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Clinical Outcome of Minimally Invasive Internal Fixation with or without External Fixation in Ankle Fracture Dislocation

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Abstract: ***This study evaluate the clinical, radiologic and functional outcomes of Minimally Invasive Internal Fixation with or without external fixator in the treatment of high-energy ankle fractures.15 PATIENT treated with either Minimally Invasive Internal Fixation (9 patients) or Minimally Invasive Internal Fixation with external fixator (6 patients) OLERUD-MOLANDER Ankle score. [0-100] was used to evaluate clinical outcomes and patients were followed up for 12 months after the surgical intervention.***

Keywords: ankle, fracture, dislocation

OLERUD-MOLANDER Ankle score

Parameter	Degree	Score
1. Pain	None	25
	While walking on uneven surface	20
	While walking on even surface outdoors	10
	While walking indoors	5
	Consult and severe	0
2. Stiffness	None	10
	Stiffness	0
3. Swelling	None	10
	Only evenings	50
	Constant	0
4. Stair Climbing	No problems	10
	Impaired	5
	Impossible	0
5. Running	Possible	5
	Impossible	0
6. Jumping	Possible	5
	Impossible	0
7. Squatting	No problem	5
	Impossible	0
8. Supports	None	10
	Taping, wrapping	5
	Stick or crutch	0
9. Work, ADL	Same as before injury	20
	Loss of Tempo	15
	Change to simpler job/ part time work	10
	Severely impaired work capacity	0

Source: *Journal of Orthopedic Trauma*

1. Introduction

Ankle fracture dislocation can range from low to high-energy injuries, with low-energy rotational injuries having good results with Minimally Invasive Internal Fixation and high-energy axial-loading injuries having moderate results with higher complication rates. The management of high-energy ankle fracture dislocation is complex due to the limited soft tissue envelope and the usual high-energy involved. The state of the soft tissue plays a crucial role in determining the timing and method of surgical fixation. Poor timing can lead to poor outcomes. The method of surgical fixation and outcomes may vary based on multiple factors such as the degree of bony comminution, the quality of reduction, the surgeon's expertise and the presence of associated injuries. There is ongoing debate among medical professionals regarding the optimal treatment for high-energy ankle fracture dislocation, with some advocating Minimally Invasive Internal Fixation to prevent articular incongruence and achieve better long-term results, and others promoting external fixator to reduce soft tissue complications and blood loss.

2. Materials and Methods

A prospective clinical study was performed to compare the results of Minimally Invasive Internal Fixation with or without external fixator for ankle fracture dislocation. The study took place from December 2021and December 2022 and patients were followed up for 12 months after the surgical treatment.

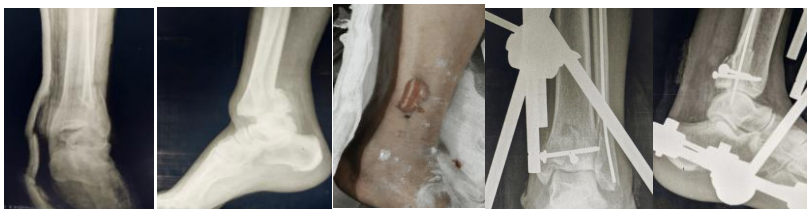
Patient selection:

Patients were selected for the study was treated with either Minimally Invasive Internal Fixationor with external fixator. The study was conducted between December 2021 and December 2022 and involved 15 patients who were followed for over 12 months after treatment.9 patients underwent, Minimally Invasive Internal Fixation of whom 4 were male and 2 female, while patients underwent Minimally Invasive Internal Fixation with external fixator, 6 male and 2 female. Patients had to be 18 or older, with ankle fracture dislocation. Exclusion criteria included serious leg injuries that could affect outcome, such as peripheral angiopathy, neuropathy, multiple fractures, morbid obesity, and compartment syndrome.

Surgical intervention

For all patients, initial management involved bed rest, pain relief, keeping the foot elevated and applying ice and a posterior slab. Radiographs were taken including views of the ankle and full leg, as well as targeted X-rays based on clinical findings and CT scans of the distal tibia and ankle joint. Soft tissue injury severity was evaluated using the Oestern and Tscherne classification. Surgical interventions were performed by a single surgeon using either Minimally Invasive Internal Fixation with screws or k wire or along with it qnkle spanning external fixator was applied which was checked for proper alignment after reduction. Patients were instructed to avoid weight bearing for 6 weeks, followed by partial weight bearing and active mobilization of the ankle and subtalar joints. A standardized physiotherapy rehabilitation was then implemented

Case 1



Case-2

3 months follow up

Case 3: pre op post op

3 month follow up

3. Statistical Analysis

Data was collected, entered, and analyzed using SPSS version 21 software on a personal computer. The significance level was set at $p<0.05$. To compare the difference between two population means of independent samples, a Student's t-test was used. Analysis of Variance (ANOVA) test was applied to evaluate the equality of mean values among multiple groups. Paired t-test was employed to

analyze the difference between two population means of matched or paired samples.

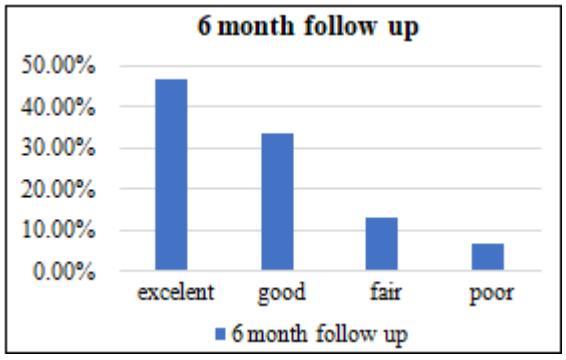
4. Discussion

The effectiveness of open reduction and internal fixation (ORIF) in treating high energy ankle fractures is disputed when skin conditions are poor. This study evaluated the reduction effectiveness of a minimally invasive technique, external fixation, with these technique we have found significant differences in terms of stability, lesser incidence of infection and no risk of implant exposure, lesser incidence of skin dehiscence, lesser incidence of implant failure. patients can be mobilised earlier if external fixator was applied as compare to open reduction and internal fixation with plates. The study also found that external fixation may have an advantage in the autorotation test as it maintained the fracture fragment with stable immobilization after applying rotational torques.

5. Result

Both patients were followed up at 1st, 2nd, 4th and 6th month after procedure. Excellent results were noted in 7 cases (46.6%), good results were noted in 5 cases (33.33%), fair results noted in 2 cases 13.3, poor result was noted in 1 case (6.6%).

Group	OLERUD-MOLANDER Ankle score
Excellent	92
Good	78
Fair	62
Poor	30



Average score were 92 in excellent group, 78 in good, 62 in fair, 30 in poor

6. Conclusion

Minimal invasive internal fixation with or without external fixation is effective in treating ankle fracture dislocation with good outcome, stable fixation and higher union rate and with no infection in patients of ankle fracture dislocation associated with swelling, abrasion and open wound as compare to other modalities of treatment like orif with plates

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