

Tarsometatarsal Joint Sprain

ICD-9: 845.11 sprain of tarsometatarsal joint

Description: The tarsometatarsal (TMT) joint, or the Lisfranc joint complex, involves the articulations of the forefoot and the midfoot. The first through third metatarsals articulate with corresponding cuneiforms. The fourth and fifth metatarsals articulate with the cuboid. Transverse ligaments join each metatarsal head, however, there is no transverse ligament between base of the 1st and 2nd metatarsal.

Etiology: A Lisfranc injury indicates an injury to the normal alignment of the cuneiforms and metatarsal joints with loss of their normal spatial relationships. The most common injury to the Lisfranc joint occurs at the joint involving the 1st and 2nd metatarsals and the medial cuneiform. In athletes, injury typically is due to an axial load sustained with foot plantarflexed and slightly rotated. If the ligaments between the medial and mid cuneiforms are disrupted, or between the 1st, 2nd metatarsals and the medial cuneiform, then the bones separate and the normal alignment of the joints is lost. When recognized, this injury may be treated surgically and has a much better prognosis than when it is not diagnosed. True Lisfranc sprains (with disruption of Lisfranc's ligament), are most often due to high-energy trauma (e.g., motor vehicle accidents) rather than from sporting events. Lisfranc joint injury should be suspected when the mechanism of injury is consistent as described above and soft tissue edema or pain in the foot persists five or more days after the initial injury

Physical Examinations Findings (Key Impairments)

Acute Stage / Severe Condition

- Pain with functional movements and activities
- Inability to bear weight while standing on tiptoe
- Inability to squat due to joint instability
- Decreased range of motion
- Pain and swelling in the midfoot (typically in the dorsum) with tenderness along Lisfranc's joint
- Tenderness with passive abduction and pronation of forefoot with fixed hindfoot
- Dorsalis pedis pulse may be diminished or absent
- Gross subluxation or lateral deviation of the forefoot is rare but muscle guarding and weakness is common
- Always consider and assess, if appropriate, for compartment syndrome of the foot

Sub Acute Stage / Moderate Condition

As above with the following differences

- Moderate pain and swelling
- The symptoms and functional range of motion will improve as the stability of the joint and closure of the diastasis is resolved.

Settled Stage / Mild Condition

As above with the following differences

- Even greater range of motion and ability to squat
- Improved segmental stability is commonly associated with improving symptomatology
- Important to resolve normal joint movement in the surrounding joints

Intervention Approaches / Strategies

Acute Stage / Severe Condition

Sprains of this joint complex must be adequately protected & immobilized until soft tissue healing is complete. Usually 6 weeks in a non-weight bearing straight leg cast to ensure complete healing is recommended.

If a weight bearing anterior-posterior x-ray shows any diastasis at the 2nd metatarsal/medial cuneiform articulation, a closed reduction and percutaneous screw fixation is usually indicated.

Nonoperative Treatment

Mild or moderate sprain – weightbearing radiograph and bone scintigrams show no diastasis

Immobilization: short leg walking cast, a removable short-leg orthotic or a non weight bearing cast is continued for four to six weeks or until symptoms have resolved. The potential for disability following a Lisfranc joint injury justifies the use of a non-weight bearing cast.

After immobilization: ambulation and rehabilitation exercises can be progressed if the symptoms persist up to 2 weeks after rehabilitation has begun, a repeat weight bearing radiograph must be obtained to evaluate the joint articulation for instability and evidence of delayed separation (i.e., disarticulation worsened after weight bearing)

Nonoperative vs. Operative Treatment

The treatment of Lisfranc joint complex fracture/dislocations remains controversial. Some investigators believe that nonoperative management of fractures and fracture-dislocations is ineffective, because the reduction and alignment that occur with casting are lost when soft tissue swelling decreases. Some investigators suggest a displacement of more than 2mm requires open reduction and internal fixation to avoid a poor outcome, especially in athletes. Others report no correlation between the degree of diastasis and the eventual outcome. All studies indicate that timely diagnosis facilitates treatment and decreases long-term disability.

Goal: Restore joint stability and soft tissue healing

Limit effusion

Reduce pain and protect from further injury

- Physical Agents
Electrical stimulation, Ultrasound, Cryotherapy / Ice to provide pain relief, decrease swelling, promote circulation, promote wound healing, and reduce muscle guarding
- Manual Therapy
Soft tissue mobilization. Joint mobilization.
Note: Early mobilization of joints in their midranges following ligamentous injury

can stimulates collagen bundle orientation and promote healing, although full ligamentous strength is not reestablished for several months. Limiting soft tissue effusion speeds healing.

- External Devices (Taping/Splinting/Orthotics)
Immobilization using a short leg walking cast a removable short-leg orthotic or a non weight bearing cast is continued for four to six weeks or until symptoms have resolved. The potential for disability following a Lisfranc joint injury justifies the use of a non-weight bearing cast.
- Re-injury Prevention Instruction
Instruct patient of proper application of non-weight bearing orthotic
Crutch training if necessary to facilitate non-weight bearing ambulation

Sub Acute Stage / Moderate Condition

Goals: Decrease and eliminate pain
Increase pain free range of motion
Limit loss of strength and proprioception

- Approaches / Strategies listed above plus
- Manual Therapy
Joint mobilization of adjacent hypomobile carpal articulation – being careful to not strain the involved, potentially unstable and healing tarsometatarsal articulations
- External Devices (Taping/Splinting/Orthotics)
Midfoot taping and orthotics can be used for support with weight bearing activities
- Therapeutic Exercises
Stretching foot, ankle, and lower extremities – primarily calf musculature
Progress from passive range of motion to active range of motion exercises in dorsiflexion, plantarflexion, inversion, eversion in pain free ranges-add resistance as tolerated
Initiate proprioceptive exercises, such as weight bearing on effected foot, seated BAPS board.

Settled Stage / Mild Condition

Goals: Regain full pain-free motion
Regain normal strength
Regain normal proprioception

- Approaches and strategies listed above plus

- Therapeutic Exercises
 - Gradual return to sport or occupational activities through use of functional progression, such as activity-specific exercise. For example:
 - Running in pool or de-loaded on a treadmill
 - Swimming
 - Gradual progression of functional activities
 - Standing on toes
 - Pushing off on toes
 - Pain free hopping on both legs progressing to single leg
 - Step up on box or stairs
 - Begin Stairmaster, treadmill, biking
 - Initiate running when fast pace walking is pain free
 - Jump rope
 - Squats

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