

Bimalleolar Fractures of Ankle –Review of Surgical Management

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Abstract:

Introduction

Ankle Fractures are common fractures of Lower limb which require surgical intervention. 25% are usually Bimalleolar fractures .Cast Application has only role in undisplaced crack Fractures. As maintainance of Reduction is a big problem **Surgical Fixation of both pillars of ankle has become a Dictum & Rule of Thumb.**

Material & Methods: In our Institute Prospective & Retro spective study was carried out on 38 patients from Jan 2010 To Dec 2014.(28 Males & 10 females), with a mean age of 44 years.(26 -68 years), who underwent surgical Fixation of Bimalleolar Fractures. Mean Follow-up 24 Months (10 -34 months.)

According To Lange Hansen Classification .the mechanism of occurrence was

1. Supination Ext- Rotation.(SER) 16 cases. (42%).
2. Pronation Ext- Rotation (PER) 13 cases (36 %)
3. Supination Adduction (SAD) 6 cases (16%).
4. Pronation Abduction (PAB) 3 cases (6%).

There were 5 (13.75%) cases associated with dislocation .Dislocations were reduced as an emergency surgical procedure . 2 cases were associated with Compound Injury which was Gustillo – Anderson Gr 2. All fractures were openly reduced & fixed by various implants .

The Trauma – Surgery Interval was 2 days (12 hrs to 8 days.)

Results: Average satisfactory results were obtained in all patients(100%).

The average union time was 9-10 wks (8-14 wks). Malleolar Screws gave good results of Fixation of Med Malleolus (80%)& 1/.3rd Tubular Plate gave good results for Lat malleolus (Fibula)87%. K- wires & TBW was a good option in osteoporotic Patients.Of the 38 cases acc to Ankle Society Criteria we had 28 good results(74%) 8 had fair outcome (21%) 2 had poor results.(5%) Commonest Complication was Joint Stiffness & Superficial Infection.

Conclusion: Anatomical Reduction especially Fibular length & early mobilization gave Excellent results.

Key Words:- Bimalleolar , Primary Osteo-synthesis , Mortise Congruity.

I. Introduction

Ankle Joint is a complex hinge weight bearing joint with bones & Ligaments playing an important role in the inherant stability. The injuries of the ankle range from minor sprains , Strains to unimalleolar, bi-malleolar tri- malleolar fractures with or with out dislocation & of plafond fractures. Due to heavy velocity injuries the incidence of such fractures is on rise. Isolated malleolar fractures form 2/3rd of total malleolar Fractures. Bimalleolar Fractures form 1/4th of the total, & the rest are all trimalleolar Fractures.

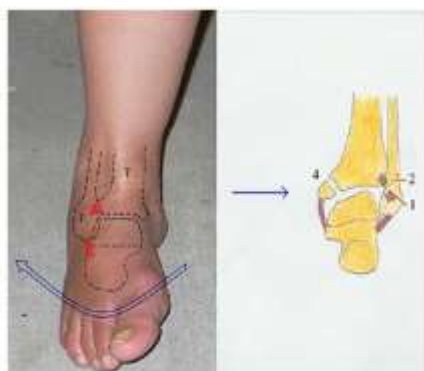
Bimalleolar Fractures cause the loss of Stability by disturbing the pillar structure & there by reduces th tibio-talar contact area & alters the joint congruity. Therefore achieving the pillar allignment & joint congruity is the key to good outcome & restores stable ankle Function. Initial wokers tried to stabilize by closed reduction & External plaster but failed because when the oedema subsided , the cast was loose & the reduction gave way producing very poor results. Also prolonged immobilization caused huge problem of Fracture disease, especially in geriatric age group.It also Increased the incidence of post traumatic arthritis So open reduction & Internal Fixation became the dictom. The primary goal of uncompromised return could only be achieved by fixation in anatomical reduction & maintenance of both pillars, giving a normal , stable ankle joint.

