Open Reduction and Internal Fixation Versus Primary Arthrodesis for Lisfranc Injuries

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KEYWORDS

• Tarsometatarsal joint • Midfoot • Lisfranc • Open reduction and internal fixation • Arthrodesis

KEY POINTS

- Lisfranc injuries represent a broad spectrum of pathology and therefore one treatment may not adequately address all injury patterns.
- Anatomic reduction is required to restore the function of the midfoot regardless of the treatment chosen.
- Primary arthrodesis has shown improved outcomes for certain injury patterns.

INTRODUCTION

The unique anatomy of the tarsometatarsal (Lisfranc) joint complex allows for effective force transfer and propulsion during gait. Injuries to the Lisfranc joint complex are rare and frequently missed on initial presentation.[1,2] If missed or treated inappropriately, Lisfranc injuries may result in chronic pain and disability.

Operative treatment of these injuries continues to generate significant controversy. Undoubtedly this is because, at least in part, Lisfranc injuries represent a broad spectrum of pathology, from the subtle sprain to the high-energy crush injury. Modern surgical treatment of tarsometatarsal injuries has emphasized achieving and maintaining anatomic reduction with open reduction and internal fixation.[3,4] Prompt diagnosis, anatomic reduction, and stable fixation has demonstrated improved outcomes over historical treatments, yet modern series still demonstrate rates of posttraumatic arthritis ranging from 25% to 94%.[5]

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Historically arthrodesis of the tarsometatarsal joints has been considered a salvage procedure[6]; however, primary arthrodesis (PA) of Lisfranc injuries has recently emerged as a viable alternative to open reduction and internal fixation (ORIF).[7] Despite promising early results, the role of primary arthrodesis in the management of Lisfranc injuries has yet to be defined.

ANATOMY

Osseous Anatomy

The osseous structure of the Lisfranc joint complex is composed of the articulations of the wedge-shaped metatarsal bases with their corresponding tarsal bones. Critical features of the osseous anatomy include the following:

- The cuneiforms and metatarsal bases have a trapezoidal configuration, with the second metatarsal base and middle cuneiform serving as the "keystone" of the transverse arch[8] (**Fig. 1**)

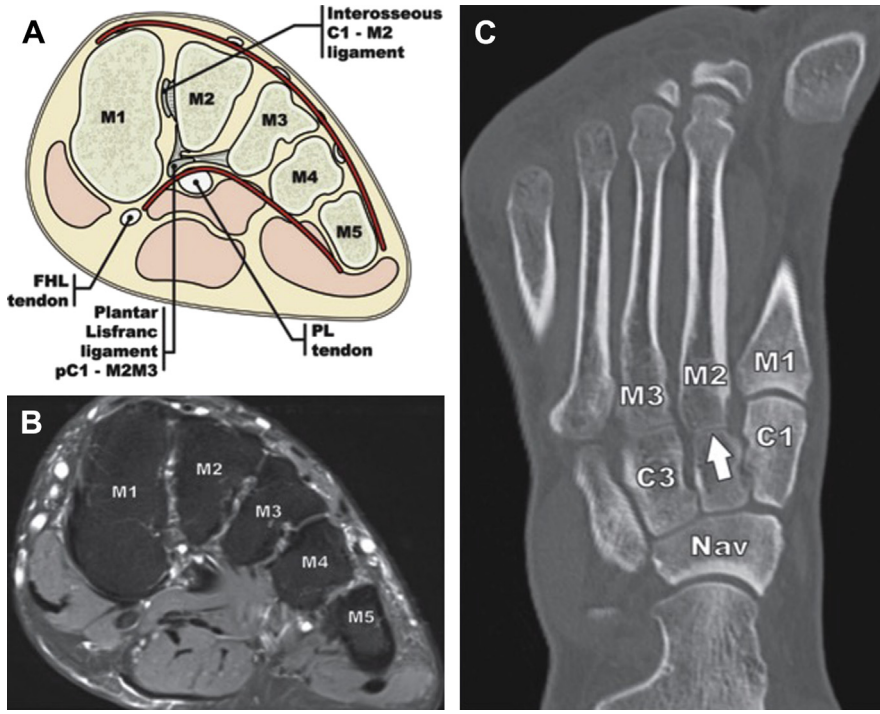

Fig. 1. (*A*) Illustration of the "Roman arch" architecture of the metatarsal bases with second metatarsal as the keystone. The interosseous or Lisfranc ligament(C1–M2) and plantar oblique ligament (pC1–M2M3) are seen. (*B*) Coronal T2 MRI sequence demonstrating the Roman arch configuration of the metatarsal bases with the second metatarsal base serving as the keystone. (*C*) Axial long-axis CT cut. The white arrow highlights the recessed position of the second metatarsal in the mortise. Note the flat joint surfaces. C1, medial cuneiform; C3, lateral cuneiform; M1, first metatarsal; M2, second metatarsal; M3, third metatarsal; Nav, navicular. (*From* Siddiqui NA, Galizia MS, Almusa E, et al. Evaluation of the tarsometatarsal joint using conventional radiography, CT, and MR imaging. Radiographics 2014;34(2):515; with permission.)