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Complex Lisfranc Fracture Dislocation: Report of Two Cases and Review

Luxofractura de Lisfranc compleja: Reporte de dos casos y revisión

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Abstract

Introduction Lisfranc injuries cover a wide spectrum of conditions that can impact the patient's quality of life if not treated appropriately. Accurate diagnosis, even of subtle cases that often go unnoticed, through specific examinations and early management is essential to obtain good results.

Materials and Methods We herein present two clinical cases of patients with Lisfranc fracture dislocation associated with tension hematomas who were submitted to decompression and open reduction and internal fixation with simultaneous use of various osteosynthesis materials little described in the literature.

Results Optimal radiographic results were obtained, which enabled accelerated rehabilitation and progressive improvement in range of motion from the week following surgery. At 18 months of the surgery, good scores were obtained on validated scales (such as the Foot Function Index [FFI] and the 36-Item Short Form Health Survey [SF-36]) that assess function and quality of life.

Discussion To date, there is no standard treatment for these lesions. In the first case, headless compression screws, locked tarsometatarsal plates, a Kirschner wire and even the button system were used, while in the second case, the fixation was performed only with Kirschner wires. Both cases presented very good functional results and return to their work activities. We performed a review emphasizing the diagnosis and management of this pathology.

Keywords

- Lisfranc injury
- headless compression screws
- tarsometatarsal locking plates
- Kirschner wires
- button fixation
- Lisfranc ligament

Resumen

Introducción Las lesiones de Lisfranc abarcan un gran espectro de afecciones que pueden impactar en la calidad de vida del paciente si no son tratadas de la manera adecuada. El diagnóstico certero, incluso de los casos sutiles que muchas veces pasan desapercibidos, mediante exámenes específicos y el manejo temprano son fundamentales para obtener buenos resultados.

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Materiales y Métodos Se presentan dos casos clínicos de pacientes con luxofracturas de Lisfranc asociadas a hematomas a tensión sometidos a descompresión, reducción abierta y fijación interna con el uso simultáneo de diversos materiales de osteosíntesis poco descritos en la literatura.

Resultados Se obtuvieron óptimos resultados radiográficos, que permitieron la rehabilitación acelerada y la mejoría progresiva del rango de movimiento desde la semana siguiente a la cirugía. A los 18 meses de la cirugía, se obtuvieron buenas puntuaciones en escalas validadas (como el Foot Function Index [FFI] y el 36-Item Short Form Health Survey [SF-36]) que evalúan función y calidad de vida.

Discusión Hoy en día, no hay un tratamiento estándar para estas lesiones. En el primer caso se utilizaron tornillos de compresión sin cabeza, placas bloqueadas tarsometatarsianas, un clavo de Kirschner e incluso un sistema de botón, mientras que, en el segundo caso, la fijación fue realizada únicamente con clavos de Kirschner. Ambos casos tuvieron resultados funcionales muy buenos y retorno a sus actividades laborales. Se hace una revisión que enfatiza en el diagnóstico y el manejo de esta patología.

Palabras clave
- lesión de Lisfranc
- tornillos de compresión sin cabeza
- placas bloqueadas tarsometatarsales
- clavos de Kirschner
- fijación con botón
- ligamento de Lisfranc

Introduction

Lisfranc injuries comprise a large number of conditions ranging from dislocations to subtle patterns that are diagnosed only with special examinations, taking into account that approximately 20% of injuries are not diagnosed.[1] It has been described that the cause of these injuries can be both high-energy traumas, with motorcycle accidents and falls from a height being frequent, and low-energy ones.[1] The consequences of not diagnosing them can impact the patients' quality of life, since they include midfoot instability, arch collapse, and posttraumatic osteoarthritis that leads to stiffness, pain, and dysfunction. These injuries are frequently associated with complications such as compartment syndrome, which can further worsen the prognosis, so early diagnosis and management are essential.[2]

The management of Lisfranc injuries is still controversial, considering that these injuries are rare. There are no high-evidence studies that conclude that one type of management is superior to another. The use of arthrodesis was initially generalized to the majority of patients; however, in young patients the trend has been changing because it limited mobility and predisposed to pathologies in adjacent structures.[3] The surgical treatment must be individualized, and the choice of implant will depend on the patient and the personality of the osteoligamentous injury, with the objective of achieving the greatest stability possible.

The objective of the present study is to report two complex cases of patients from the Orthopedics and Traumatology Service of our hospital with a diagnosis of complex Lisfranc fracture dislocation with tension hematomas, both subjected to open reduction and internal fixation with different osteosynthesis materials following the recommendations established in the literature[16] regarding the diagnosis and management of said pathology. Results were observed at 3, 6, and 18 months of follow-up. In addition, we performed an updated review of the diagnosis and treatment of Lisfranc lesion.

