ORIGINAL ARTICLE

Early Flap Coverage in Grade-III Tibial Fractures

ROOMANA AKHLAQUE, M. KHALID UR REHMAN, MOAZZAM NAZIR TARAR

ABSTRACT

Background: The grade-III tibial fractures are one of the commonest fractures which need coverage. The old teaching was to do the fixation and dressing as coverage tool but most of the time it lead to amputation. The flaps of skin that includes the deep fascia is called fasciocutaneous flap. Medial perforator flaps are designed on cutaneous arterial perforators of posterior tibial artery which arise at different levels above medial malleolus. These flaps are used according to the level of exposed bones in the immediate or early phase of management.
Aim: To perform the immediate or early coverage of these fractures with any of the flaps and assess the outcome of such coverage by means of wound + bone healing.
Methodology: This was a prospective case series study and carried out in Plastic + Orthopaedic Surgery Departments, Jinnah Hospital, Lahore. Forty cases of grade III-B fracture tibia were included. The duration of this study was 9 months and follow up time was 3 months.
Results: The data was collected and analyzed on SPSS and found that most of the cases in which the immediate coverage was carried out having excellent to good outcome. Cases in which the time duration exceeds beyond 10 days the results are from fair to poor, both in terms of fracture and wound healing. **Conclusion:** Immediate or early coverage of all the III-B, fracture lead to good healing of bone and soft tissue.
Keywords: Fasciocutaneous flap, medial perforator flap, type III B fracture types.

INTRODUCTION

The tibial fractures in our community are one of the commonest fracture because of the increased number of road traffic accidents. The grades of these fractures vary with the magnitude of trauma occurred. The type of open fractures tibia are classified by Gustilo classification (Table 1). In all cases of type III B and the managements is the coverage of the wound. Type III B cases the coverage of the wound is not possible so definitely we have the only choice of covering the exposed bone with flap. The choice of flap vary according the expertise available and the location of the fracture itself and exposed bony area.

In mid of 20th century the management of the open fracture was started as coverage of the soft tissue defects. Previously these type of cases were managed by amputation of the limbs because of chances of infection. In 1985 the overall amputation rate was 18%. Godina et al states that wounds covered within 72 hours of the injury are associated with highest success rate. Sezial debridements are also necessary in the cases when wound is much contaminated and of larger size. Anatomically lower 3rd of the tibia is covered only by a thin layer of skin and subcutaneous tissue, it makes tibia vulnerable to disruption in the overlying skin during road traffic accident. The management of these open fractures always need orthopaedic, vascular and plastic team collaboration.

The fracture management is the domain of orthopaedic surgeons. The fractures can be managed by intramedullary nailing, open reduction and internal fixation with plating and external fixator applications. The open fracture geometry of the lower 3rd tibia is notorious in its delayed or poor healing characteristics because of limited tissue perfusion and also the coverage of these defects is a challenge both for plastic and orthopaedic teams.

The lower 3rd tibial fractures type III are always in need of help and support of plastic team for coverage. Wound coverage is classified according to its timing as early coverage – within 7 days, late – 8-30 days. The average time to fracture healing will be reduced significantly if method of treatment employed as early as possible. With increasing mechanization and road traffic accidents the cases of open fractures of tibia are seen more in numbers and management plans are not straightforward. During the last few years, muscles and musculocutaneous flaps have been utilized to solve the problem of reconstructive surgery.

Although the stabilization technique all depends on the choice of orthopaedic team but this should be done with the collaboration of plastic team. The fasciocutaneous flaps are useful tools in the management of the open fractures.

Department of Orthopaedics & Plastic Surgery, Jinnah Hospital, Lahore
Correspondence to Dr. Roomana Akhlaq, Senior Registrar
email: rehmansurgeon@gmail.com

MATERIAL AND METHODS

The prospective, case series study was performed in Jinnah Hospital, the collaborative work of plastic and orthopaedic surgical department. Forty cases were included in the study with open grade III B fractures, either sex, 10-50 years of age, Gustilo type III B and no co-morbid condition. Open fracture tibia type I and II and patients having diabetes mellitus, hypertension, peripheral vascular disease and ischemic heart diseases were excluded from the study. The objective of the study in our mind was the results in terms of wound and bone healing if these are covered in immediate or early stage.

The cases presented in emergency room. Wounds classification was carried out and wound swabs sent. In the treatment room the wound washing and antiseptic dressing was performed and long leg back slab applied. Intravenous first generation antibiotics started and patients were prepared for operating room as early as possible. All the cases were operated within 8 days. In 30 of these cases external fixators applied and thorough debridement of the devitalized contaminated tissue was performed and antiseptic dressings applied. After 48 hours of first debridement the patient were again taken to the elective operative room, 2nd look debridement and in favourable conditions coverage of the wounds with suitable flaps were carried out.

