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Original Research Article

Clinical profile of patients with bimalleolar fractures of ankle

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Abstract

The malleolar fractures primarily involve lateral or medial malleolus and often other parts of the ankle as well. Sharing and tensile forces apposed through the talus produce them indirectly. Most malleolar fractures occur when the part, including the talus, is fixed on the ground by the body's weight. 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. In the present study, majority of the cases i.e. 15 (42.9%) had Supination-external rotation injury, followed by 8 (22.9%) cases had Pronation-abduction injury. The AO type B and C were the most common, involving 15 (42.3%) patients each, followed by type A in 5% (14.4%).

Keywords: Bimalleolar fractures, ankle joint, clinical profile

Introduction

The talocrural or ankle joint consists of tibial plafond including the posterior malleolus, articulating with the body of the talus, and the medial malleolus and the lateral malleolus. The ankle is complex hinge in which both bones & ligaments play important and inseparable roles [1].

The ankle often is divided into medial, lateral, and syndesmotic complexes to help the physician to understand the mechanism of injury better and to devise a treatment plan.

The medial complex consists of the medial malleolus, the media facet of the talus, and the superficial and deep components of the deltoid ligament, the lateral complex consists of the distal part of the fibula, the lateral facet of the talus, and the lateral collateral ligaments of the ankle and subtalar, and the syndesmotic complex consists of the articulation between the tibia and the fibula as well as the interconnecting ligaments of the syndesmosis and the interosseous membrane [2].

The ankle fractures occur as a result of strong rotational or predominantly axial loading. The malleolar fractures are caused predominantly by rotational forces whereas axial loading causes tibial plafond fractures, predominantly.

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the ankle as well. Sharing and tensile forces apposed through the talus produce them indirectly. Most malleolar fractures occur when the part, including the talus, is fixed on the ground by the body's weight [3].

The type of malleolar fracture that occur depends on two factors: the position of the foot at the time of injury, either supination or pronation, and the deforming force, which are external rotation, abduction or adduction. A relative bending moment is produced with rotation either in the coronal plane, producing talar adduction or abduction relative to tibia, or transverse plane, causing relative internal rotation of the tibia on the talus. These injuries are referred to as external rotation injuries.

The initial position of the foot is important because it determines which structures are tight and therefore are most likely to be injured first. When the foot is pronated, the deltoid ligament is tense, and the initial injury is medial, either a medial malleolar fracture or a deltoid ligament disruption. The two most common injury patterns are the supination external rotation (SER) and the pronation external rotation (PER) types [4].

The Supination-external rotation injury begins at the anterolateral corner of the ankle. The structures that are damaged are, in order, the anterior tibiofibular ligament (stage 1), the lateral malleolus (stage 2), the posterolateral aspect of the capsule or the posterior malleolus (stage 3), and the medial malleolus or the deltoid ligament (stage 4).

The Pronation-external rotation injury begins on the medial side of the ankle with an injury of the deltoid ligament or the medial malleolus (stage 1) and then progresses around the ankle to the anterolateral ligaments (stage 2), the lateral malleolus or the proximal part of the fibula (stage 3), and the posterolateral ligaments or the posterior malleolus (stage 4). Other less common injury patterns include the Supination-adduction and the Pronation–abduction types [5].

A fracture of the posterior malleolus can occur in association with either external- rotation or abduction injuries of the ankle. The mechanism of injury is usually an avulsion force acting through the posterior syndesmotic ligaments on the posterolateral part of the tibia. Less commonly, the mechanism is impaction of the externally rotating talus on the posterior lip of the tibia [6].

Methodology

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.

Inclusion criteria

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

Exclusion criteria

- Open fractures of the ankle.
- Those patients who are below 18 years.

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- Stable malleolar ankle fractures (treated conservatively).
- Patients which were treated by non-operative methods were excluded.
- Patients who are medically unfit for surgery.

Results

Table 1: Side Involvement

Side	No. of cases	Percentage
Right	22	62.9
Left	13	37.1

Right side was involved in 22 (62.9%) cases and left ankle in 13 (37.1%).
Right ankle was more commonly involved.
19 cases (54.3%) affected were due to road traffic accident, 11 cases (31.4%) due to fall, and 5 cases (14.3%) due to twisting injury. Road traffic accident was the most common mode of injury.

Table 2: Mode of Injury

Mode of injury	No. of cases	Percentage
Road traffic accident	19	54.3
Fall	11	31.4
Twisting injury	5	14.3

Table 3: Associated Injuries

Head injury	2 cases	5.7%
Ipsilateral tibial shaft	4 cases	11.4%
Ipsilateral distal radius fracture	1 cases	2.9%

There were 7 cases (20%) of associated injuries, of which 2 cases had head injuries, 4 cases had ipsilateral tibial shaft fracture and 1 case had ipsilateral distal radius fracture.

Table 4: Fracture Type According to Lauge Hansen Classification

Lauge Hansen Types	No. of cases	Percentage
SA	5	14.2
SER	15	42.9
PA	8	22.9
PER	7	20

In the present study, majority of the cases i.e. 15 (42.9%) had Supination-external rotation injury, followed by 8 (22.9%) cases had Pronation-abduction injury.

Table 5: Fracture Type According to AO Classification

AO Type	No. of cases	Percentage
Type A	5	14.4
Type B	15	42.3
Type C	15	42.3

The AO type B and C were the most common, involving 15 (42.3%) patients each, followed by type A in 5% (14.4%).

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Discussion

In the current study, road traffic accidents constituted majority of cases, which was in accordance with study by Lee *et al*.

Table 6: Mode of Injury Comparision

Study	No. of cases	Commonest mode
Baird & Jackson [7]	24	Fall from height
Lee *et al*. [8]	168	Motor cycle accident
Present study	19	Road traffic accident

In the present study, right ankle was more commonly affected, in accordance with Roberts RS, Beris *et al*.

Table 7: Laterality of Fracture Comparision

Study	No. of cases	Right	Left
Roberts RS [9]	25	14(56%)	11(44%)
Beris *et al*. [10]	144	73(51%)	71(49%)
Baird & Jackson [7]	24	11(45%)	13(55%)
Present study	35	22(62.9%)	13(37.1%)

In the present study, Lauge-Hansen classification system was used for operative evaluation. The most common type of injury was Supination-external rotation (42.9%), followed by Pronation-abduction injury (22.9%), in accordance with by Roberts RS, Beris *et al*., Baird and Jackson

Table 8: Type of Injury Comparision

Study	No. of cases	L-H type	Percentage
Roberts RS [9]	25	SER	34
Baird & Jackson [7]	24	SER	44
Present study	35	SER	42.9

Conclusion

- Road Traffic Accident was major cause of injury.
- According to Lauge Hanson's Classification supination, external rotation type was the most common mechanism.

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