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A prospective study on outcome analysis of fracture ankle dislocation managed with internal fixation

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Abstract

Objective: To evaluate the outcome of fracture Ankle dislocation managed with internal fixation.

Method: This is a study of patients with “Fracture Ankle Dislocation” admitted in Orthopaedic ward in B.R.D medical college, Gorakhpur, meeting both inclusion and exclusion criteria who came to our hospital. Work up done for surgical management. Consent was taken from all the patient. This prospective randomized study was analyzed.

Result: The result of this study is not in comparison with other studies as enumerated shows poor outcome as compare to other study with respect to the functional outcome following surgical stabilization of ankle fractures dislocation.

Keywords: syndesmotom joint, joint congruency, anatomical reduction

Introduction

[1] The Ankle joint is a complex joint and is commonly injured now a days because of increased vehicle trauma and sports related injury. Ankle fracture represent 10% of all fracture with incidence of around 137/10⁵ /year making these the second most common lower limb injury after hip fracture. The mean age of injury is 45 year significantly older than that of patient sustaining isolated ankle sprains. Ankle injury have a bimodal distribution with peak incidence of ankle fracture in younger men and older women and a 50 year gap between peaks. These are typically low energy injury with the majority occurring due to simple falls or sport. Sport is the third most common cause of ankle fracture. The epidemiology of the specific fracture pattern does however vary. Complex kinematics of its weight bearing position and complex ligamentous stability and articular congruency are the main reason why these fractures are of concern to surgeon and cause disability to the patients.

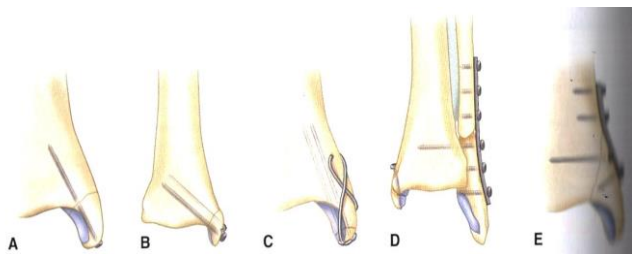
Various modality of treatment

Medial malleolus fixation

- [2] AO group recommended ORIF of both malleoli for almost all bimalleolar fracture. Displaced fracture of medial malleolus should be treated operatively because persistent displacement allows the talus to tilt into varus.
- Fixation of the medial malleolus usually consist of two 4-mm cancellous lag screw oriented perpendicular to the fracture. Smaller fragment is fixed with one lag screw and one k -wire to prevent rotation. Fragments that are too small or comminuted for screw fixation can be stabilized with two K-wire and a tension band. Vertical fracture of the medial malleolus require horizontally directed screws or anti-glide plating technique.
- [3] Dumignon *et al* demonstrated that fixation of vertical medial malleolar fracture with neutralization plating is biomechanically advantageous.
- Although stainless steel implants are used most commonly for medial malleolar fracture.

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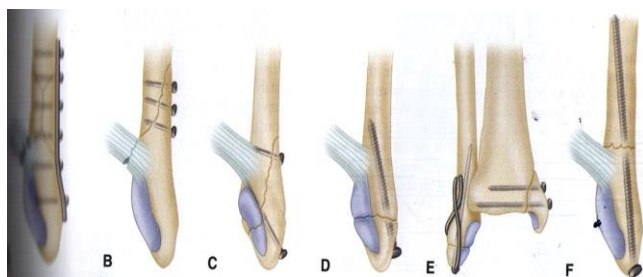


Various fixation modality for medial malleolus

Lateral malleolus fixation

[4] If the fracture is below the level of plafond, and if distal fragment is small and if the patient has good bone stock, use an intramedullary 3.5 mm malleolar screw for fixation. A 4.5 mm lag screw can be used in large patient. In patient with poor bone quality, place Kirschner wires obliquely from lateral to medial through distal and proximal fibular fragment and secure them further with tension band wire. Anatomical reduction and maintenance of fibular length are necessary.

If fracture is above the level of syndesmosis, use a small fragment, one-third tubular plate for fixation after anatomical reduction has been obtained; a 3.5 mm dynamic compression plate can be used in larger individual or for more proximal fractures. In general, place three cortical screw in the shaft of the fibula above the fracture and two or three screws distal of fracture. Unicortical cancellous screws are placed below the level of plafond. If the plate is placed postero laterally, it acts as an anti-glide plate.



