International Journal Dental and Medical Sciences Research
Volume 4, Issue 5, Sep-Oct 2022 pp 444-452 www.ijdmsrjournal.com ISSN: 2582-6018

Functional outcome of Bimalleolar Ankle Fractures treated with internal fixation

Dr. C Shyam Kumar[1], Dr. Joydeep Das[2]
[1]*Professor, Department of Orthopaedics, Siddhartha Medical College,Vijayawada, Andhra Pradesh*
[2]*Post Graduate Student, Department of Orthopaedics, Siddhartha Medical College, Vijayawada, Andhra Pradesh*

Submitted: 10-10-2022 Accepted: 21-10-2022

ABSTRACT
Ankle injuries are one of the most common musculoskeletal trauma and gain importance, because the whole body weight is transmitted through the ankle, and locomotion depends on the stability of the ankle. For unstable bimalleolar fractures open or closed reduction and internal fixation have become the mainstay of treatment. In our study twenty cases of bimalleolar fractures of ankle in adults were included. Fracture types were classified as per Lauge-Hansen classification[3] and treated surgically with various methods of internal fixation. In our study we achieved 75% excellent, 15% good, 5% fair, and 5% poor results according to Baird & Jackson's Score[4]. Cancellous screws or malleolar screws are better in internal fixation of medial malleolus and lateral plating was the best for fibular fractures. The fibular length has to be maintained for lateral stability of the ankle. Anatomical reduction is essential in all intra-articular fractures more so if a weight bearing joint like ankle joint is involved.

KEYWORDS: Bimalleolar fracture, Lauge-Hansen classification, Baird and Jackson's scoring, Internal fixation, Cancellous screw, Malleolar screw, One-third tubular plate

I. INTRODUCTION

Ankle is a three bone joint which consist of tibia, fibula and talus. Ankle injuries are one of the most common
musculoskeletal trauma encountered in the emergency department.[1] Malleolar injuries are the most common significant ankle fractures.[1] The whole body weight is transmitted through the ankle. Locomotion depends on the stability of the ankle. Sir Robert Jones said, "Ankle is the most injured joint of the body but the least well treated".[2] For unstable bimalleolar fractures open or closed reduction and internal fixation have become the mainstay of treatment.[1]

Aims & Objectives
To assess the functional outcome of surgically managed bimalleolar fractures of ankle by various methods of internal
fixation

Materials & Methods
This is a Prospective interventional study which was carried out between April 2021 and April 2022. Twenty bimalleolar fracture patient who were admitted under Department of Orthopaedics in Siddhartha Medical college Vijayawada, Andhra Pradesh and who fulfilled the inclusion and exclusion criteria were included in the study

Inclusion Criteria
1. Closed bimalleolar ankle fractures
2. Age group : 18 to 60 years

Exclusion Criteria
1. Pathological fractures
2. Compound fractures
3. Isolated medial or lateral malleolus fractures
4. Associated pilon fracture

Fracture types were classified as per Lauge-Hansen classification[3] with the help of AP and lateral view radiographs of
affected ankle. Cases were followed up after 1,2,3 and 6 months of surgery. At each assessment, all patients were questioned with regard to pain, use of analgesics, stiffness, swelling, activities of daily living, use of walking aids, and return to work and participation in sports.
At examination, the gait, any thickening, swelling, tenderness of the ankle and the range of motion of the ankle were evaluated. Anteroposterior, lateral and mortise radiographs of ankle were made at the time of examination. Baird and Jackson's ankle scoring system[4] of subjective, objective and radiographic criteria was used for the study.

International Journal Dental and Medical Sciences Research
Volume 4, Issue 5, Sep-Oct 2022 pp 444-452 www.ijdmsrjournal.com ISSN: 2582-6018

II. RESULTS

Sex ratio

In our study we found that male female ratio is 3:2(12 male and 8 female)

