavia 2019, Rossi et al 2021)

Imaging – What should we refer for?



(Falcon et al
2023,
Ponkilainen et al
2020, Seow et
al 2023)

***Radiologist report:**

Normal anatomical alignment and symmetry of the tarso-metatarsals



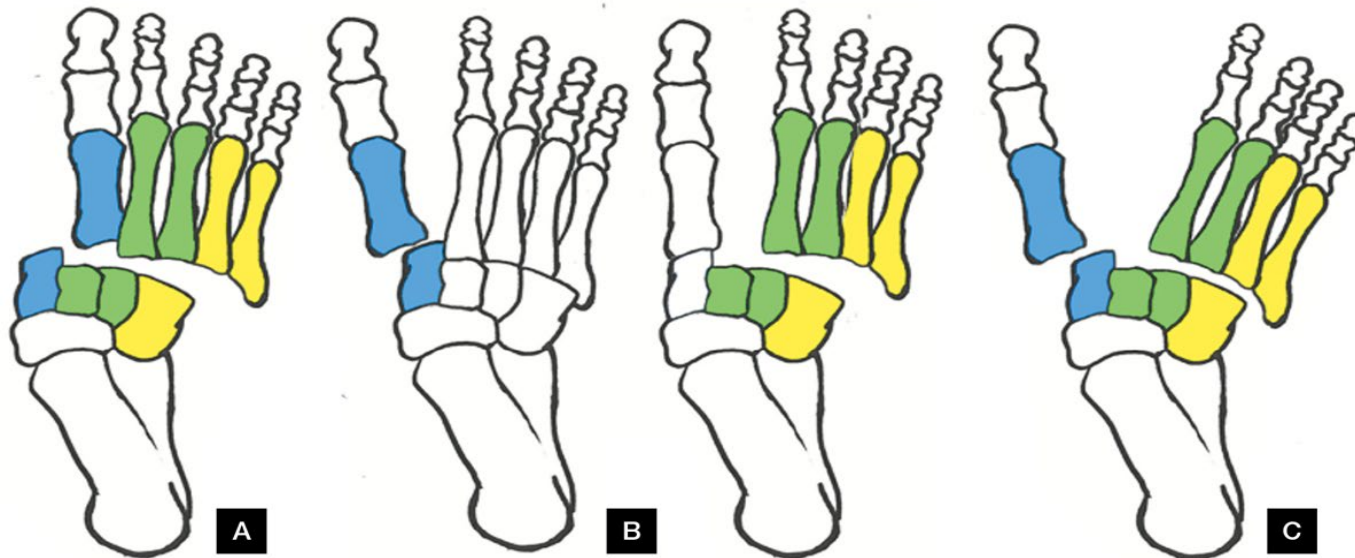
Relevant finding:
Widening of the 1st/2nd
metatarsal which subtly
extends to medial and
intermediate cuneiform

***Need to flag suspicion
of LisFranc in referral
details**



Hardcastle & Myerson Classification System

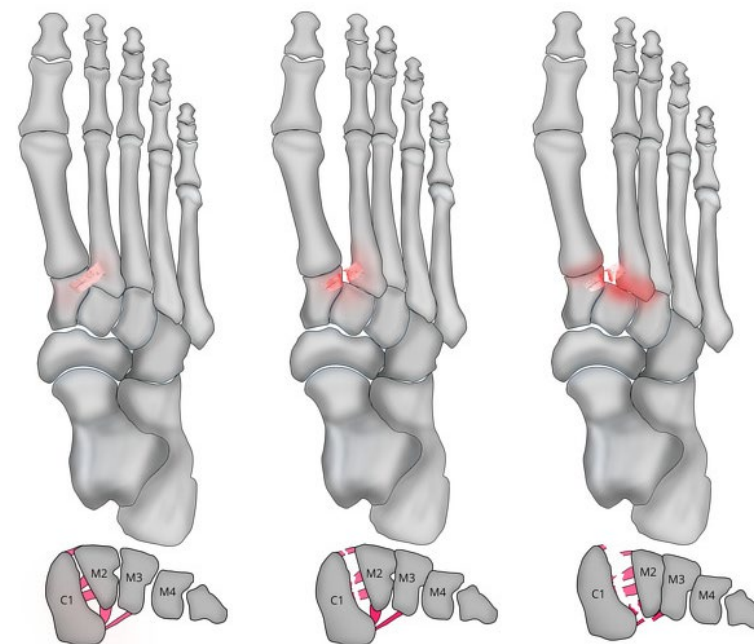
Type	Severity of Injury
A	Complete homolateral dislocation
B1	Partial injury, medial column dislocation
B2	Partial injury, lateral column dislocation
C1	Partial injury, divergent dislocation
C2	Complete injury, divergent dislocation



