



Prospective Observational Study of Functional Outcome of Management of Malleolar Fractures

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ABSTRACT

Background and Aim

In the lower extremity intra-articular fracture around ankle joint is the most common one. These fractures when occurred in olden days, ended up with permanent disability. Lauge - Hansen in 1948-1954 recognized four patterns based on pure injury sequences and takes into account at the time of injury, deforming force direction and position of the foot.¹The purpose of present study is to determine the functional outcome and result of surgical treatment of malleolus fracture and complication associated with open reduction and internal fixation.

Materials and Methods

Materials and Methods

49 Adult patients with acute ankle injuries admitted to PGI YCMH hospital were included in this study during period of January 2021 to June 2022. The results were analyzed based on Baird & Jackson's Ankle scoring system.²The four fracture patterns of Lauge - Hansen classification were analysed for results and complications. Patients were called for review at 6th week, 3rd month, 6th month and 12th month.

Results

49 Adult patients, age 22 - 85 (closed and Gustilo and Anderson grade 1 malleolar fracture) were treated

using operative intervention under the c-arm image intensifier. Patient was discharged from the hospital in a below knee slab. Routinely, postoperative X-rays were taken to assess the congruity of the joint and assess the alignment of the fractures. If there is substantial evidence of union both clinically as well as radiologically, gradual weight bearing started accordingly. Patients were put on physiotherapy for mobilization of ankle joint. 42.9% had excellent, 38.8% good, 14.3% fair, 4% poor results at the end of study.

When we look at the complications 84% have had no complications, 10% had superficial infection, 4% had deep infection and delayed union was observed in 2% patients.

Keywords

Bimalleolar fracture, Trimalleolar fracture, Pott's fracture, ankle fracture.

INTRODUCTION

In the lower extremity intra-articular fracture around ankle joint is the most common one. These fractures when occurred in olden days, ended up with permanent disability.

About three centuries ago, scientific study started with Sir Percival Pott, who in the year 1768, in his paper some few general remarks on fractures and dislocations discussed on fracture complex occurring around the ankle Dupuytren, Lefort-wagstaffe, Tillaux-Chaput, Maisonneuve and others analyze ankle joint injuries.

After studying large number of cases in 1922 Ashhurst and Bromer classified and analyzed the ankle injuries by taking into consideration the direction of forces. Lauge-Hansen in 1948-1954 recognized four patterns based on pure injury sequences and takes into account

at the time of injury, deforming force direction and position of the foot.¹

Many of the ankle injuries are mixed bony and ligamentous components. MRI nowadays is useful in precisely diagnosing ligamentous injury and repairing these components have to be borne in mind, while treating these fractures.

Achieving anatomical reduction by open methods and internal fixation of malleolar ankle fractures is necessary to avoid complications as in all intra-articular fractures. With the advent of A.O principles of management, the results of malleolar ankle fractures are better with emphasis on anatomical reduction of fracture, stable internal fixation, regaining full length of fibula and early active pain free mobilization.

The purpose of present study is to determine the functional outcome and result of surgical treatment of malleolus fracture and complication associated with open reduction and internal fixation.

AIM AND OBJECTIVES

Aim

The aim of this study is to study the functional outcome of management of malleolar fractures.

Objective

1. To study the functional outcome and results of management of malleolar fractures.
2. To study the complications after managements in malleolar fractures

MATERIALS AND METHODS

This is a prospective observational study undertaken in the Department of Orthopaedics. Adult patients with acute ankle injuries admitted to Tertiary Care Centre Government post graduation institute and hospital were included in this

study after obtaining their informed, valid written consent and Study conducted during period of January 2021 to June 2022. Clearance from institutional ethical committee was obtained before initiating the study.

METHOD OF COLLECTION OF DATA

Study Design

This prospective observational study was done under the guidelines of ethical committee of the hospital.

Study Approval

This study was approved by Institutional Medical Ethical Committee. Written, informed, valid consent was obtained from all the patients participating in the study.

Study Population

Total 49 patients of either sex came for the treatment at PGI YCMH hospital setup was studied.

Sample Size

Total 49 patients included in this study.

