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Evaluation of management-of soft tissue injury in tibia shaft fracture

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ABSTRACT

Background : *.Presently we live in the age of high velocity trauma.In this era of modern industrialisation, with increasing road traffic, mechanisation of agricultural methods and various recreational sports, life has become very busy and active. [1]As a consequence people are more exposed to risk factors which cause accidents. These accidents cause different types of fractures and injuries. Fractures of the leg bones are one of these. In particular, fractures of the shaft of the tibia and the fibula present one of the most challenging problems in orthopaedic surgery today. So the purpose of the study is to evaluation of management-of soft tissue injury in tibia shaft fracture.*

Methodology : *In this series we had 33 closed fractures and 67 open fractures. The open fractures were classified according to the modified Gustilo (1984) grading for open fractures*

Result :. *14 cases in our series were managed conservatively. Out of these 12 were in the paediatric age group (below 15 years) two cases were adults, one of which had delayed union and is discussed later. Out of the 14 cases, 8 cases (57%) were closed fractures and 6 cases (43%) were open fractures.* ***Conclusion :*** *Our cases had different modes of treatment, but the results were comparable except for a mild increase in the poor results, which was due to more of high energy trauma and contamination.*

KEYWORDS :

Introduction

Ever since mankind came into existence and progressed to modern civilization, the incidence of trauma has increased by leaps and bounds. Presently we live in the age of high velocity trauma.In this era of modern industrialisation, with increasing road traffic, mechanisation of agricultural methods and various recreational sports, life has become very busy and active. [1]As a consequence people are more exposed to risk factors which cause accidents. These accidents cause different types of fractures and injuries. Fractures of the leg bones are one of these. In particular, fractures of the shaft of the tibia and the fibula present one of the most challenging problems in orthopaedic surgery today. [2]

The management of tibial shaft fractures is beset with immense difficulties. As the tibia is a subcutaneous bone, it is more vulnerable to open and contaminated fractures. The mechanism of the fractures is many a time due to high energy trauma with comminution and displacement, leading to a delay in healing. [3,4] Cosmetic disfigurement results if the apposition of the bone fragments is imperfect, or if the fracture is open with soft tissue lacerations. If attention is not paid to proper rotational and axial alignment, severe functional disability may result. The soft tissue injury can cause tethering of tendons, clawing of toes, equinus deformity and a range of other complications. Also, stiffness of the knee, ankle and subtalar joints can be a troublesome problem to tackle.

There are a very few fractures which give scope to so much of discussion of therapeutic principles, as tibial fractures. This is because these are very commonly occurring fractures. Also, certain tibial fractures can be very difficult to treat and the complication rate is high, leading to an unsatisfactory outcome.

Therapeutic principles vary considerably between different centres. Management can be conservative, operative or a combination of both. Each method has its own merits and every effort should be made to adopt a method best suitable to the individual patient with the available resources. This is the era of preservation, the management of the fracture does not stop at saving life and limb.[5] Our main purpose today is to return full function in the shortest possible time.

An attempt was made to evaluate conservative and operative methods of treatment of fractures of the shaft of the tibia and fibula from different aspects such as healing time,type and severity of complications, effect of soft tissue injury on fracture healing,and the final outcome. This was done during the study of management of fracture shaft of tibia and fibula at the Krishna Hospital and Medical Research Centre, Karad, over a span of two years.

So the purpose of the study is to evaluation of **management -of soft tissue injury** in tibia shaft fracture.

MATERIAL AND METHODS

This study was conducted in the Department of Orthopaedics, at Krishna Hospital and Medical Research Centre, Karad, A series of a consecutive 100 cases of fractures of the shaft of the tibia and fibula, was studied. Closed and open fractures were studied. No single method of management was used and the overall results of the whole study, were evaluated.

Majority of the fractures were the consequences of road traffic accidents, agricultural mishaps, and a few had assault injuries and fall from a height. Table No.1 shows the distribution according to the etiology in this series.

Patients from different age groups were included in this study. The youngest patient treated was 4 years old while the oldest was 75 years old. Table No. 2 divides the patients according to various age groups. Most of the accident victims with fractures of the shaft of the tibia and fibula belonged to the age groups of 21-40 years. This makes it obvious that the population at maximal risk is the young adult population.

