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Lisfranc's fracture dislocation. Epidemiological study and results at the General Hospital in Mexico

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SUMMARY. *Introduction.* Lisfranc's fracture dislocation has been reported as an uncommon lesion. However, there is no agreement on this, as some claim that about 20% of cases go unnoticed, especially in patients with multiple trauma. *Material and Methods.* We conducted an ambispective study from 1998 to 2003 involving 18 feet of 17 patients classified according to Hardcastle. All patients underwent open reduction and osteosynthesis with a mean 35.5-month follow-up. *Results.* The fracture rate was 3.25%. Male-female ratio was 4.6:1. The B type lesion was the most common one, accounting for 50% of cases and the major mechanism of injury was foot crushing with 35.5% of cases. The result was good in 94.4% of cases and poor in one patient. *Discussion.* The purpose of treating tarsometatarsal joint lesions is to achieve an accurate anatomical reduction. This is the only way to attain stable, painless, plantigrade support. A displacement of less than 2 millimeters compared to the contralateral foot is considered acceptable.

Key words: dislocation, foot, metatarsophalangeal joint, intramedullary nails.

RESUMEN. *Introducción.* La fractura-luxación de Lisfranc ha sido señalada como una lesión poco frecuente, opinión que no es generalizada, pues algunos aseguran que aproximadamente 20% pasa desapercibida, principalmente en politrauma. *Material y métodos.* Realizamos un estudio ambispectivo de 1998 a 2003, en el que se incluyó 18 pies de 17 pacientes clasificados según Hardcastle. A todos los pacientes se les practicó reducción abierta y osteosíntesis con seguimiento promedio de 35.5 meses. *Resultados.* La fractura se presentó con una incidencia de 3.25%, predominio masculino a razón de 4.6:1. La lesión tipo B fue la más común con 50% de los casos y el mecanismo de lesión dominante fue el aplastamiento del pie con 35.5%. El resultado fue bueno en 94.4% y malo en un paciente. *Discusión.* El objetivo del tratamiento de las lesiones articulares tarso-metatarsales es lograr una reducción anatómica precisa, pues sólo así se logra un apoyo plantigrado, estable y no doloroso. Se considera que un desplazamiento de menos de dos milímetros, comparado con el pie contralateral, es aceptable.

Palabras clave: luxación, pie, metatarso, tornillos intramedulares.

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Introduction

Even if the paper by Quenu and Kuss in 1909¹⁻⁷ was the first significant report of this injury, over the past 10 years there has been a renewed interest in learning more about it. One of the reasons for this is the fact that it has been reported as an uncommon lesion,^{1,4-9} although Del Sel^{1,5,6} does not share this opinion. He feels it is more frequent than assumed and claims that about 20% of cases go unnoticed, especially in patients with multiple traumas.

In the 19th century, this lesion was caused by horseback riding accidents due to a flexion mechanism of the forefoot when trapped on the stirrup. Today, the main cause for this

injury is attributed to motor vehicle accidents, especially motorcycle accidents, which represent 64% of cases, followed by sports accidents.⁵

The mechanism of injury may be direct or indirect.^{1,6} The former is due to a dorsoplantar force exerted on the joint that results in atypical scattered fractures. The indirect mechanism, the most common one, is due to an axial load on the foot in plantar flexion. There are two indirect force patterns: hindfoot pronation with the forefoot fixed, and hindfoot supination with the forefoot fixed. Initially a fracture occurs on the second metatarsal bone leading to cuboid bone compression fracture.^{5,6} Metatarsophalangeal dislocation is associated to this injury and it frequently goes unnoticed. A metatarsal neck fracture is also associated to it.

Conservative treatment has been used, including closed reduction and fixation with percutaneous nails and immobilization, or surgery to perform open reduction and osteosynthesis with nails. Today no consensus has been achieved on the optimum management⁷ of this injury.

The purpose of our study is to collect data on the frequency and epidemiology of this injury in our hospital and assess the results of the treatments we have used.

Material and methods

We conducted an ambispective, longitudinal, descriptive, interventional, clinical assay-type study between September 1998 and December 2003. Patients of both sexes with Lisfranc's fracture dislocation were included. Patients with congenital foot problems or a history of neuropathic or infectious joint disease were excluded. Patients who did not comply with the follow-up visits or with an incomplete clinical history were withdrawn from the study.

Lesions were classified according to Hardcastle et al. (Figure 1).⁵ All patients were subjected to open reduction and osteosynthesis through an S-shaped dorsal approach centered on the first intermetatarsal space. The first and

second cuneometatarsal joints were located, reduced and fixated with 3.5 cortical bone screws. In Type A lesions, the fifth metatarsal base was fixated to the cuboid bone with a cortical bone screw or a K nail (Figure 2). Associated fractures were reduced with K nails and in case of multiple fragmentation irreducible fragments were resected. Finally, the incision was covered with a Jones dressing. Two weeks later it was exchanged for a short boot cast to complete a 12-week period of immobilization.

Patient follow-up time ranged between 7 and 64 months with a mean of 35.5 months. The results were assessed according to the scores shown on Table 1. Stability was determined by X-rays, using AP, lateral and oblique views, where residual displacement was unacceptable if it exceeded 2 millimeters. Arthrosis was classified as nil, mild when joint space reduction was seen, moderate when subchondral sclerosis occurred as well, and severe when osteophytes and subchondral cysts were also present. Pain was assessed through an visual analog scale (VAS).

