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**Dr. Dilip Dhameliya**  
Orthopedic Consultant, Gadhavi  
Hospital, Tharad, Gujarat, India

**Dr. Prashanth G**  
Senior Resident, Department of  
Orthopedics, MIMS, Mandya,  
Karnataka, India

## Management and outcome of patients with ankle fracture attending tertiary care hospital

**Dr. Dilip Dhameliya and Dr. Prashanth G**

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### Abstract

**Introduction:** The most important and fundamental consideration in the treatment of ankle injuries is the restoration of the normal anatomy. It is important to achieve and maintain as near a perfect reduction as possible

**Methodology:** All the patients were selected on the basis of patients having ankle fracture without distal neurovascular injury. Patients having foot injury in same limb and intra articular distal tibia fracture excluded from our study

**Results:** In our study 60% patients, who operated for ankle fracture had good result while only 12% had poor result.

**Conclusion:** Majority of patient had satisfactory end results.

**Keywords:** Ankle injuries, Management, Outcome

### Introduction

The biomechanics of the foot and ankle are important to the normal function of the lower extremity. The foot is the terminal joint in the lower kinetic chain that opposes external resistance. Proper arthrokinematic movement within the foot and ankle influences the ability of the lower limb to attenuate the forces of weight bearing. It is important for the lower extremity to distribute and dissipate compressive, tensile, shearing, and rotatory forces during the stance phase of gait. Inadequate distribution of these forces could lead to abnormal stress and the eventual breakdown of connective tissue and muscle. The combined effect of muscle, bone, ligaments, and normal foot biomechanics will result in the most efficient force attenuation in the lower limb <sup>[1]</sup>.

The most important and fundamental consideration in the treatment of ankle injuries is the restoration of the normal anatomy. It is important to achieve and maintain as near a perfect reduction as possible <sup>[2]</sup>. This factor alone has a major influence on the long term results, and the degree of initial displacement and medial ligament damage have a less important effect <sup>[3]</sup>.

Age of patient, the quality of bone, the degree of comminution and the general medical condition will also play part in deciding whether to go in for surgery or not. Loss of position after initial closed reduction is an indication for operation and should be recognized within the first two weeks. After this time the operation becomes much more difficult and it may be necessary to break down the uniting fracture in order to achieve an adequate reduction <sup>[4]</sup>.

The goal in the treatment of ankle fractures is the restoration of normal ankle function. There is little doubt that the best result are obtain by anatomic joint restoration. Management of this fracture depends on careful identification of extent of bony injury as well as soft tissue and ligamentous damage. Once defined, the key to success to outcome following rotational ankle fracture is anatomic restoration and healing of ankle mortise <sup>[5]</sup>. Recent literature supports open reduction and internal fixation.

As with all intraarticular fractures malleolar fracture necessitates accurate reduction and stable internal fixation. This ensures that early joint motion can be initiated and improves the healing of articular cartilage. Furthermore when malleolar fractures are not reduced accurately they may lead to post traumatic painful restriction or osteoarthritis or both.

Surgery can produce high rate of union, an earlier return to work or recreational activities, avoids prolong period of immobilization, reduced economic burden and prevent any residual

**Correspondence**  
**Dr. Prashanth G**  
Senior Resident, Department of  
Orthopedics, MIMS, Mandya,  
Karnataka, India

displacement which may lead to development of post-traumatic arthritis of ankle. In ankle fracture, operative treatment-internal fixation provides good result. So, we decided to study the role of internal fixation in treatment of ankle fracture.

### Methodology

Present study consists of 50 cases of ankle fracture treated with Open reduction and internal fixation. The maximum follow up was 24 months and minimum follow up was 4 month with average follow up of 10 months. All the patients were treated as indoor patient. A written informed consent was obtained before surgery.

All the patients were selected on the basis of patients having ankle fracture without distal neurovascular injury. Patients having foot injury in same limb and intra articular distal tibia fracture excluded from our study.

### Initial management

On admission detailed history was taken to know the nature of injury and detailed examination of patient was carried out including systemic examination to rule out associated injury. The vital parameters including temperature, pulse rate, blood pressure were recorded. The general condition of patient was stabilized. All patients were given Intravenous fluids as per need, tetanus prophylaxis and broad spectrum antibiotics parentally given and analgesics were administered as per need. Points on examination for fracture ankle with type of fracture, soft tissue status and distal neurovascular status were noted.

In open fracture, the size, extent and location of the wound, surrounding skin condition were noted. These wounds were thoroughly irrigated with plenty of saline and sterile dressing was applied.

Injured limb was immobilized with posterior below knee plaster slab. Once the patient was stabilized and all associated injury managed. Patient was sent for radiological examination. Roentgenogram of injured limb (tibia-fibula with ankle AP, lateral and Mortice views) were taken Roentgenogram of knee is taken to rule out other associated injury like fracture of upper third fibula. Fractures were then classified using **Laug-Hensen** classification:

### Implant selection

Implant is selected based on type of fracture (closed or open type), swelling, local skin condition, mechanism of injury (Laug-Hensen classification).

