

Treatment Strategy for a Closed Tibial Pilon Fracture Concomitant with a Closed Lateral Malleolus Fracture That Occurred in a Context of Low Energy Trauma: A Case Report of a 43-Year-Old Man

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Abstract

Case Report

Tibial pilon fractures are rare and challenging fractures of the lower limb that account for about 1% of all lower limb fractures and up to 10% of tibial fractures. They are challenging in terms of treatment outcomes. The injury is generally caused by high energy axial trauma from motor vehicle accidents or a fall from height. The type of definitive fixation is still a great challenge for surgeons and is dictated by the soft tissue injury and energy imparted to the fracture. In this case report, we describe the combination of a closed tibial pilon fracture and a closed lateral malleolus fracture occurring in an unusual context for this type of injury in a 43-year-old-man. It actually occurred in a context of low energy trauma of the ankle during a friendly soccer match. A one step internal fixation method was chosen for definitive treatment. For this, two screws were used for the fixation of the tibial pilon fracture and the external malleolus was fixed with two Kirschner wires. Post-operative follow-up was uncomplicated.

Keywords: Pilon fracture; lateral malleolus fracture; tibial fracture.

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INTRODUCTION

A tibial pilon fracture is a high-energy intra-articular fracture of the distal tibia. By definition, the "pilon" is the area enclosed by a square whose side equals the distal tibial articular surface on a frontal X-ray. They account for less than 1% of all fractures of the lower limbs and 10% of tibial fractures, and obtaining good therapeutic outcome is very challenging. The term "pilon" is derived from the French language, meaning pestle, as the distal tibial metaphysis resembles a pharmacist's pestle [1-3]. They occur more frequently in men (57-65%) than in women, in line with more exposed occupations (construction, industry, transport). Even after successful treatment of this injury, post-operative complications such as infection, wound dehiscence, non-union, mal-union and post-traumatic osteoarthritis are difficult to avoid without appropriate technique [2].

Tibial pilon fractures are diagnosed using plain X-rays. Computed tomography (CT) is useful for characterizing the fracture pattern and interpreting joint damage. Compared with plain X-rays, CT provides

additional information, such as: settlement of the articular surface and the presence of intra-articular fragments after provisional reduction. Lesions concomitant with tibial pilon fractures include ligamentous and neurovascular injuries and neighbouring bone fractures.

Tibial pilon fractures can be classified according to the Ruedi and Allgower Classification. In addition to forming the basis of the surgical approach to these lesions, it is one of the most widely used classifications [4]. It divides tibial pilon fractures into 3 categories, according to displacement and degree of comminution:

- Type I: intra-articular fracture without displacement ("cleavage fractures" of the distal tibia without displacement);
- Type II: displaced intra-articular fracture without comminution;
- Type III: displaced intra-articular fracture with comminution.

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In this case report, we describe the combination of a closed tibial pilon fracture and a closed lateral malleolus fracture in a young recreational athlete, occurring in an unusual context for this type of injury. It actually occurred in a context of low energy trauma of the ankle during a friendly soccer match.

CASE REPORT

A 43-year-old man recreational athlete, was transported to the emergency room following a sports accident (soccer match). He suffered an isolated trauma to the left leg, resulting in pain, inability to bear weight on the left ankle with restricted range of motion of the ankle. Examination revealed a circumferential swelling

extending from the ankle to the left forefoot, with ecchymosis patches on the anterolateral aspect of the distal third of the leg and on the lateral border of the ipsilateral foot, with no skin opening (Figure n°1). Distal neurovascular examination was normal.

X-rays of the left ankle revealed a simple oblique, non-displaced fracture of the medial region of the tibial pilon, type 1 of the Ruedi and Allgower classification, and a transverse, non-displaced fracture of the lateral malleolus (Figure n° 2: A and B). A CT scan of the injured ankle confirmed the diagnosis, showing in greater detail the fracture of the tibial pilon and lateral malleolus (Figure n° 3: A, B, C and D).



