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Case Report

Simultaneous Shepherd, Cedell, and lateral process talar fractures: A case report

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Abstract

Synchronous fractures of the lateral tubercle (Shepherd), the medial tubercle (Cedell), and the lateral process of the talus, associated with a hallux fracture-dislocation, represent a rare and complex injury pattern. Few cases have been reported in the literature. We present the case of a 40-year-old male patient involved in a motorcycle accident who sustained blunt trauma to his left ankle. Initial plain radiographs and subsequent computed tomography (CT) confirmed displaced fractures involving both tubercles of the posterior process of the talus as well as the lateral process, along with a fracture-dislocation extending into the tibial condyle of the proximal phalanx at the hallux interphalangeal joint. Surgical fixation was performed, including anatomical reduction and internal fixation. Clinical and radiological follow-up over 18 months demonstrated satisfactory functional recovery and bone union, with the patient scoring 70/100 on the American Orthopaedic Foot and Ankle Society (AOFAS) hindfoot score, 42% on the Foot Function Index (FFI), and 4/10 on the Visual Analog Scale (VAS) for pain. For the hallux, the AOFAS hallux score was 69 points. This case underscores the clinical importance of recognizing peripheral talar fractures, which are frequently overlooked on radiographs and require CT imaging for accurate diagnosis and appropriate management.

Level of Evidence IV; **Case report.**

Keywords: Hallux; Talus; Diagnostic imaging; Fracture fixation, internal.

Introduction

Talus fractures are rare injuries, accounting for approximately 0.85% to 1% of all fractures. They are most frequently associated with high-energy trauma, such as falls from height or traffic accidents. Fractures of the head of the talus, the lateral process, and the posterior process are collectively referred to as peripheral talar fractures. These injuries are often overlooked on initial conventional radiographs, underscoring the importance of advanced imaging such as computed tomography (CT) for accurate diagnosis[1].

The posterior process of the talus consists of two tubercles – the lateral and medial – separated by a groove through which the flexor hallucis longus tendon passes. Fractures of this region were first described by Shepherd in 1882, involving the lateral tubercle, and later by Cedell in 1974, involving the posteromedial tubercle. These injuries are currently classified as lateral tubercle fractures (Shepherd's fracture), which are more common, and medial tubercle fractures (Cedell's fracture)[2]. The simultaneous occurrence of lateral and medial tubercle fractures and the lateral process of the talus, associated with a hallux fracture, represents a rare condition (Table 1).

Simultaneous fractures of the posterior and lateral processes of the talus are rare injuries, often associated with high energy trauma. We present the case of a 40-year-old male motorcycle rider who sustained this uncommon injury pattern. This report aims to describe the diagnostic workup, surgical strategy, and 18-month outcome of this rare, combined injury.

Case presentation

A 40-year-old male patient was admitted to the emergency department following a traffic accident in which he, as a

Study performed at Hospital Alma Mater de Antioquia, Medellín. Colombia.

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Table 1. Review of cases reported in the literature

Author/Year	Age (years)	Mechanism of injury	Types of fracture	Treatment	Followup (time/scales/imaging)
Benmansour et al. (1999)	32	Fall from 3 m (dorsiflexion + pronation)	Simultaneous fracture: type I lateral nondisplaced + posteromedial	Selective ORIF (posteromedial) + neurolysis (posterior tibial nerve)	12 months. No scales. No pain, no neurological deficit. 25% decrease in subtalar mobility
An et al. (2009)	26	Traffic accident	Simultaneous fracture (lateral + posteromedial). Small posteromedial fragment (8×4×4 mm)	ORIF lateral process + resection of posteromedial fragment	3 months. AOFAS 91. No pain or limp. Progressive weightbearing
Ziran (2011)	39	Motorcycle accident	Simultaneous displaced fractures (lateral + posteromedial)	ORIF of both fractures	6 months. No functional scales. ROM: -5° dorsiflexion, 30° plantarflexion. Painfree. No imaging after 3 months
Gómez Robledo (2013)	24	Workrelated trauma	Simultaneous fracture (lateral + posteromedial) + entrapment of medial neurovascular bundle	ORIF of both + neurovascular decompression	CT at 6 months: union. Followup 16 months. No functional scales. 50% decrease in subtalar mobility. Partial sensory recovery
Zhang et al. (2025)	45	Fall from 2 m	Complex fracture: lateral + posteromedial + calcaneofibular ligament avulsion	Arthroscopy: medial tubercle ORIF (Herbert screw). No lateral fixation (comminution)	Followup 84 months. Scales: serialized VAS and AOFAS. CT at 2 years: union
Present case (2026)	40	Traffic accident: motorcycle rider collided with a vehicle	Simultaneous fracture: lateral tubercle + medial tubercle + lateral process + hallux fracture	ORIF with 2.5 mm headless cannulated compression screws	18 months. AOFAS Hindfoot 81/100; AOFAS Hallux 82; FFI 33%; VAS pain 3/10. CT: bone union. Returned to work as a motorcycle driver. Mild limitation when walking on uneven ground and a 5° loss of extension at the hallux interphalangeal joint.

