

# Joint-Preserving Reconstruction of a Neglected Complete Divergent Myerson Type C2 Lisfranc Fracture-Dislocation in a 26-Year-Old Woman: A Case Report

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## Abstract

## Case Report

**Background:** Neglected Lisfranc injuries may lead to midfoot deformity, chronic pain, and post-traumatic osteoarthritis. Delayed reconstruction is challenging because of periarticular fibrosis, soft-tissue contracture, and established bony deformity. **Case presentation:** A 26-year-old woman with no relevant medical history presented two months after a fall that caused a closed injury to the right foot in dorsiflexion and valgus. Examination showed angulation of the medial border at the first tarsometatarsal joint, midfoot tenderness, painful mobilization, and an antalgic limp, with preserved distal pulses and no neurological deficit. Radiographs and computed tomography demonstrated a complete divergent Myerson type C2 Lisfranc fracture-dislocation, associated with a malunited medial cuneiform fracture and a fracture of the base of the second metatarsal. Open reduction was performed through two dorsal approaches. The medial cuneiform malunion was taken down and reduced, followed by extensive tarsometatarsal arthrolysis, excision of interposed fibrosis, and sequential reduction of the medial, middle, and lateral columns. The reconstruction was stabilized with Kirschner wires. **Outcome:** The postoperative course was uncomplicated. The patient was immobilized in a windowed short-leg cast and remained non-weight-bearing for three months. The cast and wires were removed at 45 days, followed by non-weight-bearing rehabilitation. At six months, alignment remained globally maintained and the patient walked without pain. **Conclusion:** In a young patient with a Lisfranc injury neglected for several weeks, joint-preserving reconstruction may be considered when the deformity remains correctable and the articular surfaces are reconstructible. Correction of associated malunion, thorough arthrolysis, and methodical restoration of radiographic alignment are key steps. Longer follow-up is required to assess post-traumatic osteoarthritis. **Keywords:** Lisfranc; divergent fracture-dislocation; neglected injury; malunion; open reduction; Kirschner wires; joint-preserving reconstruction.

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## INTRODUCTION

The Lisfranc complex comprises the tarsometatarsal articulations connecting the five metatarsal bases to the three cuneiforms and the cuboid. Stability depends on the bony architecture, particularly the recessed position of the second metatarsal base between the cuneiforms, and on a dense ligamentous network. These injuries are uncommon but may be missed at the initial assessment. Untreated instability can lead to chronic pain, progressive deformity, collapse of the arch, and post-traumatic osteoarthritis [1-4].

The Hardcastle classification modified by Myerson separates total incongruity (type A), partial

incongruity (type B), and divergent injuries (type C). Type C2 denotes complete divergence of the entire tarsometatarsal complex [1,2].

