



ANTERIOR-TO-POSTERIOR SCREW FIXATION VS POSTEROLATERAL PLATE FOR POSTERIOR MALLEOLUS IN TRIMALLEOLAR ANKLE FRACTURES

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ABSTRACT

Background: It has been observed that posterior malleolar fractures occur in about 7% to 44% of all ankle fractures. Posterior malleolus (PM) refers to some malleolar fractures which involve a fracture of the posterior lip of distal tibia. Research says that posterior tibial margin plays a crucial role in the maintenance of ankle stability and bearing of weight. The standard approach to treat lateral and medial malleolus fractures is selecting a surgical treatment with open reduction and internal fixation.

Objective: To compare posterolateral plate fixation with anterior-to-posterior screw fixation

Study design: A randomised comparative study

Duration and place of study: This study was conducted at Liaquat National Hospital and Medical College Karachi from June 2024 to June 2025

Methodology: This study included all the patients who were having trimalleolar ankle fracture and were admitted in the hospital. All of the participants later underwent surgical stabilisation of all 3 malleolar fragments. The participants were aged from 18 years to 60 years. Participants were divided into 2 groups by using computerised random numbering. Anterior-to-posterior screw

fixation was done in group A while posterolateral plate fixation (open reduction and internal fixation) was done in group B.

Results: There were a total of 60 patients involved in this study. The participants were aged from 18 years to 60 years. All of them were divided into 2 groups of equal population (30 patients in each group). Anterior-to-posterior screw fixation was done in group A while posterolateral plate fixation (open reduction and internal fixation) was done in group B. 26.7% results were excellent in group A while 40% results were excellent in group B.

Conclusion: By fixing the posterior malleolar fracture, the stability and recovery is improved, making syndesmotomic screws unnecessary. Therefore, it should be fixed in all cases regardless of size.

INTRODUCTION

It has been observed that posterior malleolar fractures occur in about 7% to 44% of all ankle fractures [1]. Posterior malleolus (PM) refers to some malleolar fractures which involve a fracture of the posterior lip of distal tibia [2]. Usually, the posteromedial part of the tibial plafond or the posterior tubercle of the distal tibia is included in these types of fractures [3]. Research says that posterior tibial margin plays a crucial role in the maintenance of ankle stability and bearing of weight [4,5]. If this area is affected and injured, it can lead to degenerative ankle arthritis. When the displaced fragment includes more than 25% to 35% of the articular surface of the distal tibia, it becomes an indication to fix the posterior malleolar fracture [6].

The standard approach to treat lateral and medial malleolus fractures is selecting a surgical treatment with open reduction and internal fixation [7]. Posterior malleolus fractures are usually left unfixed because after the open reduction of the lateral malleolus, they are expected to realign automatically. However, debate is still going on related to ankle fractures involving the posterior malleolus and which types of fractures actually need posterior malleolus fixation [8]. Studies suggest that instead of direct fixation of posterior malleolus, trans-syndesmotomic fixation can be sufficient [9,10]. For the open reduction and internal fixation of posterior malleolar fragments, there have been only a few surgical techniques described [11]. Moreover, there is very limited research about the best treatment for different fracture patterns. Furthermore, there is also very limited research on the most suitable fixation method for trimalleolar fractures. Therefore, we have conducted this study to compare posterolateral plate fixation with anterior-to-posterior screw fixation, two fixation methods for posterior malleolus fractures in trimalleolar ankle injuries.

METHODOLOGY

This study is a randomised comparative study which included all the patients who were having trimalleolar ankle fracture and were admitted in the hospital. All of the participants later underwent surgical stabilisation of all 3 malleolar fragments. The participants were aged from 18 years to 60 years. All the participants were informed about this study and their written consent was obtained.

Exclusion criteria: Patients with pilon fracture were not a part of this study. Moreover, those who had additional contralateral and ipsilateral lower extremity injury were also not a part of this study. Lastly, those who had a history of a lower extremity fracture were also excluded.