ORIF: Open reduction and internal fixation; ROM: Range of motion; AOFAS: American Orthopaedic Foot and Ankle Society score; VAS: Visual Analog Scale; CT: Computed tomography; FFI: Foot Function Index.

motorcycle rider, collided with a vehicle, sustaining blunt trauma to his left foot and ankle. On initial evaluation, the patient was clinically stable, with controlled pain and moderate, nontense edema of the left ankle and foot. Examination revealed evident hallux deformity, no associated wounds, adequate mobility of the other toes, a capillary refill time of 2 seconds, and a palpable pedal pulse. Touch and discriminative sensation in the autonomous zones, particularly in the distributions of the tibial, deep peroneal, and superficial peroneal nerves, was preserved.

On admission, plain radiographs of the ankle demonstrated marked soft tissue edema and a previously undescribed finding, which we term the 'double medial and lateral peritalar contour sign' (Figure 1). Images of the foot showed a displaced fracture-dislocation of the hallux in the proximal phalanx with involvement of the interphalangeal joint (Figure 2).

Closed reduction of the hallux fracture-dislocation was performed in the emergency room, and the injury was immobilized using buddy splinting and a shortleg plaster splint for the ankle. As a key element in preoperative planning, CT scans were requested to characterize the injuries and establish the surgical plan (Figure 3). The fracture of the lateral process of the talus was classified as type IIIb, according to the modified classification by Tinner and Sommer[3], representing an articular and metaphyseal fracture that is multifragmented but reconstructable. The fracture of the posterior process was classified as a displaced Shepherd and Cedell fracture. Thus, it was considered a type 2d injury, that is, a fracture of the lateral process along with a fracture of the posterior talar process, according to the Wang et al.[4] classification. The patient was discharged with recommendations to reduce the edema, and definitive surgery was scheduled for 10 days later.

The procedure was performed under general anesthesia, with the patient in the supine position, without the use of a tourniquet, and with prophylactic administration of intravenous antibiotics. Using a posteromedial approach between the Achilles tendon and the flexor hallucis longus, the posterior process of the talus was identified under direct visualization, with careful and continuous protection of the posterior tibial neurovascular bundle and the flexor hallucis longus tendon throughout the procedure. With the aid of an external fixator acting as a tibiocalcaneal distractor, the superior half pin was placed on the medial surface of the distal tibial metaphysis, and the inferior half pin was inserted into the calcaneus just inferior to the posterior facet. The fractures of the medial and lateral tubercles were reduced and fixed using two 2.5 mm headless cannulated compression screws.

Subsequently, through a sinus tarsi approach and with the aid of an external fixator functioning as a fibulocalcaneal distractor, the superior half pin was placed on the lateral surface of the distal fibular metaphysis, and the inferior half pin was inserted into the posterior calcaneal tuberosity. The fracture of the lateral process of the talus was then identified and reduced, and fixation was completed with two 2.5 mm headless cannulated compression screws.

