

The Functional Outcome of Bimalleolar Fractures Treated by Open Reduction and Internal Fixation with Screws and Plates

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Abstract

Background and Objective: Bimalleolar fractures are one of the most common fractures in orthopaedic traumatology. As with all intra articular fracture, malleolar fracture necessitate accurate reduction and stable internal fixation. When malleolar fractures are not reduced accurately they may lead to post traumatic painful restriction of motion or osteoarthritis or both. To study the functional outcome and result of surgical treatment of bimalleolar fractures and to know the complication of open reduction internal fixation in bimalleolar fractures. **Materials and Methods:** A prospective study of thirty patients of age group of 18-60 years of acute bimalleolar fractures irrespective of gender, done at medical college and research centre. Fractures were classified on basis of danis-weber classification system. They were treated with open reduction and internal fixation with cannulated cancellous screws for medial malleoli and plates for lateral malleoli. Post operatively sequential radiographs at 0, 2 and 6 months are taken and functional evaluation is done by Olerud and Molander ankle score. **Result:** Olerudmolander ankle score was used to assess the functional outcome of the fracture fixation at 2, 3 and 6 months of follow up. At 2 months majority of patients were showing poor result at 3 months majority of patients showing fair result. And at 6 months majority of patients were showing excellent and good result. **Conclusion:** Understanding the mechanism of injury is essential for good reduction and internal fixation. The fibular length has to be maintained for lateral stability of the ankle. Anatomical reduction is essential in all intra articular fractures more so if a weight bearing joint like ankle joint is involved.

Keywords: Bimalleolar Fracture, Olerud and Molander Ankle Score, Open Reduction and Internal Fixation

1. Introduction

Ankle fractures are one of the most common lower extremity fractures treated in orthopaedics and during the last decades the trend towards surgical treatment has increased¹. The aim is to restore normal anatomy and biomechanics of the joint².

Fractures in general have been identified as a medical problem throughout history and most of Hippocrates essays (about 300 B C) described the management of injuries, especially fractures and stated that they were sometimes in connection with the skin. In the treatment

he separated between injuries with and without lesions of the skin. In the former, reduction was not performed as the patient would die within seven days³. Although Hansmann described the first internal fixation by means of plate and screws in 1858, Arbuthnot Lane and Albin Lambotte developed this method further^{4,5}. The first case of surgery in the talocrural joint was reported by von Volkmann in 1875⁶. Initially however, surgical techniques of fracture treatment did combine the disadvantages of non-surgical and operative treatment: the osteosynthesis was unstable and the fracture site had been exposed with a high risk of infection and disturbed bone healing⁵.

The ankle joint (talocrural joint) consists of three bones; tibia, fibula and talus. There are three articular surfaces: the upper joint surface, which is the dome of the talus and the tibial plafond and the main articulation of the joint; the medial joint surface, between the talus and the inner aspect of the medial malleolus; the lateral joint surface, between the talus and the inner surface of the lateral malleolus of the fibula⁶. Malleolar fractures have varied presentation understanding of the biomechanics of the joint and mechanism of injury is essential for adequate reduction and stable fixation. Ankle fractures are the result of low energy trauma involving twisting injuries. These injuries reflect the relative strength of ligamentous component of ankle mortise compared with bone⁷. Most ankle fractures are isolated Malleolar fractures accounting for two third patients. Bimalleolar fractures occur in one fourth of the patients and trimalleolar fractures occurring in remaining 5-10%. Open fractures are rare accounting for just 2% of all fractures⁷. Ankle injuries have great importance as body weight is transmitted through it and locomotion depends on the stability of the joint. Intra articular fractures like bimalleolar fractures need thorough understanding of mechanism of injury, proper anatomical alignment, accurate and stable reduction and fixation with appropriate implants in order to reduce painful restriction of movements and osteoarthritis⁸.

2. Aims and Objectives

- To study the functional outcome of surgical treatment of bimalleolar fractures treated with CC screw and plates.
- To know the complication of open reduction and internal fixation in bimalleolar fractures.

3. Materials and Methods

30 patients with fresh bimalleolar fracture who came to Dr Vasantao Pawar Medical College Hospital and Research Centre, Nashik between June 2014 2015 to December 2016 were studied. Diagnosis is confirmed by antero-posterior and lateral view radiographs (Figure 1). Adequate immobilisation by below knee POP slab, limb elevation and analgesics were given. These fracture were classified based on Dannis-Weber Classification system in adults. Routine investigations and assessment of fitness for surgery done. After pre-operative assessment, patient was taken to operation theatre and adequate anaesthesia was given. In supine position, scrubbing, painting and draping of the operative area done. The procedure was done under tourniquet to achieve bloodless operative field

and to decrease blood loss. Both medial and lateral malleoli were approached by open method. Lateral Malleolus was approached by posterolateral incision. Adequate reduction done with the help of clamps. Contoured 1/3rd semi-tubular plate or 3.5mm recon plates were used for the fixation. Medial malleolus was approached by 5cm J shaped incision taken from its tip. Adequate periosteal stripping was done. Reduction achieved with clamps and 2 parallel K wire – anterior and posterior to tip of medial malleolus towards the medial tibial cortex, without entering the joint. Fixed with two 4mm CC screws (Figure 2). All the cases are treated in the same manner. Post-operative protocol- Injectable antibiotics, analgesics and adequate IV Fluids were given. Compression bandage, below knee slab and limb elevation was given. Within first 24 hours AP and lateral X-Rays were done. Wound checked on Day 3 and sutures removed after day 12. Below Knee POP cast was given after suture removal and discharge with instructions of nil weight bearing for 6 weeks. Sequential radiographs at 2 and 6 months were taken and functional evaluation was done by Olerud and Molander ankle scoring system at 2, 3 and 6 months of follow-up.



