



Result of Ankle Fracture Fixation, Our Hospital Experience

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i36B31959

Editor(s):

(1) Dr. Aurora Martínez Romero, Juarez University, Mexico.

Reviewers:

(1) Dayneri León Valladares, University of Tarapacá, Chile.

(2) Syam Nath S H, Dhanalakshmi Srinivasan Medical College and Hospital, India.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/70260>

Original Research Article

Received 02 May 2021

Accepted 09 July 2021

Published 12 July 2021

ABSTRACT

Aims and Objectives: The goal of this study was to see the outcome of open reduction and internal fixation for ankle fractures.

Methods: A prospective analysis of 40 ankle fractures of adult patients handled surgically using diverse approaches in the period from January 2019 to January 2020 at the Orthopedic department of SMBBIT, Dow University of Medical and Health Sciences. Karachi Pakistan. The ankle grading system developed by Baird and Jackson was used to assess the functional result.

Results: We achieved 87.5 percent outstanding to good outcomes, 6.3 percent fair outcomes, and 6.2 percent bad outcomes in our study. The findings were comparable to those of other researchers around the world.

Interpretation and Conclusion: In 87.5 percent of patients, the operational results were satisfactory, with good to outstanding functional outcomes. With stable fracture fixation, excellent

outcomes are attained. Cancellous screws are better for internal fixation of the medial malleolus, while Malleolar screws are superior for that task. For ankle fractures treated surgically, patients may expect to have satisfactory function thereafter.

Keywords: Ankle fracture; open reduction; internal fixation.

1. INTRODUCTION

According to Sir Robert Jones, "Ankle is the most injured joint of the body but the least well treated" [1]. Among all body injuries, ankle injuries are significant because body mass is conveyed via the joint. Also, movement is dependent on its stability. They are frequently a combination of injuries. Ankle fracture causes not only fracture but damage to several ligaments which reinforce the joint [2]. Malleolar fractures occur in several ways, giving birth to a plethora of categorization systems, two of which are now in use: the Lauge-Hansens and Danis-Weber classifications [3]. Malleolar fractures can be addressed as the most frequent in orthopedic traumatology [4].

Malleolar fractures require accurate reduction and adequate internal fixation, like other intra-articular fractures [5]. When malleolar fractures are not properly treated, it might lead to mobility, osteoarthritis, or both post-traumatically unpleasant [6]. Many of these stable ones are reduced to conservative therapy and produce decent outcomes when it comes to malleolar fracture therapy [7]. Additionally, unstable and open fractures require internal fixation and open reduction [8]. This research has well demonstrated the benefits of ORIF over closed treatment [9]. Anatomy and mechanical loading of the ankle are recuperated during the operation. Additional benefits include improved rehabilitation without casting, faster mobility, and early weight loss. However, no research has had good impacts on bimalleolar fractures. In this study, the functional results and results of surgical treatment for malleolar fractures in adults are evaluated.

2. METHODOLOGY

Patients with bimalleolar fractures who met the inclusion criteria as fractures of the closed ankles in adults and Subluxation and dislocation of the ankle joint associated [10]. Patients also met exclusion Criteria as Open fractures, Talar fractures, associated fractures of ipsilateral limb, Children below 18 years, and Pathological fractures, were hospitalized from January 2019 to January 2020 at the Orthopedic department of SMBBIT, Dow University of Medical and Health

Sciences Karachi Pakistan. Patients were followed up for 6 months.

2.1 Operative Technique

Following the administration of spinal and/or epidural anesthesia, the patient was put in a supine posture. Under the ipsilateral buttock was a sandbag inserted [11]. In all cases, a pneumatic tourniquet with a pressure of 300mm Hg was employed [12]. In all of the instances, standard surgical procedures were followed. Regardless of the circumstances, the fibula was operated on first. To stabilize the medial malleolus, a combination of tension band wiring, K wires, malleolar screws, and cancellous screws was applied [13]. A third tubular plate and a rush pin were used to fix the lateral malleolus.

