Injury Characteristics of Low Energy Lisfranc Injuries Compared with High Energy Injuries

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Introduction/Purpose: Acute Lisfranc joint injuries result from both high-energy and low energy mechanisms and a wide range of bony and soft tissue injury can exist. The literature describing injury patterns in high-energy trauma is well established and has resulted in multiple classification systems, but low energy injury patterns have not been well described. Furthermore, a comparison of high energy and low energy injury patterns is lacking. The objective of this study is to report injury patterns in low energy Lisfranc joint injuries in a tertiary military referral center and compare them to high-energy injury patterns in the same population.

Methods: All surgically managed Lisfranc injuries were identified at a single military tertiary referral center from July 2010 to June 2015. Patient demographics, mechanism of injury, injury pattern, associated injuries, missed diagnosis rates, and clinical course were reviewed. X-rays and CT scans were reviewed to determine detailed injury patterns. Weight bearing x-rays were obtained if instability pattern or surgical indication was in question. High-energy mechanism was defined as motor vehicle crash, motorcycle crash, direct crush, and fall from greater than four feet. Low energy mechanism was defined as athletic activity, ground level twisting, or fall from less than four feet.
**Results:** 82 cases were identified with 33 high-energy (HE) and 49 low-energy (LE). Mean age at time of injury was 28. There were no differences in demographic data, smoking rates, or frequency of missed diagnosis (21% HE v 18% LE). Time to seek care averaged 2 days in the HE group with 85% presenting in less than 24 hours compared to 6 days and 51% in the LE group. HE injuries were more likely to have concomitant non-foot fractures (30% v 4%), concomitant ipsilateral hindfoot or forefoot fractures (55% v 10%), cuboid fractures (39% v 6%), metatarsal base fractures (82% v 39%), displaced intra-articular fractures (70% v 20%), and involvement of all 5 rays (23% v 6%). LE injuries were more commonly ligamentous (57% v 12%), had fewer rays involved (2.6 v 3.8), and more commonly had CT evidence of capsular avulsion (61% v 39%).

**Conclusion:** Low energy mechanisms are a more common cause of Lisfranc joint injury in a military tertiary referral hospital. These mechanisms usually result in isolated injuries that are primarily ligamentous. Rates of missed injury are similar to high-energy groups and this commonly results in delayed treatment. Low energy injuries have fewer fractures and more ligamentous and capsular avulsion injuries.