

Surgical fixation and iliac crest autografting for posteromedial tibial plateau fractures A retrospective series of 20 patients at Hassan II University Hospital, Fez, Morocco

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Abstract: **Background:** Posteromedial tibial plateau fractures present challenges in articular reconstruction and fragment stabilization. This study describes surgical management and reported outcomes in a Moroccan hospital series. **Materials and methods:** A retrospective descriptive synthesis was performed using a medical thesis reporting 20 patients treated between January 2020 and December 2025. Demographics, fracture characteristics, operative procedures, rehabilitation and outcomes were extracted from the source report. Analysis was descriptive, and inconsistencies were retained as limitations. **Results:** Mean age was 39 years (range 23–70), and 17 patients were men. Road traffic injuries accounted for 14 cases. Fractures were classified as Schatzker IV in eight patients, V in seven and VI in five. Computed tomography was performed in 18 patients. All underwent internal fixation and ipsilateral iliac crest autografting; T-shaped plates were reported in 13 cases. Meniscal injuries were recorded in 12 patients. The source classified Rasmussen outcomes as excellent in 19 patients and good in one; Lysholm outcomes were excellent in eight, good in eight and fair in four. One late implant-site infection was reported. Cohort-wide follow-up duration and standardized radiographic union data were unavailable, and scoring inconsistencies limited interpretation. **Conclusion:** Fixation combined with iliac crest autografting was associated with predominantly favorable reported function. The small, uncontrolled series supports feasibility but cannot establish comparative efficacy, the safety of a specific loading protocol or durable prevention of articular collapse.

Keywords: Tibial plateau fracture; posteromedial fragment; internal fixation; iliac crest; autologous bone graft; knee function.

Introduction

Tibial plateau fractures disrupt the weight-bearing surface of the knee and may combine articular depression, condylar splitting and soft tissue injury. The Schatzker classification remains a useful description of major fracture patterns [1]. However, bicondylar injuries may contain a distinct posteromedial fragment whose morphology is not adequately conveyed by an anteroposterior radiograph alone [2].

Computed tomography (CT) supports a column-based assessment of fracture anatomy and operative planning [3]. Posteromedial shear fragments require particular attention because construct stability depends on fragment orientation and the direction of loading. Experimental work has demonstrated differences in resistance to displacement among fixation methods [4]. Elevating a depressed articular surface may also create a metaphyseal void requiring structural or biological support.

The present article summarizes 20 surgically treated cases from Hassan II University Hospital in Fez, as documented in a 2026 medical thesis [5]. Its objective is to describe the clinical presentation, operative strategy and reported functional outcomes of fixation with autologous iliac crest grafting, while identifying the limits of the available evidence.

Materials and methods

Study design and data source

This retrospective descriptive series was derived from the thesis of Alaoui Ismaili [5], reporting patients treated in the Traumatology and Orthopaedics B4 Department between January 2020 and December 2025. The source included 20 patients described as having posteromedial tibial plateau fractures managed surgically with autografting. Formal eligibility criteria and the number of patients screened were not specified. Original hospital records and imaging were not independently re-examined for this article.

Extracted variables included age, sex, injury mechanism, side, soft tissue injury, imaging, fracture classification, approach, fixation, graft type, rehabilitation, complications and functional outcomes. Detailed results and internally consistent tables were prioritized over conflicting summary statements. The Schatzker distribution was retained; inconsistent AO and Duparc tables were not used for quantitative analysis. Counts and percentages use a denominator of 20 unless stated otherwise. No inferential testing or comparative treatment analysis was performed.

Operative management and postoperative care

The reported operative technique involved supine positioning, a thigh tourniquet, preparation of the ipsilateral iliac crest and fluoroscopic control. Submeniscal exposure allowed assessment of the articular surface. Where indicated, depressed fragments were elevated using a spatula or bone tamp, the defect was grafted and the fracture stabilized. Approaches and implants varied between patients. Associated meniscal lesions were sutured or reinserted, and documented medial collateral ligament injuries were repaired after fixation.

Postoperative care included temporary splinting for two to three weeks, antibiotic prophylaxis for 48 hours and low-molecular-weight heparin during immobilization. Rehabilitation reportedly began on postoperative day 3 and continued for eight to twelve weeks. The described protocol allowed partial weight bearing after two to three weeks and full weight bearing after clinical and radiographic consolidation, generally at two to three months. These timings describe the source protocol; adherence and individual clearance criteria were not available.

Outcome assessment

The source reported outcomes using instruments labeled Rasmussen and Lysholm, whose original descriptions provide a framework for knee assessment [6,7]. Categories and score distributions were extracted as reported, without assuming that the source questionnaires reproduced validated versions. The thesis also presented data labeled KOSS/KOS/KOOS, but the entries could not be reconstructed as standard normalized KOOS domain scores [8]. They were therefore excluded from quantitative outcome reporting. Ethics approval, consent procedures and funding were not specified in the source.