### Lateral malleolus

For lateral malleolus, 1/3<sup>rd</sup> tubular plate or AO type 3.5mm Dynamic Compressive Plate is used. Anatomic reduction at the level of mortice and syndesmosis is mandatory. In most cases plating is done on lateral side and only in some cases posterolateral plating is done by using antiglide principle. In non-comminuted fracture, after restoration of the length and rotation, inter-fragmentary fixation with lag screw principle perpendicular to fracture line is done and then it is neutralized by pre-contour plate. In comminuted fracture or osteoporotic bone, extra periosteal technique which provides bridge plate construct and for that 3.5mm locking plate is used. In case of open fracture and patient having severe swelling and skin condition is not favourable for internal fixation then fracture is fixed with intra-medullary device with rush pin or long K-wire.

### Posterior malleolus

If the fragment is less than 25% of joint surface, then usually fixation of lateral malleolus is sufficient in achieving reduction

of posterior malleolus as it is usually small and laterally based fragment and having attached posterior tibiofibular ligament. If the fragment is more than 25% then it is fixed with 4mm cc screw with indirect reduction technique through anteroposterior direction.

### Syndesmosis

After fixation of medial and lateral malleolus, "Cotton test" is performed with clamp to check the stability. Syndesmosis is reduced with large pointed forceps and reduction is checked under IITV and then it is fixed with 1 or 2 screws either tri-cortically or tetra-cortically, either with 3.5mm cortical screw or 4.5mm cortical screw with foot in dorsiflexion position to avoid over- compression of syndesmosis.

### Medial malleolus

It is fixed with two 4mm cc screws or screw with K-wire or TBW. In most of the cases TBW gives 4 times more stiff construct than screws.

### Operative Technique

#### Anaesthesia

As soon as the patient was fit for anaesthesia, patient was shifted to operation theater. Operation was carried out under spinal anaesthesia or general anaesthesia or epidural anaesthesia.

Operation was carried out on simple table and supine position. In case of open fracture, debridement of wound was carried out.

#### Incision

The fibula is approached via direct lateral skin incision just off the posterior border of fibula but may be adjusted according to condition of soft tissue. Deeper tissues are incised in line with skin and sural nerve, injury is avoided which is 7cm proximal to tip of malleolus.

### Results

This is a prospective study of 50 cases of ankle fracture treated with open reduction and internal fixation at department of orthopedics.

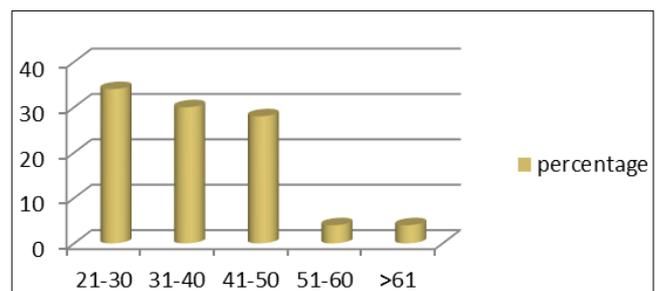


Fig 1: Age Distribution

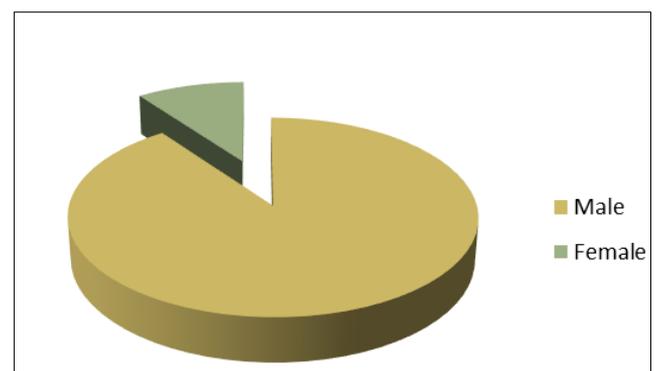


Fig 2: Gender Distribution

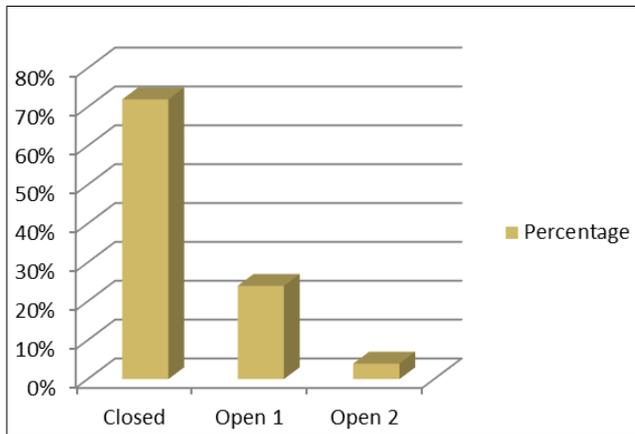


Fig 3: Fracture

Table 1: Injury Operation Interval

Interval between injury to treatment	Number of patient	percentage	Burwell's series
< 24 hour	11	22	60
24-48 hour	32	64	18
>48 hour	07	14	22

In our study most of patient operated on between 24 to 48 hrs after injury. Mode of the patient operated within 30 hours.

