*Original Article*

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# A Study on Functional Outcome of Surgical Management of Malleolar Fractures of Ankle Joint

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**Abstract**

Ankle fractures are the commonest type of injuries seen in emergency department. The purpose of treatment is to obtain an anatomical reduction and painless ankle after treatment. The aim of this study is to assess functional outcome after surgical treatment of malleolar fractures. *Materials and method:* This is a prospective study of thirty four patients conducted at tertiary care hospital from Jan 2014 to Dec 2017. Surgical management of malleolar fracture with various methods to restores the articular congruity of joint. Baird and Jackson's ankle scoring method was used during follow-up. *Results:* In our study, fourteen cases (41.18%) were in 31-40 years the age group. 24 patients were males (70.59%). 15 (44.12%) cases had supination-external rotation injury. 20 (58.82%) patients had bimalleolar fracture. Medial malleolar fractures were fixed with malleolar screw in 22 cases (73.33 %). Lateral malleolar fractures were fixed with plate in 15 cases (57.69%). Excellent results were found in 16 cases (47.06%).

**Keywords:** Functional Outcome; Malleolar Fractures; Ankle.

## Introduction

Ankle fractures are most commonly managed by orthopaedic surgeons in emergency department. Increase in the prevalence of ankle fractures over the last two decade in the young and old age patients [1,2]. Ankle fractures are complicated injuries that are difficult to manage. These patients prone for long-term disability and complications [3]. Goal of treatment include achieving complete union of fracture and painless ankle joint. Surgical management restores the normal anatomy of joint. Additional benefits include easier early rehabilitation, early mobilization of joint and earlier weight bearing [4].

The purpose of this study is to assess the functional outcome and results obtained after surgical management of malleolar fractures by various methods of internal fixation.

## Materials and method

The present study on forty eight malleolar fractures of ankle in adult's patients was conducted at Shridevi Institute of Medical Sciences & Research Hospital, Tumkur, Karnataka from Jan 2014 to Dec 2017. Out of those, six fractures were compound fractures; five patients were treated by closed manipulation and cast application. Thirty seven patients were treated surgically and they were available for the present study. Three cases were lost to follow up. The left thirty four patients were included in the present study. Unstable malleolar fractures, closed type of fractures, patient's age range from 20 to 65 years, patients willing for surgery and medically fit for proposed surgery were included. Patients with open fractures, stable fractures, fractures treated by conservative management, medically unfit for proposed surgery and who lost follow-up were excluded from study.

*Method:* A careful history was taken from the patient and patient attenders to know the mechanism and severity of injury. The patients were then assessed for general condition and to rule out vital injuries. An informed written consent was taken from patient.

On examination of patient ankle, observe for swelling of the ankle joint, deformity around joint, soft tissue injuries and distal neurovascular status. Lower ends of tibia and fibula were palpated and look for bony tenderness, displacement if any fracture, bony crepitus and stability of joint. Dorsalis pedis artery and posterior tibial artery pulsations were checked and noted. Syndesmotic instability was confirmed with the squeeze test and stress test. Radiological evaluation with plain radiographs in antero-posterior, lateral and mortise views. The fractures were classified according to Lauge–Hansen classification [5] and anatomical types [6].

*Operative Technique:* Under spinal anaesthesia the patient was placed in supine position. Lateral malleolus fractures were reduced and fixed with either a rush pin or a lag screw or K wire. Rigid fixation was achieved with one third semi-tubular plate and screws. Medial malleolus fractures were fixed with K- wire and 4 mm cancellous screw or malleolar screw. Posterior malleolus fractures were fixed with screw or plate and screws. The syndosmotic screw was used based on the type of fracture and location of the fibular injury.

*Post – operative protocol:* Intravenous antibiotic was given in the post-op period. Sutures were removed after 10 - 12 days. Below knee POP cast were applied for four weeks. Non-weight bearing walking was advised from second postoperative day. Partial weight bearing walking was started after four weeks. Ankle weight bearing was delayed in cases with syndesmotic screw fixation. Follow up was done for a period of 6 months at regular 6 weeks interval. Baird and Jackson's ankle scoring system [7] of subjective, objective and radiographic criteria was used for the present study. In this scoring system patients were questioned and assessed with pain, analgesics use, stiffness of joint, swelling around joint, daily living activities, walking aids usage, and return to normal routine work and activities.

