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Early Definitive Fixation of a Schatzker VI Tibial Plateau Fracture with Skin Blisters and Diaphyseal Extension Using Condylar Screws and Intramedullary Nailing: A Case Report

O Assouab[1]*, MY Mazouzi[1], S Bousselmame[1], A Massri[1], MR Fekhaoui[1], O Aguenaou[1], J Mekkaoui[1], M Boufettal[1], RA Bassir[1], M Kharmaz[1], MO Lamrani[1]

[1]Department of Orthopaedic Trauma Surgery, Ibn Sina University Hospital, Rabat, Morocco

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***Corresponding author:** O Assouab
Department of Orthopaedic Trauma Surgery, Ibn Sina University Hospital, Rabat, Morocco

Abstract **Case Report**

Introduction: Schatzker VI tibial plateau fractures combine complex articular disruption with metaphyseal-diaphyseal dissociation. Management becomes particularly demanding when severe soft-tissue injury is present, especially fracture blisters. ***Case presentation:*** A 42-year-old man was admitted four hours after a motorcycle-car collision for a closed left lower-limb injury. The knee was swollen, in varus, with extensive medial ecchymosis, while the neurovascular examination was normal. Fracture blisters developed within six hours. Plain radiographs and computed tomography confirmed a bicondylar tibial plateau fracture with metaphyseal-diaphyseal dissociation and diaphyseal extension, classified as Schatzker VI. After immobilisation, analgesia and thromboprophylaxis, the blisters were punctured on day 1 and treated locally with eosin. On day 2, definitive fixation was performed through an anterior midline approach using independent screws for the lateral plateau and a locked tibial intramedullary nail, whose proximal mediolateral interlocking screws contributed to reduction and fixation of the medial plateau. Passive mobilisation started on the first postoperative day, whereas weight-bearing was prohibited for 12 weeks. No infection, skin necrosis or secondary loss of reduction occurred. At the latest six-month follow-up, radiographs showed progressive union with stable implants; gait was pain-free, active flexion reached 100°, and single-leg stance was possible. ***Conclusion:*** This case illustrates the feasibility, in a carefully selected patient, of a construct combining condylar screws and a tibial nail to manage the articular, metaphyseal-diaphyseal and diaphyseal components of a Schatzker VI fracture while avoiding dual plating. However, a favourable outcome in a single patient does not justify routine early surgery through compromised soft tissues; the decision must remain individualised and accompanied by meticulous wound surveillance.

Keywords: Tibial plateau fracture; Schatzker VI; fracture blisters; intramedullary nail; condylar screw fixation; soft tissues; case report.

INTRODUCTION

Tibial plateau fractures are a heterogeneous group of peri-articular injuries whose morphology and prognosis depend on the mechanism and energy of trauma. In the Schatzker classification, type VI corresponds to a plateau fracture associated with metaphyseal-diaphyseal dissociation; computed tomography has become essential for defining fracture planes and planning surgery [1].

These high-energy injuries combine several technical challenges: restoring the articular surface, controlling condylar width and coronal/sagittal alignment, stabilising the metaphyseal-diaphyseal junction, and preserving a soft-tissue envelope that is often severely damaged [2]. The wound and infection complications reported after extensive internal fixation contributed to the development of staged protocols using temporary external fixation followed by definitive osteosynthesis after soft-tissue recovery [3,4].

Fracture blisters reflect major skin injury and complicate decisions regarding timing and surgical approach. Their treatment remains controversial because the available evidence is limited and heterogeneous [5-7]. Recent data nevertheless suggest that early definitive fixation may be feasible in carefully selected patients when performed by experienced teams and accompanied by specific wound-protection measures [8].

In parallel, constructs combining a tibial nail with condylar screws or limited plating have been proposed to stabilise bicondylar fractures with metaphyseal-diaphyseal extension while reducing medial dissection [9-12]. We report a closed Schatzker VI fracture with diaphyseal extension and early fracture blisters treated on day 2 with lateral plateau screw fixation and tibial nailing, the proximal screws of the nail contributing to fixation of the medial plateau.

