

Comparative Study of Internal Fixation for Displaced Closed Fracture of Medial Malleolus Using Malleolar Screw with k wire Versus Tension-band Wiring



Orthopaedic

KEYWORDS: malleolar screw, internal fixation, tension band wire, closed fracture.

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ABSTRACT

In a prospective, randomized trial of 40 patients with displaced closed fracture of medial malleolus at MAHATMA GANDHI HOSPITAL JODHPUR, DR.S.N.MEDICAL COLLEGE JODHPUR from 2014 to 2016, we compared two methods of internal fixation namely malleolar screw with k wire and tension-band wiring.

Introduction

Ankle injuries gain importance because body weight is transmitted through it and locomotion depends upon the stability of this joint.

Malleolar fractures are one of the most common fractures in orthopaedic traumatology. As with all intra articular fractures, malleolar fractures necessitate accurate reduction and stable internal fixation.

The study was conducted with the following objectives:

- To identify functional outcomes of closed fracture medial malleolus treated either by malleolar screw with k wire or by TBW.
- To study Union rate in both methods.

Inclusion criteria:

- a) Patients with closed malleolar fracture of ankle joint.
- b) Adult Patients of both sexes (20-65 years)

Exclusion criteria:

- a) Open ankle fracture, bimalleolar fracture
- b) A previous fracture of same ankle
- c) Bimalleolar fracture with pilon fracture
- d) Bimalleolar fracture with ipsilateral leg bone fracture which is planned for nailing
- e) Bimalleolar fracture with ankle arthritis changes and neurological involvement.

Study type: comparative study.

Study setting and study period: From July 2014 to June 2016 at MAHATMA GANDHI HOSPITAL JODHPUR, (DR.S.N.MEDICAL COLLEGE JODHPUR)

Sampling method and Sample size:

We randomized 40 patients with displaced closed fractures of medial malleolus treated by open reduction and internal fixation with either malleolar screw with k wire or with tension-band wiring.

- They were then allocated to one of two treatment groups:
- Group 1 (20 patients) had malleolar screw fixation with k wire.
- Group 2 (20 patients) had tension-band wiring.
- The populations were similar in age, sex, fracture type (weber types B & C), and aetiology (twisting, fall, or motor vehicle accident)

Evaluation:

We evaluate the patients clinically, radiologically, and functionally using a modification of the scoring system proposed by Olerud and Molander.

The scores for each component of this scale were assessed by the use of a questionnaire, in combination with clinical objective criteria.

The scoring scale has a maximum of

100 points (**>91 excellent results,**

81-90 good results,

71-80 fair results,

<70 poor results).

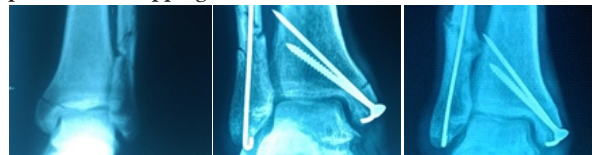
The continuous variables were analysed between groups using Independent sample *t*-test. P value of less than 0.05 was considered statistically significant.

Surgical Technique:

All the patients in this study were operated under regional anesthesia. The patient was positioned supine and pneumatic tourniquet was applied to the mid thigh.

After routine skin preparation and draping, we made an anteromedial incision that began approximately 4 cm proximal to the fracture line, extended distally and slightly anteriorly, and ended approximately 2 cm distal to the tip of the medial malleolus. We prefer this incision for two reasons: first, the tibialis posterior tendon and its sheath are less likely to be damaged, and second, the surgeon is able to see the articular surfaces, especially the anteromedial aspect of the joint, which permits accurate alignment of the fracture.

In case of when we were doing malleolar screw fixation we made only 4 cm hockey stick incision over medial malleolus without periosteum strapping fix the fracture.



Results

There were no significant differences between the two groups in age, sex, fracture type, and aetiology (twisting, fall, or motor vehicle accident)

Review of postoperative radiographs confirmed anatomic reduction with stable fixation in all forty patients. All the series of radiographs showed normal fracture healing and some patient had malunion, or loss of reduction.

Functional and radiological results were analyzed using the modified ankle scoring system of Olerud and Molander. The evaluation were based on physical and radiological examination.

The mean time for radiological bone union (indicated by disappearance of fracture line) was 10.1 weeks (ranging from 8 to 18 weeks) in group 1 patients and 9.2 weeks (ranging from 6 to 12 weeks) in group 2 patients (p=0.03).

