SPORT LISFRANC JOINT INJURIES

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Jacques Lisfranc (1790-1847) field surgeon in Napoleon’s army.

Described an amputation through the tarsometatarsal articulation of the foot secondary to gangrene that developed after injury when a soldier fell off a horse with their foot still engaged in the stirrup.
- **Lisfranc’s joint** commonly describes the tarsometatarsal joint.

- **Lisfranc’s ligament** describes the ligamentous attachments of the second metatarsal base to the medial cuneiform.
Dorsal Lisfranc’s Joint Ligaments

- Transverse ligaments join all the metatarsal bases except the first and second.
Plantar Lisfranc’s Joint Ligaments

- Soft tissue support along the plantar foot is extensive and abundant but relatively sparse along the dorsal surface leaving it weaker and more vulnerable to injury.
- The second metatarsal is the “keystone” to the Lisfranc’s joint.
Mechanisms of Lisfranc Injuries

- Commonly described as an injury occurring with the ankle and foot in a fixed or locked in plantarflexion.
- Axial load drives the metatarsal base regions dorsally through the weaker area of the Lisfranc’s joint.
Axial loading mechanisms on a plantarflexed foot
Sports Lisfranc Injury Mechanism

- Not mediated by contact or axial loading.
- Subtle twisting injury with the forefoot abducted on the rearfoot.
- Purely ligamentous injury.
Injury Pattern in Ligamentous Lisfranc Injuries in Competitive Athletes.

Porter DA¹, Barnes AF¹, Rund A¹, Walrod MT¹.

METHODS:
Eighty-two patients (64 males, 18 females) sustained an unstable Lisfranc injury (49 left, 33 right) and met inclusion criteria. Injuries were classified as traditional dislocation (TRAD, first to second TMT ligament tear), medial column dislocation (MCD, second TMT, and medial-middle cuneiform ligament tear), or proximal extension dislocation (PE, first, second, and medial-middle cuneiform ligament tear) and the injury pattern confirmed at surgery. All athletes underwent open reduction with internal fixation (ORIF) of each unstable midfoot segment. Fisher exact tests and 2-tailed t tests were used to analyze statistical significance according to injury pattern, sport, gender difference, hindfoot angle alignment, and injured side (P < .05).

RESULTS:
Average age of athletes was 21.0 ± 5.3 years old (range 12-40), and return to sports was 7.5 ± 2.1 months. Injury distribution was as follows: TRAD (n = 40), MCD (n = 17), and PE (n = 23). MCD trended toward a longer return to sport (8.4 ± 3.3 months, P = .074). Football was the most common sport at time of injury (n = 48). Wakeboard athletes (n = 5) were older (31.4 ± 3.2, P = .0002), and MCD tears were more prevalent among them (P = .061). Basketball (n = 13) players were significantly younger (19.1 ± 2.5 years, P = .028) and returned to sports quicker (5.2 ± 0.7, P = .0002). Return to sport data indicated a typical population for athletes with Lisfranc injury in these sports.

CONCLUSION:
Proximal extension disruption (intercuneiform ligament tear) occurred in 50% of these low-energy Lisfranc athletic injuries. MCD and PE may be more prevalent than previously understood. This is the first study to document the extent, pattern, and prevalence of associated intercuneiform ligament tears in the competitive athlete with a low-energy subtle, unstable Lisfranc injury.

LEVEL OF EVIDENCE:
Level IV, retrospective case series.
Clinical Signs

- Pain
- Swelling
- Bruising
- Deformity
- Inability to pushoff
X-Ray Findings

- **AP** – 1\textsuperscript{st} and 2\textsuperscript{nd} tarsometatarsal joints, medial and intermediate cuneiform joints, naviculocuneiform joints ("fleck sign", joint incongruity, additional fractures of navicular, toes, and metatarsals).

- **Oblique** – 2\textsuperscript{nd}, 3\textsuperscript{rd}, 4\textsuperscript{th}, and 5\textsuperscript{th} tarsometatarsal joints (joint congruity and associated fractures especially of the cuboid).

