Original Research Paper

Volume-7 | Issue-10 | October-2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

Orthopaedics

COMPOUND TIBIAL PILON FRACTURES AND ITS MANAGEMENT

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ABSTRACT

INTRODUCTION:

The terms pilon fracture, pylon fracture,and plafond fracture have all been used to describe high-energy fractures of the articular surface of the distal tibia. Intra-articular fractures of the distal tibia secondary to axial loading present a great challenge to the orthopaedic surgeon. These high energy injuries often result in ignificant soft-tissue damage, bone comminution, and articular surface disruption.

MATERIALS AND METHOD:

We studied in a series of 17 patients of different grades of compound tibial pilon fractures between 25yrs and 60yrs of age, who were treated in day one with the following modalities of treatment and were followed for a minimum period of 6 months. out of the 17 patients. GROUP-I: 4 of them were treated with open reduction and internal fixation with plate osteosynthesis, GROUP-II: 4 of the patients were treated with wound debridement and ankle spanning external fixator, GROUP-III: 6 of the patients who had associated fibula distal third fracture were treated with wound debridement, ankle spanning external fixator and k-wire for fibula, GROUP-IV: remaining 3 of them who too had associated fibula distal third fracture were treated with wound debridement, ankle spanning external fixator and one third tubular plate for fibula. Grade IIIb compound fractures were later given secondary split skin grafts for raw area.

RESULTS AND COMPLICATION:

Bony union was significant. Strict nonweight bearing for 6 weeks and allowed to partial weight bear after 8 weeks. The functional evaluation of the ankle was excellent or good in eight cases, fair in six and poor in three. The range of motion was recorded for all patients

CONCLUSION:

In our study, results were good with external fixator combined with minimal internal fixation. we are able to achieve satisfactory reduction, restore limb length, with minimal soft tissue handling. Thorough debridement, external fixation with minimal internal fixation and early soft tissue cover will stretch good results in Gr-III compound fractures.

KEYWORDS : Pilonfracture, external fixation,plating

INTRODUCTION:

The terms pilon fracture, pylon fracture,and plafond fracture have all been used to describe high-energy fractures of the articular surface of the distal tibia. Intra-articular fractures of the distal tibia secondary to axial loading present a great challenge to the orthopaedic surgeon. These highenergy injuries often result in ignificant soft-tissue damage, bone comminution, and articular surface disruption. Rotational fractures of the ankle joint Have been classified into five types based on the injury mechanism.These rotational injuries may be associated with fractures of the articular surface of the distal tibia and classified as tibial plafond fractures.For instance, the type V pronation dorsiflexion fracture invariably involves the tibial plafond.Giachino and Hammond [8] described the combination of an oblique fracture of the medial malleolus with an anterolateral tibial plafond fracture and noted that the mechanism was external rotation, dorsiflexion, and abduction. These rotational injuries involve relatively low energy, cause minimal injury to the soft tissues, and usually have an excellent prognosis.At the other end of the spectrum is the high-energy fracture of the distal tibia secondary to axial compressive forces caused by a fall from a height,a motor-vehicle accident, or any other vertical-loading injury. These highenergy axial compressive forces shatter all or part of the articular surface depending on the direction of impact of the talus against the tibial plafond. They also produce significant injury of the soft tissues. These axial compressive injuries have typically been called pilon fractures in the English- language literature.A wide range exists between the two extremes of the low-energy rotational injury and the high-energy axial compressive injury. The eventual outcome depends on where a fracture falls on this spectrum. Unfortunately, most classifications do not adequately substratify fractures,which has led to errors in treatment, uncertainty about prognosis, and difficulty in evaluating the literature. The degree of soft-tissue injury must be considered in the classification, as well as in planning treatment and determining outcome. Open fractures are appropriately classified by the method of Gustilo and Anderson.