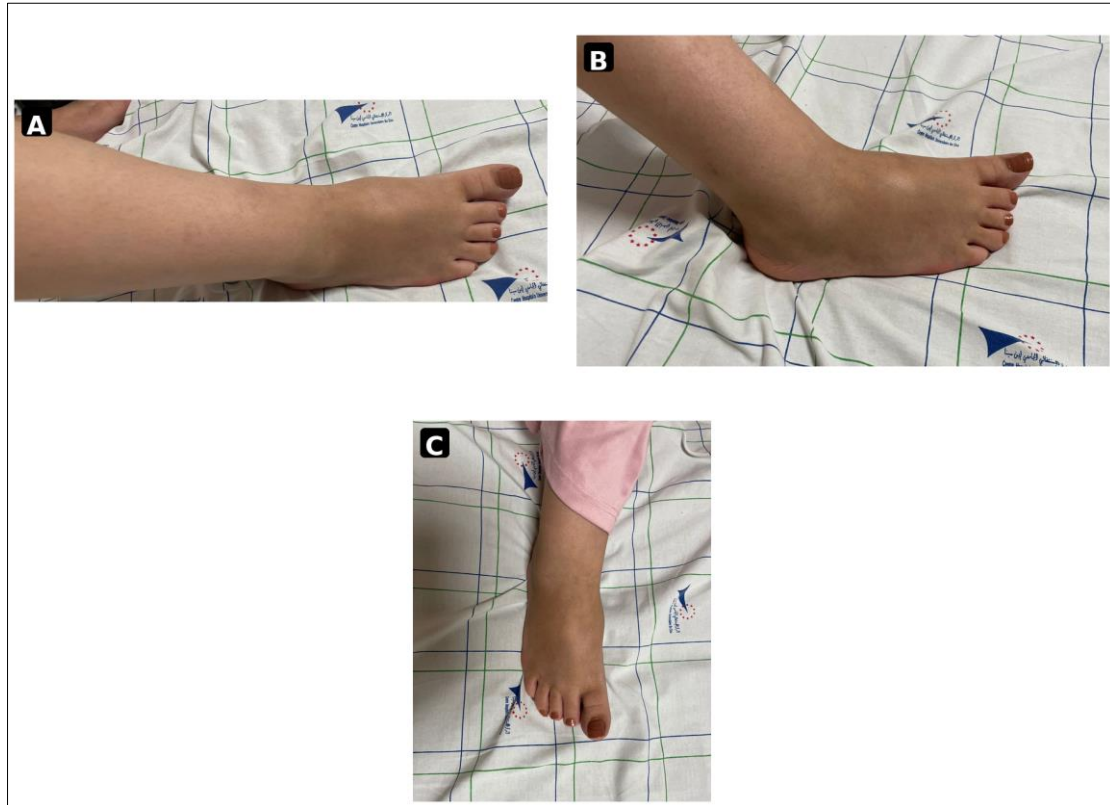
Management of delayed injuries remains controversial. Delayed open reduction may be considered when satisfactory congruity can still be restored, whereas corrective arthrodesis is often selected for established osteoarthritis, severe articular destruction, or an irreducible chronic deformity [3,5-11]. We report a complete divergent Myerson type C2 Lisfranc fracture-dislocation neglected for two months, associated with medial cuneiform malunion and treated with a one-stage joint-preserving reconstruction.

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## CASE PRESENTATION

A 26-year-old woman with no relevant medical history was referred for persistent pain, deformity of the right foot, and major difficulty walking two months after injury. The initial event was a fall in which the right foot was forced into dorsiflexion and valgus. The injury was closed and immediately caused localized midfoot pain and loss of function.

Clinical examination showed visible angulation of the medial border of the foot at the first tarsometatarsal joint. Palpation and mobilization of the midfoot were painful. The patient could walk only with pain and an antalgic limp. The skin was intact, distal pulses were palpable, and no sensory or motor deficit was identified (Figure 1).



**Figure 1: Preoperative clinical appearance of the right foot two months after injury. A: dorsomedial view; B: medial view; C: dorsal view. Midfoot deformity and angulation of the medial border are visible, with intact skin**