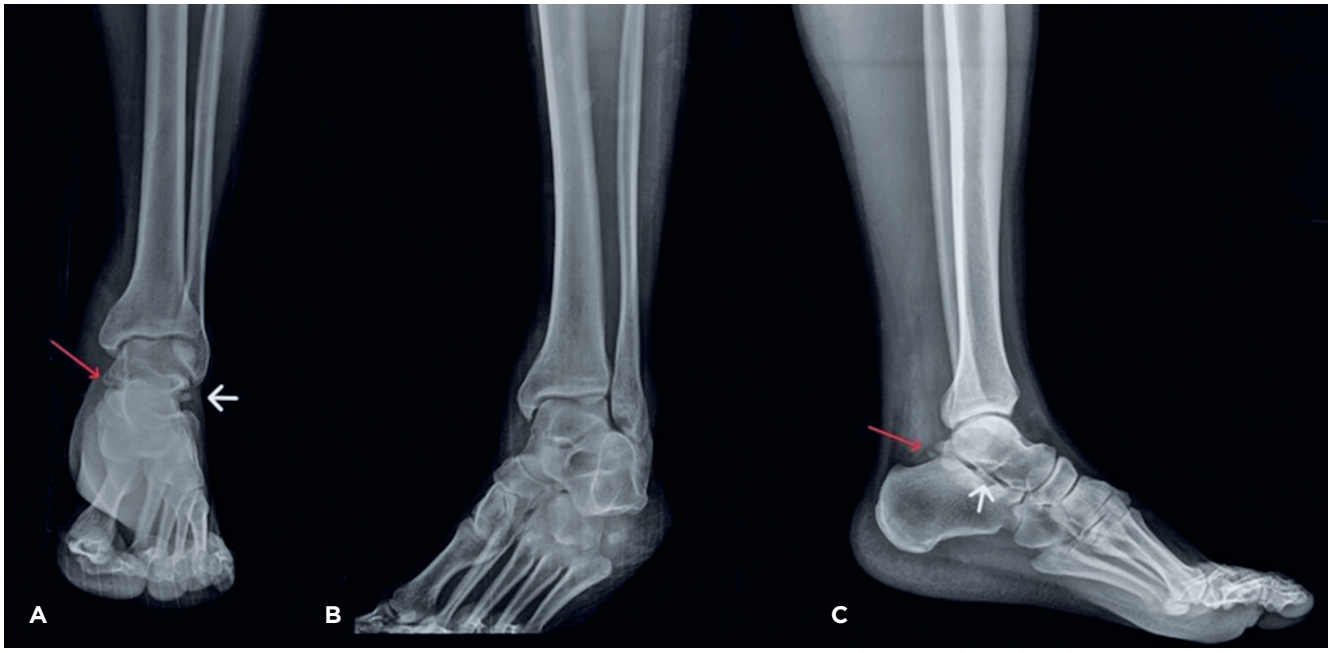

Figure 1. (A) Anteroposterior ankle radiograph. The short white arrow indicates a lateral peritalar bony double contour in the subfibular region, suggesting a fracture of the lateral process of the talus. The red arrow highlights a double contour of the medial talus, suggesting a fracture of the posteromedial process. (B) A lateral radiograph shows soft tissue swelling in the ankle. (C) A mortise radiograph; the red arrow points to the fracture line in the posterior process of the talus, and the white arrow shows the altered V-sign, which corresponds to disruption of the normal cortical outline formed by the lateral talar process and the posterior subtalar joint, and serves as an indirect indicator of fracture.

Figure 2. (A) Oblique view of the left foot, showing a fracture of the medial condyle of the proximal phalanx of the hallux, with interphalangeal subluxation (short blue arrow). (B) Anteroposterior radiograph of the foot, showing a displaced fracture of the proximal phalanx (long blue arrow).

Finally, using a dorsal approach at the level of the interphalangeal joint of the hallux, a tenotomy of the extensor hallucis longus (EHL) was performed to access the articular fracture line of the proximal phalanx. Temporary reduction was achieved with Kirschner wires; however, due to the marked instability of the hallux fracture-dislocation, definitive fixation was performed with the placement of a 1.5 mm minifragment plate. The repair of the EHL tendon was secured.

All steps were performed under fluoroscopic guidance. Extensive irrigation was performed, followed by wound closure and immobilization with a splint. The patient remained under inpatient observation for 24 hours, during which a CT scan was performed to assess the quality of the joint reduction and to rule out intraarticular implant penetration or malposition (Figure 4), and a plain radiograph of the foot was obtained (Figure 5).

