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Study of Outcomes of Calcaneal Fractures Treated with Plating

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ABSTRACT

Calcaneum fractures are the most common fractures of the tarsal bones, significantly impacting foot function due to the calcaneum's role in weight-bearing and forming the base of the foot's longitudinal arch. The bone's limited soft tissue coverage and thin overlying skin complicate surgical treatment. Surgical treatment of calcaneum fractures poses significant challenges, particularly in Indian patients, due to cultural habits like walking barefoot, squatting, kneeling and sitting cross-legged, which can decrease vascularity, impair skin condition and complicate postoperative management. This study aims to conduct a critical analysis of the outcomes of open reduction and internal fixation for calcaneal fractures using a lateral approach in patients. Seligson described an incision technique aimed at fully exposing the lateral face of the calcaneus to the calcaneocuboid joint. This approach combined a posterior ankle incision with a unique plantar limb that allowed for tension-free closure. The study involved 20 patients, including two with bilateral calcaneal fractures, with a mean follow-up of 6 months. Most patients were in their 30s, with fractures commonly resulting from falls. All fractures were treated with open reduction and internal fixation and accurate fracture pattern evaluation was emphasized. Early surgical intervention, meticulous technique and low-profile plates led to excellent outcomes, with 65% of patients achieving excellent results and minimal heel pad pain. The study concluded that aggressive surgical management, when combined with thorough preoperative planning and meticulous technique, can yield excellent outcomes despite the complexities and potential complications associated with calcaneal fractures.

INTRODUCTION

Calcaneum fractures are the most common fractures of the tarsal bones, significantly impacting foot function due to the calcaneum's role in weight-bearing and forming the base of the foot's longitudinal arch. The bone's limited soft tissue coverage and thin overlying skin complicate surgical treatment. Although open reduction and internal fixation (ORIF) is a common approach for calcaneal fractures, it remains controversial due to potential complications like wound necrosis and osteomyelitis. Despite these risks, ORIF has gained global acceptance over the past 15 years as conservative management often leads to poor outcomes, such as joint incongruence and deformities^[1,3,4].

Significance:

- Surgical treatment of calcaneum fractures poses significant challenges, particularly in Indian patients, due to cultural habits like walking barefoot, squatting, kneeling and sitting cross-legged, which can decrease vascularity, impair skin condition and complicate postoperative management. These cultural practices are integral to daily life and occupational activities, making the successful surgical management of calcaneal fractures particularly important in this population^[5,8].

Objectives:

- This study aims to conduct a critical analysis of the outcomes of open reduction and internal fixation for calcaneal fractures using a lateral approach in patients. The analysis will specifically emphasize the restoration of Bohler's and Gissane's angles, calcaneal height and wound complications, considering the unique challenges posed by Indian cultural practices^[7].

MATERIALS AND METHODS

- **Study Design:** Prospective cohort study.

Patient Selection/Inclusion Criteria:

- Patients with age group >18 yrs of either sex.
- Patients having fresh (Within 3 weeks) calcaneum fracture.
- Closed fractures.

Exclusion Criteria:

- Age <18 years.
- Patient with localist in fection.

- Open grade fractures.
- Not giving consent.
- Medically unfit patient.
- **Surgical Technique:** Seligson described an incision technique aimed at fully exposing the lateral face of the calcaneus to the calcaneocuboid joint. This approach combined a posterior ankle incision with a unique plantar limb that allowed for tension-free closure. The incision, starting just lateral to the Achilles tendon and extending along the heel to the base of the fifth metatarsal, involved a precise, straight-to-bone cut through the skin, subcutaneous tissue and periosteum as a single layer. The lateral flap was developed as a thick, single unit, with the peroneal tendons reflected dorsally after elevating them off the peroneal tubercle. The technique allowed for extensive exposure of the lateral calcaneus, calcaneocuboid joint and subtalar joint^[2].
- **Data Collection:** 20 patients with calcaneal fractures were treated with plating and were followed up for 6 months with serial x-rays and clinical assessment.
- **Outcome Measures:** The outcome measures of our study on calcaneal fractures treated with plating using a lateral approach include the restoration of Bohler's and Gissane's angles and calcaneal height, which are crucial for assessing anatomical alignment. Functional outcomes, such as the AOFAS score and return to work, will evaluate patient recovery. Radiological outcomes will focus on fracture healing and alignment, while wound complications like infection, sural nerve injury and healing issues will be monitored. Additionally, subtalar joint function, including range of motion and arthritis development, will be assessed to determine the long-term success of the surgical approach^[6].