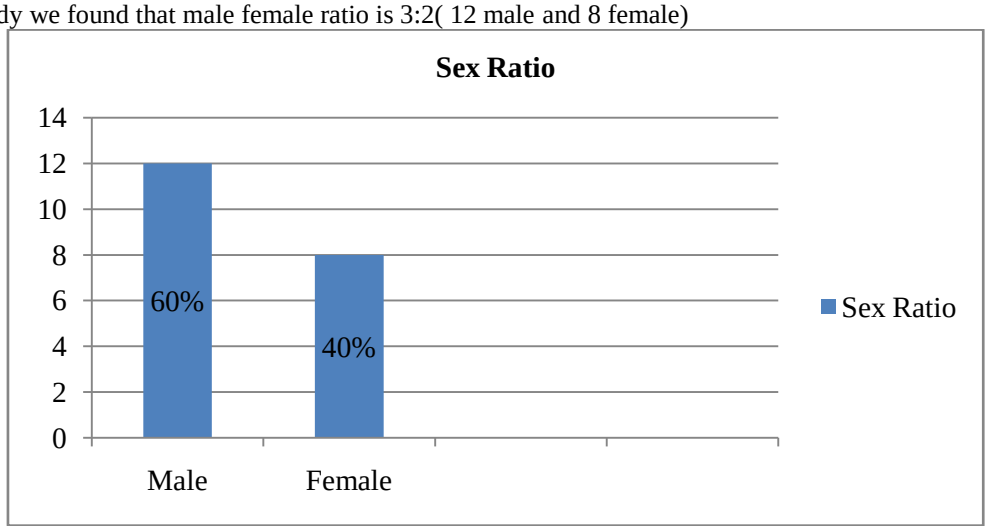

Figure No 1: Percentage of subjects in the study according to sex

Age Distribution

In our study we found that maximum patients(35%) are in the age group of 41-50 years followed by 51-60 years(30%),
31-40 years(20%) & 21-30 years(15%) age group.

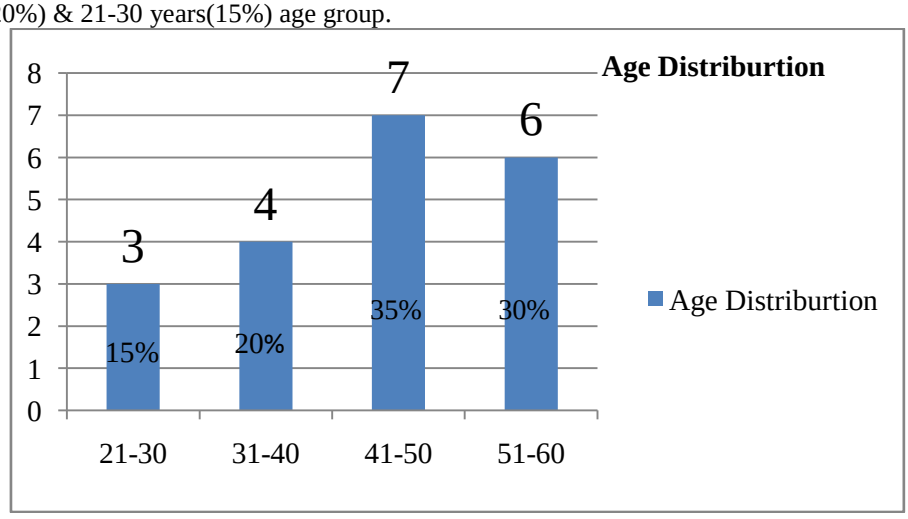

Figure No 2: Age Distribution

Mode of Injury

In our study we found that 70%(14) injuries are due to accidental fall and 30%(6) injuries are due to road traffic accident

International Journal Dental and Medical Sciences Research
Volume 4, Issue 5, Sep-Oct 2022 pp 444-452 www.ijdmsrjournal.com ISSN: 2582-6018

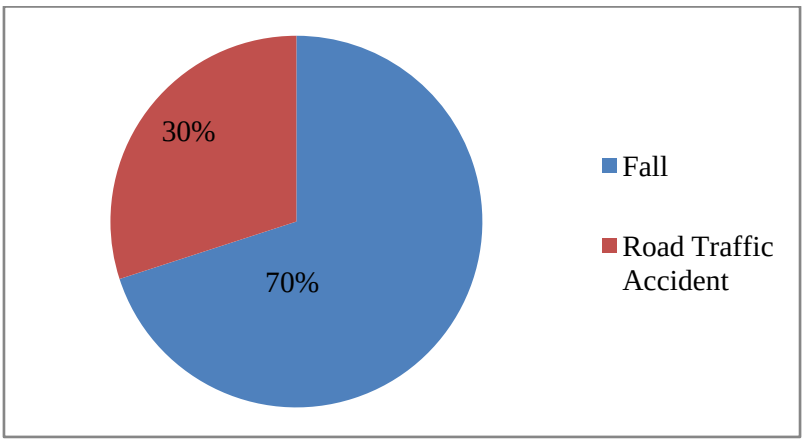

Figure No 3: Percentage of subjects according to mode of injury

Type of Injury (Lauge-Hansen classification)