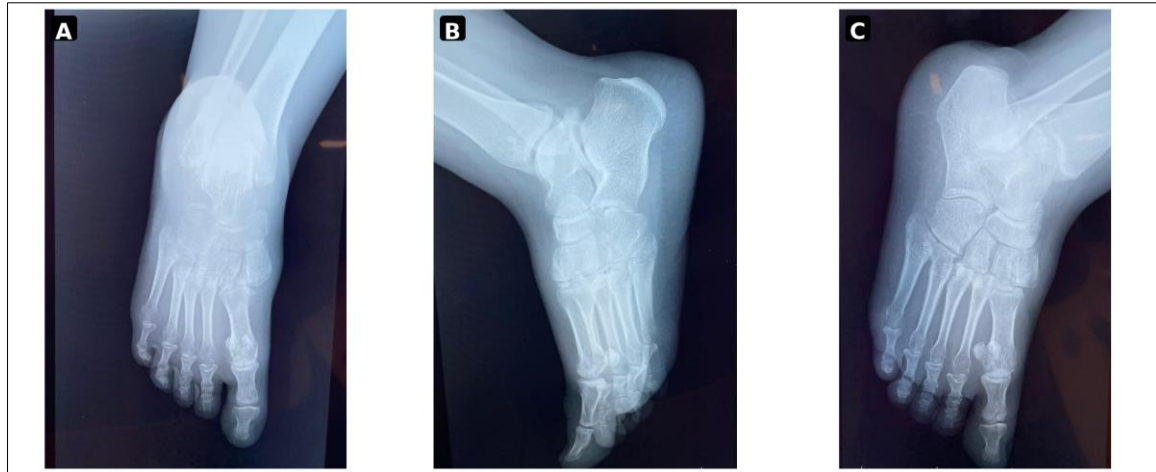
### Clinical timeline

| Time point    | Clinical and imaging findings                                                                                                                                    | Management                                                                                        |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Day of injury | Fall with a closed right-foot injury in dorsiflexion and valgus, causing pain and functional impairment.                                                         | Initial management was not documented in the available data.                                      |
| Two months    | Medial deformity, midfoot pain, and antalgic limp. Radiographs and CT: type C2 divergent fracture-dislocation, C1 malunion, and second metatarsal base fracture. | Open reduction was indicated.                                                                     |
| Surgery       | Fixed deformity caused by malunion and tarsometatarsal fibrosis.                                                                                                 | Two dorsal approaches, malunion takedown, arthrolysis, sequential reduction, and K-wire fixation. |
| Day 21        | Clean wounds and no skin or neurovascular complication.                                                                                                          | Continued immobilization and non-weight-bearing.                                                  |
| Day 45        | Reduction maintained without evident secondary displacement.                                                                                                     | Cast and K-wire removal; non-weight-bearing rehabilitation started.                               |
| Three months  | Favorable clinical course.                                                                                                                                       | Weight-bearing allowed and rehabilitation continued.                                              |
| Six months    | Painless walking; globally maintained alignment on available views.                                                                                              | Continued clinical and radiographic surveillance.                                                 |

## Imaging

Anteroposterior, lateral, and oblique radiographs of the right foot demonstrated complete loss of tarsometatarsal congruity. The first ray was displaced medially, whereas the lateral rays diverged in the

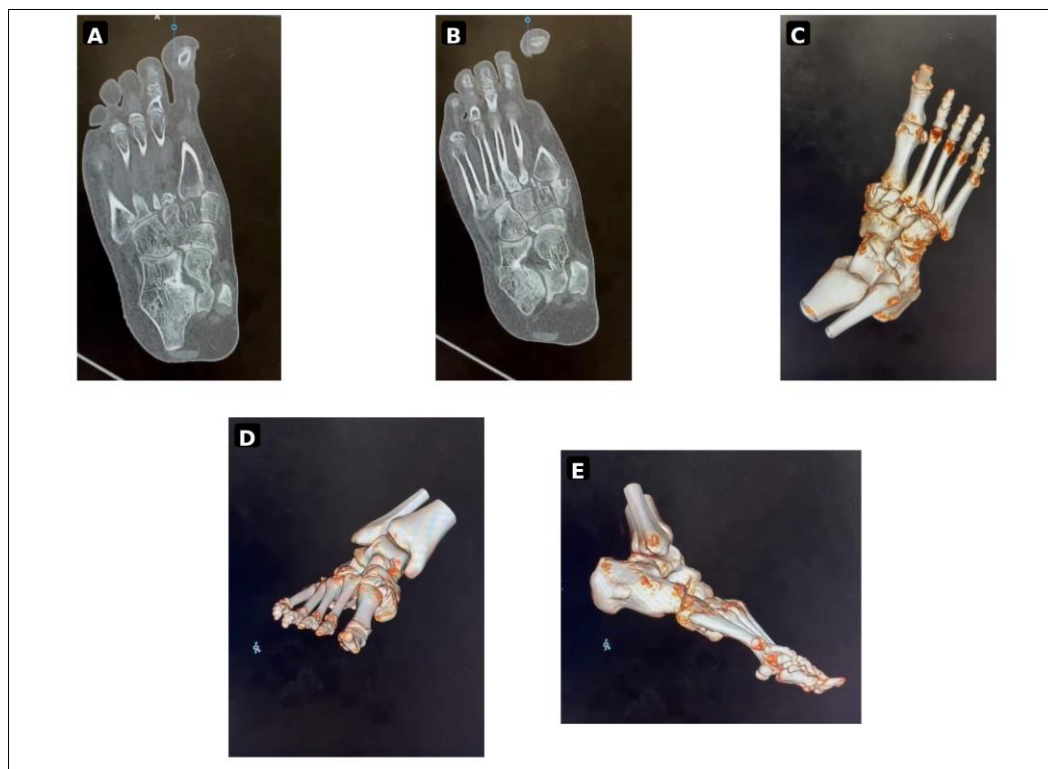
opposite direction. There was marked widening between the first and second rays, loss of alignment between the second metatarsal base and the intermediate cuneiform, and lateral-column incongruity. The lateral view showed a dorsal component of displacement (Figure 2).