The following cases are presented because it is a topic that is in full development, since new forms of diagnosis and treatment are continually being described, with new medical material, which are having good results. In this case, we combined several fixation methods rarely seen in the current literature[15], among which are tarsometatarsal plates locked with screws, headless compression screws, the suspensory system, and Kirschner wires. Furthermore, the cases herein reported present a complexity rarely seen in reviewed articles.

Case Presentation

Clinical case 1

A 31-year-old male patient, with no significant history, presented to the emergency room with an illness of approximately 2 hours due to a motorcycle accident as a rider. He reported that, after braking suddenly, the motorcycle fell on his left foot, causing intense pain, with immediate increase in volume and functional impotence.

The patient was evaluated, and significant swelling in the affected foot (+++/+++), deformity in the midfoot, and partial loss of sensation were confirmed. A radiographic study was performed, and it showed a fracture of the first metatarsal associated with a dorsal dislocation of the Lisfranc joint, which involved all the tarsometatarsal joints. In the anteroposterior view, we could see that the medial edge of the second metatarsal did not align with the medial edge of the intermediate cuneiform, >2 mm of distance between the base of the first metacarpal and the second metatarsal, as well as between the first cuneiform and the base of the second metatarsal, and the avulsion bone fragment of Fleck. On the lateral radiograph, we observed that the dorsal and plantar edges of the metatarsals did not align with the edges of the cuboid and cuneiform (►**Figure 1**).

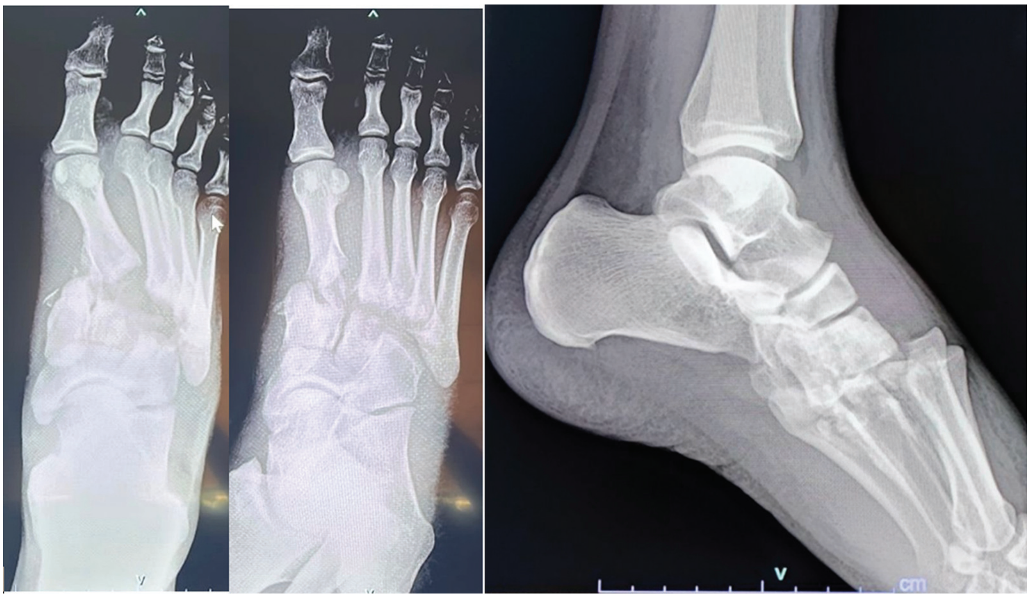

Fig. 1 Anteroposterior, oblique, and lateral foot X-rays upon admission to hospital after the accident.

The patient was submitted to emergency surgery 3 hours after the accident, with release of tension fracture hematomas, plus reduction and internal fixation of the Lisfranc lesion with Kirschner wires, as damage control. When making the incision medially to the shaft of the second metatarsal with proximal extension, a sudden decompression of purplish soft tissue was evident (►**Figure 2A**). A large fracture hematoma was released, a profuse lavage was performed with 5 liters of saline solution, and, finally, open reduction of the fracture dislocation under verification with a C-arm, and 2-mm Kirschner wires were placed to stabilize the midfoot (►**Figure 3**). The surgical wound was not closed.

The patient showed significant clinical improvement following the intervention, with strict monitoring and management of soft tissues. Three days later, surgical debridement was performed, revealing a reduction in edema and improved coloration of the soft tissue (►**Figure 4B**); four days after the intervention, the patient was admitted to the operating room for definitive closure of the surgical wound until the definitive surgery.