Those patients who were fully filling the inclusion criteria were selected and the investigator approached them by himself. Later, their detailed history was obtained. Participants' thorough systemic and general examination was done. Special and routine investigation including radiological and biochemical was performed. Participants were divided into 2 groups by using computerised random numbering. Anterior-to-posterior screw fixation was done in group A while posterolateral plate fixation (open reduction and internal fixation) was done in group B. Both the

fixation was performed by one designated orthopaedic surgeon to eliminate surgeon bias. All the participants were evaluated radiologically and clinically for bone strength, union, deformity, and weight-bearing ability. The range of motion was evaluated at 2 weeks, 6 weeks, and then up to 6 months. MS Excel, SPSS, and Primer were used to analyse the data.

RESULTS

There were a total of 60 patients involved in this study. The participants were aged from 18 years to 60 years. All of them were divided into 2 groups of equal population (30 patients in each group). Anterior-to-posterior screw fixation was done in group A while posterolateral plate fixation (open reduction and internal fixation) was done in group B. Table number 1 shows the distribution of the patients according to gender.

Table No. 1:

Gender	Group A (n=30)		Group B (n=30)	
	N	%	N	%
Female	12	40	6	20
Male	18	60	24	80

Table number 2 shows the details of the parameters in both the groups.

Table No. 2:

Parameters	Group A		Group B	
	N	%	N	%
Type of fracture				
• Close	14	46.7	16	53.3
• Open	16	53.3	14	46.7
Mean $\pm$ SD				
Age (yrs)	39.08 $\pm$ 10.01		36.44 $\pm$ 6.95	
Weight-bearing (weeks)	7.04 $\pm$ 0.73		12.02 $\pm$ 1.50	

Table number 3 shows the functional results.

Table No. 3:

Results	Group A (n=30)		Group B (n=30)	
	N	%	N	%
Poor	5	16.6	3	10.0
Good	17	56.7	15	50.0
Excellent	8	26.7	12	40.0

DISCUSSION

Ankle fractures are very common nowadays. They make up about 3.92% of all body fractures [12]. Posterior malleolar fractures occur in about 7% to 44% of all ankle fractures [1]. Mostly, the orthopedic surgeons either use a screw to fix the medial malleolus or use a plate to fix the lateral malleolus [13]. It is because these are the only simple and effective procedures. There is no need for deep surgical exploration because both malleoli lie just beneath the skin. The result is that the posterior malleolus is often left unfixed.

The posterolateral plate fixation plays a key role in maintaining the stability of the ankle syndesmosis. The stability of the tibiofibular syndesmosis can be affected when a posterior malleolus fracture occurs [14]. The posterior syndesmotic ligaments often stay attached to the fractured bone fragment in such cases. In our study, we evaluated a total of 60 patients who were divided into 2 groups. Each group had 30 patients. Anterior-to-posterior screw fixation was done in group A while posterolateral plate fixation (open reduction and internal fixation) was done in group B. A similar study was conducted by Timothy et al. who performed this study on 27 participants [15]. Our results were similar to their study. In our study, 16.6% participants' results were poor, 56.7% participants' results were good, and 26.7% participants' results were excellent in group A. On the other side, 10% participants' results were poor, 50% participants' results were good, and 40% participants' results were excellent in group B. Similar results were observed in other studies as well [16,17,18]. Another study by Sinan Karaca et al. observed that the results were excellent in 21 patients and good in 26 patients [19]. Vidović D et al. evaluated 46 patients and showed similar results to our study [20].

CONCLUSION

By fixing the posterior malleolar fracture, the stability and recovery is improved, making syndesmotic screws unnecessary. Therefore, it should be fixed in all cases regardless of size.

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Conflict in the interest

The authors had no conflict related to the interest in the execution of this study.

Permission

Prior to initiating the study, approval from the ethical committee was obtained to ensure adherence to ethical standards and guidelines.

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