



Temporary bridging external fixation in distal tibial fracture



F. Lavini, C. Dall'Oca, S. Mezzari, T. Maluta*, E. Luminari, F. Perusi, E. Vecchini, B. Magnan

Department of Orthopaedics and Traumatology, Azienda Ospedaliera Universitaria Integrata Verona, Piazzale Stefani, 1, 37136 Verona, Italy¹

ARTICLE INFO

Keywords:

Pilon fracture
Distal tibial fracture
Temporary external fixator
Bridging external fixator
Internal fixation

ABSTRACT

Fractures that involve the distal area of the tibia are associated with a high percentage of complications. Soft tissue oedema, swelling, blisters, skin abrasions and open wounds could compromise the outcome of these lesions. The waiting time before surgery with ORIF is mostly due to soft tissue conditions. Early application of a simple joint-spanning external fixator would achieve the initial goal of stability and the respect of soft tissue, thereby decreasing the time necessary for definitive treatment.

A total of 40 consecutive patients (22 male and 18 female) with a mean age of 52 years (range 17–82 years) with distal tibial fracture treated between January 2010 and January 2013 were evaluated. Early temporary external fixation was the first treatment step. Twenty patients had pilon fractures, characterised by the intra-articular involvement of the distal tibia with metaphyseal extension, and 20 patients had malleolar fracture-dislocation.

Patients were divided into two groups, A and B. Group A comprised 10 patients with ankle fracture-dislocation and bone fragmentation, who were treated with a temporary bridging external fixation that was maintained after ORIF to exploit ligamentotaxis during the first phases of bone healing.

In Group B (30 patients), the external fixation was removed after ORIF.

The results of the study are in line with the recent literature: temporary external fixation in high-energy trauma and fracture-dislocation of the ankle enables soft tissue to be restored, which facilitates postoperative assessment of bone fragments by CT scan. The complication rate in this study was 5% in patients with malleolar fractures and 20% in patients with pilon fractures.

The maintenance of temporary external fixation after ORIF synthesis during the entire first stage of bone healing seems to be a good method of treatment that has a low rate of soft tissue complications.

© 2014 Elsevier Ltd. All rights reserved.

Introduction

Fractures that involve the articular distal area of the tibia (tibial pilon) are associated with a high percentage of complications, and the outcome is often poor because of posttraumatic ankle arthritis or metaphyseal non-union and malunion [1,2]. The complications related to soft tissue injury are oedema, severe swelling, blisters, skin abrasions and open wounds, which predispose the patient to the development of wound dehiscence, skin necrosis and infections [3]. The objective of treatment is to restore articular congruency, epiphyseal-metaphyseal alignment and functional recovery. The choice of treatment must take into account correct and stable fracture treatment, and also, ideally, soft tissue

management because this is a common source of frightening complications.

Severe ankle fractures caused by high-energy trauma or polytrauma that result in epiphyseal disruption and articular damage are associated with open wound and soft tissue injury, and massive swelling of the foot and ankle in more than 30% of cases. The correct treatment of these fractures therefore involves the use of temporary external fixation, particularly in the case of comminuted fractures with soft-tissue damage, unstable fracture pattern, fracture associated with articular dislocation or fracture associated with vascular damage. The timing of definitive surgery is crucial to reduce complication rates. There are two safe surgical windows for open surgery and definitive treatment: an early period, within 6 h after injury, and a late period between 6 and 12 days after injury [4]. The choice of timing will depend on the soft tissue condition, the general condition of the patient, and the expertise of the surgeon. The immediate treatment should be performed by a trained surgeon with extensive experience in this field after consideration of the possible risks and CT evaluation.

* Corresponding author. Tel.: +39 0458123542; fax: +39 0458123578.

E-mail address: tommassomaluta@yahoo.it (T. Maluta).

¹ clinica.ortopedica@ospedaleuniverona.it.

Table 1
Group A: external fixation group.

	Age (years)	Male/female	Type of fracture		Side	AOFAS at 12 months
			Pilon fracture	Ankle fracture dislocation		
1	66	M	43.B		R	72
2	45	F	43.C		R	79
3	62	F	43.C		L	89
4	54	M	43.C		L	79
5	55	M		44.C	L	92
6	44	M		44.C	L	90
7	38	F		44.C	L	88
8	46	F		44.C	R	73
9	54	F		44.C	R	91
10	65	M		44.C	R	78
Mean	52.9					83.1

After a waiting period, the optimal time for definitive treatment is shown by skin wrinkling and skin recovery from blisters, thereby avoiding delayed skin healing and complications, such as wounds dehiscence, skin necrosis and infections [5].

