A Study of 50 Cases of Ankle Fracture in Adult Treated with Plating

ABSTRACT

Background: Ankle fractures are one of the most common injuries treated by orthopaedic surgeons. On the basis of foot and the direction of the force many classification have been described, the most popular being that of Lauge Hansen. Management of this fracture depends on careful identification of extent of bony injury as well as soft tissue and ligamentous damage. In ankle fracture, operative treatment internal fixation with plate provides good result. So we decided to study the role of internal fixation in treatment of ankle fracture.

Aims and Objectives: To study the role of internal fixation with plate in treatment of ankle fracture with restoration of normal ankle function.

Materials and Methods: This is a prospective study of 50 cases of ankle fracture treated with open reduction and internal fixation with plate (1/3 tubular plate) at tertiary care teaching hospital carried out from May 2012 to July 2014. Criteria for assessment of quality of reduction used are the same as that of Burnwell and Charnley.

Results: Maximum patients belong to age group 21–40 (64%). Among them, 45 (90%) patients were male and 5 (10%) were females. Out of 50 patients treated, 30 (60%) patients obtained excellent results, 14 (28%) obtained good results and 6 (12%) had poor outcome.

Conclusion: The keyword of success is good anatomical reduction and rigid fixation of the fracture, irrespective of the classification of the fracture or the mode of injury.

KEYWORDS: ankle fracture, internal fixation, open reduction, Lauge Hansen, Mortice view, anatomical reduction

INTRODUCTION

Ankle fractures are one of the most common lower limb fractures. They account for 9% of all fractures. The annual incidence of ankle fracture is between 102 to 184 per 100,000, and around 2% are open fractures. Ankle fractures usually affect young men and older women, however below the age of 50; ankle fractures are most common in men.

Ankle fractures are the result of low-energy injuries involving a twisting mechanism, falls and sports injuries. These injuries reflect the relative strength of the ligamentous components of ankle mortise compared with the bone. Most ankle fracture occurs when a force is applied to ankle and it displaces the talus beyond the normal elasticity of the ligaments. On the basis of position of the foot and the direction of the force many classification have been described, the most popular being that of Lauge Hansen.

Because of their high frequency and associated morbidity, ankle injuries place an enormous economic burden on society. Of the many injuries that occur, ankle fractures are increasingly common, trailing only hip fractures and wrist fractures in frequency among elderly patients, ankle fractures likely represent even longer proportion injuries. Surgical treatment of ankle fractures is frequently required and appropriate treatment and recognition of potential risk factors are essential for optimising outcome. Since the mid-1970, there has been a general trend toward operative intervention in the treatment of more severe injury of ankle.

The goal in the treatment of ankle fractures is the restoration of normal ankle function. There is little doubt that the best result are obtained 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. Recent literature supports open reduction and internal fixation.

Among intra-articular 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 prolonged period of immobilisation, reduced economic burden and prevent any residual 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.

**MATERIALS AND METHODS**

Present study consisted of 50 cases of ankle fracture treated by open reduction and internal fixation in adults (≥21 years). Study was conducted in the Department of Orthopedics, in a tertiary care teaching hospital from May 2012 to July 2014.

The maximum follow up was for 24 months and minimum was 4 months with average follow up of 10 months. All the patients were treated as indoor patients. 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 were 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 and 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. Analgesics were administered as per need. During examination for fracture ankle type of fracture, soft tissue status and distal neurovascular status were noted (Fig. 1).

Closed or open type fracture. In open fracture, the size, extent and location of the wound, and surrounding skin condition were noted. These wounds were thoroughly irrigated with plenty of saline and sterile dressing was applied. Two types of open injury are present:

- Type 1- open injury with less than 1 cm lacerated wound.
- Type 2- open injury with more than 1 cm lacerated wound.

Injured limb was immobilised with posterior below knee plaster slab. Once the patient was stabilised and all associated injury managed, patient was sent for radiological examination. Roentgenogram of injured limb (tibia-fibula with ankle anterio-posterior (AP), lateral and Mortice views) were taken. Roentgenogram of knee was also taken to rule out other associated injury like fracture of upper third fibula. Fractures were then classified using Lauge-Hansen classification. If required computerised tomography (CT) scan was taken for intra-articular extension.

**Operative procedure**

Open reduction with internal fixation with anatomical restoration and fixation of ankle by using various plates and screw (Fig. 2).
RESULTS

In this study, the highest incidence of injury was found in third decade of life whereas in Burwell's series\(^1\), the highest incidence was seen in sixth decade of life. Mean age of the patient was 37.22 years.

