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Original Research Article

A study on clinical profile of patients with open fractures of long bones attending tertiary care hospital

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Abstract

Diagnosis of open fracture is straight forward in most cases. Patient usually will have a deep bleeding laceration overlying or near the fracture of underlying bone. In some cases, fractured bone may be exposed because of soft tissue loss. However not all open fractures are obvious and there timely and proper diagnosis and treatment depends on a careful examination of the injured patient, salient features of history, reading of radiographs and good clinical judgment. All patients with open fractures of long bones presenting to emergency department, a detailed history and clinical examination were done. As part of a working proforma the following details will be noted from the patient and his attenders-demographic details, date and time of injury, the mode of injury. The fractures were graded according to Gustilo and Anderson's classification. Type I fractures constituted 15%, type II constitute 37%, type IIIA constitute 25%, whereas type IIIB with inadequate skin cover and gross contamination was 20% in the study population. There is no significant difference in distribution between the groups with respect to classification of fracture.

Keywords: Open fractures, long bones, Gustilo and Anderson's classification

Introduction

An open fracture is defined as an injury where the fracture and the fracture hematoma communicate with the external environment through a traumatic defect in the surrounding soft tissues and overlying skin. It should be emphasized that the skin defect may not lie directly over the fracture site and may lie at a distant site. It may communicate with the fracture under degloved skin. Hence any fracture associated with a wound in the same region must be considered to be an open injury until proven otherwise by surgical exploration [1].
Diagnosis of open fracture is straight forward in most cases. Patient usually will have a deep bleeding laceration overlying or near the fracture of underlying bone. In some cases, fractured bone may be exposed because of soft tissue loss. However not all open fractures are obvious and there timely and proper diagnosis and treatment depends on a careful examination of the

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injured patient, salient features of history, reading of radiographs and good clinical judgment [2].

Treatment of open fractures are affected by many pre-morbid injury and treatment variables, most of which act independently and each are expressed with the different severity scale.

The importance of a classification system is that, this allows comparisons of results between surgeons and scientific publications, and also gives guidelines to surgeons for prognosis and allows us to make statement about methods of treatment [3].

Gustilo and Anderson's classification [4]:

In 1976, the authors Gustilo and Anderson proposed a classification system that is still widely accepted today. The classification is as follows-

Type I

Wound size of less than 1 cm, with little soft tissue damage and a simple fracture pattern. As a result of low energy trauma. Soft tissue injury is by bone piercing from the inside outwards rather than a penetrating injury. Usually the level of bacterial contamination is low, unless the wounding occurs in a highly contaminated environment. There will be minimal or no muscle damage.

Type II

Wound size greater than 1 cm but less than 10 cm, moderate soft tissue damage and moderate fracture comminution and possibly moderate crushing and contamination of the wound. These wounds are usually outside to inside injury. Some necrotic tissue may be present but the amount of debridement required will be minimal to moderate and is usually confined to one compartment. Soft tissue stripping from bone is minimal to none and wound closure without skin flaps and graft is possible.

Type III

Wound size is usually longer than 10 cms. The wound is caused by outside to inside injury and with extensive muscle devitalization and extensive damage to soft tissue, high degree of contamination and severe comminution of fracture representing high-energy involvement. In general the fractures are widely displaced or comminuted although this is not an essential component. Excessive contamination of wound is also included in this group. Additional factors that will make an open fracture a type III wound: A high velocity gunshot wound, close range shotgun wound, a diaphyseal fracture with segmental loss, and a segmental fracture with displacement.

In the mid-1980, Gustilo and colleagues noticed that the type III injuries were associated with a variety of complex injuries and complications and made a sub classification to distinguish between type III fractures with different treatment needs and outcome potential [10, 11].

Type IIIA

Limited stripping of the periosteum & soft tissues from the bone, and bone coverage does not present with any major problems. Overall soft tissue coverage is fairly will preserved.

There may be loss of skin but there is adequate soft tissue coverage over bone tendon and neurovascular bundles.

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Type IIIB

Extensive injury with loss of soft tissue & significant periosteal stripping, exposure of bone mass contamination and severe comminution from high velocity injury. Devitalization or loss of soft tissue usually requiring a skin flap of free tissue transfer for exposed bone or neurovascular bundles.

Type IIIC

Open fracture that is associated with an arterial injury, regardless of degree of soft tissue injury.

Methodology

After obtaining approval and clearance from the institutional ethics committee, the patients fulfilling inclusion and exclusion criteria were enrolled for study after informed consent.
All patients with open fractures of long bones presenting to emergency department, a detailed history and clinical examination were done. As part of a working proforma the following details will be noted from the patient and his attenders-demographic details, date and time of injury, the mode of injury.
All patients underwent trauma assessment and appropriate treatment in the emergency department, the wounds were inspected for the size and extent of wound, both soft tissue and bone status was assessed and the amount of contamination was noted.

Study design: A Randomized control study.

Sample size: 35 in each group.

Inclusion criteria

1. Patients willing to give informed consent (Annexure 1).
2. Age above 18 years.
3. All patients with open fractures of long bones without any other foci of.
4. Infection detected clinically.

Exclusion criteria

1. Patients not willing to give informed consent.
2. Patients who have undergone wound debridement or surgical procedure for the Fracture.
3. Patients with open fracture who have been treated by iv or oral antibiotic.
4. Dressing before coming to emergency department.
5. Patients with polytrauma.
6. Patents with type 3C open fracture.
7. Patients with immunosuppression.