Early application of a simple joint-spanning external fixator would achieve the initial goal of stability and the respect of soft tissue, thereby decreasing the time necessary for definitive treatment [6]. Several techniques can be used for definitive treatment of these fractures, including traditional ORIF, external fixation with or without limited internal fixation, intramedullary nailing (mainly for extraarticular fractures or as retrograde technique when an early arthrodesis is indicated) or minimally invasive plate osteosynthesis (MIPO) [1,7]. All of these techniques have advantages and disadvantages and the management of soft tissue injuries is of paramount importance as it often determines the final outcome.

The aim of this study was to evaluate the clinical and radiological results of the treatment of distal tibial fractures using an early temporary external fixation followed by definitive reconstruction and stabilisation. Also considered was a new stage possibility in treatment: the maintenance of the temporary bridging external fixation after ORIF to exploit ligamentotaxis during the first phases of bone healing.

Materials and methods

A total of 40 consecutive patients (22 male and 18 female) with a mean age of 52 years (range 17–82 years) with distal tibial fracture treated between January 2010 and January 2013 were evaluated. Early temporary external fixation was the first treatment step. Twenty patients had pilon fractures, which were characterised by the intra-articular involvement of the distal tibia with metaphyseal extension, and 20 patients had malleolar fracture-dislocation.

ORIF was performed in 12 of the 20 patients who had pilon fractures; hybrid external fixation was performed in the remaining eight patients. Eight of the 12 patients who underwent ORIF were treated with cannulated screws (Hit Medica 4.0 mm) for the tibial pilon and plates and screws (LCP Synthes) for fibular fractures; the remaining four patients were treated with plates and screws (LCP anterolateral Synthes) for tibial pilon and plates and screws (LCP Synthes) for fibular fractures.

All 20 patients with malleolar fractures were treated definitively by ORIF with cannulated screws (Hit Medica 4.0 mm) for tibial malleolus and plates and screws (LCP Synthes) for fibular fractures.

Patients were divided into two groups, A and B.

Group A comprised 10 patients with ankle fracture-dislocation and bone fragmentation; these patients were treated with a

temporary bridging external fixation that was maintained after ORIF to exploit ligamentotaxis during the first phases of bone healing. This method was used in three patients with pilon fractures to enable a better check of the condition of soft tissue, three patients with malleolar fracture-dislocations to avoid a cast as they had damage to the skin of the heel and four patients affected by peripheral neuropathy because of diabetes (Table 1). In Group B (30 patients), the external fixation was removed after ORIF synthesis and a postoperative cast was applied (Table 2).

The AO/OTA (Arbeitsgemeinschaft für Osteosynthesefragen) classification of pilon fractures that divides fractures of district 43 into type A (extra-articular), type B (partial articular), or type C (complete articular) was used in the study. Malleolar fractures were classified according to the AO/OTA classification of district 44 and with Danis–Weber classification: type A (infra-syndesmotic), type

Table 2
Group B: temporary external fixation group.

	Age	Male/female	Type of fracture		Side	AOFAS at 12 months
			Pilon fracture	Ankle fracture dislocation		
1	60	M	43.B		L	95
2	17	M	43.C		R	80
3	78	M	43.C		R	92
4	54	F	43.B		R	91
5	66	F	43.B		L	90
6	35	M	43.C		R	91
7	59	M	43.B		L	86
8	82	M	43.C		R	95
9	45	F	43.C		L	85
10	66	F	43.B		L	52
11	78	M	43.C		R	95
12	55	M	43.B		L	90
13	34	M	43.C		R	95
14	55	M	43.C		L	74
15	55	F	43.C		L	95
16	44	F	43.C		R	80
17	36	M		44.C	R	95
18	35	M		44.C	R	88
19	49	F		44.C	L	100
20	65	M		44.C	R	91
21	57	F		44.C	L	90
22	51	M		44.C	L	91
23	42	F		44.C	R	86
24	56	F		44.C	L	96
25	43	M		44.C	R	85
26	69	M		44.C	L	74
27	39	F		44.C	L	98
28	37	M		44.C	R	90
29	56	F		44.C	L	99
30	56	M		44.C	R	74
Mean	52.4					88

Download English Version:

<https://daneshyari.com/en/article/3239726>

Download Persian Version:

<https://daneshyari.com/article/3239726>

[Daneshyari.com](https://daneshyari.com)