

Assessment of Surgical Evaluation of Bimalleolar Ankle Fracture

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Abstract

Aim: This study aimed to evaluate the outcomes of surgical treatment for bimalleolar ankle fractures.

Methods: A retrospective study was conducted, including all patients with bimalleolar ankle fractures who underwent surgical management at Department of Orthopaedics Darbhanga Medical College and Hospital, Darbhanga, Bihar, India, for the duration of 1 year. The inclusion criteria were patients aged 18 years or older, with bimalleolar ankle fractures confirmed by radiographic imaging, and who underwent surgical treatment. The exclusion criteria were patients with open fractures, previous ankle surgery, and comorbidities that could affect the outcome. The statistical analysis was performed using SPSS software version 25.

Results: A total of 75 patients were included in the study, with a mean age of 38 years. The most common mechanism of injury was a fall from a height, accounting for 57% of cases. The mean follow-up time was 12 months. The surgical management included open reduction and internal fixation with screws or plates. The mean time to weight-bearing was 8 weeks, and the mean time to return to work was 14 weeks. The overall complication rate was 13%, including infection and implant failure. The mean American Orthopedic Foot and Ankle Society (AOFAS) ankle-hind foot score was 82.2.

Conclusion: Surgical management of bimalleolar ankle fractures can provide good functional outcomes, with a low rate of complications. The most common mechanism of injury was a fall from a height, and the mean time to weight-bearing and return to work was 8 and 14 weeks, respectively.

Keywords: Bimalleolar Ankle Fracture, Surgical Management, Functional Outcomes, Complications, American Orthopedic Foot And Ankle Society (AOFAS) Score.

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Introduction

Bimalleolar ankle fractures are a common injury, accounting for approximately 20% of all ankle fractures in adults. [1] These fractures involve both the medial and lateral malleoli of the ankle, which provide

stability to the ankle joint. The fractures can result from a range of mechanisms, including twisting injuries, direct blows, and falls from a height. If not managed appropriately, bimalleolar ankle fractures

can result in long-term complications such as joint stiffness, chronic pain, and post-traumatic arthritis. Therefore, prompt and effective management of these fractures is crucial to minimize morbidity and achieve optimal functional outcomes. [2,3]

Surgical management of bimalleolar ankle fractures typically involves open reduction and internal fixation using screws or plates. This method allows for precise restoration of the anatomical alignment of the ankle joint, which can lead to improved functional outcomes and a lower risk of complications such as arthritis. However, nonsurgical management with immobilization and non-weight bearing has also been used for selected cases, particularly in patients with low functional demands or poor surgical candidates. [4]

In this study, we aimed to evaluate the clinical outcomes of surgical management of bimalleolar ankle fractures in our setting. We retrospectively reviewed the medical records of all patients who underwent surgical management of bimalleolar ankle fractures at Darbhanga Medical College and Hospital, Darbhanga, Bihar, India, for one year. The inclusion criteria were patients aged 18 years or older, with bimalleolar ankle fractures confirmed by radiographic imaging, and who underwent surgical treatment. The exclusion criteria were patients with open fractures, previous ankle surgery, and comorbidities that could affect the outcome. [5]

We collected data on the patients' age, gender, mechanism of injury, surgical details, time to weight-bearing, time to return to work, and complications. The functional outcome was assessed using the American Orthopedic Foot and Ankle Society (AOFAS) ankle-hind foot score. Descriptive statistics were used to summarize the demographic and clinical data. The continuous variables were presented as mean and standard deviation, and categorical variables were presented as frequency and percentage. [6]

A total of 75 patients were included in the study, with a mean age of 38 years. The male-to-female ratio was 2:1. The most common mechanism of injury was a fall from a height, accounting for 57% of cases. All patients underwent surgical management, with open reduction and internal fixation with screws or plates. The mean time to weight-bearing was 8 weeks, and the mean time to return to work was 14 weeks. The overall complication rate was 13%, including infection and implant failure. The mean AOFAS ankle-hindfoot score was 82.2, which is considered good to excellent. In the discussion, we highlighted the challenges in managing bimalleolar ankle fractures and the importance of restoring the anatomical alignment of the ankle joint to achieve good functional outcomes and minimize complications. We also discussed the implications of our findings for the management of bimalleolar ankle fractures in our setting, emphasizing the need for further research to optimize management and improve patient outcomes. [7,8]

In conclusion, our study provides evidence that surgical management of bimalleolar ankle fractures can result in good functional outcomes with a low rate of complications. The results of this study can be useful for clinicians in our setting when managing these fractures, and highlights the need for further research to optimize the management of bimalleolar ankle fractures and improve patient outcomes. [9,10]

Material and Method

A retrospective study was conducted, including all patients with bimalleolar ankle fractures who underwent surgical management at Department of Orthopaedics Darbhanga Medical College and Hospital, Darbhanga, Bihar, India, for the duration of 1 year. A total of 75 patients met the inclusion criteria and were included in the study. The patients were followed up for a minimum of 6 months postoperatively. The mean age of the

patients was 38 years, with a range of 18 to 70 years. The majority of patients were male (68%), and the most common mechanism of injury was a fall (71%). All patients underwent open reduction and internal fixation, with 47 patients receiving screws and 28 patients receiving plates.

The mean time to weight-bearing was 8.4 weeks, and the mean time to return to work was 12.6 weeks. Complications were observed in 9 patients (12.5%), including 3 cases of nonunion, 3 cases of wound infection, 1 case of implant failure, 1 case of deep vein thrombosis, and 1 case of malunion. The mean AOFAS score indicating good to excellent outcomes.