Case Presentation

A 42-year-old man sustained a closed injury of the left lower limb in a motorcycle-car collision. He was admitted four hours after the accident because of severe pain and complete functional impairment.

Clinical examination found a markedly swollen left knee in varus with extensive medial ecchymosis. Distal pulses were palpable and the neurological examination was normal. Fracture blisters developed six hours after trauma. The preoperative soft-tissue condition is shown in Figure 1.

Figure 1: Preoperative soft-tissue condition. (A-B) Knee swelling, medial ecchymosis and tense fracture blisters that developed about six hours after injury. (C) Appearance on day 1 after puncture of the blisters and local treatment

Initial radiographs, complemented by computed tomography, confirmed a bicondylar tibial plateau fracture with metaphyseal-diaphyseal dissociation and diaphyseal extension, consistent with a Schatzker VI pattern. The preoperative radiographs are shown in Figure 2; CT confirmed the diagnosis, but the images were not available for illustration.

In the emergency department, a plaster splint was applied for analgesic purposes, together with pain control and prophylactic anticoagulation. The blisters were punctured on day 1 and treated locally with eosin.

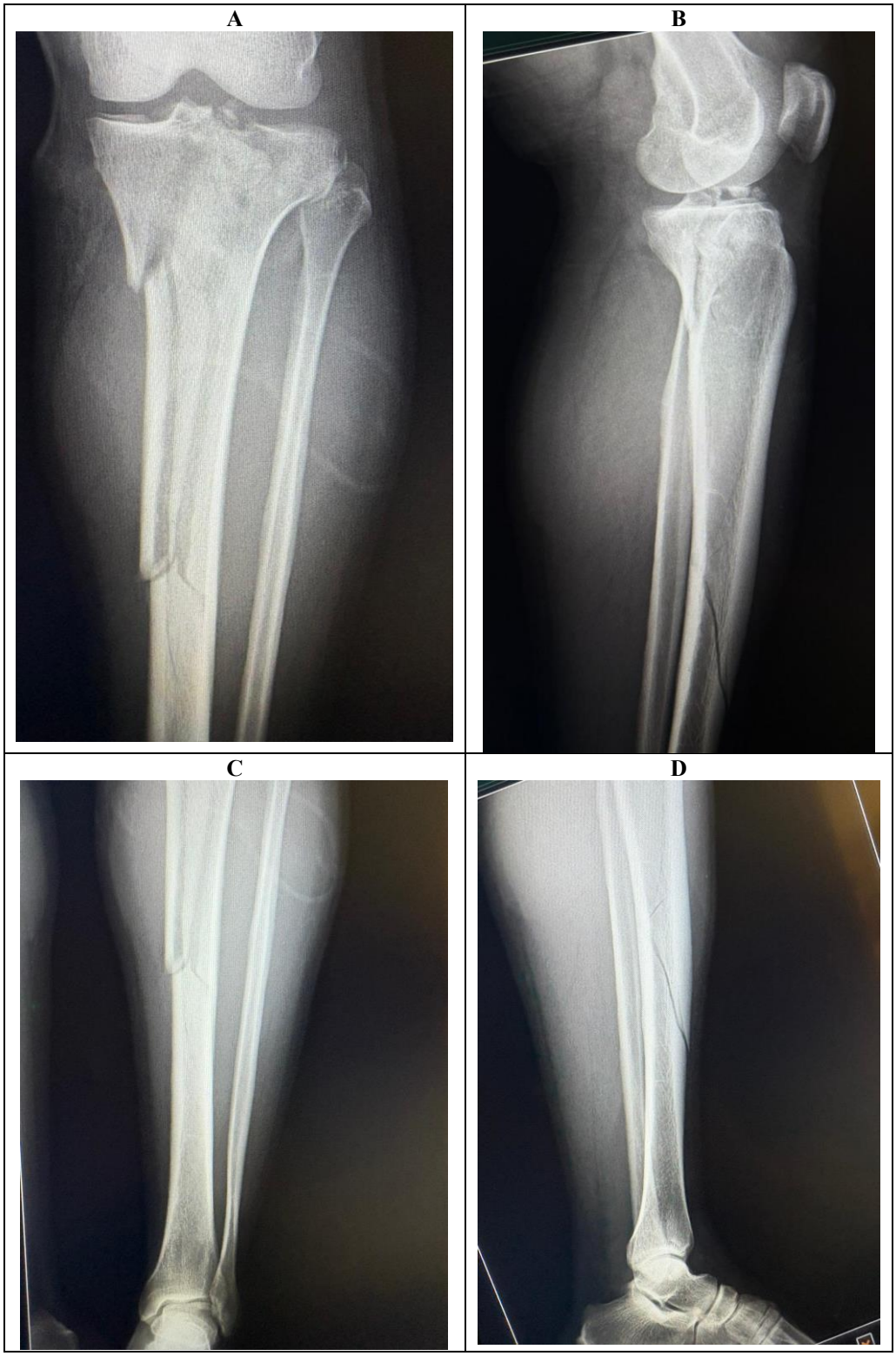

Figure 2: Preoperative radiographs. (A) Anteroposterior view centred on the knee and proximal tibia. (B) Lateral view. (C-D) Anteroposterior and lateral views of the leg showing diaphyseal extension. The pattern is consistent with a bicondylar tibial plateau fracture with metaphyseal-diaphyseal dissociation, Schatzker type VI