(Mahmoud et al 2015,
RACGP 2017)

Nunley & Vertullo Classification System

Stages	Severity of Injury	Treatment
1	Sprain to Lisfranc ligament No diastasis or <2mm	Conservative
2	Ruptured Lisfranc ligament 2-5mm diastasis (1 st CN-2 nd met)	Surgical
3	Ruptured Lisfranc ligament >5mm diastasis Loss of midfoot arch height	Surgical



(Nunley/Vertullo 2002,
RACGP 2017)

What Does Management Involve?

Conservative:

- 0-6 weeks = Non-weight bearing
- 7-12 weeks = Weight-bearing in boot
- >12 weeks = walk in shoes with custom orthotic
- 12-18 months = return to sport/high impact activities

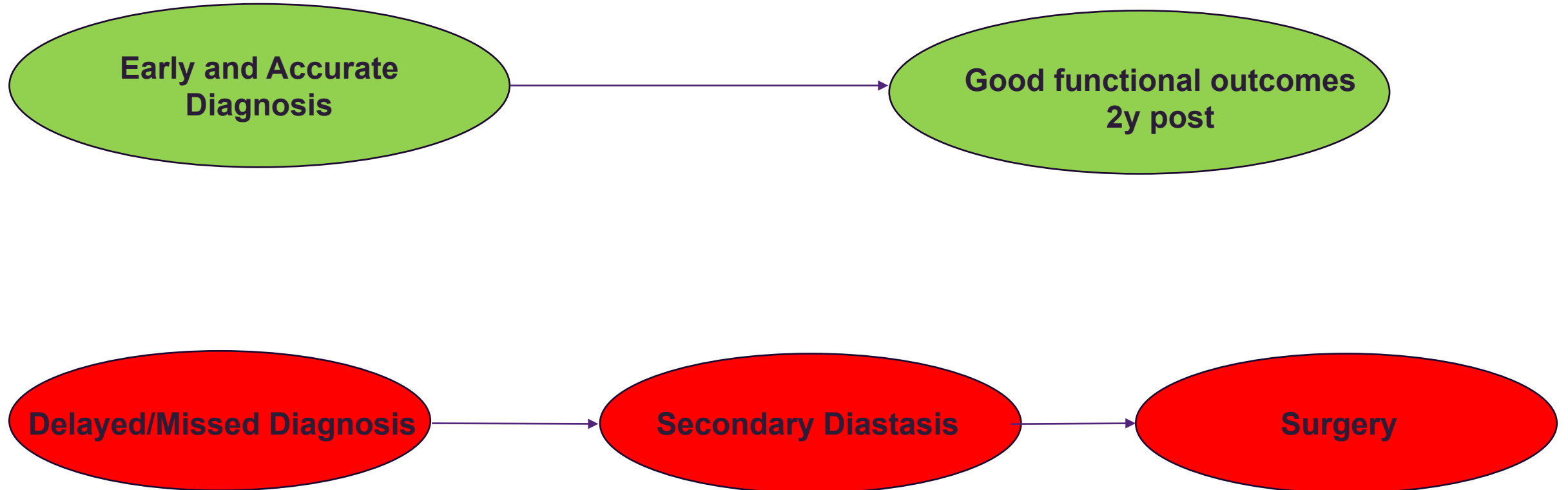
Surgical:

