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## Primary plating osteosynthesis in open fractures

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### Abstract

**Introduction:** We have undertaken the work with the idea that early internal fixation with plate provide sufficient stability for proper nursing of wound and fracture healing on one hand and initiation of early joint function and rehabilitation on the other hand. The purpose of this study was to evaluate an early aggressive wound management and fracture stability in an attempt to alter the natural history of complex open fractures with respect to union, infection rate and time and cost of hospitalization and rehabilitation.

**Materials & Methods:** The present study was conducted in the department of the orthopaedics, Medical College. A total of 30 individuals either of male or female were included in the study. They were selected from the OPD of the hospital. Each patient was subjected to a clinical, radiological and pathological examination.

**Results:** A total of 30 patients diagnosed with open fracture were included in the study and treated with help of primary plating. Out of the total 30 patients, 15 were of grade I, 7 were of grade II fracture and 8 were in grade III.

**Discussions & Conclusion:** Fifteen cases in the series reported between 3 to 12 hours after sustaining the trauma due to lack of communication and transport facilities. Only 2 patients could reach the hospital within 3 hours both of them were from urban areas. We conclude from the study that the judicious selection of cases, skilful management of the injured limb and early rehabilitation is the key for compound fractures. Infection is one of the most important problems in the management of open fractures, which determine the final outcome.

**Keywords:** Open Fracture, Primary Healing, Plate osteosynthesis, Limb fracture

### Introduction

An open fracture, also called a compound fracture, is a fracture in which there is an open wound or break in the skin near the site of the broken bone. Most often, this wound is caused by a fragment of bone breaking through the skin at the moment of the injury [1].

An open fracture requires different treatment than a closed fracture, in which there is no open wound. This is because, once the skin is broken, bacteria from dirt and other contaminants can enter the wound and cause infection [2]. For this reason, early treatment for an open fracture focuses on preventing infection at the site of the injury. The wound, tissues, and bone must be cleaned out in a surgical procedure as soon as possible. The fractured bone must also be stabilized to allow the wound to heal [3].

An open fracture can also result from a lower-energy incident, such as a simple fall at home or an injury playing sports. The procedure for evaluation and management of open fractures is best described as a set of principles that has evolved over time, often in relation to advances in wartime care of military personnel. These principles involve both initial management and subsequent surgical intervention [4].

The first step is accurate diagnosis and documentation of the mechanism of injury. Appropriate coverage of the wound and splinting of the fracture are performed in conjunction with initiation of appropriate antibiotic therapy and tetanus prophylaxis [5]. Urgent surgical intervention typically follows and involves both soft tissue and bone management. Adjuncts to the care of open fractures have evolved and often involve delivery of antibiotics or metabolically important substances to the local fracture environment [6].

Almost all open fractures are treated in the operating room. It is important to go to surgery as soon as possible so that your open wound can be cleaned out to help prevent infection. Depending on your specific injury, you will be given either regional or general anesthesia

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during this procedure [7]. Virtually all open fractures must be considered for operative intervention. The introduction of bacteria and soft-tissue compromise associated with even “minor” open fractures mandate appropriate presurgical and surgical management to minimize the risk of clinically important complications [8].

With the use of internal fixation the alignment of the fracture can be maintained in good position so that soft tissue injuries can be handled easily and effectively and also deformity should be prevented and reconstruction and grafting could be done in a clean field immediately or a later date [9]. We have undertaken the work with the idea that early internal fixation with plate provide sufficient stability for proper nursing of wound and fracture healing on one hand and initiation of early joint function and rehabilitation on the other hand. The purpose of this study was to evaluate an early aggressive wound management and fracture stability in an attempt to alter the natural history of complex open fractures with respect to union, infection rate and time and cost of hospitalization and rehabilitation.

**Materials & Methods**

The present study was conducted in the department of the orthopaedics, Medical College. A total of 30 individuals either of male or female were included in the study. They were selected from the OPD of the hospital. Each patient was subjected to a clinical, radiological and pathological examination.

The inclusion criteria included in the study were as follows: open fracture in lower and upper extremities, Patient admitted with 8 – 9 hours of trauma. The exclusion criteria followed were presenting with 12 hours, patient managed by external fixator, already growth plates.

Out of the total 30 individuals, majority of them were males and only five were females. The age range was from 15 to 45 years. Majority fracture and trauma cases were of Tibia fracture and next were the cases of fracture of femur and fracture of radius ulna fracture were second least number of cases with least number of cases were of fracture of shaft humerus. Out of the total 30 individuals included in the study, 15 were in grade 1, while 8 cases were of grade 2 and 7 were of grade 3. Out of the 30 individuals cases included in the study, 10 were in upper extremity and 20 in lower extremity.