After 12 days, after the edema had significantly decreased, and surgery had been planned with the help of a computed tomography scan, the Kirschner wires were removed in a second stage, and a definitive osteosynthesis was performed using the previous approach. The Lisfranc complex was reduced with the help of a pointed clamp, aligning the joint between the first and second cuneiforms, and fixing it with a 4-mm headless compression screw, following the steps of guide wire insertion, measuring, drilling, and countersinking. Then, the first tarsometatarsal joint was fixed with a dorsal locking plate with 4 holes. After this, the medial cuneiform was reduced with the base of the second metatarsal with a pointed clamp, and a suspensory system (button) was placed, simulating the Lisfranc ligament. Immediately afterwards, dorsal locking tarsometatarsal plates with 4 holes were used in the next 2 joints after reduction,

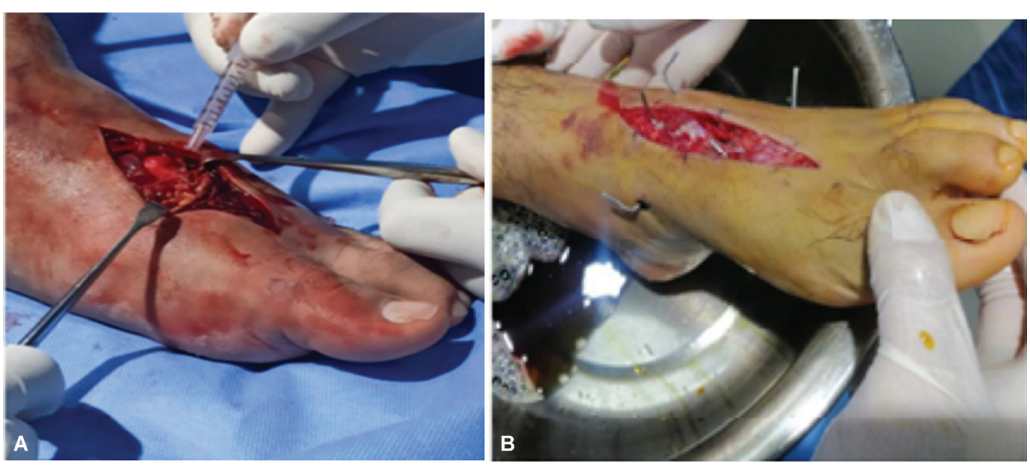

Fig. 2 and 4 (**A**) Release of tension fracture hematomas, reduction and fixation with Kirschner wires 3 hours after the accident. (**B**) Surgical cleaning 3 days after the intervention. Notable reduction in pain, paresthesia and edema.

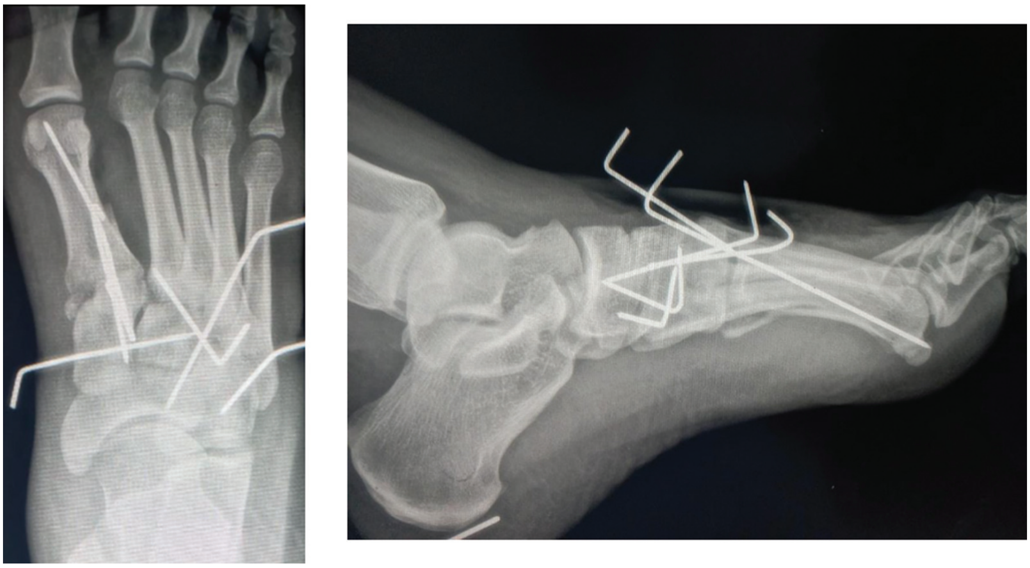

Fig. 3 Anteroposterior and lateral foot radiographs after open reduction and internal fixation with Kirschner wires.