Inclusion Criteria

1. Age : 20-85 Years
2. All closed malleolar fractures

3. Open fracture grade I of Gustilo Anderson classification

Exclusion Criteria

1. All Pathological fractures
2. Old Untreated ankle fractures
3. Open fracture grade II and above Gustilo Anderson classification

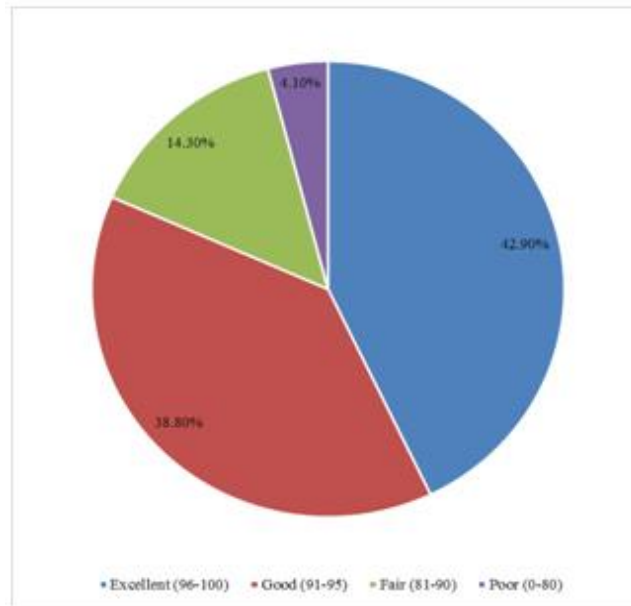
Procedure

1. A total of 49 cases
2. On admission, a detailed history and the complaints of the patients were noted along with a thorough clinical examination
3. X-ray Ankle AP, lateral and mortise view was done and if required CT scan was done to assess the fracture.
4. All routine investigation were done prior to anaesthesia fitness. Pref
5. Operative anaesthesia fitness was obtained.
6. Patients were planned for operative procedure.

RESULTS

Descriptive analysis of Final score according to Baird & Jackson's Ankle scoring system in study population (N=49)

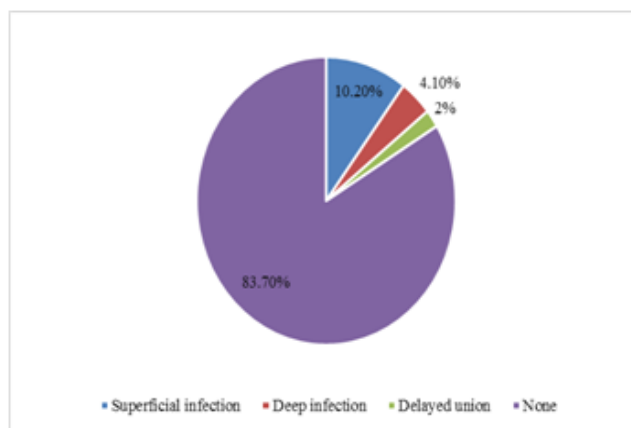
Baird & Jackson's Ankle scoring system	Number of Patients	Percentage(%)
Excellent=96-100	21	42.9%
Good=91-95	19	38.8%
Fair=81-90	7	14.3%
Poor=0-80	2	4.1%
Total	49	100%



COMPLICATIONS

Descriptive analysis of complications in study population (N=49)

Complications	No of Patients (N)	Percentage (%)
Superficial infection	5	10%
Deep infection	2	4%
Delayed union	1	2%
None	41	84%
Total	49	100%



DISCUSSION

Our study consists of 49 cases of closed malleolar ankle fractures. Maximum incidence of the injury was in the fifth decade of life. Injury was more common in males (59.2%) and females being (40.8%). Right side was more commonly involved patients (63.3%) Road traffic accidents contributed to 63.3% of injuries, followed by self-fall while walking (26.5) and twisting injury (10.2%).

