Lisfranc Injury

Lisfranc injuries describe a class of midfoot injuries (low/high velocity; ligamentous/bony/combination) to the tarsometatarsal (TMT) joint complex (TMT joints, intermetatarsal ligaments, intercuneiform joints) which are difficult to diagnose/categorize but create significant pain, altered gait, midfoot arthritis, and disability if untreated (Beaulieu, 2014; Ebraheim, 2012; Eleftheriou, Rosenfeld, & Calder, 2013; Kriz, Rafferty, Evangelista, Van Valkenburg, & DiGiovanni, 2015; SHCCVideo, 2011).

The cuboid and cuneiforms which form the anterior transverse arch of the foot provide stability with the second cuneiform-metatarsal (base extending farthest proximally into the cuneiform) acting as the keystone for the TMT complex (Beaulieu, 2014; Gallagher, Rodriguez, Andersen, Granberry, & Panchbhavi, 2013). The cuneiform-metatarsal articulations form the three "columns" of the foot from the medial ("first") metatarsal-cuneiform and proceeding laterally (Eleftheriou et al., 2013; Kriz et al., 2015). The tarsal bones "lock" into greater stability during supination (creating a higher longitudinal arch) and "unlock" for greater mobility (widening/splaying of the foot) during pronation (DrGlassDPM, 2012; Sechrest, 2012).

The Lisfranc oblique ligament is the most prominent in the TMT complex (Ebraheim, 2012). Stabilizers include the interosseous ligaments, plantar fascia, peroneous longus, and intrinsic muscles of the foot (Ebraheim, 2012; Eleftheriou et al., 2013). The congruity of these mechanisms are vital for proper foot mechanics as the midfoot transfers forces up/down the kinetic chain (American Academy of Orthopaedic Surgeons, 2011).

Quenu and Kuss classified three patterns of Lisfranc as homolateral, isolated, and divergent; Hardcastle updated Quenu and Kuss; and Myerson classified Lisfranc not only in terms of medial-lateral displacement but also dorsal-plantar (Ebraheim, 2012; Eleftheriou et al., 2013). Greater displacement within the TMT complex indicates a more severe injury.

Lisfranc injuries can be very painful with significant swelling which may aggravate the nerves running into the foot (posterior tibal, sural, superficial peroneal, deep peroneal) (Page, Frank, & Lardner, 2010; Schrest, 2012). Pain leads to muscle imbalance which leads to impaired movement/postural patterns (Page et al., 2010). As previously mentioned, the foot transfers forces up/down the kinetic chain affecting all the muscle slings and major keystone structures from the lower limbs up through the lumbopelvic-hip complex and spine (Page et al., 2010). Lewit and Lepšíková (2012) noted increased neck tension from problems at the feet, and included rehabilitation of the longitudinal arch in addressing dysfunction of the deep stabilization system. Pain/avoidance using the injured foot may lead to favoring a "good side" (e.g. hip-tilt) and without intervention/correction, will alter normal length-tension muscle relationships leading to altered joint forces/function leading to altered proprioception, joint degeneration and deviations from normal posture (Page et al., 2010).

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Gutmann and Vele (as cited in Lewit & Lepšíková, 2012, p. 56) used EMG and noted the significance of the feet even when subjects stood at rest as the greatest activity was shown in muscles involved with moving the foot/toes. Lewit and Lepšíková (2012) noted common feet dysfunction was characterized by trigger points (TrPs) at the sole, restrictions at the Lisfranc complex, disturbed foot mechanics (e.g. arches which may be greatly disturbed by Lisfranc injuries), and dyfunctional sensations/nociception.

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