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Functional results of bimalleolar ankle fractures treated by plating and Tension band wiring technique: A prospective study

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Abstract

Introduction: Ankle fractures are one of the commonest fractures encountered by an Orthopaedic surgeon with majority being treated by open reduction and internal fixation. The purpose of this study, on Bimalleolar fractures of ankle is to evaluate the functional outcome and results obtained after different modalities of treatment.

Material and methods: 22 patients with bimalleolar fractures were treated between January 2016 and January 2017 at a tertiary care hospital. The inclusion criteria were closed bimalleolar fractures in skeletally matured patients. Patients with compound fractures, pilon fractures and those with syndesmotom injuries were excluded from the study. Plating was done for all the fibula fractures while the medial malleolus fractures were treated using Modified Tension band technique.

Results: The mean age of patient was 37.3 years. As per the Lauge-Hansen classification system, 12 (54.6%) cases had supination external rotation type of injury which was most common. Radiological union was seen at 14±4.6 weeks in 13 (59.1%) cases. One (4.5%) case had superficial infection. There were no cases of non-union or mal-union in the present study. As per the Baird Jackson scoring system, 12 (54.6%) cases had excellent results, 7 (31.8%) had good, 2 (9.1%) had fair and 1 (4.5%) of the cases had poor results respectively.

Conclusion: Open reduction and internal fixation in bimalleolar fractures in the form of plating and tension band wiring provides a much favorable outcome.

Keywords: Ankle fractures, Bimalleolar fractures, fibula plating, tension band wiring

Introduction

Ankle fractures are the most common type of fractures treated by orthopaedic surgeons accounting for 10% of all fractures with an increase in prevalence over the last two decades both in the young, active patients and in the elderly^[1-3].

Most ankle fractures are complex injuries that are difficult to manage. These injuries gain importance because the whole body weight is transmitted through the ankle and locomotion depends upon the stability of the ankle joint. They have the potential to produce significant long-term disability and complications in the form of pain, instability and early degenerative arthritis^[3-4].

The goals of treatment include achieving sound union of fracture and an ankle that moves and functions normally without pain. The purpose of this study, on Bimalleolar fractures of ankle is to evaluate the functional outcome and results obtained after different modalities of treatment.

Material and Methods

22 patients with bimalleolar fractures were treated between January 2016 and January 2017 at a tertiary care hospital. The inclusion criteria were closed bimalleolar fractures in skeletally matured patients. Patients with compound fractures, pilon fractures and those with syndesmotom injuries were excluded from the study. All the necessary pre-operative workup was done in the form of Radiological and (Fig. 1) hematological investigations. All the fractures were classified using the Lauge Hansen classification system. Well written informed consent was taken from all the patients enrolled in the study. Prior ethical committee approval was obtained. Regular follow-ups were done at 3, 6 and 12 months postoperatively (Fig 2 and 3). The final results were calculated using the Baird Jackson scoring system (Table 1)

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Table 1: Baird and Jackson’s scoring system

Pain	Score
No Pain	15
Mild Pain with strenuous activity	12
Mild Pain with activities of daily living	8
Pain with weight bearing	4
Pain at rest	0
Stability of Ankle	
No Clinical instability	15
Instability with sports activities	5
Instability with activities of daily living ability to walk	0
Able to Walk	
Able to walk desired distances without limp or pain	15
Able to walk desired distances with limp or pain	12
Moderately restricted inability to walk	8
Able to walk short distance only	4
Unable to walk	0
Able to Run	
Able to run desired distances without Pain	10
Able to run desired distances with slight Pain	8
Moderate restriction in ability to run with mild pain	6
Able to run short distances only	3
Unable to run	0
Motion of the Ankle	
Within 10 degrees of uninjured ankle	10
Within 15 degrees of uninjured ankle	7
Within 20 degrees of uninjured ankle	4
<50 degree of uninjured ankle, or dorsiflexion <5 degree	0



Fig 1: Pre-operative Radiograph



Fig 2: Immediate Post-operative Radiograph



Fig 3: Follow-up at 12 months

Surgical technique

The patient was placed in supine position after administration of spinal and/or epidural anaesthesia. A sandbag was placed under the ipsilateral buttock. Pneumatic tourniquet with a pressure of 300mm of Hg was used in all the cases. Standard Surgical steps were followed in all the cases. Fibula was operated first in all the cases.