The postoperative follow-up visit took place two weeks later, during which the splint and sutures were removed. Physical therapy was initiated to facilitate early rehabilitation, and immobilization with a walker boot was prescribed, along with non-weight-bearing for an additional 10 weeks. Starting in week 12, partial weight-bearing of approximately 15 kg was initiated, with a progressive and controlled increase using crutches until week 16. Subsequently, full and unrestricted weight-bearing was permitted.

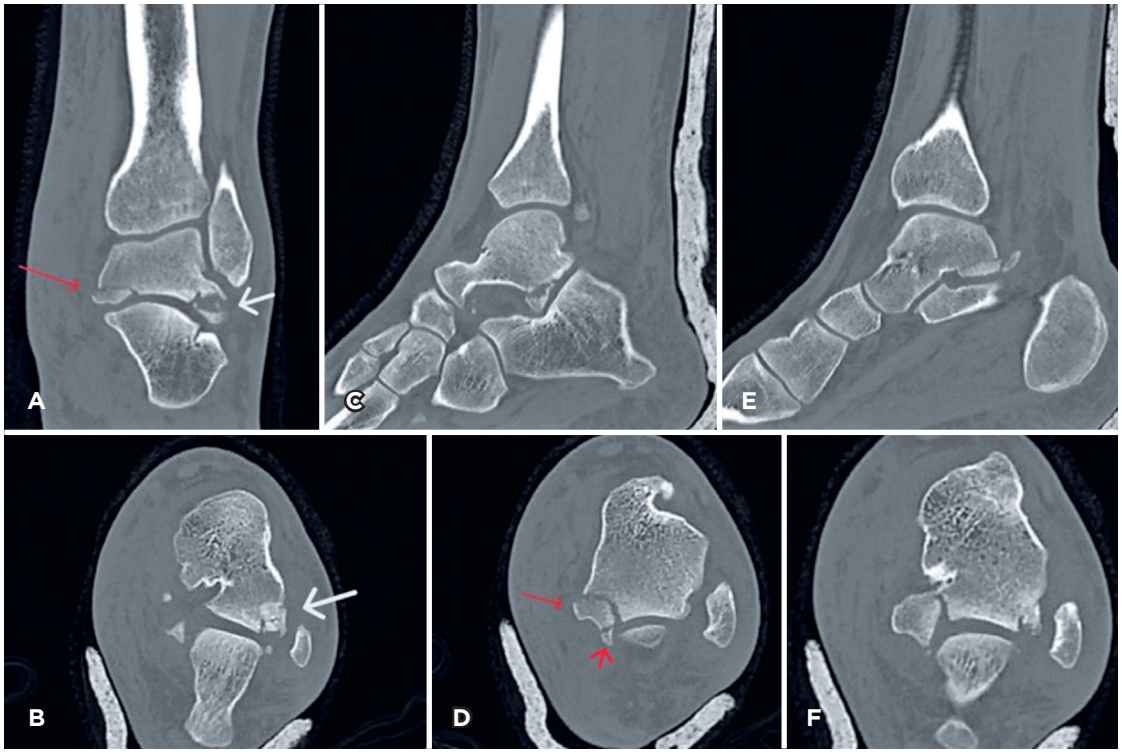

Figure 3. Preoperative computed tomography scan. (A) Coronal section showing a fracture of the lateral process (white arrow) and the posteromedial process (red arrow) (B) .Axial view shows comminution of the lateral process (white arrow). (C and E) Sagittal sections demonstrate displaced fractures of the lateral and posterior processes. (D) Axial view with clearly visible Cedell's fracture (thin red arrow) and Shepherd's fracture (red arrowhead). (F) Axial view with synchronous fracture of the lateral and posterior processes.