**Figure 2: Preoperative radiographs. A: anteroposterior view; B: lateral view; C: oblique view. The images show complete divergence of the tarsometatarsal complex, incongruity of the medial, middle, and lateral columns, and a dorsal component of displacement**

Computed tomography confirmed a complete divergent Myerson type C2 Lisfranc fracture-dislocation. It also showed a medial cuneiform fracture healed in malposition, producing deformity of the medial column and incongruity of the first metatarsal-medial

cuneiform joint, together with a fracture of the base of the second metatarsal. The malunited callus and osseous remodeling formed a mechanical block to closed reduction (Figure 3).



**Figure 3: Preoperative computed tomography. A-B: CT images demonstrating the divergent fracture-dislocation, fracture of the second metatarsal base, and medial cuneiform deformity. C-E: three-dimensional reconstructions illustrating complete divergence of the Lisfranc complex and medial-column malunion**

### Surgical treatment

Open reduction was indicated. Exposure was obtained through two dorsal approaches: a medial incision between the first and second metatarsals and a lateral incision between the fourth and fifth metatarsals.

The first step was takedown of the medial cuneiform malunion. After the osseous deformity had been released and corrected, the medial cuneiform was anatomically reduced and stabilized with Kirschner wires. Headless compression screws had been

considered but were not available in this resource-limited setting.

The second step consisted of extensive arthrolysis of the tarsometatarsal complex and careful excision of the interposed fibrous tissue. Reduction was then performed sequentially. The first metatarsal-medial cuneiform joint (M1-C1) was reduced first, restoring alignment of the lateral border of the first metatarsal with the lateral border of the medial cuneiform on the anteroposterior view. Temporary K-wire fixation maintained this reduction (Figure 4).



**Figure 4:** Intraoperative view during reduction of the first metatarsal-medial cuneiform joint (M1-C1). After takedown of the medial cuneiform malunion and arthrolysis, M1 was realigned with C1 and temporarily stabilized with Kirschner wires

The second metatarsal base was then recentered on the intermediate cuneiform, restoring alignment of their medial borders on the anteroposterior view. On the lateral view, dorsoplantar midfoot congruity and continuity of the talus-navicular-cuneiform-first metatarsal axis were checked. Finally, the lateral column

was reduced on the oblique view by aligning the medial border of the fourth metatarsal with the medial border of the cuboid. The reconstructed columns were stabilized with multiple K-wires. Immediate postoperative radiographs showed satisfactory correction of the divergence on the available views (Figure 5).



