

Original research article

Functional Outcome In Surgical Management Of Bi- Malleolar Fractures In Adults

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Abstract

Malleolar fractures are the most prevalent type of major fracture to occur in the lower extremities. Because the entire body weight is carried through the ankle, as well as the fact that movement is dependent on the stability of the ankle, these injuries take on a greater level of significance. Because these operative methods restore the anatomy, biomechanics, and contact loading characteristics of the ankle, open reduction and internal fixation have become the mainstay treatment for the majority of unstable bimalleolar fractures. This is because open reduction allows for more bone to be removed during the procedure.

Keywords: Malleolus, plating, cancellous, biomechanics, medial and TBW

Introduction

According to Sir Robert Jones, "the ankle is the most damaged joint in the body yet the least properly treated" ^[1], [citation needed]. Injuries to the ankle are important due to the fact that the body weight is conveyed through the joint and that the stability of the joint is necessary for movement. In most cases, these injuries involve both the ligaments and the bones, and each one is the culmination of a chain reaction in which the ligaments and bones in question failed as a consequence of the deforming stresses. The various appearances of a malleolar fracture have led to the development of a large number of categorization systems, two of which are currently in use. These are the Lauge-Hansens classification and the Danis-Weber classification.

In the field of orthopaedic traumatology, malleolar fractures are among the most prevalent types of broken bones. Malleolar fractures require correct reduction in addition to stable internal fixation, much like any other type of intra-articular fracture. Inaccurate reduction of malleolar fractures can put patients at risk for post-traumatic painful limitation of mobility, osteoarthritis, or both ^[2].

When it comes to the treatment of malleolar fractures, conservative treatment has been shown to be effective for many of them, particularly those that are stable and can be reduced. The remaining fractures need to have open reduction and internal fixation since they are unstable, displaced, and open. The literature ^[3] has conclusively proven that open reduction and internal fixation (ORIF) is preferable to closed therapy.

The surgical procedure restores the morphology of the ankle as well as the contact-loading characteristic of the joint. Additional benefits include a simpler recovery process that does not include the use of a cast, early mobilisation, and quicker weight bearing ^[4].

However, none of the research have turned up positive findings on the treatment of bimalleolar fractures. The functional outcome and results of surgical treatment of malleolar

fractures are what the researchers hope to determine through this study.

Methodology

Patients who met the inclusion criteria and had bimalleolar fractures and were hospitalised to the department of orthopaedics between December 2014 and May 2016 would be included in the study. Patients will be followed from the time of admission for a minimum of six months after their operations (minimum of 30 cases will be studied).

Criteria for inclusion include any and all closed fractures.

- Open type 1, 2, 3a (Gustilo-Anderson).
- Must be older than 18 years.

The Criteria for Exclusion

- With a Pilon fracture linked with it.
- Patients who are unable to have surgery.
- Patients who have mono-malleolar fractures that have minimal displacement, avulsion fractures, or stable fractures

Operative technique

For the purpose of medial malleolus fixation in our research, tension band wiring, malleolar screws, K wires, and cancellous screws were utilised. In order to fix the lateral malleolus, one third of a tubular plate and K wires were employed.

The lateral malleolus receives one-third of the tubular plate. Post-Operative Protocol

The first or second postoperative day marked the beginning of a walking pattern that did not involve weight bearing. After the cast was removed, the patient was allowed to begin bearing some weight (after clinical and radiological signs of union become evident). Ankle strengthening exercises should be performed regularly. Patients who had syndesmotomic screw fixation were not allowed to begin weight bearing until the screws were removed. The cases were followed up on at regular intervals of every six weeks for a period of at least six months. Using the ^[5] ankle scoring method developed by Biard and Jackson.

Observation and Results

In our series 30 bimalleolar fractures of ankle, treated by surgical methods during the period of December 2014 to May 2016 were studied. The following were the observations made and the available date analyzed as follows.

In our study majority of the patients were male (83.3%), most of the patients were in the age group of 19-30 years with mean age of 37.3 years. Majority of the patients sustained these injuries following road traffic accidents. Supination external rotation injury is the most common fracture type in this study, 3 patients had associated syndesmotomic injury.

Treatment of Individual Fractures

A) Medial Malleolus Fracture

Impl ts	Malleolar Screw	Cancellous Screw	K e
No of ses	16	6	5
Perce age	53.3	20	1

B) Lateral Malleolus Fracture

Implant	Plating	K Wire	Cancellous Screw
No of Cases	21	7	2
Percentage	70	23.3	6.6

C) Syndesmotic Fixation Union

Union WKS)	8 WKS	10 WKS	12 WKS	14 WKS	16 WKS
No of cases	9	10	5	5	1

Complications

Complications	No of Cases	Percentage
Superficial Infection	2	6.6
Deep Infection	2	6.6
Delayed Union of Medial Malleolus #	1	3.3

Functional Results

Functional Score	No of Cases	Percentage
Excellent	18	60
Good	8	26.6
Fair	2	6.6
Poor	2	6.6

Discussion

Over the course of the past two decades, there has been a rise in the incidence of bi malleolar fractures in patients of all ages ^[6], including younger, more active people as well as older people. Either a closed treatment, which consists of manipulative reduction and immobilisation in a plaster cast, or an open treatment, which consists of open reduction with internal fixation, can be utilised to both restore function and prevent arthritis. Burwell and Charnley demonstrated that early restoration to function might be achieved with anatomical reduction combined with tight fixation ^[7].