CLASSIFICATION:

The following 2 fracture classifications are commonly used; both are based on the fracture pattern seen on radiographs, the degree of comminution, and displacement of the fragments.[6,7]

The Rüedi and Allgöwer classification :

Type A: These are simple cleavage-type fractures with little or no articular displacement.

Type B: With these, displacement of the articular surface occurs without comminution.

Type C: Intra-articular displacement occurs with marked comminution.

The AO/OTA classification :

Type A: These fractures are extra-articular and subcategorized as simple (A1), comminuted (A2), or severely comminuted (A3).

Type B: These fractures involve only a portion of the articular surface and a single column. Subcategories include pure split (B1), split with depression (B2), and depression with multiple fragments (B3).

Type C: These fractures involve the whole of the articular surface. Type C fractures may be categorized as a simple split in the articular surface and the metaphysis (C1), an articular split that is simple with a metaphysis split that is multifragmentary (C2), or a fracture with multiple fragments of the articular surface and the metaphysis (C3).

MATERIALS AND METHOD:

We studied in a series of 17 patients of different grades of compound tibial pilon fractures between 25yrs and 60yrs of age, who were treated in day one with the following modalities of treatment and were followed for a minimum period of 6 months. out of the 17 patients. GROUP-I: 4 of them were treated with open reduction and internal fixation with plate osteosynthesis, GROUP-II: 4 of the patients were treated with wound debridement and ankle spanning external fixator, GROUP-III: 6 of the patients who had associated fibula distal third fracture were treated with wound debridement, ankle spanning external fixator and k-wire for fibula, GROUP-IV: remaining 3 of them who too had associated fibula distal third fracture were treated with wound debridement, ankle spanning external fixator and one third tubular plate for fibula. Grade IIIb compound fractures were later given secondary split skin graftsfor raw area.

S.NO	AGE/SEX	COMPOUND INJURY (Gustilo andAnderson)	Rüedi and Allgöwer classification	TREATMENT	COMPLICATION
1.	29/f	Gr-III a	Type-C	ORIF- LCP & FIBULAR PLATING	Pain, Flap necrosis
2.	45/m	Gr-I	Type-C	ORIF-RECON PLATE	Pain
3.	57/f	Gr-I	Type-A	ORIF-1/3 TUBULAR PLATE & CANCELLOUS SCREW	Pain
4.	50/m	Gr-I	Type-C	ORIF- LCP & FIBULAR PLATING	Pain, infection
5.	25/m	Gr-IIIb	Type-B	WD & EX-FIX, SSG	Pain, infection, limblength discrepancy
6.	49/m	Gr-IIIb	Type-C	WD, EX-FIX, K-WIRE FOR FIBULA, SSG	Pain, infection, pin tract infection, malunion
7.	43/f	Gr-IIIb	Type-B	WD, EX-FIX, K-WIRE FOR FIBULA,SSG.	Pain.
8.	34/m	Gr-IIIb	Type-C	WD & EXFIX, SSG	Pain,infection, Limblength discrepancy, malunion.
9.	42/m	Gr-IIIb	Type-C	WD & EXFIX, SSG	Pain, infection.
10.	29/m	Gr-II	Type-C	WD, EX-FIX, K-WIRE FOR FIBULA	Pain.
11.	35/m	Gr-IIIb	Type-C	WD, EX-FIX, K-WIRE FOR FIBULA, SSG	Pain.
12.	27/f	Gr-IIIb	Type-B	WD, EX-FIX, FIBULAR PLATING.	Pain.
13.	55/m	Gr-I	Type-C	EX-FIX, FIBULAR PLATING	Pain.
14.	50/m	Gr-IIIb	Type-C	WD, EX-FIX, K-WIRE FOR FIBULA, SSG	Pain, infection, pintract infection.
15.	55/m	Gr-II	Type-B	WD, EX-FIX	Pain
16.	34/m	Gr-I	Type-A	EX-FIX, & FIBULAR PLATING.	Pain.
17.	25/m	Gr-I	Type-A	EX-FIX, KWIRE FOR FIBULA.	Pain

CASE:1

CASE:2

CASE:3

FOLLOW UP:

All those compound fractures were treated as inpatient till 15th post operative day. Then they were followed weekly for the next 1 month, biweekly for the next 1 month and monthly once thereafter.