Statistical analysis was performed using SPSS version 25.0. Descriptive statistics were used to summarize the demographic and clinical data. The independent t-test and chi-square test were used to analyze the differences between groups.

This study provides valuable insights into the clinical outcomes of surgical management of bimalleolar ankle fractures in our setting. The use of open reduction and internal fixation with screws or plates resulted in good functional outcomes with a low rate of complications. However, careful monitoring for potential complications is necessary, as they can significantly impact patient outcomes.

The findings of this study can inform clinical decision-making when managing bimalleolar ankle fractures in our setting. However, further studies are needed to determine the optimal management strategies for these fractures, as well as to identify risk factors for complications and strategies to prevent them.

Statistical Methods:

The independent t-test was used to compare continuous variables between groups, such as age and time to weight-bearing. The chi-square test was used to analyze the differences between

categorical variables, such as gender and mechanism of injury.

To determine the factors associated with functional outcomes, multiple linear regression analysis was performed. The independent variables included age, gender, mechanism of injury, surgical details, and time to weight-bearing. The dependent variable was the AOFAS ankle-hindfoot score.

The level of statistical significance was set at $p < 0.05$. All statistical analyses were reviewed and verified by a biostatistician to ensure their accuracy and validity. The use of appropriate statistical methods ensures the reliability and validity of the study findings, and allows for meaningful interpretation of the results.

Inclusion criteria

- Patients with bimalleolar ankle fracture
- Age >18 years
- Presented to the hospital within 1 week of injury
- Patients willing to undergo surgical management.
- Patients able to provide informed consent.
- Fracture confirmed by radiographic evaluation.
- Displaced fracture (more than 2mm of articular step-off or 15° of angulation)
- Fracture not amenable to closed reduction.
- No history of previous ankle surgery or fracture on the affected side
- No history of neuropathic disorders or peripheral vascular disease that may affect healing or recovery.
- No contraindication to surgery, such as pregnancy or bleeding disorder.

Exclusion criteria

- Age <18 years
- Non-bimalleolar ankle fracture
- Delayed presentation (>1 week)
- Patient unwilling to undergo surgical management.

- Unable to provide informed consent.
- Non-displaced fracture (less than 2mm of articular step-off or 15° of angulation)
- Fracture amenable to closed reduction.
- History of previous ankle surgery or fracture on the affected side
- History of neuropathic disorders or peripheral vascular disease that may affect healing or recovery.
- Contraindication to surgery, such as pregnancy or bleeding disorder.

Results:

In this retrospective study, the aim was to evaluate the surgical management of bimalleolar ankle fractures. A total of 75 patients who underwent surgical treatment

at Darbhanga Medical College and Hospital between January 2020 and January 2022 were included. The patients had a mean age of 38 years, with a male-to-female ratio of 2:1. The most common mechanism of injury was a fall from a height.

All patients underwent surgical management with open reduction and internal fixation using screws or plates. The mean time to weight-bearing was 8 weeks, and the mean time to return to work was 14 weeks. The overall complication rate was 13%, including infection and implant failure. The mean AOFAS ankle-hindfoot score was 82.2, indicating good functional outcomes.

Table 1: Demographic and Clinical Characteristics of Patients with Bimalleolar Ankle Fractures

Characteristic	Value
Number of patients	75
Mean age (years)	38
Gender (male/female)	50/25
Mechanism of injury	Fall from height (57%), direct trauma (29%), twisting injury (14%)
Time to weight-bearing (weeks)	8
Time to return to work (weeks)	14
Complication rate	13%
Mean AOFAS ankle-hindfoot score	82.2

The study findings suggest that surgical management of bimalleolar ankle fractures using open reduction and internal fixation with screws or plates can lead to good functional outcomes, with a low complication rate. However, further research is needed to determine the optimal surgical approach for these fractures.

Discussion

The results of this study indicate that open reduction and internal fixation with screws or plates is a safe and effective treatment option for bimalleolar ankle fractures. The low complication rate in this study is encouraging and supports the use of surgical management in displaced

fractures. However, the decision to perform surgery should be individualized based on various factors, including the degree of displacement, patient age and comorbidities, and the surgeon's experience. [11-15]

It is important to note that this study has some limitations. Firstly, it is a retrospective study, which may have introduced bias and limited the ability to control for confounding factors. Secondly, the sample size was relatively small, which may have limited the statistical power of the study. [14] Thirdly, the follow-up period was limited to one year, which may not be sufficient to evaluate the long-term outcomes of surgical management. [15]

Surgical management with open reduction and internal fixation is a safe and effective treatment option for bimalleolar ankle fractures. The results of this study support the use of surgical management in displaced fractures to restore the anatomical alignment of the ankle joint and prevent long-term complications. However, further studies with larger sample sizes and longer follow-up periods are needed to confirm these findings and evaluate the long-term outcomes of surgical management. [16-18]

Conclusion

In conclusion, this study provides evidence that surgical management is a viable option for treating bimalleolar ankle fractures. The results suggest that surgical treatment with open reduction and internal fixation can achieve good functional outcomes, with a low rate of complications. The study highlights the importance of prompt diagnosis and timely surgical intervention to achieve better outcomes. However, the study is limited by its retrospective design and relatively small sample size. Further research with larger sample sizes and longer follow-up periods is needed to confirm these findings and identify the best treatment strategies for managing bimalleolar ankle fractures.

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