TJTES
TURKISH JOURNAL OF TRAUMA
& EMERGENCY SURGERY

Ulus Travma Derg. 2003 Apr;9(2):145-148

MANAGEMENT OF LISFRANC'S FRACTURE-DISLOCATION

Özcan PEHLİVAN, MD*, İbrahim AKMAZ, MD*, Can SOLAKOĞLU, MD*, Osman RODOP, MD*

ABSTRACT
Lisfranc's joint injuries are rare and complex. A car driver who sustained a traffic accident, was admitted because of partial dorsolateral fracture-dislocation of the Lisfranc's joint. The diagnosis was made by physical examination and radiographs. Reduction and pin fixation were performed under general anesthesia. At the end of the ninth month, range of motion of the foot and ankle was full, with no pain on daily activities.
Key words: *Lisfranc's Joint, Fracture-Dislocation*

INTRODUCTION

Fracture-dislocations of the tarsometatarsal joint which is also known as Lisfranc's joint, are rare and complex. The incidence is low, accounting for less than 1% of all fractures and dislocations.[1-4] The real incidence is more than reported because 20% of the Lisfranc's joint injuries are overlooked, especially in polytrauma patients.[1,2,3,5] Early diagnosis, precise anatomic reduction, and maintenance of reduction are imperative for long term good functional results.[1,3,4,6]

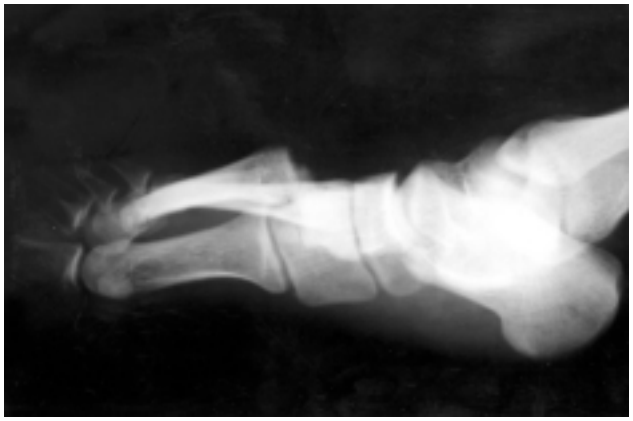
The tarsometatarsal articulation has a complex anatomy and to define the exact mechanism of injury is not always possible.[1,2,5,7,8] To know the complex anatomy of the tarsometatarsal articulation is important for the accurate diagnosis and prompt treatment. While there is no soft tissue connection between the first and second metatarsal bases, the lateral four metatarsal bases are attached to each other by transverse metatarsal ligament. Thus, at the time of injury lateral four metatarsals move as one unit.[2-4] Because of this complex anatomy, most of the Lisfranc's joint fracture-dislocations have different features, especially in indirect injuries. The following case is an example for an interesting and complex type of Lisfranc's fracture-dislocations.

CASE REPORT

A 20-year-old male car driver sustained a traffic accident. He had an isolated closed trauma to his right foot. On physical examination, his foot was very painful and swollen without any neurovascular damage. Initial radiographs showed a partial dorsolateral fracture-dislocations through second to fifth tarsometatarsal articulation. There were fractures at the neck of the metatarsals two through five (Picture1).

Picture 1a. Preoperative radiographs show partial-lateral dislocation of the Lisfranc's joint, fracture of the necks of the two through five metatarsals, dorsal dislocation of the bases of the two through four metatarsals.

On the day of injury, in the operating room, under general anesthesia fluoroscopic evaluation of the foot was performed. In addition to above findings there was a fracture at the base of the fourth metatarsal. Dislocation was succesfully reduced with closed manual manipulation and fluoroscopic evaluation was repeated. Alignment of the second and third metatarsal neck fractures was insufficient. Through a dorsal longitudinal incision in the second distal intermetatarsal space,



Picture 1b. Preoperative radiographs show partial-lateral dislocation of the Lisfranc's joint, fracture of the necks of the two through five metatarsals, dorsal dislocation of the bases of the two through four metatarsals.

Picture 2b. Postoperative radiographs show anatomic reduction of the Lisfranc's joint and fixation with smooth K-wires.

open reduction and retrograde intramedullar fixation was performed with smooth K-wires for the second and third metatarsal neck fractures. In order to maintain the stabilization of the Lisfranc's joint, the K-wire in the second metatarsal was advanced to the middle cuneiform and navicular bones. Another smooth K-wire was placed percutaneously from the base of the fifth metatarsal through the cuboid bone under fluoroscopic control (Picture 2).

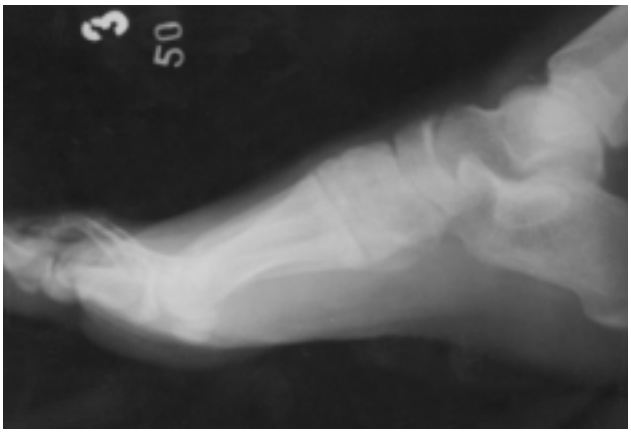
Picture 2a. Postoperative radiographs show anatomic reduction of the Lisfranc's joint and fixation with smooth K-wires.