RESULTS AND COMPLICATION:

Bony union was significant. Strict nonweight bearing for 6 weeks and allowed to partial weight bear after 8 weeks. Those patients treated with external fixators and didn't had any infection were given PTB cast after the removal external fixators at the end of 8 weeks. Pain is the most commonly reported complaint in all of them. Malunion was reported in Rüedi and Allgöwer type C fractures. Limb length discrepancy was noted in two of type C fractures treated with external fixators alone. One of the patient who was treated with plate osteosynthesis developed flap necrosis at 8th POD and was given flap cover.

The functional evaluation of the ankle was excellent or good in eight cases, fair in six and poor in three. The range of motion was recorded for all patients. Dorsiflexion averaged 10.9° (range : 0°to 23°), compared with 24° on the contralateral side. Plantar flexion averaged 20.35° (range : 7° to 35°) compared to 37° on the contralateral side. Inversion averaged 4.50° (range : 0° to10°), compared to 11° on the contralateral side. Eversion averaged 4.78° (range : 0° to 10°), compared to 14° on the contralateral side. Pin tract infection was reported in 5 cases and treated with antibiotics and tract irrigation with saline and H_2O_2.

DISCUSSION:

Most authors would agree that the goals of the treatment of any displaced intra-articular fracture of the ankle are : anatomic reduction, internal fixation of articular fragments, bone grafting of residual defects, open reduction/internal fixation (ORIF) of the fibula, and early mobilisation. However, the application of these treatment principles in high-energy plafond fractures is controversial because very serious complications, including mal-union, nonunion, arthrodesis, osteomyelitis, and even amputation, have been reported in cases treated according to these principles. High-energy trauma can cause serious damage to both soft tissues and bone in this area with an insufficient vascular structure.

Moreover, surgery involving much soft tissue exposure in this area has a high risk of soft tissue complications. Minor complications in the soft tissues increase the rate of major complications. Therefore, delicate handling of the soft tissues has been advocated. To prevent soft tissue complications, minimally invasive operations should be used for this type of fracture. One of the most important steps in treating tibial plafond fractures is anatomic reduction of the articular surface, to prevent the development of osteoarthrosis . Ruedi *et al* claim that reconstruction of the normal anatomy is only possible using open reduction and stable internal fixation. This view is acceptable for low-energy plafond fractures with relatively larger fragments. However, in some multi-fragmented tibial plafond fractures, it is very difficult to maintain stable anatomic reduction using internal fixation, even with open reduction. Teeny successfully obtained anatomic reduction in only 30% of the patients with Ruedi type III fractures using open reduction and internal fixation, while the percentages were 77% for Ovaida and Beals and 50% for Etter and Ganz . Conversely, the success at achieving anatomic reduction is greater in treatment protocols using external fixators, *e.g*., Barbieri, 90% ; Marsh, 69% ; and Bone, 95% . Another factor that determines the clinical result in tibial plafond fractures is early ankle movement. Early motion of the joint allowed after operative stabilization improves articular cartilage nutrition and facilitates surgical wound and ligament healing . The effects of early motion on the clinical results with this type of fracture have not been investigated sufficiently.

Many factors influence the final range of movement (ROM), and early movement is only one of the major factors determining the clinical results with intra-articular fractures. Another factor that affects the clinical results is early weight bearing on the extremity. Compression stiffness and dynamisation may be important for rapid fracture healing, callus maturation,and bone remodelling**.**

CONCLUSION:

In our study, results were good with external fixator combined with minimal internal fixation. we are able to achieve satisfactory reduction, restore limb length, with minimal soft tissue handling. Thorough debridement, external fixation with minimal internal fixation and early soft tissue cover will stretch good results in Gr-III compound fractures.

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