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Primary Internal Fixation in Compound Tibial Fractures: 2 Years Retrospective Study

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Abstract

Introduction :- This paper presents the results of the treatment of thirty twoconsecutive open fractures of the shafts of the tibia and fibula by primary internal fixation and wound closure.Out of thirty two patients, fourteen with Intramedullary interlocking nail of tibia (four with solid nail and tenwith custom hollow nail), twelve with plating (six with locking, six with buttress plates and two with 4.5 Recon plate), four with Ender's nailing (three supplemented with external fixator) and the remaining two patients with cannulated cancellous screws were treated. It emphasizes the risks involved and shows that this method must be used only when there is every indication that the wound will heal by first intention.

Key words: Infections, Lacerations, Contusion, Compound.

Introduction

The tibia and fibula present special problems which are not seen at other sites because the skin of the lower part of the leg forms a tight envelope around muscle and bone, with little subcutaneous tissue and a circulation that is easily impaired. (1) For these reasons incisions and wound flaps must be planned with care, and suturing of the wound under tension must be avoided to allow the skin to heal free from vascular deficiency. The care of the skin in the treatment of open fractures is of paramount importance, and the incision must be in correct relationship to both the wound and the fracture, and should not transverse skin that has been bruised or has doubtful circulation. (2) Proper debridement must be done and the wound closed with healthy skin edges,withouttension. In civilian practice, conditions for internal fixation of open fractures are ideal when the interval between injury and operation is short, because of the quick transport of the patient to hospital.(3,5)However, many surgeons have abandoned the use of internal fixation because of the unfortunate complications often encountered. (6)In my opinion internal fixation may be safely employed if patients are suitably selected and if there is a careful technique of wound closure.

Material and Methods

All the patients were treated at the Mahatma Gandhi Institute of Medical Sciences for a period of two years between 2007- 2009. During this period hundred patients who came with closed and open fractures were also treated by close as well as open reduction and internal fixation.Thirty twopatients have been included in this series.

Associated injuries in other parts of the body occurred in twelve patients.Some delay in surgical treatment was due to head injuries in eight patients. The average interval between admission and operation wasabout three to seven days.Twenty four out of thirty two patients had grade II and remaining were grade I compound wound. In twelve patients the wound was longitudinal or oblique and it was excised in the line of the exposure incision and in other twelve patients the wound was more orless transverse. In twenty patients, exposure was affected through a straight or slightly curved incision awayfrom the original wound, and in twelve patients the incision either have to be included or crossed the wound site. Although variations in technique were unavoidable and the procedures employed were generally similar and closely followed the principles of thorough wound debridement, reduction of the fracture and internal fixation by nailing or by plating.

In fourteen, primary wound closure and in next fourteen primary followed by secondary wound closure was done. The remainingfour patients required local flapsto effect adequate skin cover of the tibia.In all cases prophylactic treatment with broad spectrum antibiotics with Gentamycin and Metronidazole was started soon after the patient wasadmitted, and Tetanus anti-globulin (ATG) was given routinely. All of the patients receivedCrystalline Penicillin parenterally in six-hourly doses of ten lakh units for seven to ten days. The aim was to strip the periosteum as little as possible, to use catgutonly if absolutelynecessary, and to close the wound with as little tension as possible. The foot was elevated about two feet above thebed. The dressings were changed and the sutures removed about two weeks afterthe operation. In the event of pyrexia and discharge from the wound, antibiotics were given accordingly to culture sensitivity.

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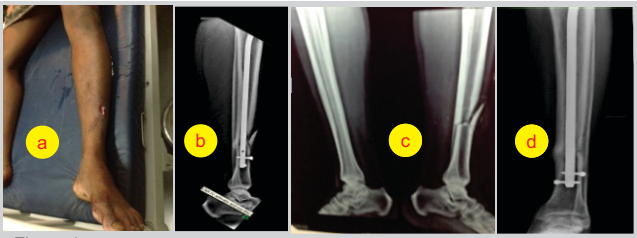

Figure 1:
(a) Preoperative photograph showing type-II fracture of the tibia,
(b) Postoperative photograph of the limb showing healing at 4 weeks,
(c) Preoperative radiograph showing the fractured tibia at the mid-shaft level,
(d) Postoperative radiograph showing union of the fracture at 24 weeks