In our study we found that maximum injuries are supination external rotation(50%) type followed by pronation abduction(25%), pronation external rotation(15%) and supination adduction(10%) type.

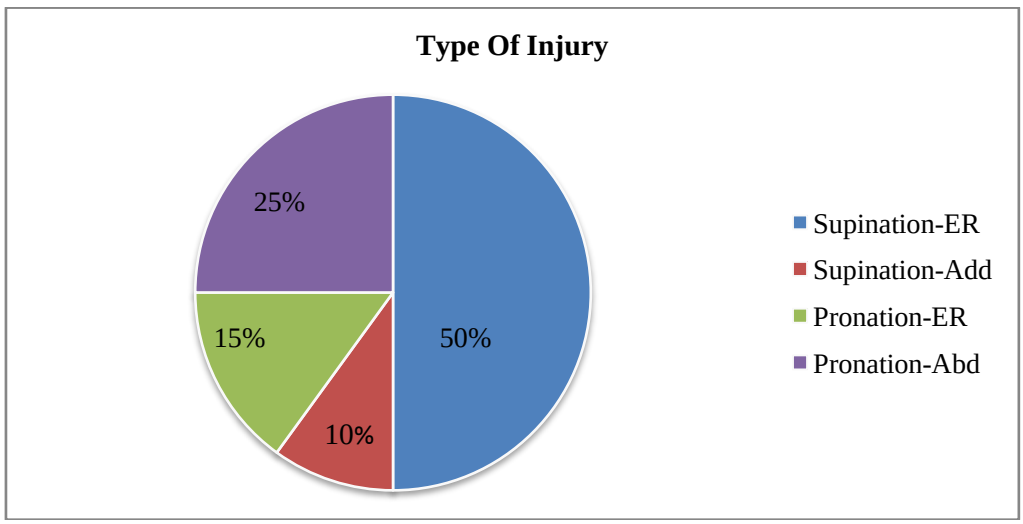

Figure No 4: Percentage of subjects according to type of injury

International Journal Dental and Medical Sciences Research
Volume 4, Issue 5, Sep-Oct 2022 pp 444-452 www.ijdmsrjournal.com ISSN: 2582-6018

Side of injury: Right ankle(65%) were injured more than left ankle(35%)