**Figure 5: Immediate postoperative radiographs. A: anteroposterior view; B: oblique view. The divergence has been corrected and the tarsometatarsal complex is stabilized with multiple K-wires under cast immobilization**

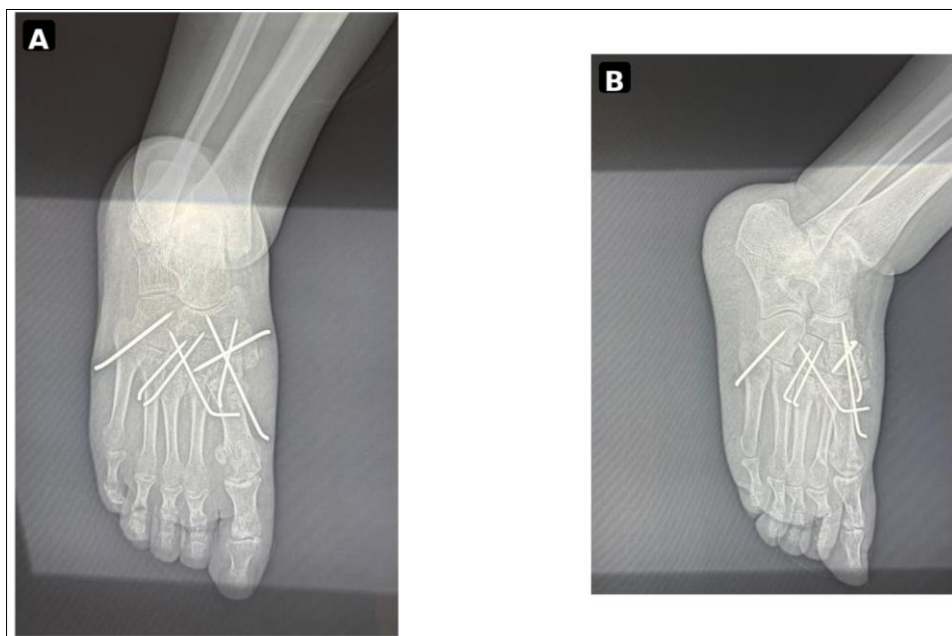
#### Postoperative management and follow-up

The immediate postoperative course was uncomplicated. There was no wound-edge compromise, skin necrosis, neurological deficit, or vascular complication. Analgesic treatment and thromboprophylaxis with enoxaparin 4,000 IU once daily for 45 days were prescribed.

A windowed short-leg cast boot was applied to permit wound monitoring and local care. Dressings were changed every two days. Strict non-weight-bearing was

maintained for three months. Follow-up visits were scheduled at day 21, day 45, three months, and six months.

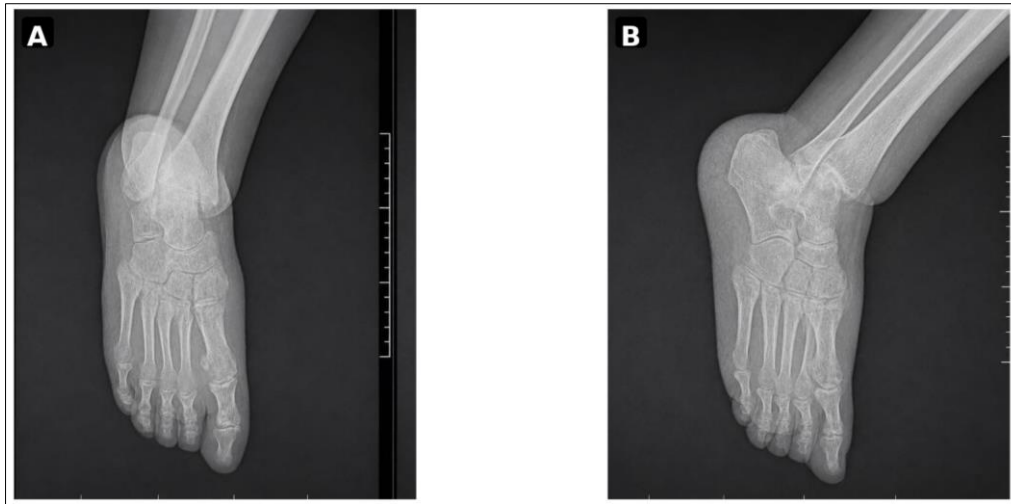
At day 21, the wounds were clean, without inflammatory changes, dehiscence, or necrosis. At day 45, the cast and K-wires were removed after radiographs confirmed maintenance of reduction without evident secondary displacement (Figure 6). Non-weight-bearing physiotherapy was then initiated. Weight-bearing was permitted from the third postoperative month.



