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COMPARISON OF FUNCTIONAL OUTCOME ANALYSIS OF POSTERIOR PLATING & LATERAL PLATING FOR LATERAL MALLEOLUS FRACTURES OF ANKLE

Orthopaedics

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ABSTRACT

Introduction-Intra-articular fractures around ankle joint are a commonly encountered entity in the lower extremity. In olden days these fractures ended up in permanent disability. This case series involves comparing functional outcome analysis of posterior plating & lateral plating for lateral malleolus fractures of ankle. **Aim**- To compare and analyze the functional outcome of posterior plating and lateral plating of lateral malleolus fractures of ankle and to evaluate the benefits and shortcomings of both these procedures. **Materials And Methods**-Case Series of 20 patients with lateral malleolus fractures fractures treated at Navodaya Medical College Hospital and Research Centre. Study included 11 Male and 9 Female with a mean follow up of 12 months. All patients were treated with open reduction with plating technique. **Procedure**-All 20 patients were operated in Navodaya Medical College and hospital and were operated under spinal anaesthesia. **Conclusion**- With the short term follow up of our study, we conclude that Posterior plating technique for lateral malleolus fractures of ankle allows better implant placement, good wound healing and a better functional outcome in comparison to the Lateral plating technique.

KEYWORDS

lateral malleolus fracture, posterior plating, Lateral plating, ankle fracture, osteosynthesis.

INTRODUCTION:

Intra-articular fractures around ankle joint are a commonly encountered entity in the lower extremity. In olden days these fractures ended up in permanent disability. Many of the ankle injuries have mixed bony and ligamentous components. In the recent days, MRI is very useful in diagnosing the ligamentous injury. As in all intra articular fractures achieving anatomical reduction by open methods and internal fixation is necessary to avoid complications such as nonunion, malunion & hence altered biomechanics resulting in pain & instability. With the advent of A.O principles of management, the results of ankle fractures are becoming better putting more emphasis on anatomical reduction, stable internal fixation, preservation of blood supply, regaining full length of fibula and early active pain free mobilization. This case series involves comparing functional outcome analysis of posterior plating & lateral plating for lateral malleolus fractures of ankle.

AIM:

To compare and analyze the functional outcome of posterior plating and lateral plating of lateral malleolus fracture of ankle and to evaluate the benefits and shortcomings of both these procedures.

METHODOLOGY

Sample Size: 20 cases

Study Duration: April 2022 to August 2023

Sampling Procedure: Prospective study.

METHOD

Patients with lateral malleolus fractures are selected after clinical and radiological analysis.

1. Detailed history and clinical examination was done. Investigations required for surgery was done.
2. A pre anaesthetic evaluation was done.
3. Pre-operative preparations were performed and informed written consent was taken.
4. Follow ups - 6, 12 and 24 weeks were made.

Inclusion Criteria

1. Skeletally mature adults (age 18-70 yrs)
2. Isolated lateral malleolus fracture
3. Bi malleolar & Tri malleolar fracture

Exclusion Criteria

1. Undisplaced or minimally displaced fractures
2. Neglected ankle fractures (> 3 wks old)
3. Open ankle fractures
4. Any Contraindication for surgery

Evaluation Of Outcome

The following significant factors were analysed at the final follow up based on AOFAS (American Orthopaedic Foot & Ankle Society) score

Pre Operative Protocol

All patients were immobilized with a Below Knee slab at the time of admission and strict limb elevation was maintained till surgery. CT ankle was done whenever intra-articular fracture pattern was noted. The POP was bivalved within 12 hours and skin condition was checked every 24 hours. Basic investigations were done and adequate medical management of any existing comorbidities were taken care anaesthetic fitness was obtained and an informed written consent was taken.

OPERATIVE PROCEDURE:

Anaesthesia- General anaesthesia/ spinal/epidural anaesthesia

Position: Patients were positioned in three positions depending on the status of medial and posterior malleoli.

1. Isolated lateral malleolus fractures - Lateral position
2. Bimalleolar fractures - Supine or lazy lateral position
3. Trimalleolar fractures - Prone position (when posteriior malleolus fixation is planned)

Surgical Procedure: OPEN REDUCTION

INTERNAL FIXATION WITH PLATEOSTEOSYNTHESIS

Tourniquet was used in all the cases before surgery lateral malleolus fractures are approached by

APPROACHES

We used two approaches to the lateral malleolus

1) Posterior approach for posterior plating group
2) Lateral approach for lateral plating group

American Orthopaedic Foot and Ankle Society (AOFAS) score	
1. PAIN	points
None	40
Mild	30
Moderate	20
Severe	0
2. ACTIVITY LIMITATION	
No limitation	10
Limitation only in recreational activity	7
Limitation both daily and recreational activity	4
Severe limitation of daily activities	0