Results

Patient and fracture characteristics

The 20 patients had a mean age of 39 years (range 23–70); 17 were men (85%). The left knee was involved in 13 cases (65%). Road traffic injuries predominated, accounting for 14 cases (70%), followed by sports injuries in three (15%), assault in two (10%) and a domestic accident in one (5%). All patients had pain and swelling; functional incapacity was recorded in 13 (65%).

Three fractures were open (15%), described as Gustilo–Anderson type II. No neurovascular injury was reported. Meniscal lesions were documented in 12 patients (60%) and medial collateral ligament lesions in two (10%). All patients underwent anteroposterior and lateral radiography, 17 underwent additional oblique views and 18 underwent CT. No MRI was reported. Schatzker types IV, V and VI accounted for eight, seven and five cases, respectively (Table 1).

Table 1. Main characteristics of the cohort

Characteristic	Patients, n (%)
Male sex	17 (85)
Left knee involvement	13 (65)
Road traffic injury	14 (70)
Open fracture	3 (15)
Schatzker IV / V / VI	8 (40) / 7 (35) / 5 (25)
CT performed	18 (90)
Meniscal injury	12 (60)
Medial collateral ligament injury	2 (10)

Total cohort: 20 patients. Mean age: 39 years (range 23–70). Source: thesis [5].

Operative findings and treatment

The approaches were medial Gernez in ten patients (50%), lateral Gernez in six (30%), combined medial and lateral Gernez in three (15%) and midline in one (5%). A T-shaped plate was recorded in 13 cases (65%), screw fixation in five (25%), Kirschner-wire fixation in one (5%) and intramedullary nailing in one (5%). The available aggregate data did not establish the anatomical position of each implant, supplementary fixation or the relationship of nailing to associated fractures.

All 20 patients received an ipsilateral iliac crest autograft: corticocancellous in 18 (90%) and cancellous in two (10%). The detailed

results documented articular reduction in 18 patients (90%), whereas the abstract described anatomical reduction in all patients. A universal anatomical reduction rate could therefore not be confirmed. No postoperative measurements of step-off, condylar width or mechanical alignment were provided for the complete cohort.

Functional outcomes and complications

According to the source categories, Rasmussen outcomes were excellent in 19 patients (95%) and good in one (5%). The corresponding score frequencies were 30 in 13 patients, 29 in three, 27 in three and 26 in one. Lysholm outcomes were excellent in eight patients (40%), good in eight (40%) and fair in four (20%); reported scores were 97 in eight patients, 92 in five, 89 in three and 72 in four. Thus, the favorable Rasmussen distribution did not imply uniformly excellent patient-reported function (Table 2).

Table 2. Functional categories as reported in the thesis

Outcome category	Rasmussen, n (%)	Lysholm, n (%)
Excellent	19 (95)	8 (40)
Good	1 (5)	8 (40)
Fair	0 (0)	4 (20)
Poor	0 (0)	0 (0)

Categories reproduce the source tables [5]. Scoring templates were inconsistent, and assessment timing was not clearly specified; these values should not be treated as independently validated standardized outcomes.

No early infection, deep vein thrombosis or compartment syndrome was reported. One later implant-site infection occurred (5%); the discussion described fistulectomy and delayed union in this patient. Stiffness, malalignment and complex regional pain syndrome were not reported, but surveillance definitions were incomplete. Donor-site morbidity was not documented.

The thesis discussed consolidation without articular collapse and functional improvement at two years in 45% of patients, but did not provide a mean or range of follow-up for the whole cohort. Consequently, a complete-cohort union rate, time to union, rate of secondary depression and long-term osteoarthritis incidence could not be established.

Discussion

Fracture definition and associated injury

This series describes predominantly young men injured in road traffic accidents, with medial or bicondylar fracture patterns and frequent meniscal injury. Its main contribution is a practical account of articular reconstruction with iliac crest grafting in a tertiary hospital. The findings remain descriptive: the cohort does not establish the incidence of posteromedial fractures or identify predictors of recovery.

CT was available in 90% of cases. Wicky et al. demonstrated that CT with three-dimensional reconstruction can reveal fracture complexity underestimated on radiographs and modify operative planning [9]. For posteromedial injuries, assessment should distinguish a discrete shear fragment from a broader medial condylar fracture or bicondylar pattern [2,3]. The present series lacks fragment dimensions, displacement measurements and a consistent CT-based classification, preventing analysis of treatment according to posterior morphology.