The treatment of ankle fractures has undergone progressive change over the years as a result of improvements in the research of biomechanics, advancements in the procedures used to heal the fractures, and the analysis of the results of recent studies. The treatment's objective is to heal the fracture while preserving as much of the afflicted ankle's anatomy as possible and allowing the patient to move their ankle fully and pain-free.

When treating unstable malleolar ankle fractures, the closed form of therapy is frequently insufficient to fully restore the anatomy and biomechanics of the patient's ankle. On the other hand, open reduction combined with internal fixation is a fantastic technique for restoring the normal morphology of the joint.

According to the findings of a number of studies ^[7, 8, 9], internal fixation of displaced malleolar fractures of the ankle yields superior results. It was discovered that treating malleolar fractures with correct open reduction and stable internal fixation employing AO method and

principles yielded a higher percentage of excellent and good results ^[10]. [Citation needed] The findings of this investigation back up these conclusions.

In this particular study, there was a total of 30 patients who underwent surgical treatment for bimalleolar ankle fractures. Every patient was tracked for a minimum of one year after their initial visit.

According to the findings of our research, the age group of 19-30 years old had a significantly higher incidence of fractures, whereas the mean age was 37.3 years. The results of our research are consistent with those found in the studies carried out by Beris *et al.* ^[10], Roberts RS ^[11], Baird and Jackson ^[5] and Lee *et al.* ^[12].

For the purpose of operative evaluation in this particular investigation, the Lauge-Hansen categorization system was utilised. According to Roberts RS, Beris *et al.*, and Baird and Jackson's research, the sort of injury that occurred most frequently was a supination-external rotation injury (46.6%), followed by a pronation-abduction injury (33.3%).

The findings of this study were compared to those found in previous research conducted by Burnwell and Charnley, Colton ^[13], De Souza *et al.*, and Beris *et al.* Seventy percent of patients in the Colton series experienced satisfactory to outstanding outcomes. In the series of 132 patients that Burnwell and Charnley evaluated, 102 of those patients (77.3%) had good outcomes, 16% had fair results, and 6% were found to have a low score.

In the De Souza series, 150 patients who had ankle fractures treated by open reduction and internal fixation with the AO/ASIF approach had 90 percent of their fractures heal successfully. According to research carried out by Beris and colleagues, 74.3 percent of the 144 patients who sustained ankle fractures experienced good to outstanding outcomes.

The functional outcomes of the present study were comparable to those of the studies that were quoted before it; 86.6% of the participants had good to excellent results, 6.6% had fair results, and 6.6% had bad results.

Study	Good to excellent	Fair	Poor
Burnwell & Charnley	102 (77%)	22 (%)	8 (%)
Colton	18 (70%)	4 (%)	4 (%)
Beris <i>et al.</i>	105 (74.3%)	21 (5%)	16 (1%)
De souza	135 (90%)	9 (%)	6 (%)
Present study	26 (86.6%)	2 (%)	2 (%)

The vast majority of authors have noted that anatomical reduction of a displaced medial malleolus ensures correction of talar displacement and is of utmost relevance when it comes to the treatment of unstable fractures ^[14]. However, Heller *et al.* ^[15]. It should be stated that the anatomical reduction of the lateral malleolus results in a more correct repositioning of the talus in the mortise.

As a result of the fact that the displacement of the talus faithfully followed that of the lateral malleolus, the findings of this study lend credence to Yablon *et al.* ^[15]. Assertion that the lateral malleolus is the essential component in the anatomical reduction of bimalleolar fractures. If the lateral malleolus fracture wasn't properly reduced, the patient would have persistent lateral displacement or residual shortening. This does not necessarily make the significance of the medial malleolus any less significant; nevertheless, it does help to highlight the fact that the lateral malleolus should no longer be overlooked. One of the patients who had a bad outcome in this study did not have anatomical reduction of the medial malleolus, which

may have been caused by the interposition of soft tissue.

Fixing a lateral malleolus can be done in a few different ways. In the treatment of fibular fractures, the lateral plate that was pushed for by the AO group has gained widespread acceptance^[15]. Hughes *et al.*^[16] suggested that the lateral malleolus should be treated before anything else. After that, the stability of the medial malleolus is evaluated, and if necessary, it is adjusted. Because of this, postoperative immobilisation can be kept to a minimum, and the patient can recover their function more quickly.