## Observation and Results

In our study, thirty four cases of malleolar fractures of ankle were treated by surgical management at Shridevi Institute of Medical Sciences & Research Hospital, Tumkur, Karnataka from Jan 2014 to Dec 2017 were analyzed. In our study, most of the patient's i.e.14 (41.18%) were within the age group of 31-40 years, followed by 10 (29.41%) cases within the age group 21-30 years. Young patient was twenty one years and eldest patient was sixty five years. The mean age was forty years. Twenty four cases (70.59%) were males and 10 (29.41%) were females. Right side ankle was affected in 20 (58.82%) cases and left ankle in 14 (41.18%). Eighteen cases (52.94%) affected were because of road traffic accident, 9 cases (26.47%) were because of fall, and 7 cases (20.59%) were because of twisting injury. The most common mode of injury was Road traffic accident.

There were twelve cases (35.29%) of associated injuries, of that four cases had head injuries, 4 cases had ipsilateral tibial shaft/pilon fracture, and one case had ipsilateral radius and ulna fracture, and three cases of ipsilateral Colles fracture. According to Lauge - Hansen classification, majority of the cases i.e. 15 (44.12%) had Supination-external rotation injury, followed by ten (29.41%) cases had Pronation - external rotation injury, six (17.65%) cases had Pronation-abduction injury and three (8.82%) cases had Supination-adduction injuries.

**Table 1:** Showing malleolarity of fracture

| Malleolarity | No. of cases | Percentage |
|---|---|---|
| Medial malleolar fracture | 8 | 23.53 |
| Lateral malleolar fracture | 4 | 11.76 |
| Bimalleolar fracture | 20 | 58.82 |
| Trimalleolar fracture | 2 | 5.88 |

In the present series (Table 1), bimalleolar fracture was seen in 20 (58.82%) patients, followed by 8 (23.53%) patients had isolated medial malleolar fracture, 4 (11.76%) had isolated lateral malleolar fracture and 2 (5.88%) patients had trimalleolar fracture.

Most of the medial malleolar fractures (Chart- 1) were stabilized with malleolar screw i.e. 22 cases (73.33%). Cancellous screw, tension band wiring (TBW), and K-wire fixation was used in the rest of the cases. Majority of the lateral malleolar fractures (Chart- 2) i.e. fifteen cases (57.69%) were fixed with plate and screws, of which 12 with one-third Semitubular plate, 2 with 3.5mm DCP, and 1 with 3.5mm reconstruction plate. Malleolar screw was used in 4 cases, rush pin in 5 cases and K wire in 2 cases in remain patients.

Two patients (5.88%) had posterior malleolar fracture; of which one was treated by operative method by malleolar screw. Another one was treated with plate and screws. In three cases (8.82 %), Syndesmotic injury was fixed with fully threaded