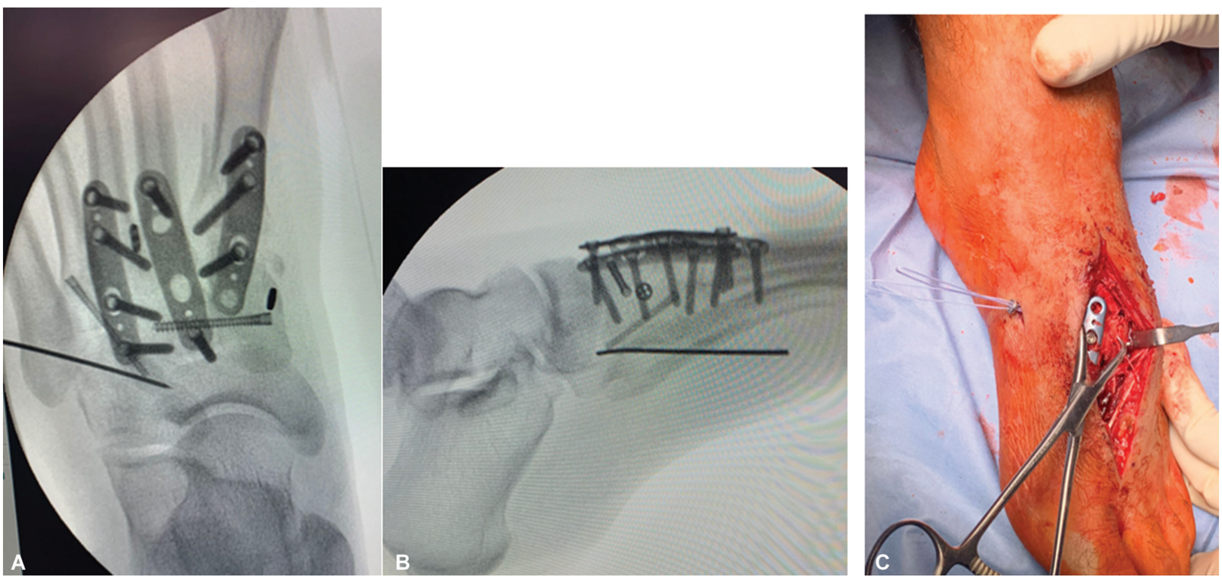

Fig. 5 (**A**, **B**) Radiographs of definitive osteosynthesis of Lisfranc dislocation fracture. (**C**) Having fixed the medial wedge with the intermediate wedge using a headless compression screw and the first metatarsophalangeal joint with a locked anatomical plate, the button was introduced from the base of the second metatarsal to the medial edge of the first wedge, simulating the Lisfranc ligament.

placing cortical screws proximally to the joint to direct them away from it, while the locking screws were placed distally. Fixation of the fourth metatarsal with the cuboid was performed with a 4-mm headless compression screw, while the fifth metatarsal was fixed with the cuboid using a 2-mm Kirschner wire. All of the procedures described were performed using the C-arm guide (►**Figure 5**).

Clinical case 2

An 18-year-old male patient was admitted with an illness of 2 hours, characterized by a fall from a height of 2 meters, with apparent axial load on the left midfoot in plantar hyperflexion, resulting in intense pain and immediate inability to walk. The physical examination revealed significant swelling, shiny and tense skin, diffuse pain on palpation, partial loss of sensitivity, and plantar ecchymosis. (►**Figure 6A**).

Through a radiographic examination, we confirmed a Lisfranc fracture dislocation using the radiographic signs described in the literature[17], as well as diaphyseal fractures of multiple metatarsals (►**Figure 6B**). The patient was scheduled for emergency surgery 2 hours after admission for the release of tense fracture hematomas, and open reduction and internal fixation. An incision was made medially to the diaphysis of the second metatarsal and another laterally to the diaphysis of the fourth metatarsal, both with proximal extension, evidencing sudden release of purplish soft tissue and release of significant blood content from the compartments. Direct reduction was performed with pincers, and 2-mm Kirschner wires were used. One of these wires fixes the joint between the cuneiforms, another simulates the Lisfranc ligament, extending from the first cuneiform to the base of the second metatarsal, and another fixes the first cuneiform