3. WALKING DISTANCE	
Greater than 6 metres	5
4-6 metre	4
1-3 metre	2
Less than 1 metre	0
4. WALKING SURFACES	
No difficulty	5
Some difficulty	3
Severe difficulty	0
5. GAIT	
None	8
Obvious	4
Marked	0
6. SAGITAL MOTION (flexion and extension)	
Normal or mild restriction	5
Moderate restriction	3
Marked restriction	0
7. HIND FOOT MOTION (inversion &eversion)	
Normal or mild restriction	6
Moderate restriction	4
Severe restriction	0
8. HIND FOOT STABILITY	
Stable	8
Unstable	0
9. ALIGNMENT	
Good	15
Fair	8
Poor	0

EXCELLENT >85 GOOD 70-85 FAIR 55-70 POOR <55

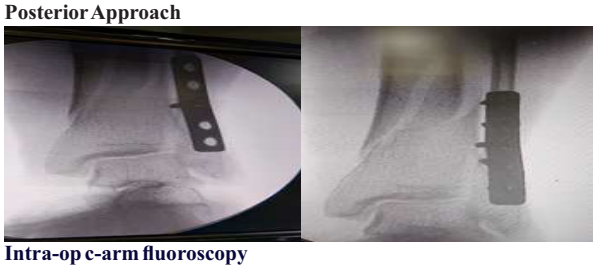
Posterior Approach - A skin incision is made between the lateral malleolus and Achilles tendon, with length depending on fracture size and implant. After exposing the peroneal and deep flexor compartments, the peroneal retinaculum is incised, allowing retraction of the peroneal tendons.An internervous plane between the Peroneus brevis and Flexor Hallucis Longus is created, exposing the lateral malleolus.

Lateral approach - In this approach thereis no internervous plane and as the lateral bone it is reached soon after the skin and subcutaneous tissue are incised, after exposing the fracture site, under C arm, guidance anatomical reduction was achieved with the help of adequate instrumentation.

CASE 1: (POSTERIOR PLATING)

Pre-op Xray

Posterior Approach

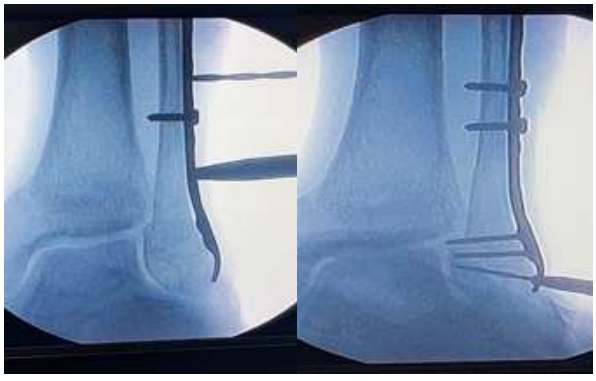


Intra-op c-arm fluoroscopy

Case 2: (Lateral plating)

Pre-op xray

Lateral approach with plate



Intra-op c-arm fluoroscopy

POST OPERATIVE PROTOCOL

Wound care :

Strict limb elevation in the immediate post period until swelling subsides

Regular dressing on 2nd, 5th and 10th post-operative day

Suture removal on 12th day along with active mobilization of ankle & toes

Rehabilitation

Strict limb elevation until swelling subsides and then gentle ankle and toe movements are encouraged Strict non weight bearing for 4 to 6 wks Partial weight bearing allowed after confirming radiological signs of callus Full weight bearing allowed after confirming radiological signs of union

Follow Up

All patients were followed up once in two weeks for the first 6 weeks, then once in a month for 6 months and then the patient is reviewed once in 3 months.

In each follow up, X rays were taken to assess radiological union, surgical scar examined, range of movements checked and appropriate rehabilitation advised which was custom made for each patient depending on his fracture pattern and radiological healing.

ANALYSIS

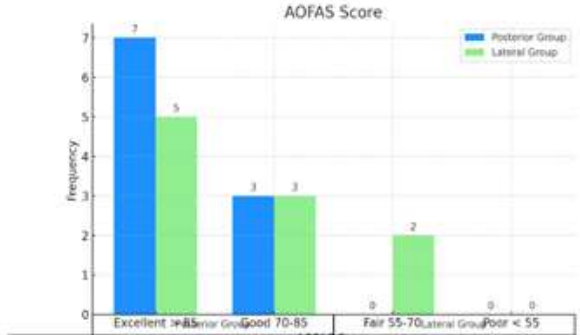
Analysis of functional outcomes of patients operated with posterior plating and those operated with lateral plating is the main Aim of this study.