On admission of the patient, a special proforma was made. Preliminary particulars including name, age and sex was taken down. A note was made about the nature of the accident, time and place of its occurrence and the same was classified as high energy or low energy trauma. The general condition of the patient was assessed, which included the assessment of vital functions and their maintenance, viz pulse, blood pressure, respiration etc.

The wounds and the fracture were examined. Distal circulation and neurological status were also examined. Any associated head, chest or abdominal injuries were noted.

After the patient's general condition was stabilized the following treatment protocol was used with due alterations in any particular

case concerned. Closed fractures were immediately splinted by a Plaster of Paris slab or. Thomas' splint with elevation of the extremity over the pillow. This reduces the soft tissue damage and oedema and prevents nerve and vessel injury which can be caused by the fracture fragments.

In case of open fractures the wounds were thoroughly cleaned with savlon, hydrogen peroxide and normal saline. Haemostasis was achieved. Sterile dressings were used and the limb was splinted. Details of soft tissue treatment is discussed later. Routine AP and lateral views of the fractured leg were obtained. Additional roentgenograms of other parts of the body were obtained whenever required. Investigations such as Hb, TLC, DLC, Urine examination, Blood sugar, Blood grouping and Rh typing, Blood urea were done. Additional investigations were done according to the requirements of individual cases. In this series we had 33 closed fractures and 67 open fractures. The open fractures were classified according to the modified Gustilo (1984) grading for open fractures.

Result :

Table : 1 MODIFIED GUSTILO'S GRADING OF OPEN FRACTURES.

Open Fractures	No. of cases	Percentage
Grade I	38	57%
Grade II	20	30%
Grade IIIa	5	7%
Grade IIIb	4	6%
Grade IIIc	-	-

14 cases in our series were managed conservatively. Out of these 12 were in the paediatric age group (below 15 years) two cases were adults, one of which had delayed union and is discussed later. Out of the 14 cases, 8 cases (57%) were closed fractures and 6 cases (43%) were open fractures. One patient was lost to follow up.

In this study the wounds were kept opened and carry out delayed primary or secondary closure or skin grafting. 29 cases were treated by a plaster cast, and 17 cases by application of an external fixator. No case was treated by open reduction and primary internal fixation.From the remaining 12, excellent results were seen in 10 patients. One patient developed superficial infection, which was adequately treated with the appropriate antibiotics. One patient had insignificant angular deformity. 33 patients underwent open reduction and rigid internal fixation in the form of a plate. Of these 8 cases (24 %) were closed fractures and 25 cases (76 %) were open fractures which were further subdivided as 18 cases of Grade I open fractures, 6 cases of Grade II and 1 case of Grade III.

Primary fixation by plate was not done for any of the patients as we were not sure of the lapse of time between the time of the accident and the patients' arrival at the hospital. All cases underwent plating on the medial surface except for 2 cases who underwent plating on the lateral surface. Primary bone grafting was not done. There was no case of implant failure reported. Out of the 33 patients here, 3 were lost to follow up. The average shortening seen was 0.5 cm, while the maximum recorded was 1.5 cm Superficial wound infection developed in 3 cases (10%) and 4 cases (13 %) had deep infection. There were 3 cases (10%) who developed osteomyelitis and all three had open fractures. There was 1 case (3 %) who developed compartment syndrome.

17 cases in these series were treated with external fixators. 12 of these were treated by open reduction and external fixation and after the formation of sticky callus, an above knee cast was applied and fixator was removed. The remaining 5 were treated primarily by external fixation and then delayed internal fixation by plating was carried out. No closed fracture was treated by this method. 5 cases were lost to follow up.

Out of the 12 patients treated with external fixator and cast, 4 cases were lost to follow up. 5 cases united at an average union time of 26 weeks and 2 cases had delayed union. Non union was seen in 1 case. Out of the 5 patients treated with external fixation and delayed plating, 1 case was lost to follow up, 2 cases had delayed union and 2 cases, non union. The overall percentage of delayed union was 33 % and that of non union was 25 %. One case developed external rotation deformity of the tibia up to 10 digree. Pin tract infection was a common problem but none of the patients developed deep infection or sequestrum at the pin site. Maximum shortening noted was 2.5cm.