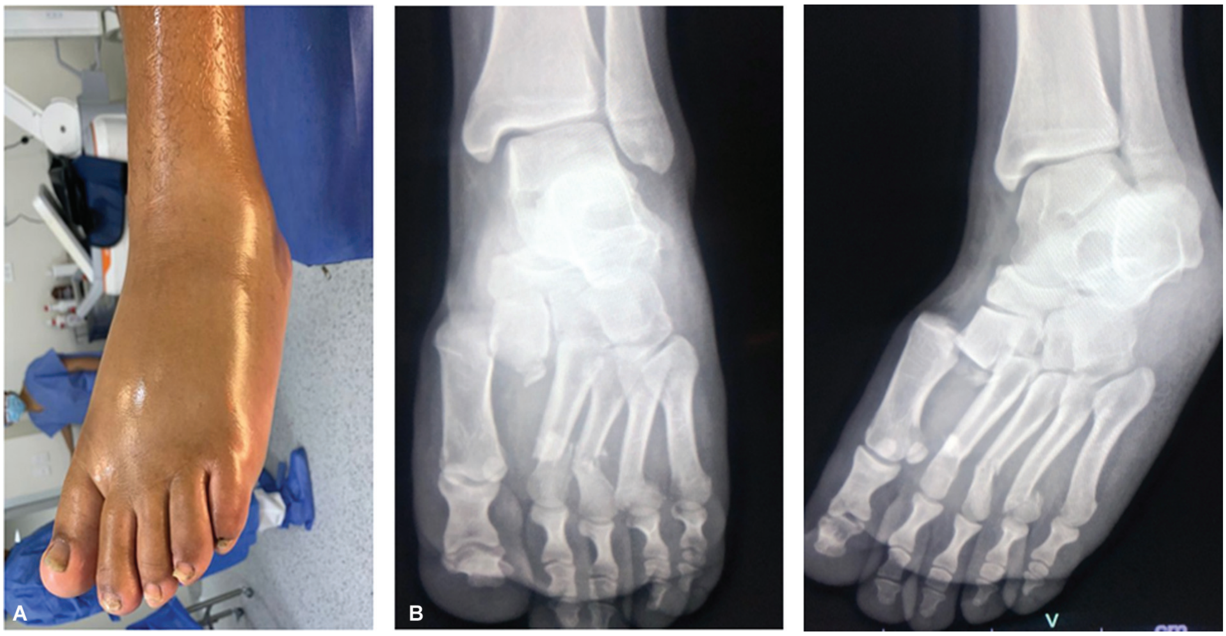

Fig. 6 (**A**) Soft tissue involvement, shiny and tense skin. (**B**) Anteroposterior and oblique radiographs of the left foot upon hospital admission.

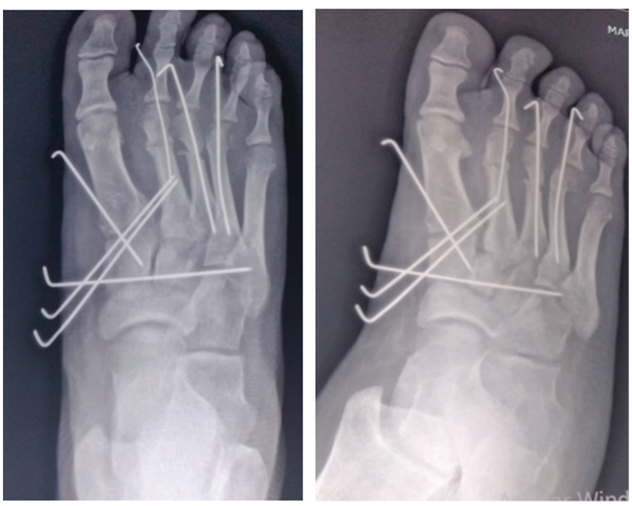

Fig. 7 Fixation of Lisfranc joint and multiple metatarsal fractures with Kirchner wires.

to the first metatarsal, and retrograde Kirschner wires are placed through the diaphysis of the metatarsals (►**Figure 7**). The incisions were left open, and the patient was scheduled for surgical cleaning and closure 3 days later, showing good progress.

At the 2-week follow-up, sutures were removed from both patients, and physical therapy was initiated. At 6 weeks, the Kirschner wires were removed in both cases after radiographic evidence of consolidation, and partial weight-bearing was also started at this time. By the third postoperative month, the patients reported no pain while walking longer distances.

Collaboration with the Department of Physical Medicine and Rehabilitation helped in recovering muscle strength by the sixth month. At the 18-month follow-up, both patients were observed walking without support and without symptoms, with improved muscle trophism and joint range of motion, evaluated using 3 validated scores. Both scored 82 on the 36-Item Short Form Health Survey (SF-36; scale from 0 to 100, in which a higher score indicates better physical function). The first patient scored 17% on the Foot Function Index (FFI), while the second scored 14% (scale from 0% to 100%, in which a higher percentage indicates worse function and greater disability).[4]

Discussion

To discuss Lisfranc injuries, it is important to note that they involve the tarsometatarsal, intermetatarsal, and anterior intertarsal joints. Lisfranc injuries can range from severe fracture dislocations to subtle ligamentous injuries or a combination of both.[1] Historically, Lisfranc fracture dislocations are related to the Napoleonic Wars, in which French gynecologist Jacques Lisfranc cared for soldiers injured in battle. He encountered a case in which a soldier's foot became trapped in the stirrup after falling from a horse, leading to foot swelling and subsequent gangrene. Lisfranc performed an amputation at the level of the tarsometatarsal.[1] Over time, the concept of *Lisfranc injury* has evolved to characterize disruption between the medial cuneiform and the base of the second metatarsal joint.