Various fixation modality for lateral malleolus

Syndesmotic injury-Syndesmotic injury are most commonly caused by pronation-external rotation, pronation -abduction and infrequently, supination -external rotation mechanism (Danis- Weber type C and type B injury).

There is general agreement that syndesmotic fixation is indicated for (1) Syndesmotic injuries associated with proximal fibular fracture for which fixation is not planned and that involve a medial injury that cannot be stabilized. (2) Syndesmotic injury extending more than 5 cm proximal to the plafond.

The integrity of the syndesmosis can be evaluated intra-operatively by performing an external rotation stress test and cotton test.

In a cadaveric study [5], Xenon *et al* showed that syndesmotic disruption, measured as posterior displacement of fibula on an external rotation stress lateral radiograph, correlated more closely with anatomical diastasis than did displacement on stress mortis radiograph [6]. Stark *et al* recommended intraoperative external rotation stress evaluation for unstable Weber B fracture after identifying a 39% incidence of syndesmotic instability after lateral malleolar fixation.

The syndesmotic screw should be placed through both cortices of fibula and either one or two cortices of tibia. The AO group recommended a fully threaded screw for

syndesmotic fixation.

Aims & Objective

To evaluate the outcome of fracture Ankle dislocation managed with internal fixation.

Material and Methods

This is a study of patients with "Fracture Ankle Dislocation" admitted in Orthopaedic ward in B.R.D medical college, Gorakhpur, meeting both inclusion and exclusion criteria who came to our hospital. Preoperatively history taken regarding mode of injury, time of injury, personal history, treatment history are documented. Work up done for surgical management. Consent was taken from all the patient. This prospective randomized study was analyzed. This study was done after approval from the ethical committee of our hospital. Study period was 2 year.

Selection criteria

1. Age above 15yrs and less than 70yrs old.
2. Patients who are medically fit for surgery.
3. Radio logically diagnosed fracture Ankle dislocation.
4. Bimalleolar, trimalleolar fracture associated with dislocation/ Subluxation.

Operative technique

General anesthesia was administered to 15 patients and Spinal anesthesia for 25 patients. The patient was placed in supine position with a sand bag under the ipsilateral buttock in cases of lateral malleolar fracture. Following exsanguinations, tourniquet was inflated with time being noted. The affected limb was prepared with a primary scrub with Betadine. The parts were then painted with Betadine and Spirit. Surgical draping was done using the standard methods and the foot was covered with a hand towel or a glove.

The operative approach for the fixation of the lateral malleolus was done as per the standard approaches, depending on the mode of fixation planned. The lateral malleolar fracture was exposed first. Lateral malleolar fixation was done in 40 cases.

Medial malleolus was approached according to the mode of fixation planned using the standard approaches. Fixation was done in 40 patients. Posterior malleolar fracture was noted in 15 cases. The posterior malleolar fracture was fixed in 7 cases as there was anatomical reduction of the fragment in remaining cases.

Most of the patients were operated 10 days later either due to late presentation or due to unsatisfactory skin condition. 4 patients were operated after 3 weeks. 6 patients were operated within 1 week.

Out of 40 patients, 15 patients were operated under tourniquet control. The duration of surgery varied from 45 minutes to 1 hour and 30 minutes averaging 1 hour.

The implants used for the fixation of fractures were as follows:

The medial malleolus was fixed with Malleolar screws in 26 cases of which four were single screw. Tension band wiring was done in 10 cases. 4 cases with plate (Recon plate, Tubular 1/3rd plate) for medial malleolus especially in supination-adduction type of injury.

The lateral malleolus was fixed with One third tubular plate in 27 cases, Tension band wire in 6, and Dynamic compression plate in 2 cases, Malleolar screw fixation in 2 cases and K-wire in 3 cases. Posterior malleolus was fixed in 7 cases. Posterior malleolus was fixed with fully threaded cancellous

screw from anterior to posterior direction for small fragment in 4 cases and One third tubular plate was used in 3 cases.

Syndesmotic screw was used in 16 cases.

The patients were evaluated as per the rating of the *Weber's* criteria which included Objective criteria, Subjective criteria and Radiological evaluation. These were graded into good, fair and poor categories.

The Objective criteria included the movements of the ankle joint and subtalar joint function together which was deemed good when the rating was 0-1, fair when the rating was between 2-4 and poor when it was 5 and above.

The Subjective criteria involved the rating of pain, walking and return to activity. These were graded as good when the rating was 0-2, fair when it was between 3-6 and poor when it was above 6.

