Original Article

PROGNOSIS OF OPEN TYPE 3-B TIBIA FRACTURES BY ILIZAROV TECHNIQUE: A PROSPECTIVE STUDY

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ABSTRACT

Background: Open fractures of the tibial shaft are both common and may be fraught with complications. Open fractures of the tibia, with associated vascular injuries, have historically had a very poor outcome. Malunion, delayed union, nonunion, and infection are all seen regularly after open tibia fractures.

Objectives: Objective of the study is to explore advantage of primary or early ilizarov surgery in Open type 3- B fracture tibia.

Methodology: A follow up study of 10 cases of open type 3-B tibia fractures between 20 to 60 years of age treated with primary or early ilizarov surgery in SMIMER Hospital, Surat.

Results: Among 10 patients, 9 patients showed union between 8 to 10 months. Two patients developed pin track infection which was managed with oral antibiotics and daily pin tract dressings. One patient developed disuse calf muscle atrophy and 2 patient developed equines deformity in ankle joint due to soft tissue contracture.

Conclusion: Ilizarov surgery in open type 3-B tibia fracture having higher union rate with less chance of infection and obscure amputation of limb though it is technically demanding and time consuming procedure.

Keywords: Open type 3b tibia fracture, ilizarov surgery, Malunion, pin track infection

INTRODUCTION

Open fractures of the tibial shaft are both common and may be fraught with complications. Malunion, delayed union, nonunion, and infection are all seen regularly after open tibia fractures[1-5]. Thesubcutaneous location of the tibia places the leg at risk for skin loss at the time of fracture. Open fractures of the tibia, with associated vascular injuries, have historically had a very poor outcome [6]. This poor prognosis has prompted some to call for early amputation in select cases[7]. Ilizarov external fixation has also proven to be a valuable method for treating open tibia fractures. The ability of the frame to stabilize a fracture, provide compression at the fracture site, and allow access to the soft tissues makes it an integral tool in the management of severe tibia fractures. Metaphyseal fractures with significant shaft extension and fractures with short periarticular fragments are examples of situations in which an Ilizarov frame is frequently employed[8].The results of treatment of open high energy tibial fractures have improved significantly because of important contributions

made by large trauma services. Several factors are important for good outcome in these fractures. Aggressive and repeated debridement of devitalized tissue, including large fragments of bone is essential. Because vascular soft tissue and bone are essential for resisting infection and providing bed for reconstruction, the tibia should be stabilized with as little additional devascularization as possible.

According to Gustilo-Anderson classification for open fractures type 3B includes fracture wound > 10cmextensive soft tissue loss with periosteal stripping and bone exposure. These injuries are usually associated with massive contamination. After debridement and irrigation a local or free flap is needed for coverage. [8a] Infection is between 10-50 & amputation rate 5-14%.[8b]

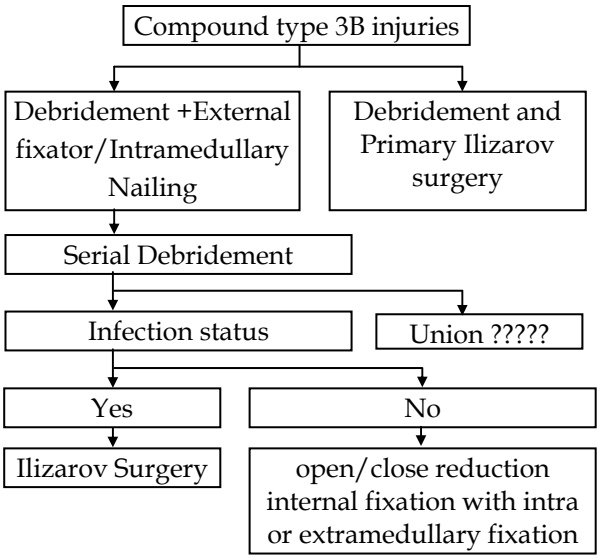

Fig 1: General protocol for compound type 3-B injury

Immediate interlocking nailing versus external fixation followed by delayed interlocking nailing for Gustilo type 3-B open tibial fractures suggest that early nailing has chance of non union upto 44% and deep infection upto 22% , delayed nailing has chance of non union upto 36% with deep infection upto 7%.[9]

Primaryilizarov in compound injuries

Usually with such kind of fractures, we are used to do uniplanner or biplanner external fixator followed by Split Thickness Graft or flap surgery accordingly. But, it is our experience that though, bone is covered chances of non-union is very high and secondly there is no control of bony infection. This eventually required either debridement or sequestretomy or Open Reduction/Close Reduction internal fixation with taking chance of infection in future.

The advantages of ilizarov technique over other treatment is minimal soft tissue dissection required, bone regeneration potential, tremendous versatility, ability to stabilize small bone fragments with thin tensioned wires, more stable fixation, by docking we can reduce wound size and bone gape, usually single stage surgery, early weight bearing.

This study was conducted to explore advantage of primary or early ilizarov surgery inOpen type 3- B fracture tibia.