Figure n°1: Clinical image patient's injured lower limb on admission; yellow arrows showing ecchymosis and white arrow showing oedema

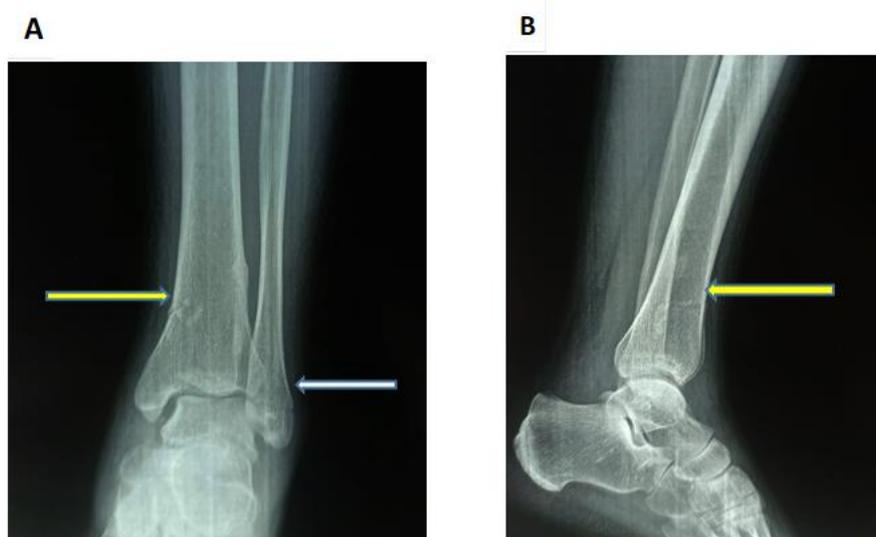


Figure n°2: Standard radiograph of the left ankle; yellow arrow showing pilon fracture and white arrow showing lateral malleolus fracture

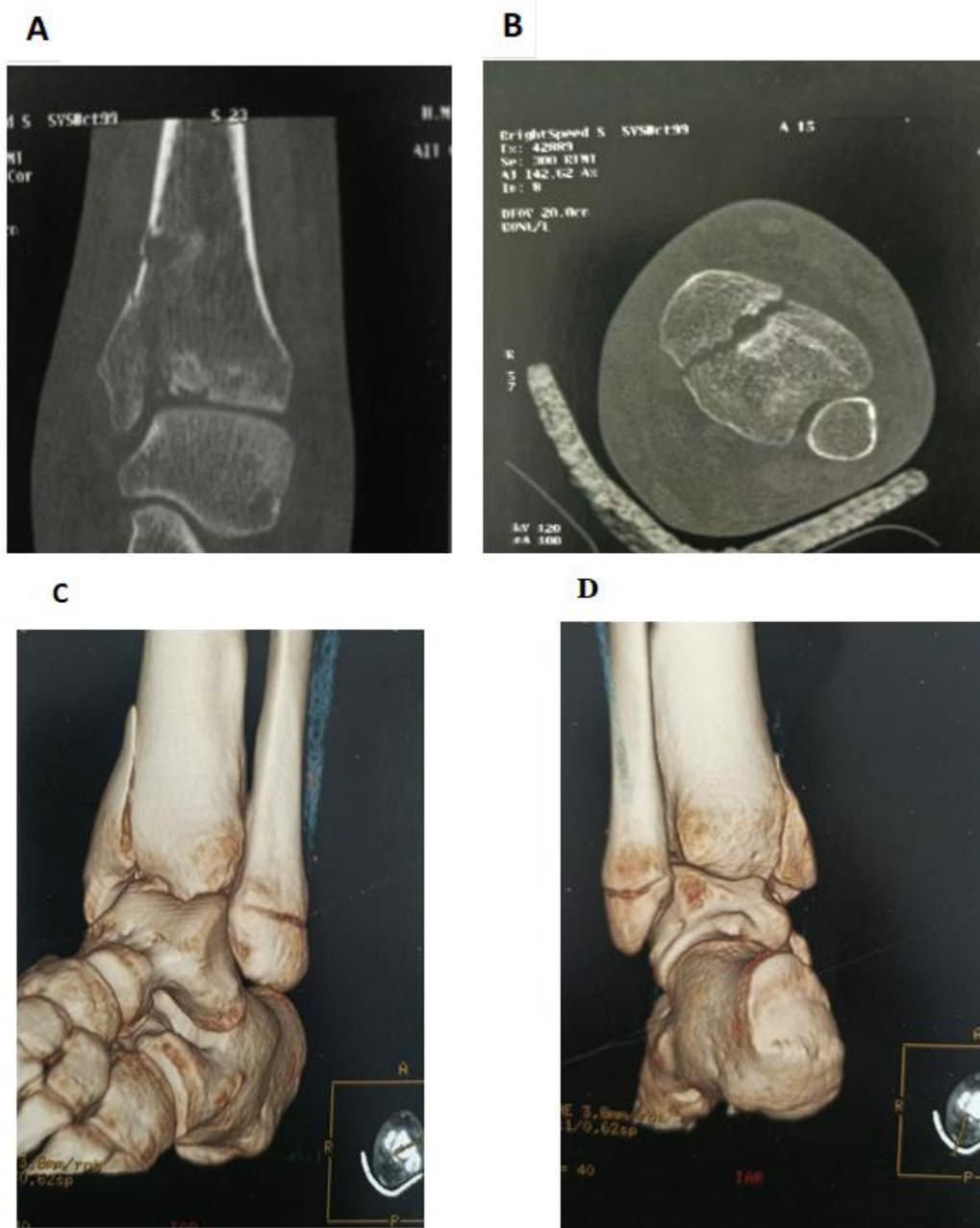


Figure n°3 (A B, C, D): Computed Tomography scan of the left ankle showing pilon and lateral malleolus fractures with more details