Results

24% of patients were in the age group of 21-30 and 41-50 years. The distribution of patients was almost equal between the ages of 21 and 50. There is no significant difference in distribution between the groups with respect to age (p=0.9419).

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Table 1: Age Wise Distribution (n=70)

Age (in years)	Group 1		Group 2		Total	
	number	%	number	%	Number	%
18-20	3	8.57	2	5.72	5	7.14
21-30	8	22.86	9	25.71	17	24.28
31-40	7	20.00	8	22.86	15	21.4
41-50	8	22.86	9	25.71	17	24.28
51-60	5	14.28	5	14.28	10	14.28
>60	4	11.43	2	5.72	6	8.5
Total	35	100.00	35	100.00	70	100.0

Out of 70 patients, 87% were males and 13% were females. There is no significant difference in distribution between the groups with respect to sex. (p= 0.721)

Table 2: Gender Distribution

Gender	Group 1		Group 2		Total	
	Number	%	Number	%	Number	%
Male	30	85.72	31	88.57	61	87.14
Female	05	14.28	04	11.43	09	12.86
Total	35	100.0	35	100.0	70	100.0

There were various causes for open tibial fractures. However, the most common was Road Traffic Accidents amounting to 90% of cases. There is no significant difference in distribution between the groups with respect to mode of injury. (p= 0.5551)

Table 3: Distribution of Mode of Injury

Mode of Injury	Group 1		Group 2		Total	
	Number	%	Number	%	Number	%
RTA	32	91.42	31	88.56	63	90
Self-Fall	1	2.86	1	2.86	2	2.86
Fall from Height	1	2.86	1	2.86	2	2.86
Fall of Heavy Object	1	2.86	0	0	1	1.42
Assault	0	0	1	2.86	1	1.42
Work Place Injury	0	0	1	2.86	1	1.42
Total	35	100.00	35	100.00	70	100.00

87% of the patients sustained trauma to the lower limbs and 13% of the fractures were of the upper limb. There is no significant difference in distribution between the groups with respect to limb affected. (p= 0.721)

Table 4: Distribution of Limb Affected

Limb Affected	Group1		Group 2		Total	
	n	%	n	%	n	%
Upper limb	5	14.2	4	11.4	9	12.8
Lower limb	30	85.8	31	88.6	61	87.2
Total	35	100.0	35	100.0	70	100.0

66% of open fractures occurred in both bones (tibia and fibula) of the leg. Among patients with fractures of a single long bone, femur was the most commonly involved accounting to 17%. There is no significant difference in distribution between the groups with respect to anatomical site of fracture. (p= 0.9824)

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Table 5: Distribution Site of Fracture

Site of Fracture	Group 1		Group 2		Total	
	n	%	n	%	n	%
Both Bone LEG	22	62.86	22	62.86	44	66.86
Both Bone Forearm	3	8.57	2	5.71	5	7.14
Tibia	2	5.71	3	8.57	5	7.14
Femur	6	17.14	6	17.14	12	17.14
Humerus	2	5.71	2	5.71	4	5.71
Total	35	100.0	35	100.0	7	100.00

The fractures were graded according to Gustilo and Anderson's classification [9]. type I fractures constituted 15%, type II constitute 37%, type IIIA constitute 25%, whereas type IIIB with inadequate skin cover and gross contamination was 20% in the study population. There is no significant difference in distribution between the groups with respect to classification of fracture. (p= 0.9065)

Table 6: Clinical Classification of Fractures

Classification	Group 1		Group 2		Total	
	n	%	n	%	N	%
Type I	7	20.00	5	14.28	12	17.14
Type II	13	37.14	13	37.14	26	37.14
Type IIIA	8	22.86	10	28.58	18	25.71
Type IIIB	7	20.00	7	20.00	14	20.00
Total	35	100.00	35	100.00	70	100.0

Discussion

70 patients who sustained open fractures of long bones satisfying the inclusion criteria were included in the study. Road traffic accidents caused the maximum number of cases (90%).
In this study 24% patients were in the age group of 21-30 and 41-50years of age, 21% patients in 31-40 years of age. The distribution was almost equal from the age of 21-50 years. This correlated well with the study by Mangala A *et al*. [5]. Probably due to increased involvement in outdoor activities and road traffic accidents.
Majority (87%) of the patients were males and 13% were females. This correlated well with the studies by Gupta *et al*. [48] and Agarwal *et al*. [6] where the incidence was higher in males than females. This may be due to the reason that males are more often involved in driving activities and hence vehicular accidents.
Trauma to the lower limb was the commonest (87%), while 13% of patients sustained upper limb fractures. 66% of patients reported with fractures of both bones (tibia and fibula) of the leg. This was similar to the observations made by Cole and Bhandari *et al*. [7] that lower extremity fractures are more common especially, open fractures of the tibial shaft which are more prone to get infected due to the high rate of contamination and commination because of its superficial location and subcutaneous characteristics of its anteromedial aspect [8]. Among patients with fractures of a single long bone, femur was the most commonly involved accounting to 17%.
The fractures were graded according to Gustilo and Anderson's classification [4]. type I fractures constituted 15%, type II constitute 37%, type IIIA constitute 25%, whereas type IIIB with inadequate skin cover and gross contamination was 20% in the study population (Table 7). The distribution of fractures were not similar to the study done by Gupta *et al*. in which type III B fractures accounted for 35% of the cases, type IIIA 15%, type 2 25% and type I 12%.

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Conclusion

- 24% patients were in the age group of 21-30 and 41-50years of age.
- Majority (87%) of the patients were males.
- 66% of patients reported with fractures of both bones of the leg.

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