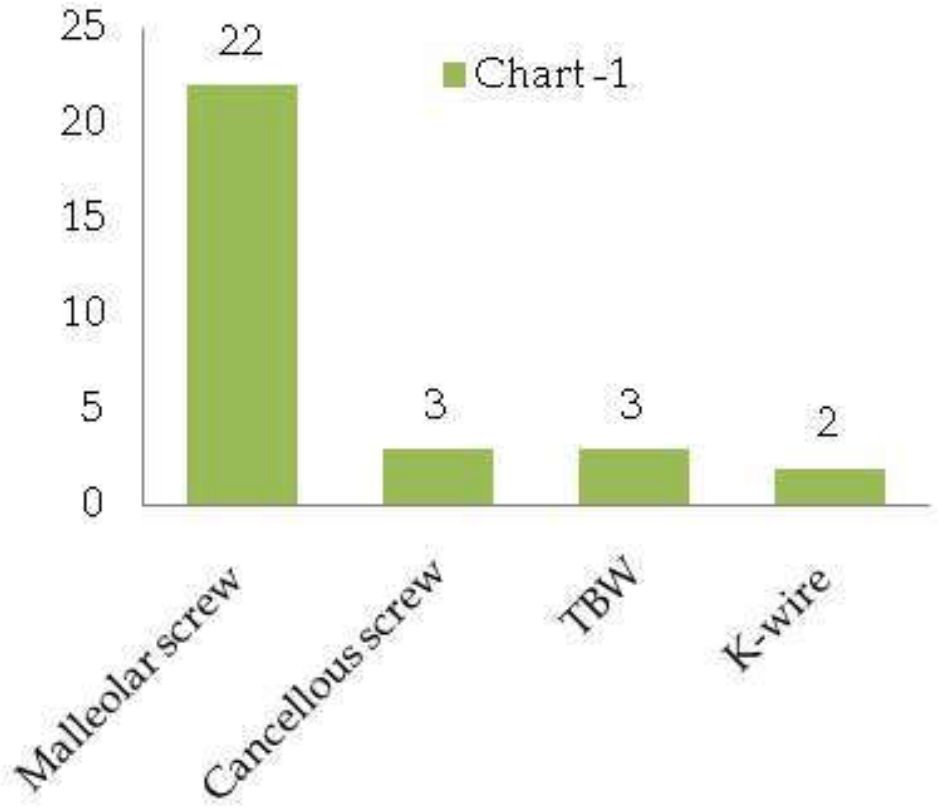


**Chart 1:** Showing implant used in medial malleolus fracture

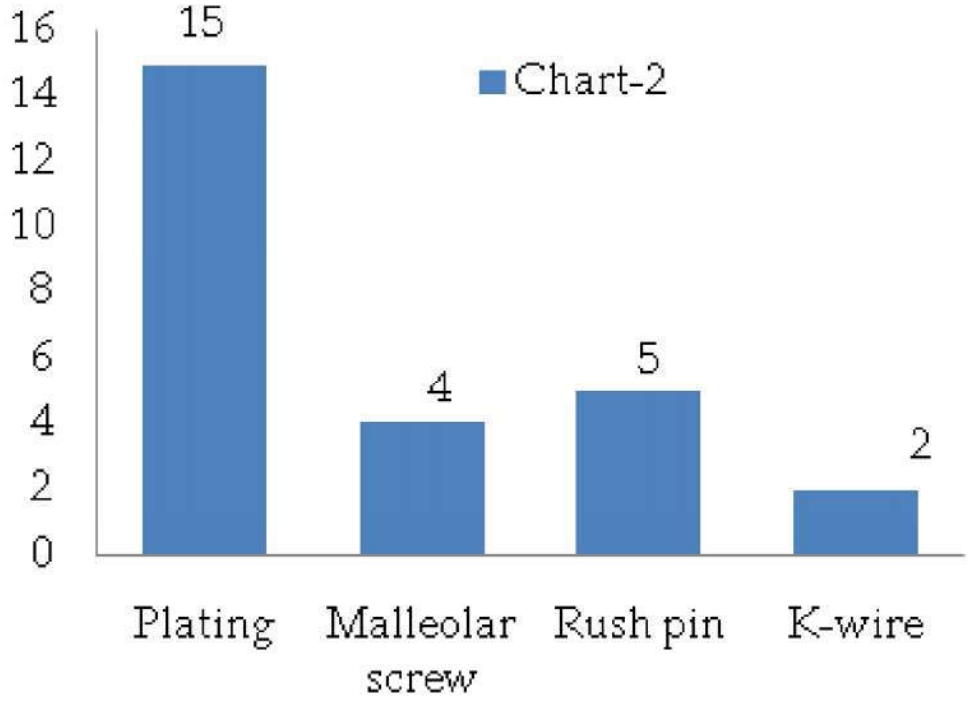


**Chart 2:** Showing implant used in lateral malleolus fracture

Pre - Operative X-Ray | Post-Operative X-Ray | Union at 10 Weeks

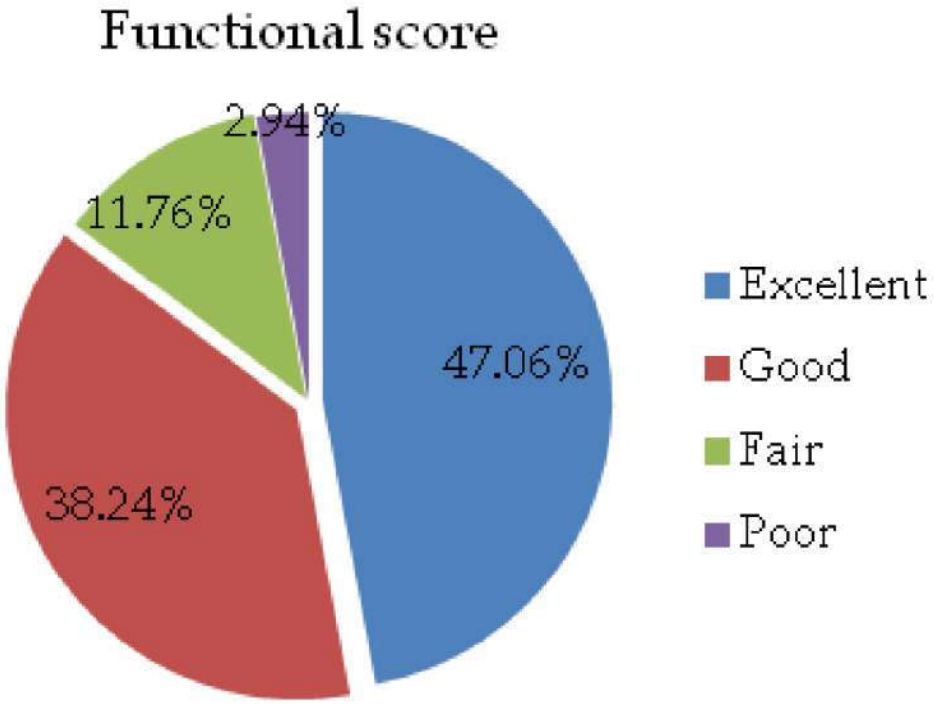


**Chart 3:** Showing fuctional outcome

cortical screws. Weight bearing was delayed for 6-8 weeks due to screw. In our series all fractures showed union between 10 – 14 weeks with average of 12 weeks. 6 (17.65%) patients had complications. Four patients had superficial infections and two patients had deep infections. The infection was managed with thorough wound debridement.

Excellent results were found in sixteen cases (47.06%), good in thirteen cases (38.24%), fair results in four cases (11.76%) and poor results in one case (2.94%).

## Discussion

Intra-articular ankle fractures are commonly seen in outpatient department. Methods to restore normal function and to prevent secondary arthritis are with conservative treatment or open reduction with internal fixation. Burwell and Charnley concluded that anatomical reduction of fracture and rigid fixation with plate and screws lead to normal function of joint [8]. Surgical management of malleolar fractures is the best method for restoration of normal joint. Several studies witnessed that, internal fixation fractures gives better results [8, 9, and 10].

In our series, ankle fractures were seen in 31-40 yrs age group, with average of 40 yrs. Our findings are compared and similar results as shown by Beris et al [11], Roberts RS [12] and Baird and Jackson [7]. In our study, we found that male predominance with 70.59% and which were comparable to the study by Baird & Jackson [7].

Eighteen cases (52.94%) are affected because of road traffic injuries, which was compared with study result by Lee et al. [13].