- ORIF (removal of hardware after 3-6m)
- Midfoot Fusion

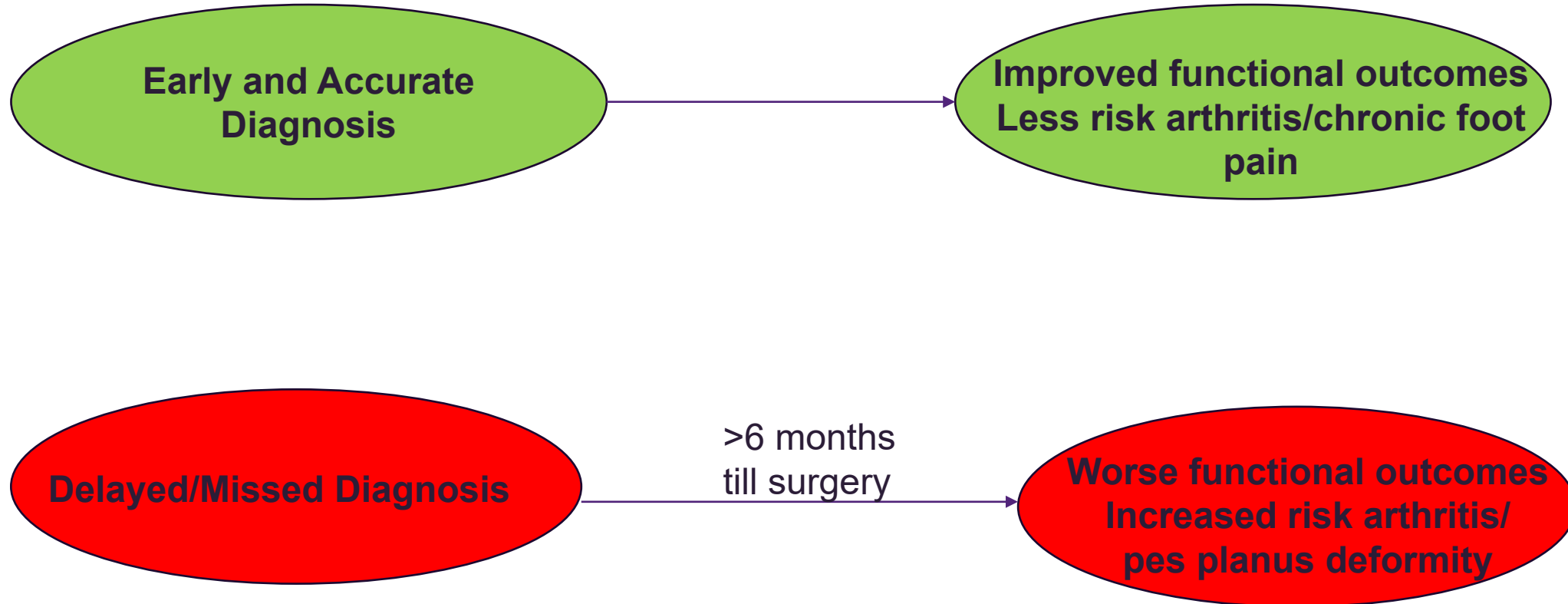


(Chen et al 2020, Guerreiro, 2023, Ren 2019)

