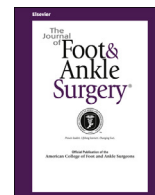




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Case Reports and Series

Surgical Treatment of Lisfranc Injury With Plantar Plate Approach

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ABSTRACT

Midfoot injuries are the second most common athletic foot injury documented in the published data. High-energy Lisfranc dislocations are commonly seen secondary to traumatic etiologies and disrupt the strong midfoot ligaments supporting the arch. These injuries require immediate surgical intervention to prevent serious complications such as compartment syndrome and amputation. The present case series reports a new Lapidus plate system used in 3 patients who underwent arthrodesis procedures for Lisfranc joint dislocation. Three patients in their fourth to fifth decade of life presented with a traumatic injury at the Lisfranc joint and subsequently underwent open reduction and internal fixation using the plantar Lapidus Plate System (LPS; Arthrex, Naples, FL). The LPS was placed in a predetermined safe zone, with measures taken to avoid the insertional points of the tibialis anterior and peroneus longus tendons. Radiographs were obtained for ≤ 6 months postoperatively and revealed consolidation across the fusion site, intact hardware, and satisfactory alignment. On examination, the corrections were well maintained and free of signs of infection. Clinical evaluation showed no indication of motion within the tarsometatarsal joint and no tenderness to palpation surrounding the fusion sites. All 3 patients successfully returned to their activities of daily living without discomfort or pain. Modern surgical treatment of Lisfranc injuries most commonly includes open reduction and internal fixation, accompanied by arthrodesis. The present case series has demonstrated that the LPS provides relief, stability, and compression of the joint in our small cohort of patients who experienced a traumatic injury to the Lisfranc joint.

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Midfoot injuries are the second most common athletic foot injury documented in the published data (1). Of these, the high-energy Lisfranc dislocation is commonly seen in males secondary to a traumatic incident, such as a motor vehicle accident or fall (1,2). Lisfranc injuries, which disrupt the strong midfoot ligaments supporting the arch, require immediate surgical intervention to prevent complications such as compartment syndrome and amputation (3). On clinical examination, patients can present with edema, point tenderness, and decreased function (2,4). The dorsal drawer test of the medial column will elicit a “clunk” compared with the contralateral side, and the passive midfoot pronation abduction test will yield positive results (1). On radiographic evaluation, Lisfranc injuries commonly show an increased asymmetric joint space at the naviculocuneiform joint and

first and second metatarsal bases. The notch sign, in which a small notch appears in the lateral aspect of the medial cuneiform, might also be seen (1).

Conservative treatment includes midfoot stabilization and movement restriction. For Lisfranc injuries without displacement on weightbearing radiographs, the use of cast immobilization for 6 to 12 weeks is common (5). Modern surgical treatments include closed reduction and immobilization, closed reduction and percutaneous pinning, and open reduction with percutaneous pinning or screw fixation (6).

Open reduction and internal fixation (ORIF) has become the most commonly performed surgical treatment of a Lisfranc joint injury with or without arthrodesis. Studies have shown that primary arthrodesis is a better treatment method for patients with Lisfranc injuries than ORIF (6). Of the various ORIF techniques, screw fixation offers an earlier return to weightbearing activities and a lower rate of displacement compared with the Kirschner wire technique (7). Alternatively, surgeons have used dorsal plating, with screw placement over tarsometatarsal joints, which is ideal for posttraumatic

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arthrodesis (7). Dorsal plating provides stability without joint compromise (8). In recent years, the use of plates has become more prominent. Medial locking plates and H-plates have been used; however, H-plates have proved to be unsuccessful in providing the necessary stability. The plantar plate construct with compression screw might be superior to dorsomedial screw for Lapidus fusion and is more in line with the AO principles biomechanically, because the plate is placed on the side of the tension (9–11). Plantar plates have demonstrated a better bone contour of the plate, decreased soft tissue irritation, and better soft tissue coverage. Plantar plating compared with dorsomedial plating showed significantly less range of motion (ROM) in the fused joint space and increased stiffness (11). Of concern with plantar plating is the tibialis anterior (TA) tendon and peroneus longus (PL) tendon at their insertion sites on the medial cuneiform and first metatarsal (10).

Scranton et al (12) demonstrated a newer model of plantar plating, using their plantar Lapidus Plate System (LPS; Arthrex, Naples, FL), which provided compression and increased stability, while protecting the PL and TA tendons. Plaass et al (10) determined a “safe zone” that could prevent irritation or tendonitis by placing the plantar lapidus plate between and away from the insertions of the TA and PL tendons. Our study further analyzed the results of the plantar LPS in 3 patients who underwent arthrodesis for Lisfranc injury secondary to trauma.

Case Report

Patient 1

A 41-year-old male patient presented to our clinic in March 2016 with a chief complaint of pain in the dorsal midfoot from an injury 1



Fig. 1. Non-weightbearing anteroposterior view of patient 1 at the initial visit.



Fig. 2. Non-weightbearing medial oblique view of patient 1 at the initial visit.

day previously. A right foot Lisfranc ligament disruption secondary to trauma was diagnosed. The lower extremity physical examination showed exquisite tenderness to palpation around the dorsal second metatarsal base and marked pain with ROM of the tarsometatarsal articulations. The radiographs (Figs. 1–3) showed homolateral dislocation at the tarsometatarsal joints and comminuted fractures of the bases and cuneiforms. The patient provided consent for right foot Lisfranc fracture treatment with ORIF.

Patient 2

A 58-year-old female presented in September 2016 with acute right foot pain after a traumatic fall from a ladder. She had significant history



Fig. 3. Non-weightbearing lateral view of patient 1 at the initial visit.

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