Classification and Imaging Detection of Low-Energy Lisfranc Injuries with Proximal Injury Patterns

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INTRODUCTION: Low-energy “subtle” Lisfranc injuries are difficult to detect and are often misdiagnosed or missed upon evaluation. There has been a recent increase in studies reporting disruption of the intercuneiform (IC) ligament between the medial and intermediate cuneiform bones in low-energy Lisfranc injuries. Notably, traditional Lisfranc injury classification systems do not account for proximal involvement of the IC ligament. The purpose of this study was to determine the prevalence of proximal IC ligament involvement in low-energy Lisfranc injuries and assess preoperative imaging effectiveness.

METHODS: 80 patients with low-energy Lisfranc tears between April 2014 and October 2022 were intraoperatively classified as having either traditional dislocations (TRAD), proximal (PROX) injuries, or combined (COMB) injuries. All classification patterns included injury to the Lisfranc ligament, with TRAD also including lateral subluxation of the 2nd metatarsal and disruption of the 2nd tarsometatarsal (TMT) joint, PROX also involving the IC complex, and COMB including both the 2nd TMT joint and IC complexes. Preoperative radiographic and magnetic resonance imaging (MRI) studies were reviewed and compared to intraoperative findings to determine sensitivity and specificity for the detection of proximal injury variants. Study outcome measures included patient demographics, Lisfranc injury classification patterns, and radiographic and MRI sensitivity and specificity.

RESULTS: The 80-patient low-energy Lisfranc injury cohort with a mean age at the time of presentation of 32.2 $\pm$ 15.0 years included 41 females and 39 males. The Lisfranc injury pattern distribution included 45 patients (56.3%) with TRAD injuries, 22 patients (27.5%) with PROX injuries, and 13 (16.3%) patients with COMB injuries. Radiographic detection displayed a sensitivity of 56.7% and specificity 90.4%. MRI detection displayed a sensitivity of 63.7% and specificity of 100%.

DISCUSSION AND CONCLUSION: Proximal injuries with IC instability occurred in 43.8% of low-energy Lisfranc cases. Given the low sensitivity of preoperative imaging detection for proximal Lisfranc injuries, surgeons should evaluate IC instability intraoperatively.