Figure 1. X Ray AP & Lateral Ankle view showing Bimalleolar Fracture.

4. Observation and Results

In our study 30 patients, age being 18-60 years with mean age of 34 years with a male predominance of 66.6%. weber type b were the most common type consisting of 46.67%. 24 patient were taken for surgery in first three day and rest of give patient were taken within two weeks for surgery due to increased swelling. All the cases were given below

knee slab for for first 2 weeks (upto suture removal). Then they were immobilized under below knee casting and cast was removed on average of 4 weeks. xrays were taken at 1.5, 3 and 6 months of follow up to assess union of fracture. Olerudmolander ankle score was used to assess the functional outcome of the fracture fixation at 2, 3 and 6 months of follow up. At 2 months majority of patients were showing poor result at 3 months majority of patients showing fair result. And at 6 months majority of patients were showing excellent and good result (Figure 3).



Figure 2. X ray Lt Ankle AP & lateral showing internal fixation of bimalleolar fracture.

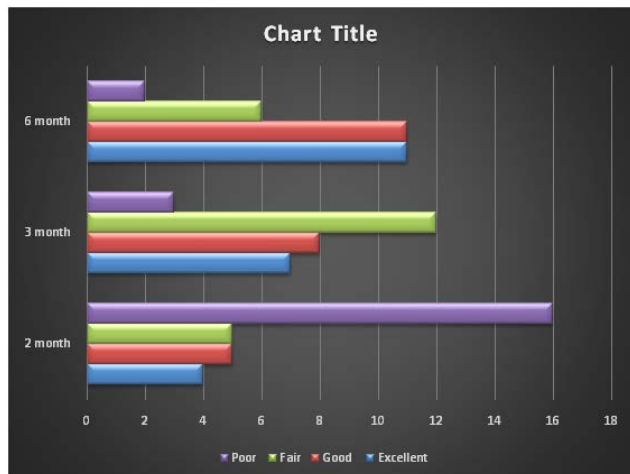


Figure 3. Post operative follow up of Study participants.

- The final outcome as per the Olerud and Molander ankle score was 36.67% excellent, 36.67% good, 20%

fair and 6.67% poor result showed good correlation between the immediate post-operative radiological alignment and reduction, and timing of surgery. Post operatively x ray evaluation 2 patients were showing inaccurate anatomical reduction (fail reduction). On 2nd week post-operatively 4 patients were having superficial skin infection, and were managed by one more week of i.v., antibiotics and daily dressing. Two patients showed deep infection needed debridement with 4 weeks of i.v., antibiotics to resolve. None of them required implant removal. Two patients developed pressure sore and 4 were having wound maceration which resolved on dry dressing (Figure 4).

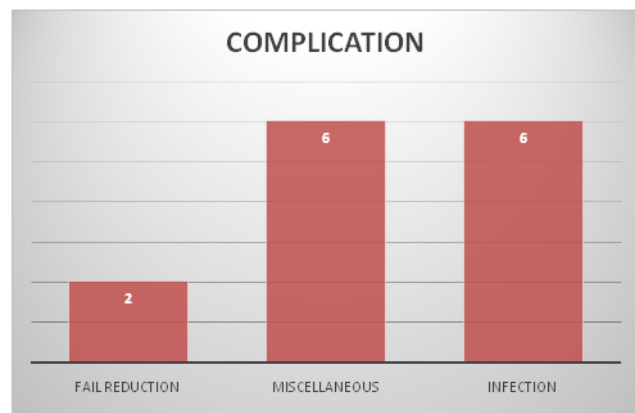


Figure 4. Post operative complications in study participants.

5. Discussion

Understanding the mechanism of injury is important for good reduction and internal fixation. Anatomical alignment and reduction is essential in all intraarticular fractures, more so if a weight bearing joint like ankle joint is involved. More severe injuries showed least satisfactory results and the fibular length has to be mentioned for lateral stability of the ankle. Physiotherapy after cast removal, play a vital role in alleviating post-traumatic ankle stiffness and pain. In the post-operative period, splintage of the ankle and precaution to prevent swelling of the ankle is necessary. The swelling may lead to delayed wound healing. Patients are ambulated with walker without bearing weight on the injured limb from the first post operative day if there are no associated injuries and can be discharged from the hospital by the second week after removal of suture. Most of the fractures in our study were fixed within 48 hours which however did not change the final outcome. The complications that arose were in those where the fractures were fixed after a week due to swelling which were delayed wound healing and superficial infections of the wound which

mostly healed with regular wound care. The six week period of immobilization did not affect the final range of ankle function as most patients had achieved full range of motion by the end of 12 weeks postoperatively with active exercise regimen.

6. Conclusion

The result of this study in comparison with other studies as enumerated shows similar findings with respect to the functional outcome following surgical stabilization of bimalleolar fractures. The rarity of complications in comparison to other studies may be due to a small number of patients and a very short period of follow up. Our study used Weber's classification for radiological classification. We recommend use of Weber's classification for management which is easier for classification and radiological assessment. Our series encourage operative intervention within 48 hours in the management of bimalleolar fractures of the ankle as the key for high percentage of good result.

7. References

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