Discussion :

For assessing the soft tissue injury, Modified Gustilo (1984) classification proved to be of great help. In our series, 57 % cases were classified as Grade I, 30 % as Grade II and 14 % as Grade III.A similar series of „wen fracture was studied by Patza-kis (1983). [6] This series recorded 46.7 % of Grade I open fracture, 39.4 % of Grade II and 13.7 % of Grade III. Our series had Grade I and Grade II open fractures in a high incidence. In both the series Grade I was seen in maximum number and Grade III, the minimum number, suggesting that the pattern of injury seen in the present series is quite similar to the series from another part of the world.

Various studies [7,8] has advised to leave all wounds open & primary closure for Grade I and Grade II wounds and delayed primary closure for Grade III wounds. Such a policy was set by us because in most of the cases, the time interval between the occurrence of the accident and reporting time to the hospital was either uncertain or greater than 6 hours. Also, as a large number of casualties were due to road traffic accidents, contamination was present in many cases.

For better healing of soft tissue, early stabilization of the fracture either by application of a plaster cast, external fixation or internal fixation within 24 hours is very important. Proper stabilization maintains position and length of the bone and decreases the tissue reaction caused by motion.

Various studies[9,10,11] advised stabilization with the use of a plaster cast. & have advised open reduction and primary rigid internal fixation.

For conservative management treatment of tibial fractures in children was gratifying because they had a short healing time, low complication rate and no case of delayed union or nonunion if surgery was omitted. A study [12]confirmed the rapid healing of tibial fractures in children & said that leg length discrepancy is not a major problem following tibial fractures in children. This present study consists of total follow up not exceeding more than 2+ years. It is very difficult to ascertain at present as to what kind of limb length discrepancy these children may develop in the future. Though this is not within the preview of this present study, it will certainly form an important observation for future retrospective analysis.

For closed reduction Nicoll (1964) [13] assessed the residual deformity in 671 patients of which 8.6 % were present in the form of varus/valgus angulation, anterior/posterior bowing in excess of 10 digree in any plane. In our series most cases had some shortening. The range of shortening was from 0.6cm to 2.5 cm. One case had 2.5 cm of shortening, 3 cases had shortening between 1.1 to 1.5 cm. In the remaining cases shortening was insignificant.

For open reduction and plate fixation primary fixation by plate was not done for any of the patients as we were not sure of the lapse of time between the time of the accident and the patients' arrival at the hospital. All cases underwent plating on the medial surface except for 2 cases who underwent plating on the lateral surface. Primary bone grafting was not done. There was no case of implant failure reported. Comparing with the study of they reported 3 cases of osteomyelitis out of 323 patients (0.9 %) with closed tibial fractures treated by DCP. In our study no case of closed fracture developed osteomyelitis.

The incidence of delayed union was 10 % in the Ruedi et al (1976) [14]

study while in our study it was observed to be 18%. The delay in fracture healing following surgery has been attributed to the reduction of blood flow to the fracture following damage to the capillary bed caused by stripping of the periosteum and muscular attachments. Intramedullary reaming and instrumentation also compromise the vascularity of the fracture site from within the bone.

In our study the average time of union for closed fractures was 18 weeks and that for open fractures was 23 weeks. We believe that our results show that the traditional fear of plating a Grade I or Grade II open fracture is unjustified. Moreover rigid fixation allows easy unencumbered access to the patient for treatment of his tibial wounds and by effecting anatomical reduction and allowing early mobilization, it produces excellent results in terms of function. This is particularly important in patients with high energy trauma who are prone to other complications and severe fracture disease.

For external fixation Blachut et al [5] studied 41 open tibial shaft fractures treated by external fixation and delayed intramedullary nailing. Fracture healing was within 24 weeks . 5 % cases developed deep infection, 2 cases had non union and one case had delayed union. In our series the rate of delayed union and non union was high. This is due to the fact that all the cases who had non union were of Grade III type. Also the exact time interval between their accident and admission to the hospital was not known. We still find external fixation with delayed plating convenient because of ease of application of the plate and decreased risk of infection as compared to nailing where the infection might spread throughout the medullary canal leading to endosteal infection.

Our cases had different modes of treatment, but the results were comparable except for a mild increase in the poor results, which was due to more of high energy trauma and contamination. Since we cannot make out the exact number of Grade III fractures in the Johner and Wruhs [15] (1983) study, a proper comparison cannot be made as far as the poor results are concerned.

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