2.2 Medial Approach

Typically, the medial incision begins at the medial malleolus [14]. To ensure proper protection of the saphenous vein and nerve, it is vital to keep these areas protected. The fragment of the fracture was reduced, and the articular surface was evaluated for the presence of soft tissue interposition. For type 1 Lauge-Hansen instances, modified tension band wiring was used [15]. In a vertical fracture, two or three lag screws on their own may be adequate if the fragmented part is large enough and the bone quality is good enough. If in doubt, a buttress plate may be a better option.

2.3 Lateral Approach

The conventional method for most lateral fractures is a longitudinal lateral incision. In case a lateral plate is needed for the lateral malleolus, the incision might be made somewhat anteriorly or posteriorly such that the plate should not come to rest precisely under the incision. If a posterior plate is planned, make the incision slightly posteriorly to avoid soft-tissue dissection. The dissection plane is located anteriorly between the peroneus Tertius and posteriorly between the peroneus longus and brevis. At the fracture site, release the periosteum. The fracture site is now exposed to reduce devascularization. The fracture was reduced by reversing the force that

created the fracture. The fragments were initially fixed using inter-fragmental lag screws, which were then followed by the placement of a 3.5mm Low contact dynamic compression plate/distal fibula anatomical LCP or a reconstruction plate on the lateral or posterior surface of the fibula, as required. Under fluoroscopy, the reduction was visible in both orthogonal views at every critical phase. All of the cases were meticulously closed [16,17,18].

2.4 Post - Operative Protocol

Walk without bearing any weight was initiated on the first or second day after the operation. After the cast was removed, partial weight-bearing began (after the appearance of clinical and radiological evidence of union) [19]. Ankle exercises were recommended [20]. Weight-bearing was delayed in individuals with syndesmotic screw fixation until the screw was removed. Cases were followed up every two weeks, every six weeks, and every six months after that. The ankle scoring system devised by Baird and Jackson [21] was used. Patients were evaluated for union clinically and radiologically on every visit.

3. RESULTS

The research included 40 patients aged 19 and above, with 14 women and 26 men participating. The most common mode of injury was a car accident, with 17 patients having a left ankle fracture, 19 patients having a right ankle fracture, and 4 patients had bilateral involvement, with 12

patients having a bimalleolar fracture, 13 patients having a medial malleolus fracture, 11 patients having a lateral malleolus fracture, and 4 patients having an associated posterior malleolus fracture. Patients with severe skin problems, such as abrasions, lacerations, or open ankle fractures, were excluded from the study. The bulk of the 40 patients suffered from supination external rotation damage, followed by under-pronation adduction and pronation external rotation damage, with only a handful suffering from under-pronation abduction injury. For lateral malleolus fixation, the most common modality was one-third tubular plate, locking plate, and rush pin, for medial malleolus fixation was 4mm cancellous cancellous screw with washer/k wire, and for posterior malleolus, fixation was lag screw from anterior to posterior or posterior to anterior. The average length of stay in the hospital for the patients listed above was about two weeks. At the 2-week follow-up, 15 patients out of 40 had persistent swelling and pain at the operative site, 12 patients had restricted ankle movements, 6 patients had wound dehiscence at the suture site, 2 cases out of 40 developed non-union at the medial malleolar fracture site due to early weight-bearing, and revision surgery with bone graft was performed at the non-union site. From the sixth week to the sixth month after surgery, the improvement in the subjective assessment (of pain, walking, activity levels, ankle, and subtalar joint functions) was statistically significant. Even the radiographic assessment showed a subjective statistical improvement from the sixth week to the sixth month after surgery.