II. Material & Methods

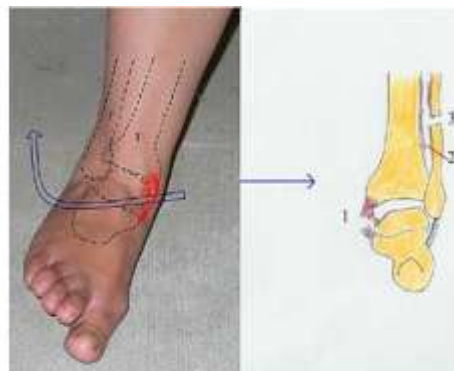
A prospective study was done in 38 cases over a period from Jan10 to Dec 14 in Bharati Vidyapeeth University Medical College & Hospital Sangli.. All were bimalleolar fractures were with out Dislocation. There were 28 males & 10 females .Mean age was 44 years (26 -68years).3 cases were in the 6th decade, & 8 were in the 5th decade, Right sided fractures were 20 & Left sided were 18 . Most of the injuries were due to Road Traffic Accident-26 patients, Domestic Injury in 12 patients of which 8 were more than 50 years of age.

According To Lange Hansen Classification .The mechanism of occurrence in our Series was as Follows:-

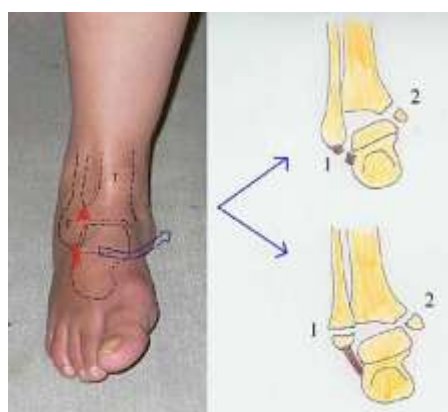
- 1.Supination Ext- Rotation.(SER) 16 cases..... (42%).
- 2.Pronation Ext Rotation (PER) 13 cases.....(36 %)
- 3.Supination Adduction (SAD) 06 cases..... (16%).
- 4.Pronation Abduction (PAB) 03 cases..... (06%)



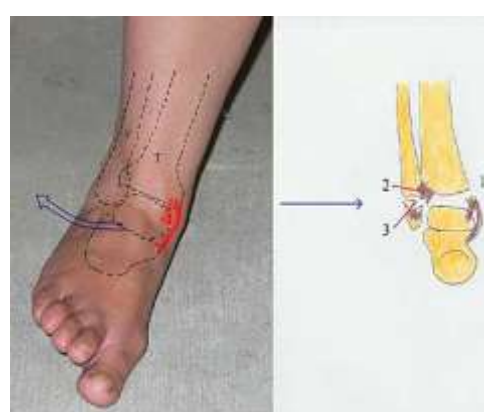
Supination Ext Rotation 16/38 (42%)



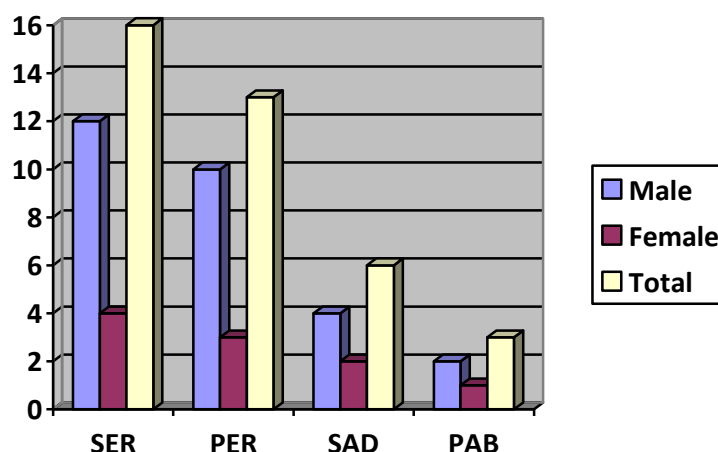
Pronation Ext Rotation 13/38 (36%)



Supination Adduction 6/38 (16%)



Pronation Abduction: 3/38 (06%)



All were classified as Unstable Fractures needing Surgery.

There were 5 (13.75%) cases associated with dislocation .Dislocation were reduced as an emergency surgical procedure . 2 cases were associated with Compound Injury which was Gustillo – Anderson Gr 2. All fractures were openly reduced & fixed by various implants .

The Average Trauma – Surgery Interval was 4 days (12 hrs to 8 days.)

Associated Injuries to Proximal Tibia.....2 cases.

Shaft Tibia 3 cases

Supracondylar Femur ... 2 cases.