- **Lateral** – 1\textsuperscript{st} and 2\textsuperscript{nd} tarsometatarsal joints, cuboid, and navicular.
Normal Lisfranc joint

Displaced Lisfranc Joint Injury

Weight Bearing Images Are Important
CT SCAN

- More useful with delayed presentation, extensive injury and reconstructive planning.
MRI is very useful in subtle injuries
49-year-old female for evaluation of generalized pain in the right foot after falling in her bedroom.
✔️ Probe is able to easily placed through Lisfranc ligament but not the intercuneiform joint. 1\textsuperscript{st} and 3\textsuperscript{rd} tarsometatarsal joints are unstable.
Post op SPORT (purely ligamentous) Lisfranc Injury

- Non-weight bearing splint 2 weeks
- Non-weight bearing in removable cast 4-6 weeks with removable cast
- Can start off weight bearing ROM, pool therapy after two weeks
- Partial weight bearing in removable cast for an additional 6 weeks with arch support
- Gradual transition to shoes and activity after about 12 weeks
- May need hardware removal 4-6 months (12 months in non-athlete and if symptomatic)
- Return to practice 12-16 weeks

- Nunley (The Event 2014)
- Anderson (Alabama Orthopedic Society)
RESULTS:
Postoperatively, 31 patients (94%) were able to return to some form of sport. Twenty-two patients (66%) returned to playing sport at or above their preinjury level. Of the 11 patients who played less sport, 6 had ongoing pain, and the remaining 5 were asymptomatic but were participating less frequently because of other lifestyle reasons. In addition, of the 33 patients, 11 (33%) had some degree of ongoing pain that might limit their ability to return to sports and physical activities. There was strong correlation between overall FAOS and the Sports Questionnaire.

CONCLUSION:
Most patients who sustained a Lisfranc injury could return to sport and physical activity after ORIF. Patients should be counseled preoperatively that about 1 in 3 might experience continued pain at the injury site

Level IV, retrospective case series.
Return to Sports and Physical Activities After Primary Partial Arthrodesis for Lisfranc Injuries in Young Patients.

MacMahon A1, Kim P1, Levine DS1, Burket J2, Roberts MM1, Drakos MC1, Deland JT1, Elliott AJ1, Ellis SJ3.

RESULTS:
Patients participated in 29 different and 155 total physical activities preoperatively, and 27 different and 145 total physical activities postoperatively. Preoperatively, 47.1% were high impact, and postoperatively, 44.8% were high impact. The most common activities were walking, bicycling, running, and weightlifting. Compared to preoperatively, difficulty was the same in 66% and increased in 34% of physical activities. Participation levels were improved in 11%, the same in 64%, and impaired in 25% of physical activities. Patients spent on average 4.2 (range, 0.0 to 19.8) hours per week exercising postoperatively. In regard to return to physical activity, 97% of respondents were satisfied with their operative outcome. Mean postoperative FAOS subscores were significantly worse for patients who had increased physical activity difficulty.

CONCLUSION:
Most patients were able to return to their previous physical activities following primary partial arthrodesis for a Lisfranc injury, many of which were high-impact. However, the decreased participation or increase in difficulty of some activities suggests that some patients experienced postoperative limitations in exercise. Future studies could compare sports outcomes between primary partial arthrodesis and open reduction internal fixation for Lisfranc injuries.

LEVEL OF EVIDENCE:
Level IV, retrospective case series.
Return to Sports and Physical Activities After Primary Partial Arthrodesis for Lisfranc Injuries in Young Patients

Aofie MacMahon, BA, Paul Kim, MD, David S. Levine, MD, Jayme Burket, PhD, Matthew M. Roberts, MD, Mark C. Drakos, MD, Jonathon T. Deland, MD, Andrew Elliot, MD, and Scott J. Ellis, MD
Outcomes of Lisfranc Injuries in the National Football League

Kevin Jude McHale, MD,1 Joshua Rozell, MD,1 Andrew Milby, MD,1 James L. Carey, MD, MPH,2 and Brian J. Sennett, MD2

Data on National Football League (NFL) players who sustained a Lisfranc injury during a ten-year time period (2000-2010). Variables included age, experience, position, and operative vs. non-operative management.

28 NFL athletes in the study period, including 11 offensive players and 17 defensive players.

While 2 of 28 (7.1%) players never returned to the NFL, the remaining 26 (92.9%) athletes returned to competition at a median 11.1 months from time of injury. Players treated non-operatively were noted to have an earlier return to play.

Analysis of pre- and post-injury athletic performance revealed no statistically significant changes following return to sport after Lisfranc injury. Conclusion:

Greater than 90% of NFL athletes who sustained Lisfranc injuries returned to play in the NFL at a median 11.1 months from time of injury. Operative treatment was associated with a longer time to return; however, this is a potential surrogate for greater injury severity. Offensive and defensive players experienced a decrease in performance after return from injury that did not reach statistical significance when compared to their respective control groups over a similar time period.
SUMMARY

- Sport Lisfranc Mechanism with increasing incidence.
- Missed diagnosis could result in significant disability.
- Weight bearing x-rays bilateral.
- MRI helpful if in question.
- Surgery does not always equate to complete pain relief and return to activity.