In our series, numbers of male patients were higher than female patients whereas in Burwell’s series, the incidence was found to be the same in either sex.

As it is evident from the Table 3, the incidence of ankle injuries in our series was 28% whereas in Burwell’s series it was only 5.20%.

- In our study most of the patients were operated in between 24–48 hours of injury (mostly within 30 hours).
- In our study, 7% patients (14%) had infection, 3 patients (6%) had implant impingement, 1 patient (2%) had loss of reduction and 1 patient (2%) had non-union of fibula.
- In our study, the medial union time is 13 weeks.

- In our study most of the patients (60%) return to their routine work within 12 to 14 weeks after the surgery.
- The methods of fracture management have changed throughout medical history but the goal of physicians had remained same and constant since the time of Hippocrates.

The present study is a prospective study of 50 cases of ankle fracture treated by open reduction and internal fixation with plate. In this study, the highest incidence of ankle injuries were found in the third decade of life (Table 1) and predominantly in males (Table 2). Thus young and productive populations are more vulnerable to ankle injury due to their more active life. Vehicular accidents were the most common mode of injury in our study (48%) and mostly were closed fracture (Table 3).

In our study we found that patients who were operated as early as possible after injury are far better than who were operated later (Table 4).

As the ankle joint is superficial joint; lateral and medial malleolus is covered with a layer of skin and subcutaneous tissue due to which some patient had implant impingement and pain (Table 5).

The fracture is considered united if the patient is able to bear full weight without pain at fracture site and if radiographs shows callus bridging at fracture site. The median union time in our study was 13 weeks (Table 6).

In our study most of the patients (60%) returned to their routine work within 12 to 14 weeks after surgery (Table 7). It is apparent that if fracture is reduced anatomically and fixed rigidly, the final outcome is better. Ankle joint being one of the weight bearing joint, come under more stress while patient is either working or in squatting like positions. Because of unequal proportion of the weight bearing axis of the rest of the body, if there is minimal defect in the reduction of the fracture...
The results of operated ankle with open reduction and internal fixation with plate were classified as excellent, good and poor according to criteria suggested by Phillips et al. In our study, 88% of patients had good results which were similar to the series by Joy et al., and 6 patients had poor results (Table 5). From the poor results, we conclude that lateral malleolus is very important for the stability of ankle joint, so in our study most of cases where we were not able to stabilise lateral malleolus with rigid fixation, patient developed pain, limping and instability of ankle joint and that was responsible for poor results in our study (Table 8).

### DISCUSSION

Ankle fractures can be treated conservatively or surgically depending on the type of fracture and the surgeon’s opinion, the question of whether surgery or conservative treatment should be used for ankle fractures remains controversial.

Surgical treatments involve reduction of fractured parts and fixation using plates, screws. This operative technique aims to provide anatomical restorations and immediate stability, which facilitates earlier mobilisation. However, all surgery carries the risk of complications such as wound infections, implant or fixation failure, mortality, amputation, re-surgery.

With early mobilisation and postoperative physiotherapy, these adverse effects may be prevented. If surgical treatment can protect or accelerate the bone healing process by securely stabilising the fracture, it can also reduce recovery. This may not be the case for older people with osteoporosis because the porosity of their bones may increase the risk of fixation failure and thus preclude early mobilisation.

### CONCLUSION

Ankle fractures are most common lower limb fractures. Most fractures are associated with ligament injuries, the direction and the nature of force applied to the ankle joints correlating to the pattern of fracture and ligament injury. Non-operative treatment with immobilisation can provide satisfactory results if anatomical reduction is maintained and closely followed, however cast immobilisation can lead to muscular atrophy, cartilage degeneration and a stiff, swollen joint. Surgical treatment involves open reduction and internal fixation of the fractured parts using various devices such as metal plate, screws or external fixation. These operative techniques aim to provide anatomical restoration and immediate stability, which facilitates early mobilisation. Management after surgery may also include the use of plaster cast.

When performing a literature review of different techniques of ankle fracture fixation, there is conflicting evidence with two biomechanical studies showing that posterior non-locking plating are superior in stability than laterally placed plates, however there is little clinical evidence. There is also conflicting evidence regarding complications and failure rates of plating techniques, with increased peroneal tendon lesions with posterior placed plates.

In general, the results of ankle fracture fixation with plating are good compared with non-operative treatment with regard to post-traumatic complications.

### REFERENCES


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