The incidence is of approximately 1 in every 55 thousand people/year, representing 0.1 to 0.4% of all fractures, with men in their third decade of life being the most affected, as in the cases herein presented.[5,6] It is worth mentioning that 20% of Lisfranc lesions are overlooked or misdiagnosed.[6]

The injury can originate from a high-energy trauma (collision in a car or motorcycle, falls from a height, impact sports such as soccer and windsurfing) and low-energy trauma, such as simple slips or falls, often being confused with a sprain.[5,6] Patients with this injury often experience polytrauma.[7] The cases herein presented involved high-energy trauma, one as a motorcycle rider and the other from falling off the second floor of a building.

The Lisfranc joint represents the transition from the midfoot to the forefoot, which is essential for normal walking. Anatomically, the Lisfranc joint is considered to have three longitudinal columns: the medial column consists of the medial cuneiform and the base of the first metatarsal; the intermediate column includes the intermediate cuneiform and the lateral cuneiform with the bases of the second and third metatarsals; and the lateral column comprises the cuboid with the bases of the fourth and fifth metatarsals, which is the most mobile.[7,8] The bases of the metatarsals form a Roman arch in the axial cut, with the second metatarsal being a crucial part. It articulates proximally with the second cuneiform and also makes contact with the first and third cuneiforms.[8] There are several ligaments involved in the Lisfranc joint complex: intermetatarsal ligaments (dorsal, interosseous, and plantar); plantar and dorsal tarsometatarsal ligaments; and the Lisfranc ligament itself, which extends from the base of the medial cuneiform to the plantar surface of the second metatarsal, playing a crucial role in maintaining stability and alignment of the midfoot.[6] This ligament is very strong, long, and crucial for stabilizing the second metatarsal. In addition to connecting the medial column with the intermediate one, it maintains the arch of the midfoot and restricts the bone mobility of the foot.[6] Stability is largely achieved through the second cuneometatarsal joint (the second metatarsal is firmly embedded within the tarsus and must fracture to completely dislocate).[5] The mechanism of Lisfranc fracture dislocation generally involves direct or indirect forces or axial loading on the midfoot in hyperflexion or plantar flexion, often combined with forced abduction.[6] Isolated ligamentous injuries are associated with low-energy traumas, whereas bone fractures are typically present in motor vehicle accidents and falls from heights.[6] Male subjects suffer from these injuries 2 to 4 times more often.[8] In the cases herein presented, there were not only ligamentous injuries (intermetatarsal, tarsometatarsal, Lisfranc), but also bone fractures, indicating the high energy of the trauma, as described.

The clinical presentation is variable, since it depends on the severity of the Lisfranc lesion. In the anamnesis, the common denominator is pain in the midfoot and, as the severity of the injury increases, other inflammatory signs such as edema and swelling in that area appear, in addition to functional limitation, which hinders standing up. On physical examination, local heat is palpable in the midfoot and plantar ecchymosis can often be present. Provocative maneuvers must be performed to evaluate stability, such as pronation, supination, adduction, abduction, loading with one foot, and passive mobility of the three columns in the coronal and sagittal planes.[8] It is essential to perform a neurovascular assessment, which includes confirming the dorsalis pedis pulse, considering that it may be compromised by the dislocation of the second metatarsal.[6] Both Chopart and Lisfranc dislocations are frequently associated with compartment syndrome of the foot, and the incidence of this complication is of 25% and 34% respectively.[2] Therefore, the symptoms and clinical signs of said pathology must be continually evaluated.