The patient underwent surgery on day 2. Given the skin condition and the wish to proceed early, we chose screw fixation of the lateral tibial plateau and insertion of a tibial intramedullary nail. The proximal mediolateral interlocking screws of the nail were used to reduce and fix the medial plateau through an anterior midline approach. A Redon drain was left in place, and a Zimmer splint was prescribed after dressing. The immediate postoperative radiographs are presented in Figure 3.

Figure 3: Immediate postoperative radiographs. (A-B) Anteroposterior and lateral views of the proximal tibia showing independent plateau screws, the tibial nail and the proximal interlocking screws. (C-D) Distal segment and distal locking. Overall alignment was restored without immediate secondary displacement

The postoperative course was uneventful. The patient was discharged on day 3 for skin monitoring and drain removal. Postoperative instructions included non-weight-bearing for 12 weeks, use of a Zimmer splint for 30 days, removal only during rehabilitation sessions, dressing changes every two days, suture removal on day 21, analgesics, and prophylactic enoxaparin 4,000 IU/day. Rehabilitation started immediately using continuous passive motion: 0-30° flexion from day 1 to day 15, 0-60° from day 16 to day 30, and 0-90° from day 30 onward.

At the end of the first postoperative month, the scar was clean with no inflammatory signs or skin necrosis. Passive flexion was 60° and active flexion 45°, allowing active mobilisation.

At 45 days, follow-up radiographs showed maintained reduction and stable fixation (Figure 4).

Figure 4: Radiographic control at 45 days showing maintained reduction and construct stability

At 12 weeks, passive flexion had improved to 100° and active flexion to 85°. Progressive weight-bearing was allowed.

At the latest six-month follow-up, gait was pain-free, active flexion reached 100°, extension was satisfactory, and single-leg stance was possible. The clinical outcome is illustrated in Figure 5 and the six-month radiographic control in Figure 6.