Conservative Management Prognosis

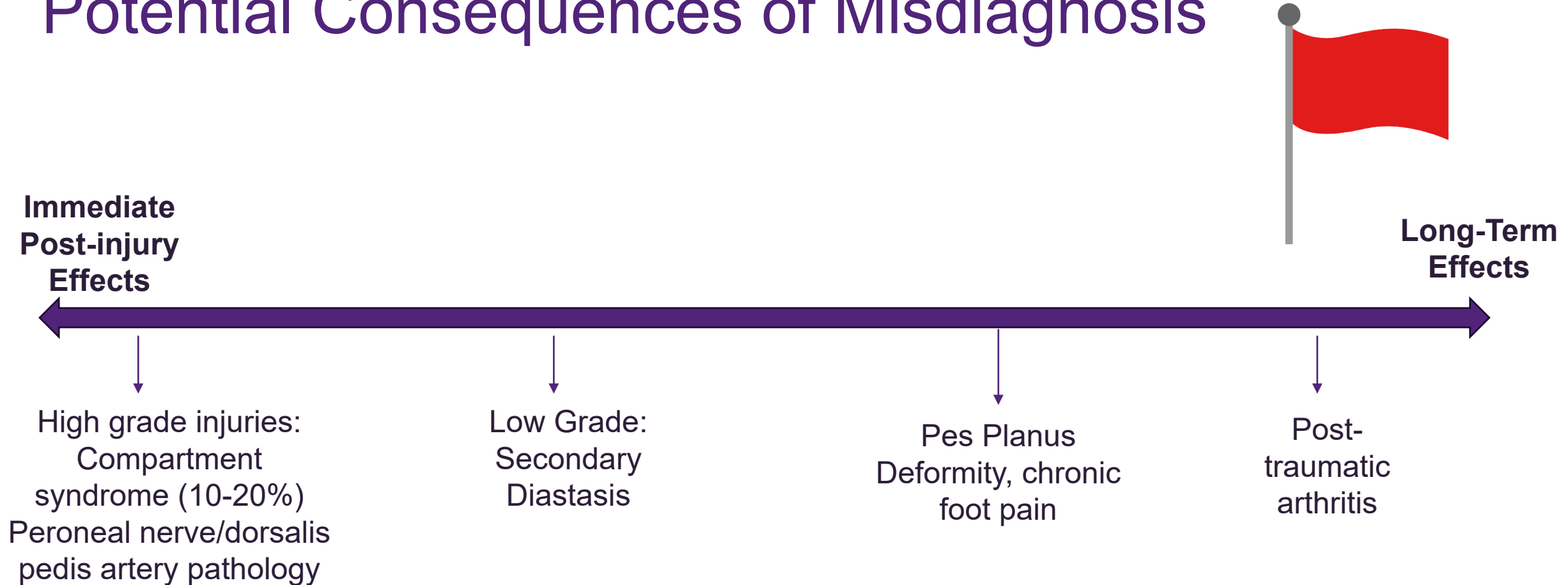


Surgical Management Prognosis



(Buchanan et al 2023,
Chen et al 2020)

Potential Consequences of Misdiagnosis



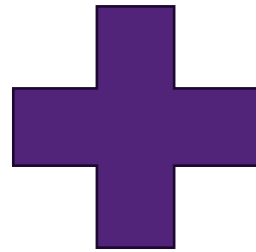
Take Home Message!



***LIS FRANC = LIGAMENTS + JOINTS + BONES**

Signs (some or all):

- Plantar foot ecchymosis
- Midfoot pain/dorsal swelling
- Pain palpation of midfoot
- MOI



IMAGE!
MRI is best
CTs/X-rays
(WB + bilateral)



**EARLY
DIAGNOSIS**
Best outcome for
patients



Questions?



References

1. Buchanan BK, Donnally III CJ. Lisfranc Dislocation. [Updated 2023 Dec 13]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK448147/>
2. Carter, TH, Heinz, N, Duckworth, AD, White, TO & Amin, AK 2023, 'Management of Lisfranc Injuries: A Critical Analysis Review', JBJS Reviews, vol. 11, no. 4, e22.00239. <https://doi.org/10.2106/JBJS.RVW.22.00239>
3. Chen J, Sagoo N, Panchbhavi VK. The Lisfranc Injury: A Literature Review of Anatomy, Etiology, Evaluation, and Management. *Foot & Ankle Specialist*. 2021;14(5):458-467. doi:[10.1177/1938640020950133](https://doi.org/10.1177/1938640020950133)
4. Chen P, Ng N, Snowden G, Mackenzie SP, Nicholson JA, Amin AK. Rates of Displacement and Patient-Reported Outcomes Following Conservative Treatment of Minimally Displaced Lisfranc Injury. *Foot Ankle Int*. 2020 Apr;41(4):387-391. doi: 10.1177/1071100719895482. Epub 2019 Dec 17. PMID: 31847592
5. Feng P, Li YX, Li J, Ouyang XY, Deng W, Chen Y, Zhang H. Staged Management of Missed Lisfranc Injuries: A Report of Short-term Results. *Orthop Surg*. 2017 Feb;9(1):54-61. doi: 10.1111/os.12320. PMID: 28371497; PMCID: PMC6584157
6. Graef J, Tsitsilonis S, Niemann M, Gehlen T, Nadler P, Graef F. Retrospective analysis of treatment decisions and clinical outcome of Lisfranc injuries: operative vs. conservative treatment. *Int Orthop*. 2021 Dec;45(12):3213-3219. doi: 10.1007/s00264-021-05135-w. Epub 2021 Aug 6. PMID: 34357433; PMCID: PMC8626366
7. Guerreiro F, Abdelaziz A, Ponugoti N, Marsland D. Nonoperative management of lisfranc injuries - A systematic review of outcomes. *Foot (Edinb)*. 2023 Mar;54:101977. doi: 10.1016/j.foot.2023.101977. Epub 2023 Feb 11. PMID: 36841140
8. Mahmoud S, Hamad F, Riaz M, Ahmed G, Al Ateeq M, Ibrahim T. Reliability of the Lisfranc injury radiological classification (Myerson-modified Hardcastle classification system). *Int Orthop*. 2015 Nov;39(11):2215-8. doi: 10.1007/s00264-015-2939-8. Epub 2015 Jul 30. PMID: 26224617
9. Mayich DJ, Mayich MS, Daniels TR. Effective detection and management of low-velocity Lisfranc injuries in the emergency setting: principles for a subtle and commonly missed entity. *Can Fam Physician*. 2012 Nov;58(11):1199-204, e620-5. PMID: 23152455; PMCID: PMC3498011
10. Moracia-Ochagavía I, Rodríguez-Merchán EC. Lisfranc fracture-dislocations: current management. *EFORT Open Rev*. 2019 Jul 2;4(7):430-444. doi: 10.1302/2058-5241.4.180076. PMID: 31423327; PMCID: PMC6667981
11. Nunley JA, Vertullo CJ. Classification, investigation, and management of midfoot sprains: Lisfranc injuries in the athlete. *Am J Sports Med*. 2002 Nov-Dec;30(6):871-8. doi: 10.1177/03635465020300061901. PMID: 12435655