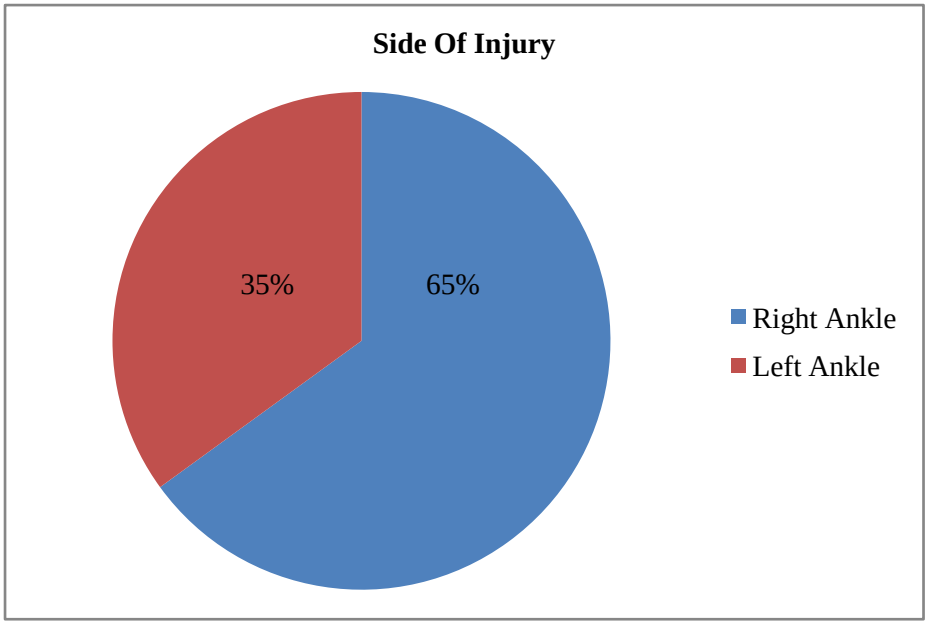

Figure No 5: Percentage of subjects according to side of injury

Comorbidities

In our sudy we found that 35%(7) patient having comorbidities as a smoking habit, 35%(7) patient having diabetes mellitus, 20%(4) patient having hypertension. 2 patient had coronary artery disease and 3 patient had bronchial asthma.

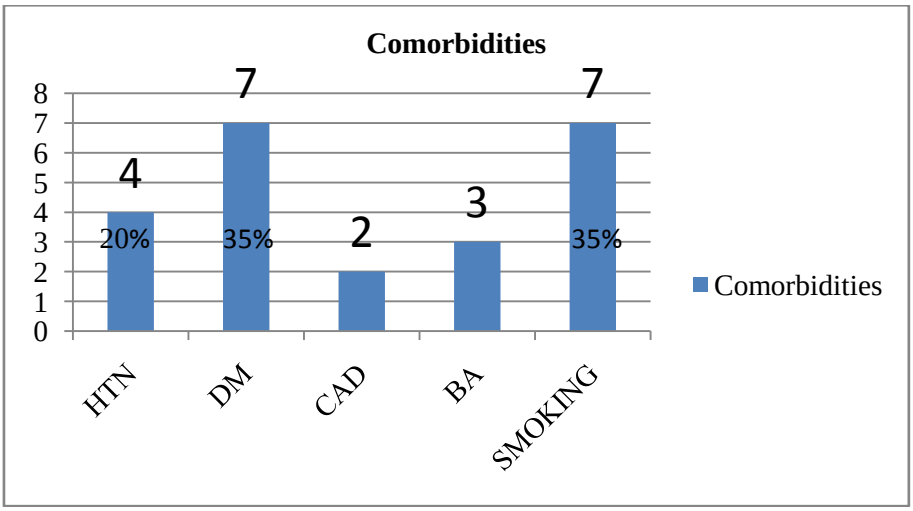

Figure No 6: Percentage of subjects according to comorbidities

Implants used for fixation

Medial Malleolus Fixation

In our study 45% medial malleolus was fixed with malleolar screw, 40% fixed with cannulaed cancellous screw and 15% fixed with tension band wiring.

International Journal Dental and Medical Sciences Research
Volume 4, Issue 5, Sep-Oct 2022 pp 444-452 www.ijdmsrjournal.com ISSN: 2582-6018

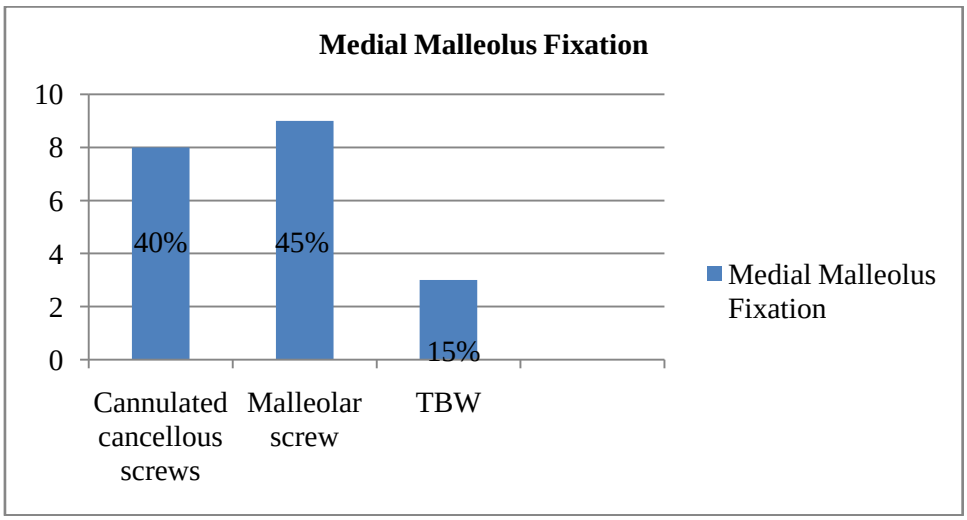

Figure No 7: Implants used for medial malleolus

Lateral Malleolus Fixation

70% Lateral malleolus was fixed with one-third tubular plate and 30% fixed with rush nail.