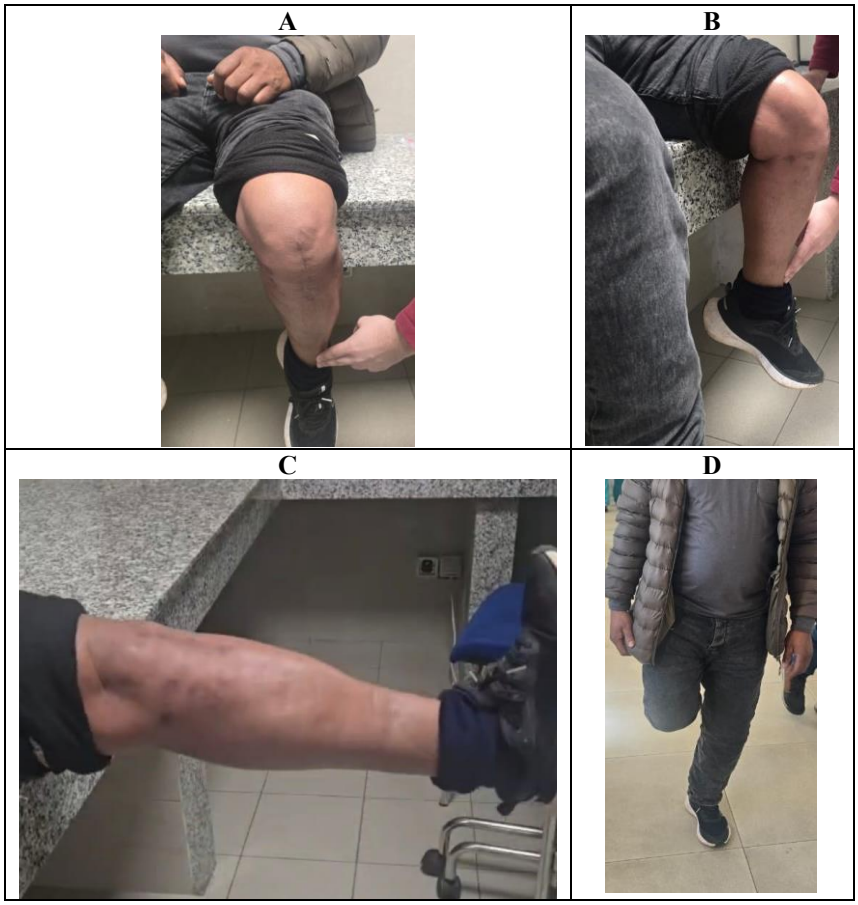

Figure 5: Clinical outcome at six months. (A) Supple anterior scar without inflammatory signs. (B) Active flexion. (C) Active extension. (D) Single-leg stance on the operated limb

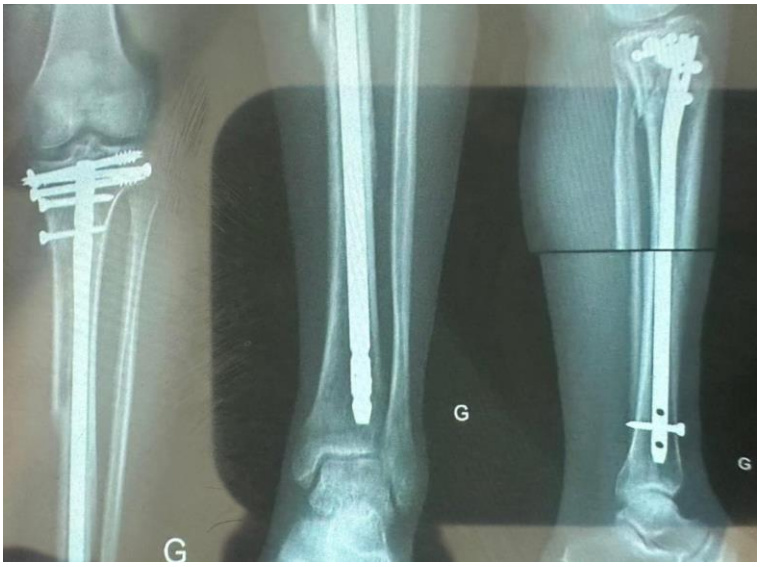

Figure 6: Radiographic control at six months showing progressive union, maintained alignment and no implant breakage