The 60% frequency of documented meniscal lesions highlights the importance of soft tissue assessment. Gardner et al. found frequent ligamentous and meniscal abnormalities on MRI in operatively treated plateau fractures [10]. As MRI was not used here, operative findings may not capture all associated injuries. This limits comparison of injury severity with imaging-based series and may help explain variation in functional recovery.

Reduction and fixation strategy

Posterior access and buttress fixation have been described for selected posteromedial fractures, including the clinical series of De Boeck and Opdecam [11]. More recent work has evaluated modified anatomical plates [12]. Experimental studies using synthetic bone and cadaveric models support directing fixation against posteromedial displacement, but laboratory stability does not establish clinical superiority in every fracture pattern [4,13].

The present cohort used several approaches and constructs. A medial Gernez approach should not automatically be equated with a

dedicated posterior approach, and the term T-shaped plate does not confirm posteromedial buttress positioning. Because implant details and case-level imaging were unavailable, the study cannot determine which fixation strategy best maintained reduction. Similarly, the discrepancy between 18 documented reductions and the abstract claim of anatomical reduction in all 20 patients precludes a precise anatomical success rate.

Role of autografting and alternative defect fillers

Iliac crest grafting was consistently reported and predominantly corticocancellous. Its intended role was to fill the void beneath the elevated articular surface and support healing. Nevertheless, because every patient received an autograft, the contribution of grafting cannot be separated from reduction, fixation, associated injury repair or rehabilitation.

Literature on alternative materials must be interpreted accurately. Segur et al. reported bone *allograft* use, and Meiser et al. evaluated patients treated with femoral head allografts [14,15]. These studies concern donor-derived tissue and cannot substantiate an autograft-specific success rate. In a randomized study, Russell and Leighton compared autogenous bone graft with calcium phosphate cement and found less articular subsidence with cement, with similar union outcomes [16]. This supports consideration of material-specific evidence rather than an assumption that autograft is invariably superior.

Iliac crest harvesting also introduces a second operative site. Donor-site pain and other complications have been described independently [17]. Their omission from the present thesis should be interpreted as missing outcome information, not proof that harvesting was morbidity-free. Future comparisons should include donor-site symptoms, graft volume, defect size, radiographic support and patient-reported recovery.

Rehabilitation, complications and interpretation of function

The source protocol combined early rehabilitation with partial loading after two to three weeks. Such a schedule cannot be validated by an uncontrolled cohort without individual loading and radiographic data. A biomechanical study of dual-plate fixation of bicondylar fractures found that constructs supporting early motion did not reliably tolerate simulated immediate full weight bearing [18]. Although that model does not directly test this cohort's partial-loading schedule, it illustrates why loading decisions must account for fracture pattern and construct stability.

One late infection was reported. Larger studies of complex bicondylar fractures have documented clinically important infection and reoperation burdens despite careful operative planning [19]. Differences in injury severity, open-fracture frequency, surveillance and follow-up prevent meaningful numerical comparison with this small series. The absence of other reported complications cannot exclude events that were not systematically assessed.

Reported functional results were encouraging, but measurement uncertainty is substantial. The Rasmussen template included alignment among its components, while the Lysholm template listed a running item and component maxima totaling 105 despite a stated maximum of 100. These inconsistencies prevent confirmation that validated instruments were administered as intended [6,7]. The KOOS-related table likewise lacked interpretable normalized domain scores [8]. For this reason, only the thesis categories and score frequencies were reproduced; pooled standardized means and cross-study score comparisons were avoided.

Long-term follow-up is particularly important after an intra-articular knee fracture. Stevens et al. evaluated outcomes at a mean of more than eight years, illustrating a timescale beyond early rehabilitation [20]. Here, two-year observations were mentioned only for a subset, and the timing of functional scoring was not consistently specified. Favorable reported function therefore cannot establish durable joint preservation or absence of post-traumatic osteoarthritis.

Limitations and future reporting

The main limitations are the small retrospective sample, single-center setting, absence of a comparator and dependence on an aggregate thesis report. Selection criteria, baseline function, injury-to-surgery interval, patient-level construct details and complete follow-up were unavailable. Internal discrepancies affect classification, reduction and outcome scoring. These constraints prevent causal attribution of outcomes to autografting or any specific implant. Prospective reporting should use a consistent fracture definition, validated questionnaires, serial measurements of reduction, explicit union criteria and systematic assessment of both knee and donor-site complications.

Conclusion

In this 20-patient series, surgical fixation with ipsilateral iliac crest autografting was followed by predominantly favorable reported functional categories, although four patients had fair Lysholm results and one developed a late infection. The findings support the feasibility of this reconstructive strategy in selected patients. Incomplete follow-up, heterogeneous fixation and scoring inconsistencies prevent conclusions about comparative superiority, universal anatomical restoration or long-term protection against collapse and arthritis.

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