

A study on complications of management of bimalleolar fractures of ankle

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Abstract

The ankle helps for the smooth vertical movement of the body's center of gravity and to decrease the transient ground reaction force during forward progression. In the normal walking, the ankle is in plantar flexion, as the heel comes in contact with the ground and foot accepts the weight of body. On admission of the patient, a careful history was elicited from the patient and/or attendants to reveal the mechanism of injury and the severity of trauma. The patients were then assessed clinically to evaluate their general condition and a complete survey was done to rule out significant injuries. In our study, 14.3% patients had complications. 3 patients had superficial infection, 1 patient deep infection, 1 patient delayed union of medial malleolus. The infections (superficial and deep) were managed with debridement and antibiotics. Delayed union #MM was treated with continued immobilisation, which eventually united without surgical intervention.

Keywords: Complications, management, bimalleolar fractures

Introduction

The ankle and foot segments provide support and a stable but mobile bone needed to maintain an upright posture.

The movement at subtalar joint and ankle joint are usually supportive to each other. Normal motion of the ankle joint is predominantly in the sagittal plane, but it involves variable degrees of rotation around the vertical and longitudinal axes ^[1].

Inman described the empirical axis of the ankle joint as passing approximately 5 mm distal to the tip of the medial malleolus and 3 mm distal and 8 mm anterior to the lateral malleolus. The empirical axis of ankle joint is also described as the one passing just below the tips of the medial and lateral malleolus. Because of the variable contours of the medial and lateral talar dome trochlea, ankle joint has a continuously changing axis of rotation. In dorsiflexion, the axis is inclined downwards and laterally, whereas in plantar flexion the axis is inclined downwards and medially ^[2].

The motion of the ankle is complex, combination of hinge type motion at the ankle, that is, dorsiflexion and plantar flexion with internal rotation and external rotation of talus in the long axis of the tibia, with associated movements at subtalar joint and foot joint. The normal

motion of plantar flexion and dorsiflexion is a combination of sliding and rolling. The normal range of motion of the ankle has been estimated to range from 12 degrees of dorsiflexion to 56 degrees of plantar flexion in the unloaded state ^[3].

Inversion has been defined as an action in which lateral margin of the sole is depressed and medial margin elevated. Conversely, in eversion, medial margin of the sole is depressed and the lateral border is elevated.

Supination and pronation are defined as rotation of the foot internally and externally around the longitudinal axis through the foot.

Adduction offers to the medial, abduction to the lateral deviation of the foot around the dorsoplantar axis through midtarsal joint.

The ankle helps for the smooth vertical movement of the body's center of gravity and to decrease the transient ground reaction force during forward progression. In the normal walking, the ankle is in plantar flexion, as the heel comes in contact with the ground and foot accepts the weight of body. During stance phase, the ankle initially dorsiflexed as the body moves over the footpad, and then plantar flexed as the foot pushes off during swing phase. A minimum of 10 degree of dorsiflexion and 20 degree of plantar flexion are required for ankle function during walking. The subtalar joint whose function is closely linked with that of the ankle provides inversion and eversion, as well as accommodation to rotational stresses ^[4].

As a weight-bearing joint, the ankle is exposed to forces that transiently exceed 1.25 times the body weight with normal gait and that may exceed 5.5 times the body weight with vigorous activities. The major weight-bearing surface of ankle is the tibia - talar surface. One sixth of static load of the body weight is carried by fibula. The fit of talus in mortise is precise, making it the most congruent of the weight bearing joints. This loading actually serves as a stabilizing influence on the joint because it causes the talus to seek an anatomically reduced position underneath the tibial plafond (by means of an associated 2 mm lateral talar shift). This acts to reduce the motion of the injured ankle.

The bony anatomy of the talocrural joint provides stability in dorsiflexion and relative mobility in plantar flexion. In the standing, dorsiflexed position, the ankle joint behaves like a true mortise, with the stability conferred principally by articular congruity. In the non-weight bearing, plantar flexed position, ankle joint stability is conferred mostly by the ligamentous structures ^[5].

The contributions of the articular surfaces, the ligaments, and the capsular and musculotendinous structures, to the stability and function of the ankle are influenced by changes in loading characteristics and joint position and are altered in response to injury ^[6].

Methodology

Inclusion criteria

1. Patients with Bimalleolar fractures of ankle.
2. Patients above 18 years of age.
3. Patients willing for treatment and given informed written consent.

Exclusion criteria

1. Open fractures of the ankle.
2. Those patients who are below 18 years.
3. Stable malleolar ankle fractures (treated conservatively).
4. Patients which were treated by non-operative methods were excluded.
5. Patients who are medically unfit for surgery.

35 patients with bimalleolar fractures of ankle who were admitted and operated were included in the present study.

All the patients were explained about the aims of the study, the methods involved and an

informed written consent was obtained before being included in study.

On admission of the patient, a careful history was elicited from the patient and/or attendants to reveal the mechanism of injury and the severity of trauma. The patients were then assessed clinically to evaluate their general condition and a complete survey was done to rule out significant injuries.

Careful examination was done to rule out fractures at other sites. Local examination of injured ankle and following clinical signs were looked for.

Results

Table 1: Age Incidence

Age (in years)	18-30	31-40	41-50	51-60
No. of cases	10	13	7	5
Percentage	28.6	37.1	20	14.3

In our series, majority of the cases i.e.13 (37.1%) were in the age group of 31- 40 years, followed by 12 (28.6%) cases in the age group 18-30 years. The youngest patient was 18 years old and eldest patient was 60 years. The mean age was 38.1 years.

Table 2: Sex Incidence

Sex	No. of cases	Percentage
Male	24	68.6
Female	11	31.4

In the present series, males were more commonly involved. Majority of the patients were males-24 cases (68.6%) and 11 (31.4%) were females, with M: F ratio of 2.2 : 1.

Table 3: Complications

Complications	No. of cases	Percentage
Superficial infection	3	8.6
Deep infection	1	2.9
Delayed union	1	2.9

In our study, 14.3% patients had complications. 3 patients had superficial infection, 1 patient deep infection, 1 patient delayed union of medial malleolus. The infections (superficial and deep) were managed with debridement and antibiotics. Delayed union #MM was treated with continued immobilisation, which eventually united without surgical intervention.

Discussion

In our study, fractures were commoner in the 31-40 yrs age group, with mean age being 38.1 yrs. Our findings are comparable to the studies made by, Beris *et al.*, Roberts RS, Baird and Jackson and Lee *et al.*

Table 4: Age comparison

Study	No. of cases	Mean age (in years)
Roberts RS ^[7]	25	40
Beris <i>et al.</i> ^[8]	144	43.8
Lee <i>et al.</i> ^[9]	168	44
Present study	35	38.1

Our series had a male predominance with 68.6% and male: female ratio of 2.2:1, which is comparable to the study by Baird & Jackson.

Table 5: Gender Comparison

Study	No. of cases	Male: Female	% of Male patients
Roberts RS ^[7]	25	11:14	44
Beris <i>et al.</i> ^[8]	144	56:88	38.88
Lee <i>et al.</i> ^[9]	168	89:79	42.9
Baird & Jackson ^[10]	24	17:7	70
Present study	35	24:11	68.6

Conclusion

- Incidence was more common in middle aged male patients, involving right ankle more often.
- Most common complication faced was postoperative superficial infection in 9% patients.

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