Approach to fibula

A direct lateral approach over the fibula was taken with the dissection plane between the peroneus tertius anteriorly and the peroneus longus and brevis posteriorly. Soft tissues and periosteum were cleared a few millimeters of the fracture edge and fracture fragments were visualized. Fracture reduction was done by reversing the force that caused the fracture. Preliminary fixation of the fragments was done using the inter fragmentary lag screws which was later followed by Application of 3.5mm Low contact dynamic compression plate/ distal fibula anatomical LCP or a reconstruction plate was applied on the lateral or posterior surface of the fibula as appropriate. The reduction was visualized at every crucial step under fluoroscopy in both the orthogonal views (Fig. 2). Meticulous closure was done in all the cases.

Approach to Medial malleolus

The sandbag under the buttock was removed to facilitate the approach for medial malleolus fracture. Anteromedial approach centered over the fracture was used in all the cases. Fracture fragment was reduced and the articular surface was visualized for any soft tissue interposition. Modified tension band wiring was done for all the cases. Meticulous closure and repair of deltoid ligament was done wherever required.

Results

The mean age of patient was 37.3 years. There were 17 (77.2%) males and 5 (22.8%) females in the present study. Right sided preponderance was seen in the present study accounting for 14 (63.6%) cases. Nine (40.9%) cases had road traffic accident as the mechanism of injury, 8 (36.3%) had accidental fall whereas 5 (22.8%) cases had a twisting injury in the present study. According to Lauge-Hansen classification system, 12 (54.6%) cases had supination external rotation type of injury, 6 (27.3%) cases had pronation external rotation type of injury and 4 (18.1%) cases had Pronation adduction type of injury pattern. Radiological union

was seen at 14±4.6 weeks in 13 (59.1%) cases, 17±4.3 weeks in 6 (27.3%) cases and 20±5.7 weeks in 3 (13.6%) cases. One (4.5%) case had superficial infection which resolved completely with oral antibiotics. There were no cases of non-union or mal-union in the present study. As per the Baird Jackson scoring system, 12 (54.6%) cases had excellent results, 7 (31.8%) had good, 2 (9.1%) had fair and 1 (4.5%) of the cases had poor results respectively.

Discussion

There has been gradual evolution in management of ankle fractures due to improved analysis of biomechanics, improvement in fixation techniques and analysis of results of recent studies. The goal of treatment is to provide fracture union with painless full motion of ankle, with anatomical restoration of the injured ankle.

Closed method of treatment is often inadequate in restoring the anatomy and biomechanics of ankle in unstable malleolar ankle fractures. Conversely, open reduction with internal fixation is an excellent method for restoration of normal anatomy of joint. Several studies indicated that, internal fixation of displaced malleolar fractures of ankle provides better results [5-7].

The treatment of malleolar fractures with accurate open reduction and stable internal fixation using AO method and principles was found to give a high percentage of excellent and good results [8]. The present study supports these

Conclusions

In the present study, there was a male predominance with 77.27% and male: female ratio of 3.4:1, which is comparable to the study by Baird & Jackson [9]. The most common mechanism of injury in the present study was road traffic accident which is comparable to studies by Colaco *et al.* [3], Baird & Jackson [9] and Lee *et al.* [10].

In the present study, Lauge-Hansen classification system was used which is the most common classification system used clinically comprising of 12 (54.6%) cases who had supination external rotation type, 6 (27.3%) cases who had pronation external rotation and 4 (18.1%) cases who had Pronation adduction type of injury pattern respectively. Similar were the observations of Colaco *et al.* [3], Baird & Jackson [9] and Robert RS *et al.* [11].

Most authors have stated that anatomical reduction of displaced medial malleolus ensures correction of talar displacement and is of paramount importance in treating unstable fractures [12]. However, Yablon *et al.* [13] state that talus is more accurately repositioned in mortise by anatomical reduction of lateral malleolus and 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 distal part of fibula would result in persistent lateral displacement or residual shortening. This does not necessarily lessen the importance of the medial malleolus in contributing to the congruity of medial aspect of ankle, but it does serve to emphasize that the lateral malleolus should no longer be ignored in the treatment of ankle injuries.