Results

During the study period, 553 patients were admitted to the service with a diagnosis of fracture. Eighteen of them had a Lisfranc's fracture dislocation diagnosis accounting for a 3.25% incidence. A total 18 feet from 17 patients were included. Males prevailed over females with a 4.6:1 ratio. Type B injury was the most common one, affecting 50% of cases. The prevailing mechanism of injury was the crushed foot injury, which accounted for 35.3% of all cases (Table 2).

Results were rated as good in 17 (94.4%) cases; there were no average results, and one result was considered as poor (5.6%), in a Grade III open fracture with bone loss. Stability was attained in 94.4% of cases (17 feet); no arthrosis in 61.1% (11 feet); mild arthrosis in 33.3% (6 feet); a pain score < 3 in the VAS was reported in 77.8% of cases (14 feet); and a pain score between 4 and 7 in the VAS was seen in 5.6% of cases (1 foot).

Discussion

Lisfranc's fracture dislocation has been historically catalogued as a serious foot injury leaving significant sequelae

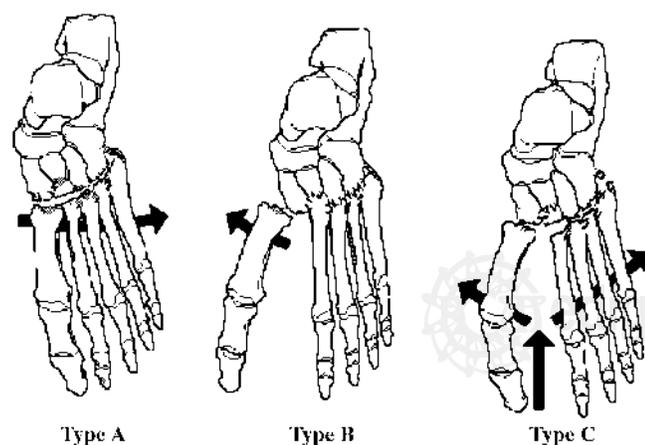


Figure 1. Hardcastle classification.

Table 1. Assessment of results.

	Results		
	Good result	Average result	Poor result
Joint stability	Stable	Stable	Unstable
Arthrosis	None or mild	Moderate	Severe
Stiffness	None or mild	Moderate	Severe
Pain (VAS)	< 3	4-7	> 8
Function	Normal	Acceptable	Limited



Figure 2a.



Figure 2b.



Figure 2c.



Figure 2d.

Figure 2. a. Skin incision, b. Cuneometatarsal joint, c. Preoperative X-ray, d. Postoperative X-ray.

Table 2.		
Number of patients	17	
Males	14 (82.3%) (1 bilateral)	
Females	3 (17.7%)	
Classification	A	4 (22.2%)
	B	9 (50%)
	C	5 (27.8%)
Causality	Crushing	6 (35.3%)
	High fall	5 (27.8%)
	Motor vehicle accident	4 (22.2%)
	Plantar flexion	3 (17.7%)

both in terms of function and gait. We found it occurred in about 3.25% of the fractures treated in our hospital.

The cause of injury in our patients varied. No significant prevalence may be claimed for a specific one. We were interested to see that unlike other reports claiming motor vehicle accidents as the number one cause,⁷ occupational accidents involving direct trauma accounted for most of our cases. The fact that the majority of injuries were occupational resulted in more males suffering from this lesion than females, with a significant difference.

The purpose of treating tarsometatarsal joint injuries is to achieve an accurate anatomical reduction. This is the only way to achieve a plantigrade, painless, stable support. A displacement <2 millimeters compared to the contralateral foot is considered as acceptable.^{2,4,8,10} Manipulating or

trying to perform a closed reduction by traction is justified. If achieved, fixation should be maintained with percutaneous K pins and the cornerstone (second metatarsal base) must be perfectly reduced. We recommend protecting the reduction with a short boot cast. Problems with this kind of treatment are nail migration, infection, and correction loss. Three of our patients came in with prior treatment from another hospital center. Two of them underwent closed reduction and fixation with K pins. The third one was immobilized only with a boot cast. Loss of reduction was seen in all cases and led to a second intervention in our hospital, after which patients did well.

Open reduction and osteosynthesis with nails is aimed at reducing problems associated to K nails⁵ and allowing for the decompression of foot compartments thus preventing compartmental syndrome⁷ from occurring. A weakness of this treatment is the recommendation to remove the osteosynthesis materials once healing is achieved and before weight bearing. This requires a second surgery. Another potential disadvantage is joint damage due to nail size thus increasing the risk of arthrosis and midfoot stiffness. None of our patients had loss of reduction due to screw loosening. Cases showing considerable swelling upon admission to the hospital, primarily those presenting with compression and severe damage to bone and soft tissues, benefited dramatically from the dorsal incision. We had no cases of compartmental syndrome requiring releasing the incisions. Contrary to the general opinion, we removed the screws only in two cases because of pain attributed to them, but this did not affect the patients' function or wellbeing. In the cases where K nails were used to fixate the fifth metatarsal base, they were always removed.

The time to resuming gait has been extremely controversial. Opinions differ by as much as 6 weeks (week 10 and week 16).^{1,2,4,5,7} We told our patients to resume weight

bearing at 12 weeks, once the boot cast and K nails had been removed.

Generally the end result and, particularly results on stability, arthrosis and/or pain, were quite satisfactory. Overall, 94.4% of feet were rated as having good stability, in over half of the feet no arthrosis was reported, and even if most had residual pain, it did not limit the patients in performing their activities of daily living.

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