Regarding the radiological diagnosis, both radiography, computed tomography and magnetic resonance imaging are useful.[5] Anteroposterior, lateral and internal oblique 30-degree X-rays must be requested, all of these with loading and comparisons.[8] When not performed with weight-bearing, 20 to 50% of subtle Lisfranc injuries go unnoticed.[8] In the anteroposterior X-ray view, the diagnostic criteria is the misalignment of the medial edge of the second metatarsal with the medial edge of the intermediate cuneiform and a distance of > 2 mm between the base of the first and second metatarsals or between the first cuneiform and the base of the second metatarsal. Sometimes, the pathognomonic Fleck sign is observed, which is a bone fragment from the base of the second metatarsal avulsed due to traction of the Lisfranc ligament, located in the intermetatarsal space.[6] In the lateral view, the dorsal and plantar edges of the metatarsals should align with the edges of the cuboid and cuneiform bones; any misalignment is abnormal.[6] In the 30-degree oblique view, the medial edge of the lateral cuneiform should align with the medial edge of the base of the third metatarsal, and the medial edge of the cuboid should align with the medial edge of the fourth metatarsal.[8] Despite the various incidences and radiographic signs, the diagnostic accuracy of this method is low.[8] In patients whose radiography is negative but there is clinical suspicion, stress radiography, computed tomography or magnetic resonance imaging should be performed.[9] In both cases herein presented, radiographic signs such as the Fleck sign and misalignment between the metatarsals and cuneiforms were observed, making the diagnosis evident through this imaging method.

Stress radiography can be performed under anesthesia, and it involves applying maneuvers under fluoroscopy, enabling the dynamic evaluation of the foot. These maneuvers consist of pressing the midfoot, pronation, supination, abduction, adduction, and moving the first metatarsal in the dorsal and plantar directions.[9] Cadaveric studies[9] have found that the abduction stress maneuver was superior to weight-bearing radiography for the diagnosis of Lisfranc instability.

The gold standard is computed tomography, particularly with high-velocity trauma, as it provides insight into fracture pattern, displacement, comminution, and surgical planning.[5] It identifies an additional 51% of tarsal bone fractures and 38% of metatarsal bone fractures.[10] The disadvantage is that the tomography is not load-bearing and dynamic; therefore, it less useful to diagnose subtle injuries (pure ligamentous).[8] Magnetic resonance imaging is not routinely used but can aid in the diagnosis of ligamentous injury in the absence of bone injury, occult fractures, or edema.[5] In the first case herein presented, a computed tomography scan was requested after the placement of Kirschner wires to assess displacement, comminution, and mainly to plan the definitive surgery.

Many classification schemes have been described, such as those by Hardcastle and Myerson (total, partial, and divergent incongruence), Quenu and Kuss (homolateral, isolated, divergent), and Nunley and Vertullo (severity combining clinical assessment, weight-bearing radiographs, and bone scintigraphy). It is worth mentioning that none of these classifications reliably correlates with prognosis and treatment, having very limited usefulness in clinical practice.[7,11]

The goal in treating these injuries is to achieve a stable, pain-free plantigrade foot, which requires an anatomical reduction of the Lisfranc complex.[8] For Lisfranc injuries without evidence of instability, such as nondisplaced fractures or those with a diastasis shorter than 2 mm and absence of arch collapse confirmed by weight-bearing and stress radiographs, immobilization with a below-knee cast is recommended for 6 to 12 weeks.[7] In addition to the cast or immobilizing boot, the recommendation is not to bear weight for 1 or 2 weeks. If, by the second or third weeks, after a reduction in swelling and pain in the foot, a weight-bearing X-ray shows stability, controlled weight-bearing may begin. At 6 weeks, the boot may be removed, and a firm orthopedic arch support may be prescribed. Exercise can begin in the third month and return to sports is possible at 6 to 8 months. However, if the injury is displaced, surgical treatment is advisable to prevent complications such as midfoot arthritis or further displacement.[7] To date, there is no consensus regarding surgical treatment; no surgical technique is superior to another. If the displacement is severe or there is a complex dislocation, the suggestion is to perform closed reduction and immobilization under sedation to improve symptoms, recover alignment, and reduce vascular risk. If the reduction cannot be maintained, the provisional use of Kirschner wires is suggested. After the soft tissue edema improves, definitive surgery will be scheduled, and the recommendation is that it be performed in the first 6 weeks, with the prognosis being worse after this time, requiring arthrodesis in most cases.[7] The more time passes after the initial injury, the more difficult it will be to obtain a satisfactory reduction of displaced or dislocated fractures.[8] Compartment syndrome, which is common in this pathology, is another reason for early surgical intervention. In the first case herein presented, provisional fixation with Kirschner wires was performed early, and definitive surgery, 20 days after the accident, an adequate time according to the literature[8], which positively influences the prognosis of the injury.