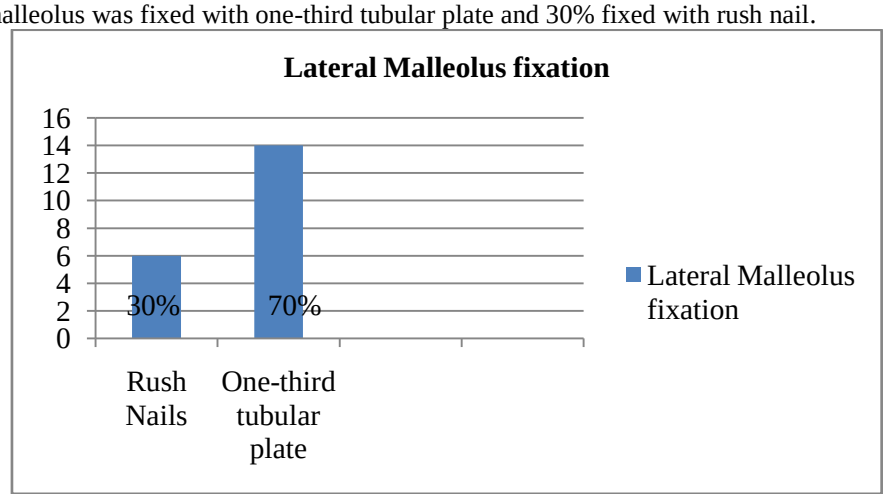

Figure No 8: Implants used for lateral malleolus

Complications

As complications we found that 6 patient had persistant pain, 3 patient had joint stiffness, 3 patient had post operative
Infection and 2 patient had delayed union.

International Journal Dental and Medical Sciences Research
Volume 4, Issue 5, Sep-Oct 2022 pp 444-452 www.ijdmsrjournal.com ISSN: 2582-6018

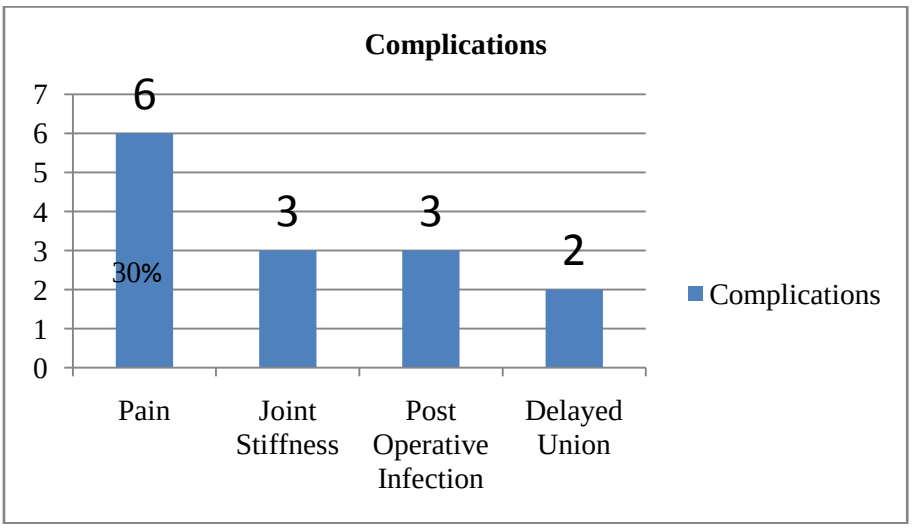

Figure No 9: Post operative complications

Functional outcome(Baird & Jackson's Score)

According to Baird's and Jackson's Score we found that 75% excellent, 15% good, 5% fair, and 5% poor results.

