



STRIDES TO RECOVERY: FUNCTIONAL AND RADIOLOGICAL OUTCOMES IN BIMALLEOLAR ANKLE FRACTURE REPAIR

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ABSTRACT

Background: Ankle fractures are frequently treated by orthopaedic doctors. The ankle can be injured by low-energy rotational forces in sports, by a misstep in daily activities, or by an automobile accident. In general, young and middle-aged individuals are at greater risk. Restoration of ankle function at an early and optimal stage is essential. Surgical reduction and internal fixation are used in the treatment of most ankle fractures. This study analyses the causes, patterns, and surgical outcomes of ankle fractures. **Methods:** A prospective analysis of 30 cases of adult bimalleolar ankle fractures treated surgically at Saphthagiri Institute of Medical and Research Centre after meeting the criteria. The Olerud and Molander Score and AOFAS – Ankle – Hindfoot score were used to assess the functional outcomes and radiological outcomes. **Results:** The most popular method of fixation for the medial malleoli was Tension band wiring and malleolar screw and lateral malleoli was with one third tubular plate, respectively. Syndesmotomic screws were used in 5 cases. Five out of thirty patients had superficial wound infections, which were treated with the proper medicines and dressings. At a 6-week follow-up, 40% (n=12) of the patients still reported pain and swelling problems. The mean Olerud and Molander Ankle Score at six months was 84.67 ± 13.96 . The mean AOFAS Scoring at the final evaluation was 91.52 ± 8.15 . **Conclusion:** A favourable functional outcome is achieved postoperatively for ankle fractures treated surgically. The fracture's functional prognosis is better when it had anatomical reduction. The outcomes of an operated ankle fracture should be improved by prompt and effective treatment, anatomic reduction and fracture fixation, strict postoperative mobilization, and rehabilitation

KEYWORDS : Bimalleolar Ankle fractures, Lauge – Hansen, Outcome, Olerud and Molander ankle score.

INTRODUCTION

One of the injuries that orthopaedic surgeons treat the most frequently is an ankle fracture. With limited soft tissue coverage, the ankle is a perfectly oriented joint. The ankle joint functions as a hinge joint that is approximately uniaxial. Combined with the lateral malleolus of the fibula and the inferior transverse tibiofibular ligament, the lower end of the tibia and its medial malleolus create a mortise for the talus body⁶.

Ankle fractures is the second-most common lower limb fracture after hip fractures, accounting for ten instances in every hundreds of all fractures with an incidence of about 137/1,000,000 per year⁷.

Being a weight-bearing joint, the ankle is subject to forces that may exceed 1.25 times body weight when walking normally and forces that may approach 5.5 times body weight when engaging in intense exercises. Plantar flexion and dorsiflexion must be adequate for normal walking. The subtalar joint offers inversion and eversion as well as accommodation to rotational loads. Because it is not innately stable in any position, the ankle joint needs support from the muscles that cross it^{1,2,3}.

The aim of treatment for fractures around the ankle joint is anatomic repair of the joint. The recommended treatment for unstable ankle fractures is open reduction and internal fixation⁴. However, relatively few researchers have looked at the functional recovery after surgical treatment for ankle fractures⁵.

This study's goal is to examine the causes, patterns, and functional results of ankle fractures that have been surgically repaired.

Objectives

Assessing the functional and radiological outcomes following surgical treatment for Bimalleolar ankle fractures

Methodology

Patients with ankle bimalleolar fractures who visited Bangalore's Saphthagiri Institute of Medical Science and Research Centre were the subject of a prospective study. The study was carried out with previous approval from the institution's ethical committee.

Patients under the age of 20 and those over the age of 70, as well as those who had pathological fractures, open fractures, and other related fractures in the same limb, were excluded from the study.

A total of 43 patients with bimalleolar fractures of the ankle had visited the casualty; of these, 6 had open fractures, 4 were beyond the age of 70, and 3 had other fractures in the same leg. As a result, 30 patients

who met the inclusion requirements were chosen for the study. Patients who underwent surgery were monitored for six months, with regular OPD visits and X-ray imaging at each stage. Patient characteristics were noted immediately following surgery, at 6 weeks, 12 weeks, and 24 weeks. The functional outcome was measured using the Olerud and Molander along with AOFAS ankle hind foot scoring system for the ankle. The goniometer was used to measure the range of motion in the ankle. Scoring for each patient was critically analysed and the outcome of each patient was categorised as excellent, good, fair and poor depending on total scores.

Preoperative Preparation Of Patients

Before surgery, patients were kept fasting for eight to ten hours. Fluids were infused intravenously as required. Well-explained written informed consent was taken pre operatively after explaining the procedure. Thirty minutes before the procedure, an intravenous antibiotic was given. Tetanus toxoid and a test dose of xylocaine were administered.