In the young athletic population, as there is high demand to restore function as much as possible, it is necessary to maintain movement in the medial column. Arthrodesis in this group of patients, apart from limiting mobility, can place excessive load on adjacent structures, predisposing to nonunion, stress fractures, or the development of metatarsalgia due to transfer.[3] Avoid arthrodesis in pediatric patients with open physis.[8]

Fixation with screws above the Kirschner wires is recommended for the medial and intermediate columns, specifically between the first cuneiform and the first metatarsal, and between the second cuneiform and the second metatarsal. It is important to fixate between the medial cuneiform and the second metatarsal, which recreates the Lisfranc ligament.[7] Lewis and Anderson[19] popularized the "home run" screw and intercuneiform screws. "Home run" consists of using a 3.5-mm or 4-mm cortical screw under the principle of interfragmentary compression following the course of the Lisfranc ligament. By adding intercuneiform screws to the screw already described, it would be possible to reduce the medial column to the intermediate column.[8] The techniques to replace the Lisfranc ligament have evolved, ranging from partially-threaded cannulated screws of 4.0 mm to 5.0 mm to headless compression screws. Hansen[18] proposed that both the medial and intermediate columns contain nonessential joints and could be fused with permanent implants. Conversely, in the lateral column, the opposite occurs, needing reconstruction and preservation of the joint. This is typically achieved by temporarily fixing and maintaining reduction of this column using Kirschner wires, which are usually removed around 6 weeks on average.[8] Recently, the button has emerged as an alternative to the "home run" screw as a replacement for the Lisfranc ligament, having the advantage of maintaining the flexibility of the midfoot, without losing stability.[12] In the first case herein presented, a headless compression screw was used between the medial and intermediate cuneiforms, with locking plates for the first three tarsometatarsal joints, another headless compression screw for the fourth joint, and a Kirschner wire for the last joint. Additionally, a button was employed to simulate the Lisfranc ligament, a configuration little described in the literature but, as we will see, yielding favorable outcomes. In the second case herein reported, Kirschner wires were used as definitive treatment, also resulting in favorable outcomes. Comparing the results of both cases is not feasible due to the greater severity involved in the first case (involvement of more joints).

The use of plates with screws represents an alternative to transarticular screws. This method of fixation likely provides greater rigidity and less displacement compared to transarticular screw fixation.[13] Ardoin and Anderson[14] recommend using locked screws in the most distal and proximal holes, while in those closest to the joint, non-locked screws, in order to direct them away from it if necessary, a recommendation that was followed in the first case herein presented.

Primary arthrodesis is suggested for highly displaced and comminuted fracture dislocations, in which there is extensive joint damage that makes the onset of posttraumatic osteoarthritis inevitable.[8]

Regarding the approach, both were dorsal. On the one hand, a double dorsal incision can be made, in which they are separated by a skin bridge of 4 to 5 cm.[8] On the other hand, a simple modified dorsal approach can be performed to access all three columns, which has a complication rate comparable to that of double incision, but greater exposure.[8] In the first case herein reported, a single dorsal approach was performed, while in the second case, a double dorsal incision was used, with neither case experiencing complications.

Patients who undergo surgery are advised not to bear weight for 6 weeks. They require a custom-molded shoe for up to 6 months. Physical therapy should begin in the early postoperative period. Removal of hardware, such as Kirschner wires, is typically performed around 6 weeks, whereas plates and screws may be removed between the fourth and sixth months. It is recommended to remove only transarticular screws from the tarsometatarsal joints, while leaving the Lisfranc and intercuneiform screws in place to prevent diastasis later on.[8]

The prognosis depends on the anatomical reduction achieved during surgery and the extent of articular surface damage. It is important to emphasize that the quality of anatomical reduction translates into restoring the length of the medial and lateral columns as well as the shape of the longitudinal arch. This is a crucial factor to predict functional outcomes, often more significant than the choice of fixation material. It should be noted that patients treated with Kirschner wires have a higher risk of fixation loss compared to those submitted to rigid fixation with plates and screws (37.5% versus 0%). The prognosis worsens with the delay in diagnosis, which is often the case with subtle Lisfranc injuries that can go unnoticed.[8] Displacement greater than 2 mm and poor reduction are associated with symptomatic and radiographic arthritis.[7] The two patients herein presented had very acceptable scores in the various validated scores, which reflects good functionality and quality of life after the surgical interventions performed.

Conclusion

We presented two cases of complex Lisfranc injuries treated with tension hematoma release, reduction, and osteosynthesis. In the first case, following initial placement of Kirschner wires, a second stage involved tarsometatarsal plates, headless compression screws, an additional Kirschner wire, and a button system. In the second case, only Kirschner wires were used. Both patients experienced satisfactory recovery without complications, restoring functionality early on. The combined use of these surgical techniques has been little described in the reviewed literature. It is important to note that studies with higher levels of evidence are needed to determine the optimal treatment for each type of Lisfranc injury, aiming to improve long-term outcomes.

Conflict of Interests
The authors have no conflict of interests to declare.

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