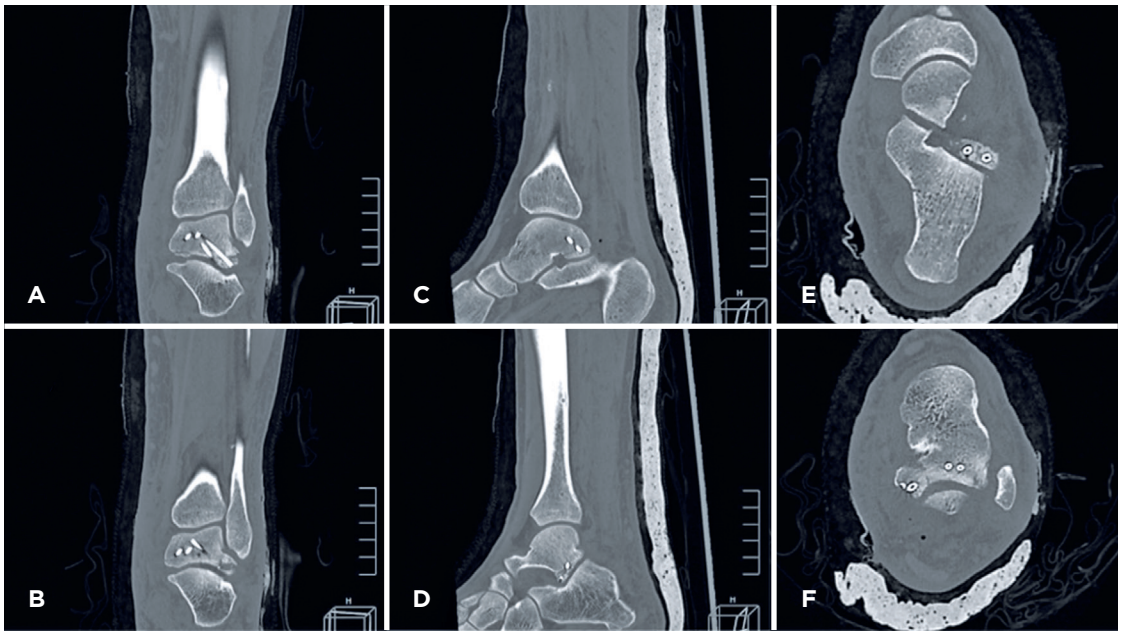

Figure 4. Postoperative computed tomography scan of the ankle obtained on the following day. (A, B) Coronal sections showing anatomical fixation of the lateral process of the talus. (C) Sagittal section demonstrating reduction with screws in the medial tubercle (Cedell). (D) Stable fixation of the lateral process. (E) Axial section showing reduction without joint stepoff and adequate fixation of the lateral process. (F) Anatomical reduction of the posterolateral tubercle of the talus (Shepherd).

In the 24-week follow-up, the patient was already bearing full weight and had adequate healing of the surgical wounds. He scored 70/100 on the American Orthopaedic Foot and Ankle Society (AOFAS) hindfoot score, 42% on the Foot Function Index (FFI), and 4/10 on the Visual Analog Scale (VAS) for pain. He returned to work with restrictions and began cycling as a recreational sport. At this time, a follow-up CT scan of the ankle was performed, showing complete bone union (Figure 6). Regarding the hallux, the score achieved to date on the AOFAS hallux score was 69 points.

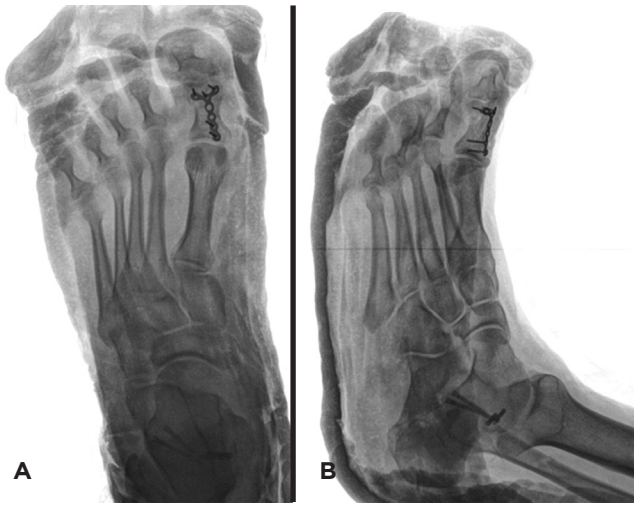

Figure 5. Anteroposterior (A) and lateral (B) radiographs of the left foot, showing an adequately reduced fracture of the proximal phalanx of the hallux, without evidence of intra-articular screw/implant penetration.