Composite Scores	Number of Patients	Percentage(%)
96-100(Excellent)	15	75%
91-95(Good)	3	15%
80-90(Fair)	1	5%
0-80(Poor)	1	5%
Total	20	100%

Figure no 10: Functional outcome according to Baird & Jackson's Score

Pre-operative & Post-operative X-rays

International Journal Dental and Medical Sciences Research
Volume 4, Issue 5, Sep-Oct 2022 pp 444-452 www.ijdmsrjournal.com ISSN: 2582-6018

Figure No 11: Pre operative x-ray

Figure No 12: Post operative x-ray

Intra operative pictures

Figure No 13: Lateral malleolus plating incision Figure No 14: Placement of one-third tubular plate

International Journal Dental and Medical Sciences Research
Volume 4, Issue 5, Sep-Oct 2022 pp 444-452 www.ijdmsrjournal.com ISSN: 2582-6018

Figure No 15: Closure after lateral malleolus plating

Post operative ankle range of motions (ROM)

Figure No 16: Post operative ankle range of motions

III. 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 and with anatomical restoration of the injured ankle.Closed method of treatment is often inadequate for bimalleolar ankle fractures. The treatment of malleolar fractures with accurate open reduction and

stable internal fixation using AO method and principles was found to give a higher percentage of excellent and good results.[5]

In the current study, we have 20 patients with bimalleolar ankle fractures, who were operated upon. All patients were followed up with minimum period of 6 months. The most common type of injury was supination-external rotation (50%), followed by pronation-abduction injury (25%), in accordance with by Roberts RS, Beris et al, Baird and Jackson[4]The most common aetiology being accidental fall.

The results of operative fixation are satisfactory in 90% of patients. Most of the complications were minor and resolved within three weeks. Tension band wiring is the method preferred for small fragments and osteoporotic bone. Cast immobilization for four weeks did not affect movements at ankle because the duration was very short.

The results in current study were compared with that of Burnwell & Charnley[6] ,Colton[7] , De souza[8] et al. In De souza[8] 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[5], of 144 patients with ankle fractures, 105 (74.3%) had good to excellent results. Our study results are comparable with the above cited studies with 75% excellent, 15% good, 5% fair, and 5% poor results.

IV. CONCLUSIONS

The operative results were satisfactory in 90% cases, with good to excellent functional outcome. Excellent results are obtained with stable fixation of fracture. Cancellous screws or malleolar screws are better in internal fixation of medial malleolus and lateral plating was the best for fibular fractures. The fibular length has to be maintained for lateral stability of the ankle. Anatomical reduction is essential in all intra articular fractures more so if a weight bearing joint like ankle joint is involved.

Limitations

A probable limitation of this study was smaller size of the study. Some observations like loss of reduction, implant failure, second surgery etc. which were not found to be statistically significant in our study, but are noted in many other studies is probably due to the smaller size of this study.

REFERRENCES

[1]. Dr Ravi Bharath, Dr Vishnuvardhan Reddy¸ Dr Shahnawaz Functional Outcome of Bimalleolar Ankle Fractures Treated With Semitubular Plate for Lateral Malleolus and Malleolar Screws for Medial Malleolus: IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 2 Ser. 2 (February. 2019), PP 25-38

[2]. Shelton Mar vin L. Complication of fractures and dislocation of the ankle. In: Complications in orthopaedic surgery, Chapter 23, 3rd edn.,Vol.I, edt. EPPS, Charles H, Philadelphia : J.B. Lippincott Company, 1994; 595-648pp.

[3]. Lauge-Hansen N. Fractures of the ankle. III: genetic roentgenologic diagnosis of fractures of the ankle. Am J Roentgenol Radium Ther Nucl Med. 1954;71(3):456-71.

[4]. 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.

[5]. Beris AE, Kabbani KT, Xenakis TA ,Mitsionis G, Soucacos PK, Soucacos PN. Surgical treatment of malleolar fractures – a review of 144 patients. Clin Orthop Related Research. Aug 1997; 341: 90-98.

[6]. 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.

[7]. Colton CL .The treatment of Dupuytren's fracture dislocation of the ankle. J Bone Joint Surg, 197; 53B:63-71.

[8]. 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.