Operative Technique

The patient was positioned in the supine posture while receiving spinal and/or epidural anaesthesia. To enhance lateral side exposure, the ipsilateral buttock was lifted on a sandbag. The treatment was carried out in an area that was free of blood, allowing for clear view to define the fracture pattern and, as a result, to permit anatomical reduction.

The procedure took between one and one and a half hours to complete. Tension band wiring, malleolar screws, K-wire fixation, 4mm cannulated cancellous screws, rush nail, one-third tubular plating with screws, or recon plate, distal fibula anatomical plate and screws were used to open reduce and internally repair malleolar fractures.

Postoperative Management

Fluids were infused through IVs as necessary. Amikacin and third-generation cephalosporin antibiotics were continued for three and five days. Serratiopeptidase and analgesics were administered. Limb elevation was given for the injured limb. Anteroposterior, mortise and lateral images of x-rays were collected after 24 hours. On the second day, wounds were assessed. On average, sutures were removed 14 days after surgery. A below the knee slab was applied, and the patient was told to avoid weight-bearing on the injured limb for six weeks before being discharged.

After the slab was removed, partial weight bearing started (after clinical and radiological signs of union become evident). Active ankle ROM exercises were advised. Weight-bearing was postponed until the syndesmotomic screw was removed in patients with the same.

For a minimum of six months, follow-up on cases was conducted at regular intervals of six weeks. At the time of the evaluation, radiographs of the ankle's anterior, posterior, lateral, and mortise were taken. The study employed the subjective, measurable, and radiographic criteria of Olerud and Molander ankle scoring system along with AOFAS ankle hind foot score. After evaluating each patient, scores were given.

RESULTS

Thirty cases of bimalleolar fractures treated surgically using various methods are discussed. 63.33% male and 36.66% female participants make up the study. Ages 31 to 50 are most frequently impacted (46.6%, 14 cases). Compared to the left side, the right side was involved in 21 occurrences (70%) more often (9 cases). Twisting injuries following RTA were the primary cause of damage for 76.6% of the patients. The most frequent fracture pattern, accounting for 33% of patients, was a supination-external rotation injury type. Open reduction and internal fixation of the lateral malleolus with a 1/3 tubular plate/recon plate with or without syndesmotomic screw fixation and the medial malleolus with 4 mm cannulated cancellous/malleolar screws or tension band wire were the surgical procedures used.

In 7 cases, the most frequent complication was postoperative skin infection, and in two of those patients, the implant had to be removed after three months. By doing an open reduction, the risk of medial malleolus nonunion because of periosteal interposition is reduced. For a successful reduction and internal fixation, it is crucial to comprehend the mechanism of the injury. When lateral plating for the fibula, the bend of the lateral malleolar should be replicated. For optimal ankle stability, fibula length should be maintained. Regardless of the type of fracture, a good anatomical reduction is necessary for a successful clinical outcome.

At the completion of the study, 24 (80%) cases had excellent to good results, 2 (6.66%) cases had fair results, and 4 (13.33%) cases had bad results. A statistical study was conducted, and it was discovered that the patient's age was a major predictor of postoperative pain and functional result. (p values, 0.002 and, respectively, 0.011). There was no statistically significant difference in the postoperative result according to the patient's gender, injury type, or co-morbidities.

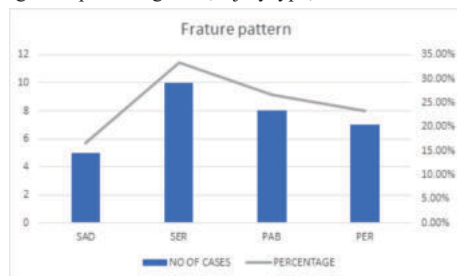


Chart 1: Percentage Of Type Of Fracture

Outcome Based on AOFAS Scoring

At the final evaluation, mean AOFAS score was 91.51(± 8.15) out of a maximum of 100. The average pain score was 36.34 ± 7 out of 40, the average function score was 46.28 ± 5.32 out of 50 and the average alignment score was 9.16 ± 1.85 out of 10

DISCUSSION

The most common injury pattern seen in our study was Supination-external rotation type. Stress radiographs are useful to assess ankle instability. Schonk et al suggested that gravity stress test is comfortable and more sensitive than manual stress test. Weber stated that instability is overestimated by stress radiographs. Evaluation of deep deltoid ligament injury associated with ankle instability is assessed by stress radiographs which help to differentiate SER - II injury from SER - IV equivalent injury⁸. SER - IV fractures are unstable and needs ligament reconstruction and syndesmotomic stability⁹. In SER pattern 9 out of 10 patients had good to excellent functional outcome.