After 18 months of follow-up, weight-bearing and comparative X-rays were performed, showing mild signs of post-traumatic subtalar osteoarthritis, with no involvement of other joints and no failure of the osteosynthesis material in the hindfoot (Figure 7). Complete union was observed in the interphalangeal joint of the hallux, with no arthritic changes (Figure 8). The patient returned to work as a motorcycle driver. He requires orthopedic footwear with a thermoformed insole providing scaphoid support to relieve residual pain. He achieved a score of 81/100 on the AOFAS hindfoot score, 33% on the FFI, and 3/10 on the VAS score for pain. Regarding the hallux, he obtained a final score of 82 points on the AOFAS hallux score (Figure 9).

Discussion

It has been reported that fractures affecting the lateral process account for 10.4% of talus fractures, with a mean patient age of 20 to 30 years, predominantly men, and a trauma mechanism resulting from motor vehicle accidents (73%)[2]. The mechanism of injury remains unclear. However, current literature suggests that forces of dorsiflexion,

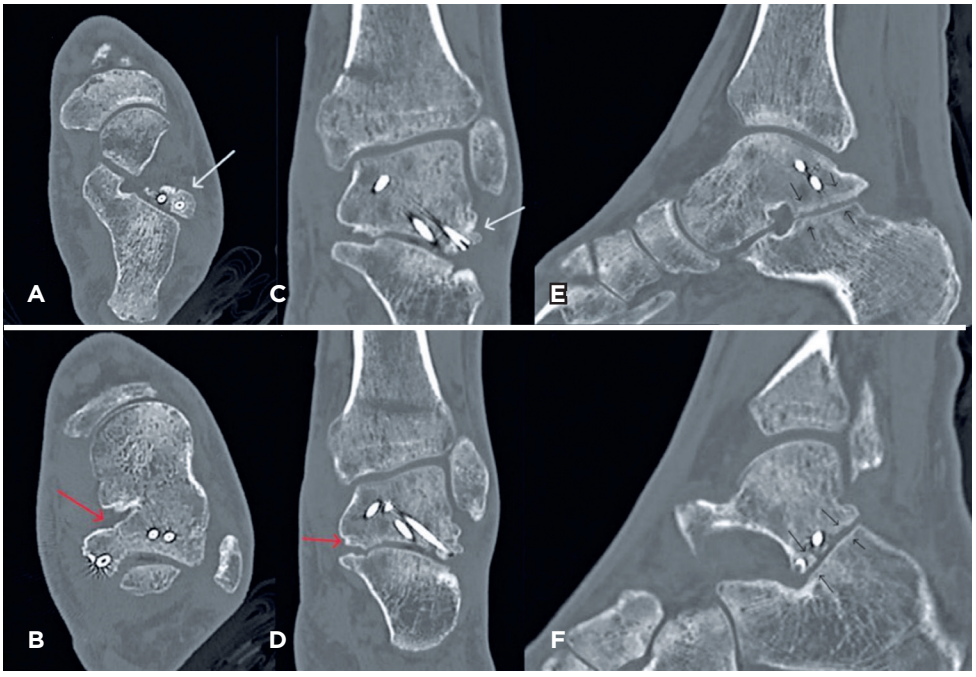

Figure 6. Computed tomography scan at week 24. (A and B) Axial view showing screws in the lateral process, non-articular (white arrow), and bone bridge (union) in the fracture of the posterior process (red arrow). (C and D) Coronal view showing bone bridge (union) in the fracture of the lateral process (white arrow), and in the medial tubercle (Cedell) of the posterior process (red arrow). (E and F) Sagittal views showing minimal changes due to subtalar osteoarthritis (short black arrows).

Figure 7. Comparative radiography at 18 months after the definitive surgery. (A) Lateral view of the ankle, showing stable fixation and minimal arthritic changes in the subtalar joint. (B) Anteroposterior view of the ankle demonstrates proper alignment of the hindfoot, without signs of avascular necrosis. (C and D) Weight-bearing views of the foot, showing proper sagittal alignment of the midfoot and forefoot.