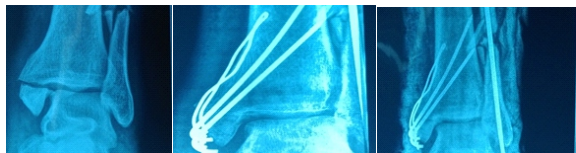
According to the modified ankle scoring system of Olerud and Molander,

4(20%) patients in group1 and 2(10%) patients in group2 were excellent:

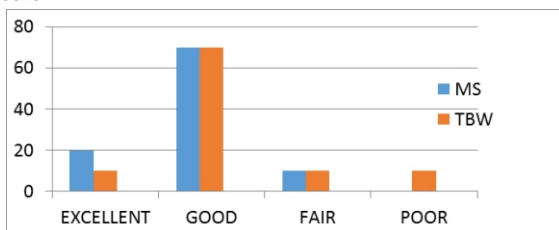
good in 14(70%) patients in group1 and 14(70%) in group2:
fair in 2(10%) patients in group 1 and 2(10%) in group2:
poor in 2(10%) patients in group2 and non in group1 patients.

Excellent and good results were achieved in 90% in group1 patients and 80% in group2

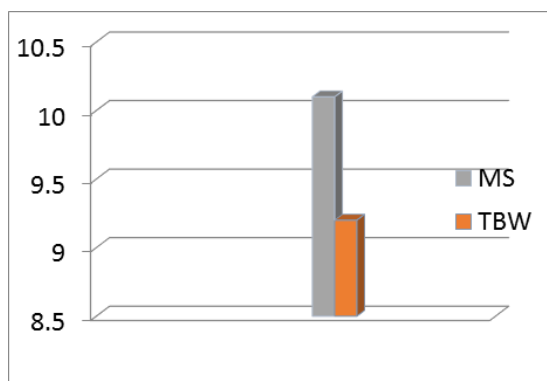
patients. (p=0.049).



The modified ankle score of Olerud and Molander Parameter Score



Mean Union rate



Complications:

Postoperative:

1. Skin necrosis. Necrosis of the skin edges at the site of the operation was recorded in three patients (7.5%), one in group1 and the other in group2 patients. They were treated with meticulous debridement of the necrotic skin and dressing.

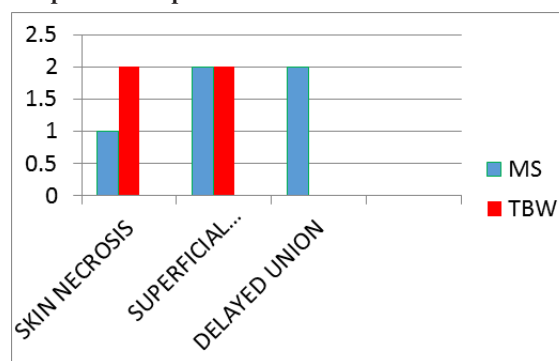
2. Superficial wound infection. It developed in 4 (10%) patients, two in group1 and two in group2. The condition resolved with local wound care, regular dressing and antibiotics.

3. Delayed union, two cases (5%) out of 40 cases develops this complication. The patients were female aged 50 years and male aged 43 years; they are treated by malleolar screw (group1 patients). The patients continue to have pain on the medial side of ankle joint after 12 weeks of fixation and the fracture takes around 18 weeks to unite radiologically. During this period we continued in protection of the fracture with splint and full weight-bearing was also delayed.

4. Limitation of movement.

Clinically the loaded dorsal range of movement was measured at the final follow-up examination by SUPINE with the knee and hip extend. Both ankles were measured. 80% of group1 patients compared with 70% of group 2 Patients group-1 had ankle dorsiflexion greater than 15 degrees.

Post operative complications



Conclusions

1. The preliminary results of the current study suggest that **malleolar screw with k wire** may be more valid option for internal fixation of medial malleolar fractures because this requires less size of incision, **less tissues handling, less time consuming, less chances of post-op. infection, easy to remove.**

2. The tension-band wiring is more technically advantageous for **small fragment fixation and transverse fracture** of medial malleolar fractures.

3. The tension-band wiring may be **more available** and its usage could translate into over all cost saving when applied to the large number of ankle fractures treated surgically in our country.

4. The **fast radiological union (around 1 weeks)** which was achieved with the use of **tension-band wiring** as compared with malleolar screw.

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