

COMPARATIVE STUDY OF THE TREATMENT OF MEDIAL MALLEOLAR ANKLE FRACTURES BY CLOSED REDUCTION AND PERCUTANEOUS FIXATION VERSUS OPEN REDUCTION AND INTERNAL FIXATION

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INTRODUCTION

Medial malleolus fractures are involved in approximately 50% of all ankle fractures and are often associated with lateral or posterior malleolar fractures, occurring less frequently in isolation. Treatment of medial malleolus fractures aims to restore ankle stability and function, ensuring anatomical alignment to prevent post-traumatic degenerative changes. Traditionally, open reduction and internal fixation (ORIF) have been considered the gold standard, providing excellent visibility and fixation. However, percutaneous fixation methods are gaining traction as minimally invasive alternatives, potentially reducing soft tissue complications while maintaining efficacy. This study explored the comparative effectiveness of closed reduction with percutaneous fixation versus ORIF in achieving optimal clinical and radiological outcomes for medial malleolar fractures.

AIM OF THE WORK

The aim of this study was to compare the outcomes of closed reduction and percutaneous fixation with those of open reduction and internal fixation in the treatment of medial malleolar fractures. This comparison focuses on radiological alignment, functional recovery, and complication rates to determine the most effective and safe approach.

SUBJECTS AND METHODS

The study was conducted prospectively on 50 adult patients presenting with closed medial malleolar fractures at El-Hadra University and Gamal Abdel-Nasser Hospitals. Patients were divided equally into two groups: Group I underwent closed reduction and percutaneous fixation, while Group II received ORIF. Inclusion criteria included patients with recent, displaced medial malleolar fractures aged over 18 years. Patients with open, comminuted, or neglected fractures and those with Charcot joints were excluded from the study.

All patients underwent thorough clinical and radiological evaluations preoperatively. Group I underwent closed reduction and fixation using percutaneous cannulated screws guided by fluoroscopy.

Group II received ORIF allowing direct visualization and anatomical reduction of the fracture. Postoperatively, both groups received a short leg cast for six weeks, followed by rehabilitation exercises. Patients were evaluated clinically using the American Orthopedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Score and radiologically using standardized criteria for fracture alignment. The follow-up period extended to six months post-surgery.

RESULTS

The study found no statistically significant difference in radiological or functional outcomes between the two groups. Radiological assessment showed that 52% of Group I and 60% of Group II achieved "Good" alignment scores. Functional outcomes, assessed by the AOFAS score, revealed that 52% of Group I and 48% of Group II achieved "Excellent" scores. However, Group II had a higher rate of wound infections (6% vs. 2%, $p = 0.501$). Other complications, including malunion, non-union, painful hardware, and deep venous thrombosis, were similar between the groups (Figure 1). Age and comorbidities were found to influence outcomes, with older patients and those with diabetes or vascular insufficiencies exhibiting higher complication rates and poorer outcomes. Among the 50 patients, those with road traffic accidents had higher rates of Excellent (32.0%) and Good (20.0%) outcomes compared to those who experienced falls (18.0% Excellent, 12.0% Good). However, both groups had similar rates of Fair outcomes (8.0% vs. 6.0%), while Poor outcomes were only observed in road traffic accident cases (4.0%). Overall, 25 patients had Excellent scores, 16 had Good, 7 had Fair, and 2 had Poor outcomes. The p-value of 0.11 indicated no statistically significant association between the mode of trauma and AOFAS Ankle-Hindfoot Score (Table 1).

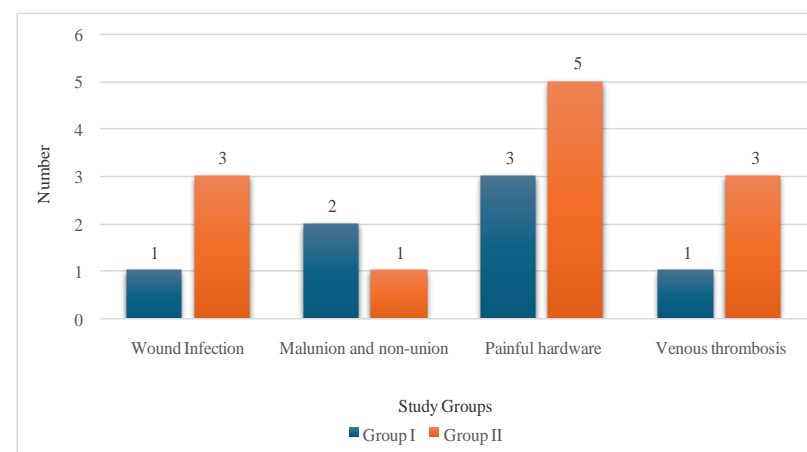


Figure 1: Comparison between both study groups according to the incidence of postoperative complications

Table 1: Correlation Between Mode of Trauma and AOFAS Ankle-Hindfoot Score.

Mode of Trauma	Excellent (≥ 85)	Good (70 – 84)	Fair (55 – 69)	Poor (< 55)	p
Road Traffic Accidents	16 (32.0%)	10 (20.0%)	4 (8.0%)	2 (4.0%)	0.11
Falling Down	9 (18.0%)	6 (12.0%)	3 (6.0%)	0 (0.0%)	
Total	25	16	7	2	50

Data presented as numbers (percentages); (p) p value of probability; (*) significant if ≤ 0.05 .

CONCLUSION

Both closed reduction with percutaneous fixation and ORIF achieved satisfactory radiological and functional outcomes for medial malleolar fractures, with no significant difference in functional recovery based on the AOFAS Ankle-Hindfoot Score. Radiological outcomes were comparable between the two techniques, with most cases demonstrating "Good" fracture alignment. However, patients with diabetes, vascular insufficiencies, or other systemic comorbidities experienced higher complication rates, while older patients showed poorer radiological and functional outcomes, emphasizing the impact of age on fracture healing and recovery.