Figure 8. Weight-bearing and comparative radiographs of the feet showing a completely healed fracture of the proximal phalanx of the hallux, proper alignment, the hallux interphalangeal joint remained congruent, and no signs of osteoarthritis in the interphalangeal joint.

inversion, eversion, and potentially external rotation are all contributing factors[4]. Fractures affecting the posterior process of the talus occur due to direct compression, either during dorsiflexion and pronation or during forced plantar flexion, resulting in compression of the posterior process between the posterior tibial rim and the calcaneus. They can occur in falls from height, traffic accidents, and dance, where plantar flexion is common[5].

The simultaneous occurrence of fractures involving the lateral process, the lateral tubercle (Shepherd), and the medial tubercle (Cedell) of the posterior process of the talus is exceptionally rare and has been reported only in a few case reports[6-10].

Compared with previously reported cases[6-10], our patient shared the highenergy trauma mechanisms described, particularly traffic accidents and falls from height. In this context, our case aligns with more contemporary reports by Ziran[8], Gómez Robledo[9], and Zhang et al.[10], in which anatomical reduction and internal fixation were emphasized to optimize joint congruency and reduce the risk of functional sequelae. However, unlike several of these reports, where less stable techniques or combinations of fixation and resection were employed, in our case stabilization of all fractures was achieved using rigid fixation systems with compression screws, thereby promoting a more stable biomechanical environment for bone union.

Figure 9. Comparative clinical images after 18 months of follow-up. (A) Posterior view showing adequate hindfoot alignment. (B) Anterior view showing the midfoot and forefoot without secondary deformity. (C and D) Standing on heels and toes. Note mild limitation of full extension of the left hallux. (E) The scar has healed, the midfoot arch is preserved, and there is no hallux flexus deformity.

From the perspective of the injury pattern, most of the described cases correspond to synchronous fractures of the lateral process and the posteromedial tubercle, with or without displacement. Our case presents a particularly unusual configuration – combining displaced fractures of both components (Shepherd and Cedell) of the posterior process along with a fracture of the lateral process of the talus and a hallux fracture-dislocation, which broadens the spectrum described to date in the literature. In comparison, some authors have reported associated neurovascular compromise Gómez Robledo[9] or complex ligamentous injuries Zhang et al.[10]. The coexistence with a hallux injury highlights the highenergy nature of the trauma and, we hypothesize, may suggest a more aggressive combined rotational mechanism. Additionally, our approach included comprehensive imaging characterization via radiography and CT both preoperatively and during immediate postoperative followup, which allowed for precise planning and objective verification of joint reduction – an aspect not systematically documented in most published cases.

This report has several limitations. First, it describes a single case, which restricts the generalizability of the findings. Second, preinjury functional scores were not available, limiting the ability to quantify recovery. Third, the followup period was insufficient to fully assess the development of posttraumatic arthritis. Finally, the absence of comparative evidence prevents definitive conclusions regarding the superiority of the chosen treatment strategy.

Conclusion

This case broadens the clinical spectrum of peripheral talus fractures by documenting an exceptional synchronous combination that suggests a high-energy rotational injury mechanism more complex than is typically described. Beyond its rarity, the main contribution lies in emphasizing that the discrepancy between clinical findings and initial imaging should prompt further evaluation, as underestimation of these injuries leads to inappropriate therapeutic decisions and potential functional impairment. In this regard, the systematic integration of CT scanning into the diagnostic algorithm should not be considered complementary but rather decisive when peritalar involvement is suspected. Likewise, postoperative followup with CT scanning is essential to adequately assess the quality of reduction and to detect early posttraumatic osteoarthritic changes.

Authors' contributions: Each author contributed individually and significantly to the development of this article: JMRA * (https://orcid.org/0000-0002-9390-9496). Performed the surgeries, data collection, survey of the medical records, performed the clinical examination, and participated in the review process; AHD * (https://orcid.org/0009-0008-7214-8262) and EVP * (https://orcid.org/0009-0006-1075-5978) Conceived and planned the activities that led to the study, interpreted the results of the study, participated in the review process, performed the surgeries, data collection, performed the bibliographic review, formatting of the article, survey of the medical records, and performed the clinical examination. All authors read and approved the final manuscript. *ORCID (Open Researcher and Contributor ID) .

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