The initial management of all the cases were started in the emergency department. A through and detail history were recorded along with clinical and radiographic examination. The open fractures were classified based on the severity of injury of the soft and hard tissues.

In operation theatre, wound debridement was done before internal fixation under aseptic conditions. All the tissue with gross contamination and with questionable viability was removed. Muscle viability was evaluated by scully *et al.*, criteria for consistency, contractility, colour and ability to bleed. For internal fixation choice of surgical exposure was influenced by extent and location of wound.

In 10 cases (33.3%) the satisfactory reduction and plate fixation was achieved either by extension of injury wound or through the wound without extension. In 20 cases site and size of wound was not appropriate, separate incision was given in 20 cases (66.7%) for separate reduction and internal fixation.

**Table 1:** Sex and Age in years

Age in Years	Male	Female
15 to 20 years	2	1
21 to 25 years	6	1
26 to 30 years	5	1
31 to 35 years	3	2
36 to 40 years	8	0
Total	25	5

**Results**

A total of 30 patients diagnosed with open fracture were included in the study and treated with help of primary plating. Out of the total 30 patients, 15 were of grade 1, 7 were of grade II fracture and 8 were in grade III.

Soft tissues of all patient categorised in grade I did healed within 2 - 3 weeks, while the patient categorised in grade II healed within average 4 weeks and those categorized in grade III did healed in nearly 8 to 10 weeks. Two cases of grade III and two cases of grade II and one case of grade I took more than 3 months for healing. All the cases in grade I showed good results, in grade II showed fairly good result and in grade III showed satisfactory results of healing. The detail description of the patients included in the study are described in the table 2 listed below.

**Table 2:** Wound management after stabilization of fracture by primary plating

	No. of cases	Grade I	Grade II	Grade III
Primary Closure	12	12	0	0
Delayed closure	6	3	2	1
Skin grafting required	5	0	3	2
Muscle flap done	4	0	2	2
Secondary healing	3	0	0	3
Total	30	15	7	8

**Discussion**

The present study was planned with the sole aim to delineate the role of primary plating in the management of open fracture. In the present study, total of 30 individuals were included with 25 males and 5 females. This male and young age dominance could very well be attributed to the fact in Indian social structures males particularly in this age group are much exposed to accident on road as well on other fields. Fifteen cases in the series reported between 3 to 12 hours after sustaining the trauma due to lack of communication and transport facilities. Only 2 patients could reach the hospital within 3 hours both of them were from urban areas. Most of the cases (75%) either received no first aid or received first aid in the form of unsterile dressing. In our series 11 (91.66%) patients presented within 9 hours. We observed that chances of infection can be reduced significantly if soft tissue management and fixation of fracture is done as early possible, preferably within 9 hours. We agree with Rittman *et al.*, (1979) that the adequate debridement is one of the most important pre-requisite for prophylaxis against infection [10]. Rittmann and Matter (1977) [11] found that antibiotic prophylaxis has no definite advantage in a parallel series. Only deep soft tissue infections are reduced under high prophylactic dose of penicillin and streptomycin. One of qualifying condition is that the antibiotic must be effective

against the usual organisms that cause infection. Primarily, it should be broad spectrum covering all common pathogens later it should be based on culture and sensitivity. Matter and ritman (1977) recommended that all wounds of open fracture should be left open irrespective of severity of injury. We performed primary closure with drainage tube in all the 6 cases of grade I and out of these none developed any necrosis of edges or any infection. Delayed primary closure with drainage tube in 2 cases had excellent results and soft tissue healed within 3 weeks. All grade III cases were left open for subsequent skin grafting and muscle pedicle flaps, 1 for each case. We observed that it is better to leave all the wounds open except in clean cases of grade I injury, where primary closure can be done, if required with drainage tube. Post operatively, on 5<sup>th</sup> to 7<sup>th</sup> day, acute inflammation subsides and infection if existing becomes apparent. At this stage we are in better position to decide, whether delayed primary closure is to be under taken or the wound should be left open for debridement, secondary suturing or skin grafting or muscle pedicle flaps whenever possible.

### Conclusion

We conclude from the study that the judicious selection of cases, skilful management of the injured limb and early rehabilitation is the key for compound fractures. Infection is one of the most important problems in the management of open fractures, which determine the final outcome.

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