Bimalleolar Fractures were fixed along with the Other Fracture preferably in 1 sitting only. Compound Fractures were treated on separate days.

Preoperatively the limb was elevated .ICE packs were given & crepe bandage was applied with a Temporary Posterior Plaster Splint

All fractures had undergone Open Reduction & Fixation of Medial Malleolus by

1.Malleolar Screw 4 mm

2 Malleolar Screw with K-wire & TBW.

The Lateral malleolus was Fixed by means of

1.1/3rd Tubular Plate

2.3.5mm Dynamic Compression Plate

3.3.5 mm Reconstruction plate./ Anti glide plate.

4. 3.5 mm cortical inter-frag lag screw.

Syndesmotic screw was fixed in 5 cases by means of 3.5 mm cortical screw after judging the stability intra operatively by Colton's Test.

All surgeries were done under IITV & Tourniquet & preferably Spinal or Epidural Anaesthesia. The Average Op Time was 1 hr .

Operative Procedure:-

For Lateral Malleolus – the fibula was Fixed first as a routine procedure which exposed from lateral approach, anatomically reduced by Bone & Plate holding clamps & fixed with 1/3rd Tubular plates -20 cases(14 –SER, 4-PER, 1-PA & 1 SA.)

3.5 mm DCP was used in 10 cases. (5-PER, 2-SER, 1-PA, 2 –SA).

Reconstruction Plate was used in 6 cases.(SER-2, PER-2 , PA-1 , SA-1).

L-wire used in 2 cases.(PER-1 & PA-1).

For Medial Malleolus:-A antero-medial approach was taken, fracture site exposed & edges freshened & anatomically reduced & Fixed with malleolar screw 4mm in 18 cases(7-SER, 8- PER, 2- PA, 1-SA). In 2 cases Deltoid lig which was also injured was diagnosed & treated accordingly.

After fixation the stability was checked & Syndesmotic Screw was fixed in 5 cases (PER-4, SER-1).with 3.5mm cortical screw with three cortical purchase as per AO principles.

Lateral malleolus was always fixed initially. then the Syndesmotic screw was fixed 1 cm from joint line if necessary.(Colton's Test +ve) Then the medial malleolus.

In Gr II compound wound initial Primary debridement was done with Betadine & Hydrogen Peroxide on the same day. A posterior splint & I/V Antibiotics was given for 5 days.

All compound fractures were of PER type, & had a wound on the Medial side.They were fixed after 5-6 days after skin condition became favourable.

Post-operative:-

I/v antibiotics was given for 5 a period of days, the limb was elevated & supported by a posterior splint. Toe movements were encouraged the same day. Knee Flexion was started from day1, & non- weight bearing was allowed on Crutches from day 3 depending upon tolerance of the patient. Sutures were removed on the 12th day & a Below knee plaster was given. Patient was advised non wt bearing physiotherapy for atleast 6-8 weeks till follow-up Xrays taken every month showed signs of healing & Clinical Examination reveals pain free movement at ankle.

III. Results

Results were evaluated by means of Ankle Society (R-B Criteria)It is Subjective & Objective clinical criteria with Radiographic results based on presence of pain, stability, Range of movements,& ability to walk & run.

Ankle Society Score has max score 100.points.

Clinical evaluation has 75 points. Radiolical evaluation has .max 25 points.

Accordingly more than 90 means Excellent to Good .

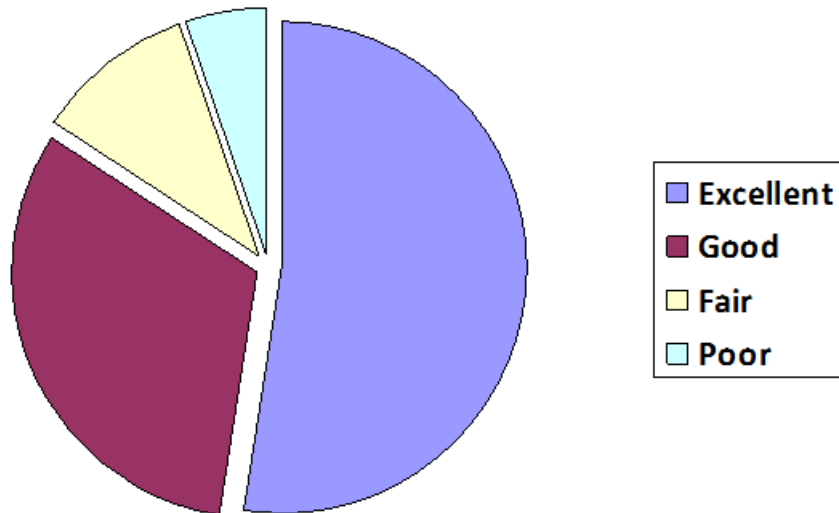
Less than 80 means poor results.