Functional outcome was calculated based on AOFAS score (American

Orthopaedic Foot & Ankle Society) and the observations are as follows.

Functional Score (AOFAS score)

AOFAS Score	Posterior Group Frequency	Posterior Group Percentage	Lateral Group Frequency	Lateral Group Percentage	p-value
Excellent >85	7	70%	5	50%	P = 0.043 (Significant)
Good 70-85	3	30%	3	30%	
Fair 55-70	-	-	2	20%	
Poor <55	-	-	-	-	
Total	10	100%	10	100%	



Excellent > 85	7	5
Good 70-85	3	3
Fair 55-70	0	2
Poor < 55	0	0

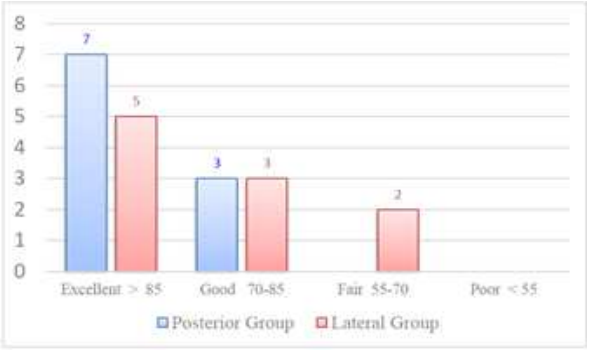
The P value was 0.043 showing that the outcome analysis is significant. Hence posterior plating technique confers additional benefit of improved functional outcome to the patient compared to the lateral plating technique.

RESULTS

Clinical examination of surgical scars, difficulty in walking, and pain were assessed at each follow-up. Functional outcomes were analyzed using the AOFAS score, with results calculated at the final follow-up of each patient.

In the posterior group, 7 patients had excellent outcomes and 3 had good outcomes. In the lateral plating group, 5 patients had excellent outcomes, 3 had good outcomes, and 2 had fair outcomes. There were no poor outcomes in either group.

Three patients in the lateral plating group experienced superficial wound infections, with 2 cases resulting in wound gaping and delayed mobilization. No wound healing problems were observed in the posterior plating group.



DISCUSSION:

Intra-articular ankle fractures are common and historically led to permanent disability. With the advent of A.O. principles, morbidity has decreased significantly. Proper anatomical reduction, achieved through open methods and internal fixation, is crucial to avoid complications like non-union, malunion, and altered biomechanics resulting in pain and instability.

A.O. principles emphasize anatomical reduction, stable internal fixation, preservation of blood supply, regaining full fibular length, and early mobilization[1].

Weber et al. classified ankle fractures by the lateral malleolus fracture level relative to the syndesmosis, while Lauge and Hansen's 1950 classification system is now more commonly used, considering the direction of the injuring force and ankle position at the time of injury.

Lateral plating is commonly used for lateral malleolus fractures due to its ease of application but is associated with hardware irritation. Posterior plating offers better soft tissue and skin coverage, resulting in less hardware irritation and better biomechanical stability, particularly in osteoporotic patients[2].

In our study, functional outcomes of posterior and lateral plating for lateral malleolus fractures were analyzed using the AOFAS score, with follow-up periods ranging from 7 to 29 months (average 13 months). Road traffic accidents were the major cause of fractures, and patients operated on within 3 days had higher AOFAS scores.

Posterior plating allows for better implant placement and bicortical screw purchase without intra-articular screw penetration, enabling early mobilization and better functional outcomes. The AOFAS scores showed significant functional advantages for posterior plating. Complications were fewer with posterior plating, with no wound issues ,this observation is in concurrence with the study conducted by Shriniwas Yemul et al in which it was concluded that"Posterior plate fixation for lateral malleolus gives bicortical screw purchase without intra-articular screw penetration leading to a secure and stable fixation allowing early mobilization and a better outcome"[3],also in the study conducted by Shriniwas Yemul et al it was noted that posterior plate fixation for lateral malleolus resulted in decreased post-operative complications, hardware penetration and wound dehiscence[3,4], which is in concurrence with our study.

Malunions were observed in both groups but resulted in good clinical outcomes if the fibular length and intra-articular congruity were maintained. Union rates were higher in the posterior plating group, though not statistically significant due to the small sample size. Peroneal tendon irritation, a potential issue with posterior plating, was not observed in our study.

Overall, our study found better functional outcomes and earlier union rates with posterior plating, though further long-term studies are needed to confirm these findings.

CONCLUSION

With the short term follow up of our study, we conclude that Posterior plating technique for lateral malleolus fractures of ankle allows better implant placement, good wound healing and a better functional outcome in comparison to the Lateral plating technique.

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