Postoperative management of the patient was made with a below knee walking-cast and partial weight-bearing was permited.. Cast and K-wires were removed at the end of the sixth week, and full weight-bearing was permited. At the last follow-up visit, at the end of the ninth month, range of motion of the ankle and foot was full, with no pain on daily activities. Radiographs taken implied that there was no redisplacement (Picture 3).

Picture 3a. Radiographs taken nine months later show maintenance of reduction

DISCUSSION

According to Hardcastle classification system,[9] Lisfranc fracture-dislocations are divided into three types of incongruity: total, in which all



Picture 3b. Radiographs taken nine months later show maintainance of reduction

tarsometatarsal joints displace in one direction; partial, in which only first tarsometatarsal joint displaces medially (partial-medial) or lateral four joints displace laterally (partial-lateral) in one direction; and divergent, in which first tarsometatarsal joint displaces medially and lateral four joints displace laterally.[9]

Although it is difficult to explain the exact mechanism of Lisfranc fracture-dislocations, the authors have defined two main mechanisms of injury: direct and indirect.[1-3,5,8] The mechanism in the case presented is indirect, due to the foot pressed against the floorboard of the car causing a combination of longitudinal and rotational excessive forces onto the plantarly flexed foot.

At the level of the tarsometatarsal articulation capsuloligamentous structures are stronger at the plantar aspect of the joint.[2,8] This soft tissue orientation makes dorsal structures more vulnerable to the injury, causing dorsal subluxation or dislocation of the metatarsal bases. The second metatarsal is termed as "keystone" among the osseous structures of the Lisfranc's joint because it is the longest metatarsal bone and its base is recessed between the medial and lateral cuneiform bones. The base of the second metatarsal is attached to the medial cuneiform with the Lisfranc's ligament. This anatomic localization of the second metatarsal base makes it relatively immobile and more susceptible to fracture rather than dislocation.[2,3,5,8] Distruption of the second metatarsocuneiform joint results in instability of the Lisfranc's joint. Therefore, accurate anatomic reduction and fixation of the second metatarsocuneiform joint is a "keystone" for the stabilization of the Lisfranc's joint.[1-3,5,8]

Although there are different opinions for the treatment options of the Lisfranc's joint fracture-dislocations, all the authors agree that for optimum functional outcome, early diagnosis and accurate anatomic reduction and fixation are essential.[1-3,6] In our case report, after immediate and precise reduction and fixation we achieved satisfactory functional results, that were full range of motion of the ankle and foot, with pain free daily activities and no sign of redisplacement. If accurate reduction and prompt fixation can not be achieved, long term results are boring for both the surgeon and the patient. The most frequent long term problems, recorded in the literature are posttraumatic arthritis, chronic pain, uncomfortable gait patterns, and chronic instability at the Lisfranc's joint.[1,2,4,6]

Closed reduction and cast immobilization alone has a high tendency for instability and redislocation. Most authors prefer fixation with pins or screws after closed or open reduction.[1,2,4-8] In early diagnosed cases closed reduction is also possible. However, interposition of an avulsed second metatarsal base fragment or tibialis anterior tendon makes closed reduction impossible.[1-4,6,7] Open reduction is imperative in late cases.[4]

REFERENCES

1. *Buzzard BM, Briggs PJ. Surgical management of acute tarsometatarsal fracture dislocation in the adult. Clin Orthop 1998; 353: 125-133.*
2. *Morris KL, Giacopelli JA, Granoff DP. Medial column instability in the Lisfranc's fracture dislocation injury. J Foot Surg 1991; 30: 513-523.*
3. *Reinherz RP, Gastwirth CM. Dislocation of the tarsometatarsal joint. J Foot Surg 1989; 28: 1-2.*
4. *Wojciehoski RF, Krych SM, Harkless LB. Open reduction of Lisfranc's dislocation. J Am Podiatr Med Assoc 1989; 79: 86-88.*
5. *Margolis M, McLennan MK. Radiology raunds: tarsometatarsal fracture dislocation. Can Fam Physician 1994; 40: 1103-1110.*
6. *Arntz CT, Veith RG, Hansen ST. Fractures and fracture-dislocations of the tarsometatarsal joint. J Bone Joint Surg [Am] 1988; 70: 173-181.*

7. *DeBenedetti MJ, Evanski PM, Waugh TR. The unreducible Lisfranc fracture. Clin Orthop 1978; 136: 238-240.*

8. *Wargon CA, Goldman FD. Lisfranc fracture dislocation: a variation. J Am Podiatr Med Assoc 1986; 76: 466-468.*

9. *Hardcastle PH, Reschauer R, Kutscha-Lissberg E, et al. Injuries to the tarsometatarsal joint. J Bone Joint Surg [Br] 1982; 64: 349-356.*

*Orthopaedic Surgeons, Gulhane Military Medical Academy, Haydarpasa Training Hospital, Department of Orthopaedics and Traumatology, İstanbul, Turkey.
Corresponding Author: Özcan Pehlivan, MD
İlyas Bey Caddesi, No: 49/51 D.5 34310 Yedikule, İstanbul, Turkey.
E-mail: ozipeh@e-kolay.net