The Radiological rating was good when it was 0, fair when it was 1-2 and poor when it was 3 and above.

Results

Final outcome of the study as per Weber's criteria

Table 1: Depicts the percentage of the results based on Weber's criteria

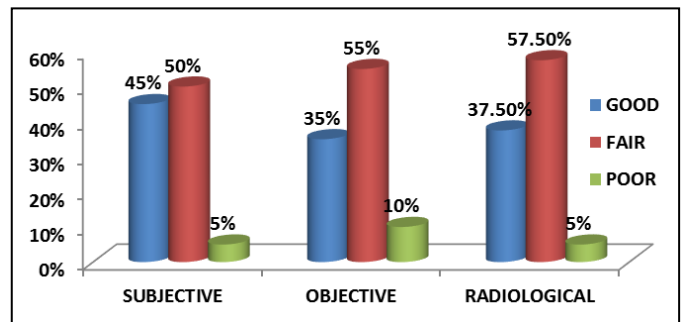
	Good	Good	Fair	Fair	Poor	Poor
Subjective	18	45%	20	50%	2	5%
Objective	14	35%	22	55%	4	10%
Radiological	15	37.5%	23	57.5%	2	5%

Table 3: Result compare with other study

Study	Excellent	Poor	
St Gallen ⁷	A-78.2%, B-75.6%, C-77.4%	A-21.8%, B-24.4%, C-22.6%	130 Cases with 67.5months follow-up
Freiburg Series ⁸	A-82.4%, B-83.4%, C-85.3%	A-17.6%, B-16.6%, C-14.7%	105 Cases with 2-7years follow-up
Liestal Series ⁹	A-82.7%, B-78.7%, C-61.8%	A-17.3%, B-21.3%, C-38.2%	213 Cases with 4-12years follow-up
Our Study	A-80.3%, B-83.6%, C-84.6%	A-19.7%, B-16.4%, C-15.4%	40 Cases with 3-24months follow-up

Discussion

- The fractures of the Ankle are commonly seen in the young adult male population with Road traffic accidents and twisting injuries being the common causes.
- Right side ankles were commonly involved than the left side.
- Weber type B was the commonest type of fracture. Supination external rotation injury was the most common mechanism of injury.
- The Aim of surgery is to achieve anatomical reduction of the fracture fragments, Ankle mortise congruity, restoration of the length of the fracture and restoration of syndesmotic integrity.
- During surgery, the soft tissues dissection was kept minimal to avoid further vascular compromise in an already tense, swollen ankle.
- In the postoperative period, splintage of the ankle and precaution to prevent swelling of the ankle is necessary. The swelling may lead to delayed wound healing. Patients are ambulated with crutches or walker without bearing weight on the injured limb from the first post-operative day if there are no associated injuries and can be discharged from the hospital by the first week.
- Most of the fractures in our study were fixed after 10 days which however change the final outcome, though other studies have stressed upon fixation within 8 hours of injury ideally and preferably within 24 hour. The complications that arose were in those where the fractures were fixed after 24 hours which were delayed



The results of other studies were compared with our final outcome. This was divided into 2 groups of excellent and poor results in each of the fracture types. The results when compared showed a comparable result as shown below in table 3.

Table 2: Weber's type of injury

Study	No. of Patients	Type	%
Liestal	108	Type B	64.8
Freiburg	100	Type B	60
St. Gallen	130	Type C	47.7
Present Study	40	Type B	50

The findings were similar to those of Liestal and Freiburg. The most common mechanism of injury was Supination-external rotation injury with 40% incidence.

- wound healing and superficial infections of the wound which mostly healed with regular wound care
- The six week period of immobilization did not affect the final range of ankle function as most patients had achieved full range of motion by the end of 12 weeks postoperatively with active exercise regimen.
- The result of this study is not in comparison with other studies as enumerated shows poor outcome as compare to other study with respect to the functional outcome following surgical stabilization of ankle fractures dislocation.
- Our study used ^[10] Lauge- Hansen's classification for mechanism of injury and Weber's classification for radiological classification. We recommend use of Weber's classification for management which is easier for classification and radiological assessment.

Conclusion

The final outcome as per the Weber's Radiological criteria was 57.5% fair, 37.5% good and 5% poor and Subjective criteria was 50% fair, 45% good and 5% poor. Objective criteria was 55% fair, 35% good and 10% poor result which showed good correlation between the postoperative radiological score and presentation of patients.

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