**Figure 6: Radiographic assessment at day 45. A: anteroposterior view; B: oblique view. Reduction remains globally maintained without evident secondary displacement at the time of cast and K-wire removal**

At six months, the scars were supple and painless, and the neurovascular examination remained normal. The patient walked without pain. Anteroposterior and oblique radiographs showed

globally maintained tarsometatarsal alignment without evident recurrent divergence on the available views (Figure 7).



**Figure 7: Six-month radiographic assessment. A: Anteroposterior view; B: Oblique View. Tarsometatarsal alignment remains globally maintained after hardware removal, without evident recurrent divergence on the available views**

## DISCUSSION

Neglected Lisfranc injuries are difficult to treat because delayed diagnosis allows periarticular fibrosis, capsuloligamentous contracture, osseous remodeling, and malunion of associated fractures to develop. These changes may prevent closed reduction and lead to painful deformity, midfoot instability, and post-traumatic osteoarthritis [4,5,8,11].

The present injury was particularly unstable: a complete type C2 divergence associated with a malunited medial cuneiform fracture and a fracture of the second metatarsal base. The C1 malunion prevented restoration of the length and orientation of the medial column; therefore, its correction was a prerequisite to reduction of the remaining Lisfranc complex.

Reduction quality is a major determinant of functional outcome after Lisfranc injury [1-3]. The second metatarsal base usually functions as the keystone and central reference for reconstruction. In this case, however, the medial cuneiform deformity required restoration of the medial column first, followed by recentering of the second metatarsal on the intermediate cuneiform and correction of the lateral column. This individualized sequence progressively restored the main radiographic landmarks.

For delayed injuries, the choice between joint-preserving reconstruction and arthrodesis depends on the interval from injury, flexibility of the deformity, cartilage condition, and the feasibility of obtaining stable reduction. Aronow supported delayed open reduction in the absence of major arthritis or an uncorrectable fixed deformity, whereas arthrodesis is favored when articular destruction or osteoarthritis is advanced [5]. The series by Cassinelli and Singh suggest that delayed operative treatment may still reduce pain and improve function in selected missed injuries [9,11]. Nevertheless, outcomes

of late injuries are generally inferior to those of injuries treated early [7,8].

Feng *et al.*, described staged distraction and reconstruction for neglected injuries presenting three to eight months after trauma [10]. In the present case, the two-month delay and the ability to mobilize the columns after malunion takedown and arthrolysis allowed one-stage correction without excessive skin tension or soft-tissue complications.

K-wire fixation was selected because headless compression screws were unavailable. Although this construct is less rigid than screw fixation of the medial and middle columns, stability was supported by strict immobilization, close radiographic surveillance, and prolonged non-weight-bearing. The lack of evident secondary displacement at day 45 and six months suggests that adequate stability was achieved in this individual case.

This report has limitations. Six months is too short to assess post-traumatic osteoarthritis, no validated midfoot functional score was recorded, and the final imaging does not provide a detailed assessment of cartilage. Continued clinical and radiographic follow-up is required.

## CONCLUSION

A neglected complete divergent Myerson type C2 Lisfranc fracture-dislocation is a complex injury. In this young woman treated two months after trauma, correction of the medial cuneiform malunion, extensive arthrolysis, and sequential reduction of the three columns restored satisfactory alignment and resulted in painless walking at six months. Joint-preserving reconstruction may therefore be considered in selected subacute injuries when the deformity remains correctable. Longer follow-up is necessary to detect secondary osteoarthritis.

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