Table 2: Intraoperative Complication

Complication	No. of patients	Percentage
Damage to vain	04	08%
Difficult closure	06	12%
Damage to neurovascular structure	-	-
Iatrogenic fracture	-	-

In our study, 4 patients (8%) had damage to vain and 6 patients(12%) had difficult closure.

Table 3: Postoperative complication

Post operative complication	No. of patient	Percentage
Infection	07	14%
painful hardware	03	06%
loss of reduction	01	02%
non union	01	02%

In our study, 7 patients (14%) had infection, 3 patients (6%) had implant impingment, 1 patient (2%) had loss of reduction and 1 patient (2%) had non union at fibula.

Table 4: Type of Union

Weeks	No. of patient	% of patient
10-12	9	20
12-14	23	51
14-16	12	27
>16	1	2

In our study, The medial union time is 13 weeks.

Table 5: Return to same work

Weeks	No. of patients	Percentage
10-12	12	24%
12-14	30	60%
>14	08	16%

In our study most of patients (60%) returns to same work with

in 12 to 14 week after surgery.

Table 6: Results

Result	No of case	Percentage
Excellent	30	60
Good	14	28
Poor	06	12

In our study 60% patients, who operated for ankle fracture had good result while only 12% had poor result.

**Discussion**

The results of operated ankle with internal fixation were classified as excellent, good and poor according to criteria suggested by philips *et al.* [6]. In our study 88% of patient had excellent to good results which is similar to other study [7].

Out of 50 patients, 6 patients (12%) had poor result.

One patient, 26 year old male patient having closed bimalleolar fracture, supination and adduction type of injury, with associated fracture proximal tibia in same limb. Medial malleolus is fixed with 4mm cannulated cancellous screws and lateral malleolus was not fixed due to excessive swelling. In later part, patient had excessive pain over lateral malleolus and having difficulty in walking and painful movement of ankle joint.

One patient, 29 year old male patient having open type 2, bimalleolar fracture Supination Adduction type of injury. In this case medial malleolus fixed with K wire and lateral malleolus was not fixed due to contamination of wound. Then patient developed infection and septic arthritis of ankle joint. That patient was treated with thorough debridement and parental antibiotics according to pus culture and sensitivity report. At the end the patient developed arthritis of ankle joint and having severe pain in ankle joint while walking and during the movement of ankle joint.

A 30 year old male patient having a closed vertical fracture of medial malleolus, that was fixed with 4 mm cannulated cancellous screws perpendicular to fracture line and having deep abrasion over lateral malleolus and lateral malleolus was not fixed in first stage. Patient refused another surgery in second stage and after 6 months, medial malleolus united well but, patient had severe pain on lateral aspect of ankle during walking.

One 30 year old male patient having closed fracture medial malleolus fracture, Supination External rotation type of injury associated with middle 3<sup>rd</sup> tibia fibula fracture treated with closed reduction and internal fixation with interlocking nail for fracture tibia and TBW done for medial malleolus fracture. Later on patient developed impingement of implant and abscess over medial aspect. Incision & drainage and implant removal was done after 2 months and patient was put on parental antibiotic for 3 weeks. After 6 months, patient developed ankle arthritis and painful restriction of ankle movement which was associated with walking thus patient had poor result.

One patient, 35 year old, male having Supination External Rotation-4 type trimalleolur pott's fracture. Patient present after a week and patient was stabilized with TBW for medial malleolus and 1/3<sup>rd</sup> tubular plating for lateral malleolus fracture, but posterior malleolus was not reduced because of fibrosis and later that patient developed painful ankle movement.

One patient, 48 year old male having closed trimalleolar fracture, PA type of injury. Medial malleolus fixed with 4 mm cannulated cancellous screws and fibula fixed with rush nail. After 3 months patient had pain and impingement of implant on

lateral aspect of ankle joint.

From our poor results, We conclude that lateral malleolus is very important for stability of ankle joint, So in most of our cases, Where we were not able to stabilized lateral malleolus with rigid fixation, Patient developed pain and instability of ankle joint and that was responsible for poor results in our study. Also we found that in bimalleolar fracture Medial Malleolus Osteoligament Complex is important and if it is not stabilized with stable fixation, patient developed instability of ankle joint and painful movement of joint.

#### **Conclusion:**

- In the present study, six patients had infection. One patient had non union of fibula, one patient had intra operative loss of reduction, one patient had implant impingement.
- Adequate surgical debridement, judicious use of antibiotics, good post operative dressing will reduced chance of infection in open fracture.

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