References cont.

1. Ponkilainen VT, Partio N, Salonen EE, Riuttanen A, Luoma EL, Kask G, Laine HJ, Mäenpää H, Päiväniemi O, Mattila VM, Haapasalo HH. Inter- and intraobserver reliability of non-weight-bearing foot radiographs compared with CT in Lisfranc injuries. *Arch Orthop Trauma Surg.* 2020 Oct;140(10):1423-1429. doi: 10.1007/s00402-020-03391-w. Epub 2020 Mar 5. PMID: 32140830; PMCID: PMC7505866
2. Practitioners, T.R.A.C. of general (2017). *Lisfranc injuries*. [online] Australian Family Physician. Available at: <https://www.racgp.org.au/afp/2017/march/lisfranc-injuries>.
3. Reischl SF, Noceti-DeWit LM. Current concepts of orthopaedic physical therapy. 2nd edition. Alexandria: Orthopaedic Section, APTA, 2006
4. Ren W, Li HB, Lu JK, Hu YC. Undisplaced subtle ligamentous Lisfranc injuries, conservative or surgical treatment with percutaneous position screws? *Chin J Traumatol.* 2019 Aug;22(4):196-201. doi: 10.1016/j.cjtee.2019.03.005. Epub 2019 May 27. PMID: 31235287; PMCID: PMC6667927
5. Renninger CH, Cochran G, Tompane T, Bellamy J, Kuhn K. Injury Characteristics of Low-Energy Lisfranc Injuries Compared With High-Energy Injuries. *Foot & Ankle International.* 2017;38(9):964-969. doi:[10.1177/1071100717709575](https://doi.org/10.1177/1071100717709575)
6. Rossi M, George F. Wallace, The piano key test: When and How, a survey, *Foot & Ankle Surgery: Techniques, Reports & Cases*, Volume 1, Issue 2, 2021, 100022, ISSN 2667-3967, <https://doi.org/10.1016/j.fastrc.2021.100022>
7. Seow, D., Yasui, Y., Chan, L. *et al.* Inconsistent radiographic diagnostic criteria for lisfranc injuries: a systematic review. *BMC Musculoskelet Disord* **24**, 915 (2023). <https://doi.org/10.1186/s12891-023-07043-z>
8. Sherief TI, Mucci B, Greiss M. Lisfranc injury: how frequently does it get missed? And how can we improve? *Injury.* 2007 Jul;38(7):856-60. doi: 10.1016/j.injury.2006.10.002. Epub 2007 Jan 9. PMID: 17214988
9. Singh A, Lokikere N, Saraogi A, Unnikrishnan PN, Davenport J. Missed Lisfranc injuries-surgical vs conservative treatment. *Ir J Med Sci.* 2021 May;190(2):653-656 doi: 10.1007/s11845-020-02364-7.
10. Sobrado MF, Saito GH, Sakaki MH, Pontin PA, Santos ALGD, Fernandes TD. EPIDEMIOLOGICAL STUDY ON LISFRANC INJURIES. *Acta Ortop Bras.* 2017 Jan-Feb;25(1):44-47. doi: 10.1590/1413-785220172501168995. PMID: 28642650; PMCID: PMC5474402

Contact

Simran Shah

BPHTY(Hons)

Email: Simran.shah@uqconnect.edu.au