Table 1. Shows Type of fracture no of patients and Treatment

Type of fracture	No. of patients	Treatment	No. of patient treated
Medial malleolus fractures	13	TBW + Malleolar Screw Cancellous Screw	7 6
Lateral Malleolus Fractures	11	Lateral Plate Rush Pin	5 6
Posterior malleolar fixation	4	Anterior-Posterior Screw	4
Bimalleolar fracture	12	Tbw + Lateral Plate Malleolar/Cancellous Screw/Rush Pin	5 7

Table 2. Shows complications and no. of patients

Complications	No. of patients
Persistent Swelling	8
Pain	7
Restricted ankle joint movements	12
Wound dehiscence	6
Non-union	2

3.1 Complications

Table 3. Functional score of complications based on Baird and Jacksons scores at 6 months

• SUB-CATEGORIES	SCORE
1. Pain	A (15)
2. Stability	A (15)
3. Able to walk	A (15)
4. Able to run	B (8)
5. Ability to work	A (10)
6. Motion of the ankle	A (10)
7. Radiographic results	A (25)

*Functional outcome by Baird and Jacksons scores at 6 months:
The composite score is 98, which indicates EXCELLENT in Baird and Jackson scoring system*

Table 4. Functional score of complications based on Baird and Jacksons score

• SUB-CATEGORIES	SCORE
1. Pain	B (12)
2. Stability	A (15)
3. Able to walk	A (15)
4. Able to run	B (8)
5. Ability to work	A (10)
6. Motion of the ankle	A (10)
7. Radiographic results	A (25)

*Functional outcome by Baird and Jacksons score:
The composite score is 95, which indicates GOOD in Baird and Jackson scoring system*

4. DISCUSSION

Our study's goal is to establish the functional result for closed ankle fractures which were treated with open reduction and internal fixation, as well as the occurrence of post-operative sequelae. The majority of ankle fractures are handled operatively with stable internal fixation devices, resulting in excellent/good functional outcomes. The study included 40 individuals over the age of 19, with 14 females and 26 males participating. Road traffic incidents were the most prevalent cause of injury, with thirteen patients suffering from left ankle fractures, fifteen suffering from right ankle fractures, and two suffering from bilateral involvement. According to the Lauge-Hansen classification [22,23], the most prevalent mechanism of damage was pronation external rotation type of damage, followed by pronation adduction and only rarely pronation abduction and pronation dorsiflexion type of damage. We achieved 87.5 percent outstanding to good outcomes, 6.3 percent fair outcomes, and 6.2 percent bad outcomes in our study which is quite close near to Lash et. al's result [24]. Lash's result found that 5 percent achieved 'poor' results, 16 percent patients achieved a 'fair' result, 77 percent patients gained a 'good' result. Conservative treatment of an unstable malleolar fracture of the ankle has resulted in poor repair of the ankle's anatomy

and biomechanics. Open reduction with internal fixation, on the other hand, it is a great approach for restoring normal anatomy and biomechanics of the joint. A 4mm cannulated cancellous screw with a washer is the most common fixation approach for the medial malleolus, while a 1/3rd tubular plate is the most common fixation method for the lateral malleolus, according to Kochai et al. [25].

Ankle fractures are prevalent in young adults, though they fared better than elderly individuals. The right-side ankles were more typically affected than the left side. Splinting the ankle, and not putting the ankle in water, is essential for the first week after surgery [26]. Wound healing may be slowed when an abscess is present. If there are no concomitant injuries, patients are wheeled using crutches or a walker. However, they should avoid bearing weight on the affected limb from the first post-operative day. Ankle function improved significantly from the second week to the sixth month after surgery, as measured by the Baird and Jackson grading system.

5. CONCLUSION

From the study, we conclude that the outcome of an operated anchor fracture is likely to be improved with anatomical reductions and the use

of fixation, as well as a strict postoperative program of mobilizations and rehabilitations. After 6 months, most patients have had minimal or no malaise, as well as modest functional impairments. The use of AO principles for open reduction and steady internal fixing yielded great and good outcomes. Regarding complications: The most prevalent late effects were prolonged edema and lingering discomfort; some of our patients also had restricted ankle range of motion. Functional Outcome was assessed at two weeks, six weeks, and six months. These findings are comparable to those of numerous other recent systematic studies, although they also have certain characteristics with others and contradict those of other systematic studies.

CONSENT AND ETHICAL APPROVAL

As per international standard or university standard guideline patients consent and ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:

The peer review history for this paper can be accessed here:
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