Satisfactory union were seen in all cases.(100%)

Average union time was obtained in 10 wks.(8 -16 weeks).Excellant Results in

26 cases .(74%) Fair in 9 cases(20%), poor in 3 cases(6%).

Serial No	Type Of # Mechanism n=38	Excellant	Good	Fair	Poor
1	SER 16/38=42%	10 (62.5%)	03(18.75%)	02 (12.5%)	01 (6.25%)
2	PER 13/38=36%	06 (46.15%)	03(23.08%)	03(23.07%)	01(7.70%)
3	SAD 06/38=16%	02 (33.33%)	02(33.33%)	01(16.67%)	01(16.67%)
4	PAB03/38 =06%	01 33.33%)	01(33.33%)	01(33.33%)	0 (0%).



Complication

1. Superficial Infections 6/38...(16%)
2. Implant Failure 4/38....(10.5%)



Cases & Observations:-





IV. Discussion

The fractures of the ankle are injuries seen in the young and middle aged patients commonly. The mean age in our series was noted to be 36 yrs with a male predominance of 73.68%

Table 9:- Sex distribution in various studies

Study	No Of Patients	Males	Females	% Of Males
Robert SR	25	11	14	44%
Berris et al	144	56	88	38.8%
Present Study	38	28	10	73.68%

Sex distribution in our study showed a male preponderance compared to other studies.

Weber’s Type B fractures consisted of 53.7%

Sr No	Study	No Of Patients	Weber Type #	Percentage
1	Liestal	108	TypeB	64.8%
2	Freibrug	100	Type B	60%
3	St Gallen	130	Type C	47.7%
4	Present Study	38	Type B	63%

Table 11:- Weber’s type of injury:

The findings were similar to those of Leistal and Freibrug.

The present study suggests anatomical reduction of the fracture and restoration of the joint congruity of the ankle at the earliest.

The post operative immobilization in a plaster slab or a cast upto six weeks does not affect the final outcome with respect to achieving the ankle and subtalar range of movements as most of the patients had achieved full range of motion at the end of 12 weeks.

The factors that affected the final poor outcome were the presence of long standing and uncontrolled Diabetes and old age, which was seen in four cases of which one had a neuropathic foot. the talus as drawn across the medial and lateral talar ridges and a difference of 2mm is abnormal. This is also measured by the differences in the perpendicular line across the top of the talus and the weight bearing line down the centre of the tibia on the anteroposterior film and a difference of more than 50 from the contralateral side is abnormal. Syndesmotomic width is the horizontal distance from the tibial incisura to the medial border of fibula.

V. Conclusion

- 1) 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.
- 2) Right side ankles were commonly involved than the left side.
- 3) Weber type B was the commonest type of fracture. Supination external rotation injury was the most common mechanism of injury.
- 4) The aim of surgery is to achieve anatomical reduction of the fracture fragments, ankle mortise congruity, restoration of the length of the fibula and restoration of syndesmotomic integrity.
- 5) During surgery, the soft tissues dissection was kept minimal to avoid further vascular compromise in an already tense, swollen ankle.
- 6) In the post operative 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.
- 7) Most of the fractures in our study were fixed within 24 hours which however did not change the final outcome, though other studies have stressed upon fixation within 8 hours of injury. The complications that arose were in those where the fractures were fixed after 24 hours which were delayed wound healing and superficial infections of the wound which mostly healed with regular wound care.
- 8) 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.
- 9) The result of this study in comparison with other studies as enumerated shows similar findings with respect to the functional outcome following surgical stabilization of bimalleolar fractures. The rarity of complications in comparison to other studies may be due to a small number of patients and a very short period of follow up.
- 10) Our study used 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.

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