

## Post-traumatic osteonecrosis of the lateral tibial plafond

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### Abstract

We report a series of patients who presented with post-traumatic osteonecrosis of the lateral tibial plafond. Nine patients were identified with evidence of osteonecrosis limited to the lateral tibial plafond. All of them were seriously impaired with a mean valgus collapse of the ankle joint of 15.3°. Seven patients had a Weber C open medial fracture-dislocation, and two had a closed Weber C fracture-dislocation. This series confirms that post-traumatic osteonecrosis of the lateral tibial plafond is associated with Weber C fracture-dislocation. It evolves into a valgus deformity of the ankle due to collapse of the lateral tibial plafond. The prognosis is poor and required further reconstructive surgery in all cases.

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### 1. Introduction

Osteonecrosis in the foot and ankle is possible following trauma and has commonly been described in the talus, and to a lesser extent in the tarsal navicular and the sesamoids [1–5]. The traumatic insult to the bone blood supply is believed to be responsible for the process of osteonecrosis [6,7], yet injuries to the distal epiphysis of the tibia, although frequent, have not been clearly identified as a possible cause and location for osteonecrosis.

The goal of this study is to report a series of documented post-traumatic osteonecrosis of the distal tibia with a literature review in order to make this unrecognized and severe condition a more understandable and clear clinical entity.

### 2. Material and method

Patients were selected from between August 2000 and January 2003. These patients were referred for second

opinion regarding the treatment of their ankle fracture after surgical management in other institutions. Each patient had a clinical history taken by the junior author and was further examined by one of the senior authors.

To be enrolled in the study, patients had to fulfill each of the following inclusion criteria: (1) recent (less than 5 years) history of ankle fracture whether closed or open; (2) complete radiographic history including injury, immediate postoperative and follow-up films; (3) advancing radiographic signs of collapse and sclerosis of the tibial plafond on consecutive radiographs.

The exclusion criteria were: (1) plafond fractures; (2) history of chronic inflammatory disease; (3) corticosteroid therapy; (4) clinical signs of ankle infection; (5) history of ankle septic arthritis.

Radiographic signs of osteonecrosis of the tibial plafond were defined as follows: areas of loss of bone density adjacent to the talo-crural joint mixed with areas of spotty sclerosis, lacuna formation evolving in progressive tibia plafond collapse, joint space narrowing and eventually ankle joint malalignment. All these elements had to be present in order to make the radiological diagnosis of avascular necrosis. The lateral tibial plafond was arbitrarily defined as

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Table 1  
Data on the patients' population

Patient no.	Age (years)	Side	Fracture pattern	Time between injury and evidence of osteonecrosis (months)	Radiographic ankle valgus (angle)	Salvage surgical procedure	Histology and bacteriology of plafond bone biopsy
1	35	L	Weber C fracture-dislocation, open with medial transverse wound	5	8°	Structural bone graft and ankle fusion (surgery scheduled)	N/A
2	31	L	Weber C fracture-dislocation, open with medial transverse wound	8	23°	Structural bone graft and total ankle arthroplasty	Osteonecrosis; no infection
3	22	R	Weber C fracture-dislocation, open with medial transverse wound	6	11°	Structural bone graft and ankle fusion	Osteonecrosis; no infection
4	45	L	Weber C fracture-dislocation, open with medial transverse wound	5	22°	Structural bone graft and total ankle arthroplasty	Osteonecrosis; no infection
5	56	L	Weber C fracture-dislocation, open with medial transverse wound	7	20°	Structural bone graft and total ankle arthroplasty	Osteonecrosis; no infection
6	56	R	Weber C fracture-dislocation, open with medial transverse wound	6	9°	Structural bone graft and ankle fusion	Osteonecrosis; no infection
7	54	R	Weber C fracture-dislocation, open with medial transverse wound	4	23°	Structural bone graft and ankle fusion	Osteonecrosis; no infection
8	36	L	Weber C fracture-dislocation, closed	3	18°	Structural bone graft and ankle fusion (surgery scheduled)	N/A
9	36	R	Weber C fracture-dislocation, closed	7	4°	Structural bone graft and total ankle arthroplasty (surgery scheduled)	N/A

the lateral half side of the mortise on an AP plain ankle radiograph. All radiographs were viewed by an attending radiologist.

Some patients had a reconstructive surgery during the study period. These patients had bone biopsies performed at time of the surgery as well as several bacteriology swabs of their ankle fluid and distal tibia bone marrow. Bone biopsies were sent for histology and bacteriology. No patients received prophylactic antibiotics prior to completion of these studies, neither did they have a course of antibiotherapy during the preoperative weeks.

For those patients who did not undergo surgery, infection was ruled out on the basis of clinical assessment and blood parameters (leucocytes count, ESR, C-reactive protein).

### 3. Results

Nine patients were included in the study (Table 1). There were six females and three males. Their average age was 41.2 (22–56). Follow up was 1.2 (0.8–4.8) years.

The initial injury was an open Weber C fracture-dislocation in seven patients (Fig. 1). All seven had had a large medial transverse wound centered at the level of the medial malleolus (Fig. 2). The scar of the wound could be clearly differentiated from the scar left by the surgical incision because of its thickness as well as its transverse orientation (antero-posterior). Its mean measurement was 42 mm (32–91). Initial surgical management in all seven patients consisted in irrigation and débridement followed by open reduction and internal fixation. None of them was treated with external fixation and none had a medial flap. On



Fig. 1. AP radiograph of the ankle demonstrating a Weber C type fracture-dislocation (patient 1, Table 1).

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