Lateral malleolus can be fixed by various methods. Lateral plate, as advocated by AO group has become widely accepted for treatment of fibular fracture. Hughes *et al.* [14] 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.

The results in present study were compared with that of Burnwell & Charnley [5], De souza *et al.* [6], Beris *et al.* [8] and Colton *et al.* [12].

In Colton [12] series, 70% of the patients had a good to excellent results. Burnwell & Charnley [5] 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 souza [6] 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 al.* [8], 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 mentioned studies, with 19 (86.3%) cases having excellent to good results respectively.

Although early mobilization was advocated by AO, immobilization in the initial post-operative period has also been supported. Others have found no significant difference in the results produced after early motion or immediate plaster splintage [2]. In the present study, immobilization till suture removal in plaster cast followed by mobilization and partial weight bearing was used successfully. The range of motion was reduced initially but after the cast removal the ankle movement rapidly improved. A number of different treatment regimens have been suggested.

Limitations

Low sample size and short duration of follow-up remains the limitations of the present study.

Conclusion

The surgical management by open reduction and internal fixation for Bimalleolar ankle fractures can provide a predictable outcome with good functional results. However, further multicentric trials and randomized studies are essential in order to come to a definitive conclusion.

References

1. Bauer M, Benger U, Johnell O. Supination–eversion fractures of ankle joint: Changes in incidence over 30 years. *J Foot Ankle.* 1987; 8:26-8.
2. Daly PJ, Fitzgerald RH, Melton LJ, Lstrup DM. Epidemiology of ankle fractures. *Acta Orthopaedica Scandinavian.* 1987; 58:539-44.
3. Colaco Rajiv, Naik Lokesh, Waybase Ashok, Sharma Gaurav *et al.* Functional outcome of surgical management of malleolar fractures of the ankle joint using Baird Jackson scoring- A Prospective study. *International journal of Medical and Health Research.* 2017; 3(1):42-45
4. Carrage EJ, Csongradi JJ, Bleck EE. Early complications in the operative treatment of ankle fractures. *J Bone Joint Surg.* 1991; 73B:79-82.
5. Burwell HN, Charnley AD. The treatment of displaced fractures of ankle by rigid internal fixation and early joint movement. *J Bone Joint Surg.* 1965; 47B:634-60.
6. De Souza LJ, Gustilo RB, Meyer TJ. Results of operative treatment of displaced external rotation-abduction fractures of ankle. *J Bone Joint Surg.* 1985; 67A:1066-74.
7. Cimino W, Ichtetz D, Silabaugh P. Early mobilization of ankle fracture after open reduction and internal fixation. *Clin Orthop.* 1991; 267:152-6.
8. Beris AE, Kabbani KT, Xenakis TA, Mitsionis G, Soucacos PK, Soucacos PN *et al.* Surgical treatment of

- malleolar fractures – a review of 144 patients. Clin Orthopaed Related Research.1997; 341:90-8.
9. Baird AR, Jackson TS. Fractures of the distal part of the fibula with associated disruption of the deltoid ligament. J Bone Joint Surg. 1987; 69A:1346-52.
 10. Lee Yih-Shiunn, Huang, Chun-Chen NSP, Chen, Cheng-Nan, LinChien-Chung. Operative treatment of displaced lateral malleolar fractures: The Knowles pin technique. J Orthop Trauma. 2005; 19(3):192-97.
 11. Roberts RS. Surgical treatment of displaced ankle fractures. Clin Orthop. 1983; 172:164-70.
 12. Colton CL. The treatment of Dupuytren's fracture dislocation of the ankle. J Bone Joint Surg. 1977; 53B:63-71.
 13. Yablon IG, Heller FG, Shouse L. The key role of lateral malleolus in displaced fractures of the ankle. J Bone Joint Surgery. 1977; 57A:169 -173.
 14. Hughes J. The medial malleolus in ankle fractures. Orthopaedic Clinics of North America. 1989; 11(3):649-660.