In all such cases with type III B, the medial perforator or sural flaps were utilized for the coverage of defects. This also depends on the expertise available but our main primary objective is to cover the exposed bone. The size of the wound is measured and accordingly size and shape of the flap is designed and under tourniquet control the flap is raised. The haemostasis secured as tourniquet deflated and insetting of the flap is carried out by suturing with 3/0 prolene. The viability of the flap was assessed on first and third day when the dressing was changed.

Patients were discharged from the ward after discussing with ortho team within 15 days of management and followed in both orthopaedic and plastic surgery clinics simultaneously. All the data was collected in a proforma regarding the type of fracture, management plan, choice of the implant, choice of flap for coverage and at the end the follow up healing and complications rate.

RESULTS

The patients in whom the early coverage was performed were discharged from the hospital with in 2 weeks of surgery. 85% patients were infection free with good attempt of bone healing, 10% patients got infection for which multiple debridements were carried out. Such patients were not having good bone healing even at last follow up. In 10% patients intramedullary nailing was performed and immediate early coverage done with good results.

Table 1: Gustilo's classification

Type I	**Low energy wound <1cm**
Type II	>1cm, moderate soft tissue damage
Type III	High energy >10cm size
A	Extensive soft tissue damage but bone can be covered
B	Extensive soft tissue damage, bone cement be covered
C	With vascular injury

Table 2: Frequency of types of flaps

Flap types	**n**	**%age**
Medial perforator based	25	63.0
Sural flaps	15	37.0

Table 3: Mode of injury

Mode of injury	**n**	**%age**
Road traffic accident	32	80.0
Fall from height	4	10.0
Fall of heavy object on leg	4	10.0

Table 4: Frequency of time delay of surgery

Time (hours)	**n**	**%age**
< 72 hours	26	65.0
< 1 week	8	20.0
> 1 week but < 2 weeks	6	15.0

Table 5: Frequency of procedure by orthopaedic team

Procedure	**n**	**%age**
ORIF (plating/nailing)	10	25.0
External fixator	30	75.0

DISCUSSION

The tibia is a subcutaneous bone in its anteromedial aspect and most of the open fractures in orthopaedics are the tibial fractures so the management of these fractures takes a special attention both by orthopaedic and plastic surgery. These wound defects are notorious in bone healing and infections rate is very high due to the precarious blood supply and contamination. Usually in road traffic accidents crushing, avulsion and bursting injuries lead to more complex defects which need particulate attention by the plastic surgeons as well. The most frequent cause of these complex fractures are RTA with 35% with motorbikes RTA with other vehicles 22%, pedestrian accidents 17%, domestic accidents 10%, crushing injury 5% and firearm injury 5%.

In our study the percentages of results are almost equal to the results in the literature on the same subject. The fracture management techniques were chosen by the orthopaedic surgeons according to the need and expertise of the surgeons at particular time. Other common choices of the flaps are posterior tibial perforator flap, saphenous flap, mallelar island perforator flap. Any delay in the management of the open fractures can lead to catastrophic results which are embarrassing for the surgeons and can lead to the miserable life for the patients in the form of amputations. Management of more complex fracture with very large defects previously resulted in amputation but now a days the rate of primary post traumatic amputations has reduced to very low to negligible percentage. Early wound management and coverage can lead to excellent to good outcome in these complex injuries. Now this is a consensus between the plastic surgeons that the management of all the open fractures is coverage as early as possible and don not wait for wound to be cleaned and later coverage.

The ideal management of open tibial fractures can be done unless one categorizes the injury according to fracture type, degree of soft tissue loss and velocity of injury. The average bone fracture healing times can be reduced to minimum if the bone is covered as early as possible with return to the work. The complex and bigger defects are still challenging for the plastic surgeons but now the concept of free flaps is prevailing but it needs more experties for microvascular surgery and it is more times consuming.

CONCLUSION

The grade III B fractures should be adequately and early covered by the soft tissues can lead to decrease co-morbidities for patients and also lead to more early healing of the fractures with fewer complications.

REFERENCES

1. Sherman R, Law M. Lower extremity reconstruction: Bruce M. Plastic Surgery 1st ed. St. Louis: Mosby 2000;475-94.
2. Byrd HS, Spicer TE. Management of grade-III open tibial fractures. Plast Reconstruct Surg 1985;76:719.
3. Anderson JT, Guistillo RB. Open fractures. Ortho Clinic North Am 1980;11:569.
4. Khan MA, Khan SW. Role of external fixator in the management of type-II and type-III open tibial fractures. J Postgrad Med Inst 2004;18:12-7.
5. Handulin L, Pjarinaw J. Early intramedullary nailing of lower extremity fracture and respiratory function in poly traumatized patients. Acta Orthop Scand 2004;75:477-80.
6. Gregory CF. Open fractures. Rockwood and Greens 1984;1:169-72.