Table 1: Timeline of management and follow-up

Time	Clinical or therapeutic event
H0	Motorcycle-car collision; closed injury of the left lower limb.
H4	Admission: pain, complete functional impairment, swollen knee in varus, medial ecchymosis; palpable pulses, normal neurological examination.
H6	Development of fracture blisters.
Day 1	Blister puncture and local eosin treatment.
Day 2	Lateral plateau screw fixation + locked tibial nail; proximal screws contribute to fixation of the medial plateau.
Postop. days 1-30	Progressive continuous passive motion; Zimmer splint; non-weight-bearing.
Day 21	Suture removal.
1 month	Clean scar; passive flexion 60°, active flexion 45°; active mobilisation authorised.
45 days	Maintained reduction and stable fixation.
12 weeks	Passive flexion 100°, active flexion 85°; progressive weight-bearing started.
6 months	Latest follow-up: progressive union, supple scar, active flexion about 100°, pain-free gait and single-leg stance.

DISCUSSION

Schatzker VI fractures are among the most demanding peri-articular injuries to manage [1,2]. The combination of bicondylar articular involvement, metaphyseal-diaphyseal dissociation, diaphyseal extension and a compromised soft-tissue envelope requires a strategy balancing mechanical stability with soft-tissue preservation.

In high-energy trauma, the soft-tissue envelope often determines surgical timing. Historical series of extensive internal fixation reported substantial wound and infection complications [3]. Temporary spanning external fixation followed by definitive reconstruction after soft-tissue recovery therefore remains a reference strategy in many centres [4].

Fracture blisters reflect significant skin injury. Classical studies have assessed non-intervention, aspiration or de-roofing without demonstrating clear superiority of any one approach [5,6]. The most recent systematic review highlights the low quality of the available evidence, recommends avoiding incisions through blister beds and does not validate any topical treatment as clearly superior [7]. In the present case, puncture and eosin were followed by a favourable course, but this result cannot be extrapolated.

Surgery on day 2 departs from the conventional delayed strategy. A recent comparative study suggested that immediate fixation of Schatzker IV-VI fractures may be feasible in selected patients, without an obvious increase in complications [8]. However, those findings are not directly transferable to this case because of differences in patient selection, wound protection and fixation method. Early surgery should therefore remain exceptional and depend on repeated soft-tissue assessment.

The construct addressed the fracture components separately. Independent screws provided reduction and subchondral support for the lateral plateau.

The tibial nail controlled the diaphyseal extension and helped maintain alignment, while its mediolateral proximal interlocking screws contributed to fixation of the medial plateau. This concept is related to techniques using a nail associated with condylar bolts or nail-plate constructs [9-12]. The particular feature here was the absence of a plate and the use of standard proximal interlocking screws as medial fixation.

The theoretical advantages are central load-sharing fixation, stabilisation of a long diaphyseal fracture line, and avoidance of a separate medial approach. Potential disadvantages include conflicts between articular screws and the nail trajectory, imperfect control of posterior fragments, risk of intra-articular screw penetration, residual condylar widening, and coronal or sagittal malalignment. Dual plating and circular fixation remain validated alternatives [13,14]. A single case cannot establish superiority.

The achieved stability allowed early knee mobilisation with controlled progression of range of motion. The rehabilitation literature after tibial plateau fixation generally supports early motion to limit stiffness, whereas the timing of weight-bearing should be individualised according to construct stability, fracture pattern and bone quality [15]. In this comminuted injury, 12 weeks of non-weight-bearing was chosen prudently. The six-month clinical result was encouraging, with pain-free gait, active flexion of 100°, satisfactory extension and stable single-leg stance.

Follow-up remains too short to judge the risk of post-traumatic osteoarthritis, which is influenced by fracture severity, cartilage injury, instability and residual malalignment [16]. Limitations of this report include its retrospective single-case design, the absence of CT images, the lack of standardised radiographic measurements and the absence of a validated functional outcome score.

Conclusion

The combination of independent lateral plateau screws and a locked tibial nail whose proximal screws contributed to medial plateau fixation stabilised a Schatzker VI fracture with diaphyseal extension without dual plating in this patient. Despite early fracture blisters, the soft-tissue, radiographic and functional course at six months was favourable. This case illustrates a technical option in a selected patient, but does not constitute a general recommendation; soft-tissue status remains paramount.

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