In Colton¹¹ series, 70% of the patients had a good to excellent results. Burnwell & Charnley⁶⁴ in their series of 132 patients, 102 (77.3%) had good results, 16% had fair results and 6% were found to poor score.

In De souza¹² series, 150 cases of ankle fractures treated by open reduction and internal fixation using AO/ASIF method, obtained 90%

good results. In a study by Beris et al¹⁰, of 144 patients with ankle fractures, 105 (74.3%) had good to excellent results.

The functional results of the present study were comparable with that of the above cited studies, with 83.4% had good to excellent results, 13.3 % had fair results and poor results in 3.3%.

Most authors have stated that anatomical reduction of displaced medial malleolus ensures correction of talar displacement and is of paramount importance in treating unstable fractures¹³. However, Heller⁴ et al. state that talus is more accurately repositioned in mortise by anatomical reduction of lateral malleolus

Observation in this study support the contention of Yablon¹⁴ et al that lateral malleolus is the key to the anatomical reduction of bimalleolar fractures, because the displacement of the talus faithfully followed that of the lateral malleolus. Poor reduction of the lateral malleolus fracture would result in persistent lateral displacement or residual shortening. This does not necessarily lessen the importance of medial malleolus, but it does serve to emphasize that the lateral malleolus should no longer be ignored. In the current study, the two patients with poor outcome, didn't have anatomical reduction of the medial malleolus possibly due to soft tissue interposition.

Lateral malleolus can be fixed by various methods. Lateral plate, as advocated by AO group has become widely accepted for treatment of fibular fracture¹⁵. Hughes¹⁶ et al recommended that lateral malleolus should be fixed first. The medial malleolus is then inspected for stability and fixed if necessary. This allows minimal postoperative immobilization and rapid recovery of function.

Rush nail has potential advantages of a smaller incision, less soft tissue dissection, better mechanical stability in osteoporotic bone, with less prominent metalwork and has the potential to reduce the incidence of complications While it may not control the rotation of fragment neither can effectively maintain the length of the fibula as compared to plate fixation but these can be minimised with good surgical and postoperative management^{17,18}.

In many fractured ankles, syndesmosis is stable after reduction and internal fixation of fibula fracture and medial malleolar fracture. Yablon⁶⁹ stated that anatomical reduction of the fibula is the key factor in achieving good outcome of the treatment of ankle fractures with syndesmotomic disruption. In the current series, 5 patients underwent trans-syndesmotomic screw fixation.

Bray noted that incidence of complications is less in patients who underwent immediate surgery when compared to those who underwent delayed surgery¹⁹.

The treatment of bimalleolar fractures with accurate open reduction and stable internal fixation using the AO method, principles.



Figure No 1 : Medial Malleoli Fixation With TBW



Figure No 2: Intra Op Image After Fixing Fibula



Figure No 3: One Month And Two Months Post Op Xray

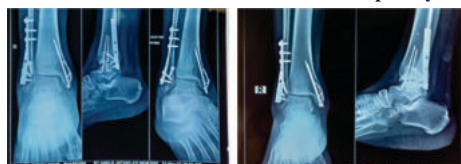


Figure No 4: Three Months And Eight Months Follow Up Xray



Figure No 5: Full Range Of Movements At The End Of 8 Months

CONCLUSION

Firstly, ankle injuries were identified as a common occurrence in both young males and elderly females, indicating a wide demographic affected by such fractures. Secondly, the age group most frequently afflicted ranged from 20 to 30 years, with the study's mean age recorded at 40.1 years. This demographic insight offers valuable context for the prevalence and treatment of bimalleolar ankle fractures.

The study also shed light on the predominant mechanisms of injury, with external rotation incidents, specifically supination external rotation and pronation abduction injuries, emerging as the leading causes. This insight provides crucial information for understanding the origins of these fractures and tailoring treatment strategies accordingly.

Moreover, the research underscored the critical importance of maintaining fibular length before proceeding with the fixation of the medial malleolus. This step was identified as pivotal in stabilizing the ankle mortise, highlighting a specific surgical priority for effective treatment.

In terms of outcomes, the surgical approach yielded satisfactory results in 80% of cases, with a majority experiencing a level of functional recovery ranging from good to excellent. Notably, the data revealed a correlation between age and gender, indicating that younger age groups and males generally exhibited more favorable functional outcomes, while older age and wound infection were associated with fair to poor results.

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Ethical Approval: The study was approved by the institutional ethics committee.

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