According to Lauge-Hansen classification system, we noticed that supination-external rotation injury (44.12%), followed by pronation-external rotation injury (29.41%), and are compared with studies by Roberts et al [12], Beris et al. [11], Baird and Jackson et al. [7]. Yablon [14] study shown that, anatomical reduction and fixation of the lower fibula is the best thing to do in treatment of ankle fractures with syndesmotic instability. Bray [15] noted that incidence of postoperative complications are minimal in immediate surgery than delayed surgery.

**Table 2:** Showing comparison of functional results

| Study | Good to excellent | Fair results | Poor results |
|---|---|---|---|
| Burnwell & Charnley[8] | 102 (77%) | 22 (17%) | 8 (6%) |
| Beris et al[11] | 105(74.3%) | 21(14.6%) | 16(11.1%) |
| De souza[9] | 135(90%) | 9(6%) | 6(4%) |
| Present series | 29(85.3%) | 4(11.76%) | 1(2.94%) |

Functional outcome (Table 2) according to Baird and Jackson's ankle scoring system we found that, most of the patients (85.3%) had good to excellent results are similar results as shown by Burnwell & Charnley et al. [8], De souza et al. [9], Beris et al. [11]. Excellent and good functional results are achieved with anatomical reduction and rigid internal fixation [11]. Fair to poor results in the current series were seen because of postoperative wound infection, associated syndesmotic instability, and associated posterior malleolar fracture. Poor result seen in Pronation-external rotation type of injury.

## Conclusion

Good functional outcome can be achieved through anatomical reduction and rigid fixation of malleolar fractures. Early mobilization of joint can be achieved through surgical fixation of fracture. Surgical management of fracture was found to give a high percentage of good functinal results.

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*Conflict of interest:* Nil

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