According to the findings of this research, patients who received stable internal fixation of the medial malleolus by means of a cancellous or malleolar screw had improved functional outcomes. The outcomes were not as acceptable in individuals who had a less rigorous fixation of the medial malleolus using only Kirschner wires as they were in patients who had this type of fixation. Results obtained with tension band wiring of the medial malleolus were comparable to those obtained with screw fixation, although there were fewer reports of skin irritation with the tension band wiring method. Skin irritation was more common in patients who had screw fixation.

After reduction and internal fixation of the fibula fracture and the medial malleolar fracture, syndesmosis is stable in many cases of fractured ankles. According to Yablon15, the anatomical reduction of the fibula is the most important component in getting a favourable outcome in the treatment of ankle fractures with syndesmotic disruption. [Citation needed] In this particular series, the trans-syndesmotic screw fixation was performed on three different patients. One patient experienced an outstanding recovery, while the other two patients made satisfactory progress.

Although the AO group argued for early mobilisation, other research have revealed that the results obtained after early mobilisation are not significantly different from those achieved after regular mobilisation. In this particular investigation, immobilisation was performed for a period of one month. Those who showed early radiological signals of union were advised to begin partial weight bearing, and those who showed complete symptoms of union were advised to begin full weight bearing. At first, there was a restriction in the range of motion of the ankle, but this got better after a few weeks.

Because we gave the soft tissues around the ankle enough time to heal, none of our 30 patients exhibited any signs of ankle or subtalar joint instability. This was made possible by the fact that we gave them adequate time. Because there was no discernible difference in the outcomes after six months of follow up, we decided that postoperative immobilisation was the best course of action rather than allowing active ankle exercise.

Bray found that patients who had early surgery had a lower frequency of problems compared to those who had delayed surgery. This was the case for both types of individuals. Which is supported by the findings of our research.

As a result of wound infection and a delay in the union of the medial malleolus, the current series produced results that ranged from fair to bad. In four individuals, it was seen that the activity level and range of mobility were restricted, but there was no radiological indication of arthritis.

The results of this study showed that the majority of patients, or 86.6% of them, had good to excellent outcomes. These findings are comparable to those seen in other series, such as Burnwell & Charnley, Colton, De souza *et al.*, and Beris *et al.* It was discovered that treating bimalleolar fractures with correct open reduction and secure internal fixation with AO method and principles resulted in a significant percentage of excellent and good outcomes. These findings are supported by this study, which also found that its findings were equivalent to those found in other investigations.

Conclusion

In this study, 30 cases with bimalleolar fractures of the ankle that were unstable, displaced, or both were surgically treated by open reduction and internal fixation. These

procedures were carried out by orthopaedic surgeons.

An unstable bimalleolar ankle fracture is a common injury sustained as a result of vehicle collisions. Injuries to the ankle are rather prevalent in males of middle age. The most common damaged age groups were those between the ages of 19 and 30. The participants' ages, on average, were 37.3 years old in this study. The incidence of bimalleolar fractures is significantly higher in males compared to females. The supination-external rotation injury was responsible for the majority of them (37.5% of all injuries). It is absolutely necessary for anatomical reduction and fixation to have a solid understanding of the mechanism of the injury. In order to preserve lateral ankle stability, the alignment of the tibia (both in terms of length and rotation) must be preserved. In the case of intra-articular fractures, anatomical reduction and the restoration of the articular congruence are both critical procedures. This is especially true in the case of weight-bearing joints like the ankle. The articular congruity of the ankle joint can be restored with the use of open reduction and internal fixation. In 86.6% of cases, the results of the operation were satisfactory, and the functional outcome ranged from good to excellent. The outcomes of functional tests were found to be significantly better in younger age groups and in men. The bimalleolar fractures that were related with wound infection and those that did not have an adequate reduction of fracture fragments led to results that ranged from fair to bad. Fixation of the fracture in such a way that it is stable produces excellent results. When it comes to the internal fixation of the medial malleolus, cancellous screws or malleolar screws are superior to Kirschner-wire fixation, while lateral plating was the most effective treatment for fibular fractures. TBW was performed on PER and PA injuries, and the outcomes were encouraging and equivalent to those achieved with screw fixation. Additionally, there were less reports of skin irritation at the wound site. It is the procedure that is most commonly used for osteoporotic bones of both malleoli as well as small transverse fragments, particularly in senior patients. When plating is done correctly, the normal bend of the lateral malleolus is restored, which leads to improved functional results. Through surgical therapy, the possibility of non-union caused by the interposition of soft tissue was eliminated. Two cases had delayed union, which may have been the result of poor reduction at the time of surgery. Surgery is the treatment of choice for bimalleolar ankle fractures because it yields the best functional outcomes. These patients are able to begin bearing their own weight and moving around relatively quickly.

As a result, we have arrived at the conclusion that the surgical treatment of bimalleolar ankle fractures has a favourable functional outcome. Early mobilisation is possible when the fracture has been successfully stabilised with surgical fixation.

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