METHODOLOGY

SMIMER hospital is a 750 bedded tertiary care hospital with well equipped operation theatre facility. Ten to twelve ilizarov surgeries performed monthly for open fractures, deformity correction, limb lengthening and infected non union cases. This was the prospective study conducted during 3 years duration from 2010-12 in SMIMER Hospital. All the patients having open type 3 B tibia fractures admitted in our hospital were included in the study. From the total of 10 patients admitted, four patients were primarily treated with external fixator then ilizarov surgery performed within 2 weeks, 2 patients with unreammed interlocking nail then ilizarov surgery performed within 3 weeks and four patient primary ilizarov surgery within 48 hours of trauma. Each patient was followed up every 3 weekly after two months of discharge till 10 months from the day of surgery.

In Ilizarov surgery first we remove all dead necrotic tissues and bone if dead. Then docking at fracture site then corticotomy of tibia not involving fracture site but proximal or distal to fracture site. After one week, we start controlled compression and distraction at fracture site to induce mesenchymal osteogenic stem cell which enhance in union of fracture.

RESULTS

Among 10 patients, 7 were male and 3 were female patients. The age of the patient was between 20 to 60 years. Among 10 patients, 9 patients showed union between 8 to 10months.

Two patients developed pin track infection which was managed with oral antibiotics and daily pin tract dressings. One patient developed disuse calf muscle atrophy and 2 patient developed equines deformity in ankle joint due to soft tissue contracture. Figure 1 to 4 shows the stepwise follow-up of the patient from the day of injury.

Figure 1: Injury showing proximal tibial metaphyseal fracture with fibula fracture (taken on the day of injury)

Figure 2: Primary external fixator done on first day.

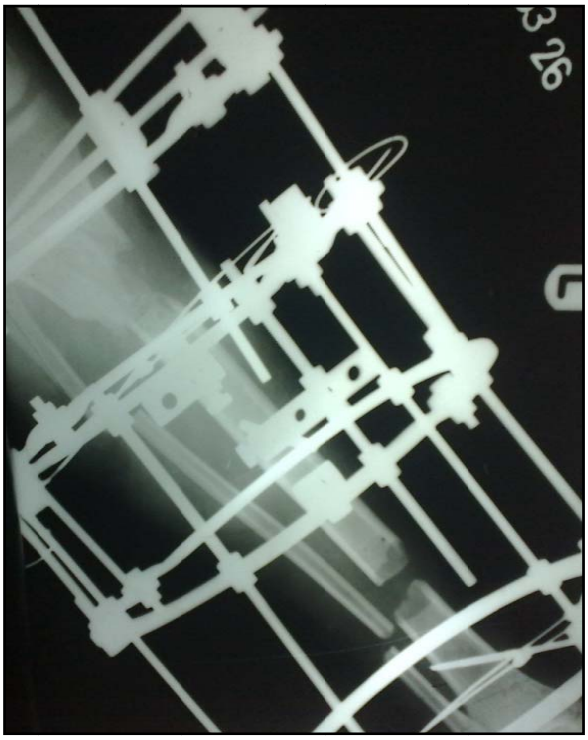

Figure 3: Ilizarov showing bony defect at fracture site with corticotomy distal to fracture site (taken at 3 weeks after trauma)

Figure 4: union at 8 months after trauma.

DISCUSSION

Treatment options may be limited, especially with open type 3-B fractures of the tibia. With

these fractures, Ilizarov external fixation may be used to achieve fracture union as well as wound closure. New methods employing the Ilizarov technique may provide distinct advantages regarding the soft tissues. These advantages may include fewer indications for rotational and free flap wound coverage, less need for amputation, fewer infections, and shorter treatment time. In addition the surgery is performed using percutaneous technique with limited exposure to minimize soft tissue trauma. Postoperatively the frame allows adjustability as well early weight bearing through axially dynamized stable fixation.[10] Defects in the bone and soft tissue of the tibia may be treated with debridement followed by an acute or gradual approximation of the bone ends. Compression is then employed at the fracture site, which also provides closure of the soft tissue defect. The bone and soft tissue defect is treated with compression and shortening at the injury site with a synchronized distraction and lengthening at a level outside the zone of injury. This technique achieves union while simultaneously treating any pre existing or iatrogenic limb length discrepancy. A low energy percutaneous osteotomy is performed in the proximal metaphysis of the tibia. Compression and shortening are employed at the fracture/wound while simultaneous distraction and lengthening of the osteotomy occurs. The tibial wound may be closed acutely or subacutely with the aid of the compression that is occurring at the fracture site. In the present case, the goal was to obtain wound closure and fracture healing. The concept of the previously mentioned techniques was used, but simultaneous proximal tibia lengthening was precluded because of an associated tibial plateau fracture and the presence of a plate. It was decided that lengthening, if necessary, would be performed after all healing had occurred. Our experience is limited, but this may serve as an additional tool in the treatment of open tibia fractures.

CONCLUSION

We conclude from our study that though ilizarov surgery is effective tool for treating open type 3-B tibia fractures and it may prove to be equally effective in dealing with the soft tissue aspect of these injuries. Utilizing compression at the fracture site will not only promote bone healing but may allow closure of wounds that previously required flap coverage or amputation. Though technically demanding surgery with minor treatable complications, it has higher rate of union than any other methods of surgery in this type of fracture.

Limitations:

In Ilizarov technique is highly skill demanding and patients require continuous psychological, social & familial support as it takes around 10 months to return to their routine lives

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