After confirming the diagnosis, an analgesic splint was put in place and the patient was taken to the theatre for internal fixation under spinal anesthesia. An open reduction and internal fixation with two 4.5 mm cancellous screws, size 44mm and 40mm was performed for the tibial pilon fracture via an anteromedial approach (Figure n°4: A and B). The fracture of the lateral malleolus was fixed with two 20mm Kirschner wires through two skin flecks (Figure n°4: A and B). After satisfactory fluoroscopic control and lavage, we performed a tension-free skin closure.

Postoperative care consisted of intravenous antibiotic treatment for 2 days, in accordance with local

protocol for the treatment of closed fractures. Postoperatively, the patient received a posterior ankle splint to relieve soft-tissue pressure, and an elevated position of the operated limb to avoid oedema. Pericisional skin monitoring on the first 2 post-operative days revealed no trophic complications, and the patient was discharged from hospital on the 3rd post-operative day. An 8-week non-weight bearing program by two crutches was prescribed followed by physiotherapy. Gradual weight bearing was started at 8 weeks. At four months' follow-up, full range motion of ankle was regained. At six months' follow-up, he had neither ankle pain nor ankle instability.



Figure n°4 (A, B): Postoperative control plain X-ray of the left ankle showing internal fixation with two cancellous screws for the pilon fracture and two Kirschner wires for the lateral malleolus (A) anteroposterior view (B) lateral view

DISCUSSION

In this case report, we describe the combination of a closed tibial pilon fracture and a closed lateral malleolus fracture occurring in an unusual context for this type of injury (during a soccer match).

In addition to being rare, the majority of these fractures typically occur in road accidents (e.g motorcycle accidents), following a fall from a great height like in construction accidents. These fractures are typically the result of high-energy trauma, which explains the importance of the soft tissue injury frequently associated with them. Apart from the complexity of the fracture, due to their intra-articular nature, their severity is also determined the degree soft tissue injury. The evolution of these soft tissue injury influences the quality of the treatment outcome, as it determines the type, timing and extent of definitive reconstructive surgery [2, 3].

In the present case, the tibial pilon fracture associated with the fracture of the lateral malleolus occurred in a context of low-energy trauma in a young person. This combination of lesions occurred during a friendly soccer match. As far as the skin was concerned, apart from bruising, there were neither phlyctenes nor skin openings. The choice of surgical set-up was determined by the non-displaced nature of the fractures and the state of the skin (open reduction and internal fixation by two screws for the pilon fracture through a medial approach and small skin flecks for placement of

Kirschner wires for the lateral malleolus fracture). It has been shown that, in case of low-energy injuries, open reduction and internal fixation yielded satisfactory results in terms of fracture consolidation and ankle function [3, 5, 6].

Careful attention must be paid to splinting and elevating the injured limb during post-operative care. Post-operative immobilization protects bone and soft tissue, and reduces pain. Elevating the injured limb reduces peri-lesional oedema. In general, a six-week non-weight bearing program is prescribed.

CONCLUSION

Tibial pilon fractures are high-energy lesions, and the increase in the number of road accidents is increasing their frequency. Their management is still a great challenge for the orthopaedic surgeon, given the complexity of the bone and soft-tissue lesions. The timing and type of definitive fixation are dictated by the soft tissue injury and the degree of energy imparted to the fracture. In the present case, contrary to the mechanisms described in the literature, the fracture occurred after a low-energy setting, with minimal soft tissue injury and non-displaced fractures of the tibial pilon and lateral malleolus, which influenced our choice of treatment. Further studies to establish a protocol for the early management of these injuries will help minimize complications.

Highlights

- Tibial pilon fracture is a high-energy intra-articular fracture of the distal tibia that typically occur during road traffic accidents or fall from great heights.
- Though relatively easy to diagnose, they are very challenging in terms of treatment outcomes. The timing and type of definitive fixation are dictated by the soft tissue injury and the degree of energy imparted to the fracture

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