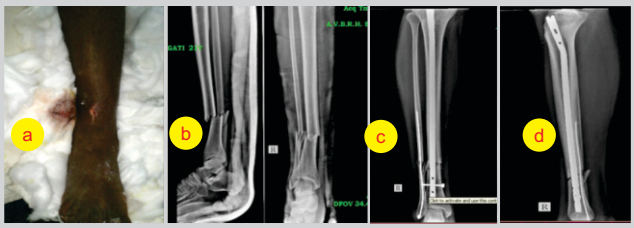

Figure 2:
(a) Preoperative photograph showing type-II fracture of the tibia,
(b) Postoperative photograph of the limb showing healing at 4 weeks,
(c) Preoperative radiograph showing the fractured tibia at the mid-shaft level,
(d) Postoperative radiograph showing union of the fracture at 24 weeks

All the operations were performed under image intensifier by twelve different surgeons, most of whom were residents under training. At the time of discharge from hospitalwounds of all thirty two patients indicated satisfactory healing.The data were obtainedby direct observations during treatment, from records, and from personal examination of the patients in both the open and closedfracture groups. Soft-tissue damage varied from clean puncture wounds to severe lacerations with skin and muscle contusion from crush injuries. Because of this variation, and in order to obtain a more accurate assessment of the results of treatment, it is necessary to grade open fracturesaccording to the severity of the soft-tissue damage. (1)

This grading may also be of greatassistance in deciding the correct treatment, because it is a practical guide to the severity ofthe injury.(2) The following classification appears to be a convenient and practical method of grading soft-tissue damage in open fractures, but it is realised that it is approximate and variable.(3)

Grade I: Puncture wounds from within or small lacerations up to about one inch in length with no loss of skin and minimal muscle damage. The wound is usually excised in the line of the exposure incision and primary closure of the wound presents no difficulty.

Grade 2:Larger wounds over an inch in length with contusion of the adjacent skin of variable degree. Some muscle damage requiring debridement but allowing safe wound closure after excision of the margins and exposure of the fracture.

Grade 3: Severe crush injuries with extensive damage to the skin and muscles, especially inthe anterior compartment. Primary wound closure, after debridement, is difficult and oftenimpossible.

Discussion

Healing of the wound without infection can beachieved in most cases by early adequate debridement, delayed closure of the wound andplaster immobilisation under antibiotic therapy(3). Primary wound closure is definitely hazardous, that's why selection of the patients is important(4). Antibiotic therapy, improved surgical technique and the development of metals suitablefor internal fixation have stimulated the recent trend for more ambitious results in the

treatment of peace-time fractures. (5)In converting an openfracture into a closed one, within a few hours of injury, tissues, whether bone, muscle or skin,are restored to as near normal as possible. The important role played by adequate reduction of thefracture in the prevention of wound infection. (6)With the fragments held in good position,dead space in which contaminated blood clot and wound exudates can collect is avoided,pressure of fragments against the undersurface of the skin that might cause necrosis does notoccur, wound margins are more easily approximated without tension, and repeated damagingefforts at reduction are unnecessary.(7)Despite early surgery, ideal hospitalconditions and antibiotic therapy, the incidence of infection will remain high. On the otherhand, when the wound is small and clean and muscle damage minimal (Grade I) the resultshave been excellent. Importance of safe skin closure cannot be overemphasized.(8). The site and direction of the wound and the condition of the adjacent skin are factors ofgreat importance if primary wound closure is contemplated. Incisions are carefully plannedto avoid contused skin and facilitate wound closure. (9) Crossing of the woundby the incision is avoided, and transverse or oblique wounds are extended by proximal anddistal incisions at their opposite corners. Longitudinal wounds are excised in the line of theincision. Skin economy in wound excision, particularly in the lowest third ofthe leg, may prevent unnecessary plastic procedures andpermit closure without tension.(10)

Result

There was primary healing of the wound in twenty four open fractures (75%) treated by this method. Satisfactory bony union by primary intention occurred in twenty fractures (62.5%) and eventual bony union in twelve fractures(36.5%). In an analysis of the complications encountered, it was considered important to take into account the severity of each fracture.

A significant conclusion concerning the management of these fractures may be drawn if the incidence of complications in the less severe type (Grade 1) is materially lower than that in (Grade 2 or 3). Infection, skin loss, non-

union and excessive scarring were the main complications encountered, in that order of frequency (Table III). Infection was classed as superficial or deep. Superficial infection implied someseparation of the edges of the wound and a short period of discharge. If the bone wasinvolved the infection was classed as deep infection.

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