The most common injury pattern seen in our study was Supination - external rotation type. Stress radiographs are useful to assess ankle instability. Schonk et al suggested that gravity stress test is comfortable and more sensitive than manual stress test. Weber stated that instability is overestimated by stress radiographs. Evaluation of deep deltoid ligament injury associated with ankle instability is assessed by stress radiographs which help to differentiate SER² injury from SER⁴ equivalent injury.³ SER⁴ fractures are unstable and needs ligament reconstruction and syndesmotic stability.⁴

In pronation external rotation injury restoration of the fibular length and rotation, ankle mortise and syndesmotic stability is important factor as noted by maverick et al.⁵

Displacement is position of talus in the mortise and depends on intact deep deltoid ligament.⁶ Fixing the malleolar fragment will not restore ankle stability and need to repair deep deltoid if torn.⁷ Stable fractures do not displace with axial loading.⁸ Treatment decisions are based on the stability of fracture. Prognosis is determined by energy of injury.⁹ Fixing the malleolar fragment will not restore ankle stability and need to repair deep deltoid if torn. Even though Lauge-Hansen classification describes in detail about the

pattern of ankle fracture it does not deal with syndesmotic injuries.

According to Micheal Bekorom¹⁰, pronation injuries/weber C are commonly associated with syndesmotic injuries than supination injuries/weber B, our study also reflects similar incidence of syndesmotic injury among the various fracture patterns.

We have assessed syndesmotic stability intraoperatively by cotton test or hook test. AO foundation stated that intraoperative cotton or hook test is important to assess the syndesmotic disruption & in turn ankle instability. Boden et al suggested when rigid medial fixation is achieved, no syndesmotic stabilization is required, in the absence of rigid medial fixation if the height of the fibular fracture of more than 4.5 cm above the joint line syndesmotic stabilization is required.

In our series 8 cases had complications such as wound infection, delayed union. Superficial infection (10.2%) with skin necrosis was the commonest complication we encountered. Skin necrosis was very much less when plate and screws of 3.5 mm system is used. Miller et al noted infection rate of 2.2% in his series of bimalleolar fractures, and he suggested that the skin incision should be carried straight down to the level of bone, without undermining the skin or subcutaneous tissue and skin necrosis was very much less when plate and screws of 3.5 mm system is used. Delayed

union of medial malleolus was seen in one case due to early removal of implant due to deep infection.

Case

Age: 48years, Sex: Male

Classification: A.O : B

Injury surgery interval: 4 days. Complications: Nil.



Pre op x-ray



Immediate post op x-ray



6 months post op follow up x-ray



14 months post op follow up x-rays



14 months follow up pictures

CONCLUSION

Supination-external rotation injury is the most common type of malleolar ankle fracture and also common type associated with dislocations and complications. Pronation- External Rotation type had excellent and good results without much complications.

The accurate anatomical reduction and restoration of articular congruity and early surgical fixation with appropriate implants results in good functional outcome.

Good functional outcome was achieved by restoring sufficient stability and providing good mobility at the ankle joint.

REFERENCES

1. Lauge-Hansen N. Fractures of the ankle. Combined experimental surgical and experimental-Roentgenologic investigations Arch surg 1950;60:957-985.
2. Baird and 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
3. Bucholz, R.W, Heckman, J.D, Court-Brown, Tornetta, Rockwood and Green's Fractures in adults, ed 7, Philadelphia, 2010 J.B Lippincott company.
4. Weber. B.G. Simpson L.A.: Corrective lengthening osteotomy of fibula Clin. orthop 199, 61-67, 1985.
5. Yablon I.G., Segal. D., Leanch R.E., Ankle Injuries, New York, 1983, Churchill Livingstone.
6. Yablon I.G., Heller. F.G., Shouse. L; The Key role of lateral malleolus in displaced fractures of ankle : J. Bone Joint Surg : 59 A: 169, 1977.
7. S.Terry canale, James H Beauty Campbell's operative orthopaedics, ed 12, 2013, Mosby Company.
8. Journal of college of Medical sciences-Nepal, Early weight bearing compared with non-weight bearing functional mobilization after operative treatment of an ankle fracture, 2011, vol-7, No.-1, 40-46,
9. Ramsay, P.L. Hamilton. W : Changes in tibiotalar area of contact caused by talar shift, J. Bone Joint Surg. 58B. 356, 1976..

10. Makwana N, Bhowal B, Harper WM, Hui AW.

Conservative versus operative treatment for displaced ankle fractures in patient over 55 years of age: a prospective randomized study. *J Bone Joint Surg* 2001; 83B: 525-9.