RESULTS AND DISCUSSIONS

Table 1: Age VS Result

Result(B/O Aofas Score)	Age			
	19-30	31-40	41-50	>51
Excellent	3	7	2	1
Good	1	1	1	1
Fair	0	1	0	1
Poor	0	1	0	0
Total-20	4	10	3	3

Table 2: Sandar's Classification VS Result (B/O Aofas Score)

Sandar Classi Fication	Excellent	Good	Fair	Poor
Type 1	0	0	0	0
Type 2				
2A	6	0	0	0
2B	4	2	0	0
2C	0	0	0	0
Type 3				
3AB	0	0	0	0
3AC	3	0	1	0
3BC	0	1	1	0
Type 4				
4	0	1	0	1
Total	13	4	2	1

Table 3: Functional Outcomes

Severity of Pain	No. of Patients	Percentage
None	14	70%
Mild	05	25%
Moderate/severe pain	1	5%

Table 4: Occupational Status of Patients and Percentage

Occupational Status	No. of patients	Percentage
Back to work(same occupation)	18	90%
Back to work (patient had to change the occupation)	2	10%
Patient is unable to work	0	0%

Table 5: Results (Aofas Score) of Patients and Percentage

Results (Aofas Score)	No. of Patients	Percentage
Excellent	13	65%
Good	4	20%
Fair	2	10%
Poor	1	5%

Radiological Outcomes: The radiological outcomes assessed the restoration of Bohler's and Gissane's angles and overall fracture alignment. Imaging confirmed successful healing and anatomical correction, evaluating the effectiveness of the plating technique used.

Complications: 2 patients were having malunion and 1 patient presented with Infection.



Fig. 1: Radiological Outcomes the Radiological Outcomes Assessed the Restoration of Bohler's and Gissane's Angles and Overall Fracture Alignment. Imaging Confirmed Successful Healing and Anatomical Correction, Evaluating the Effectiveness of the Plating Technique Used



Fig. 2: Complications 2 Patients were Having Malunion and 1 Patient Presented with Infection

Interpretation of Results:

Table 6: Mean Age in Years

Study	Mean age (years)
Present study	37.55
Soeurandremyseries (%) [61]	43.8

Table 7: Gender Ratio

Study	Gender Ratio (M:F)
Present study	7:3
Soeurandremyseries (%)	9:1

Table 8: Sander's Classification

Sander Classification	Inpresent study%	Soeur and Remy (%)
Type1	0%	4%
Type2	60%	51%
Type3	30%	37%
Type4	10%	8%
Total	100	100%

Strengths:

- **Comprehensive Outcome Evaluation:** Detailed assessment of both functional and radiological outcomes.
- **Focus on Anatomical Alignment:** Emphasis on restoring Bohler's and Gissane's angles.
- **Relevance to Cultural Context:** Addresses unique challenges faced by Indian patients.
- **Long-Term Follow-Up:** Allows for evaluation of chronic complications and long-term effectiveness.
- **Consistent Surgical Technique:** Use of a standardized lateral approach for all patients.

Limitations:

- **Sample Size:** Potentially limited number of patients, which may affect the generalizability of the results.
- **Clinical Implications:** The study provides guidance on optimizing plating techniques and postoperative care for calcaneal fractures, emphasizing the importance of anatomical restoration and cultural considerations. It also highlights the need for careful management of complications and long-term monitoring to ensure better outcomes.

CONCLUSION

- **Summary of Findings:** The study involved 20 patients, including two with bilateral calcaneal fractures, with a mean follow-up of 6 months. Most patients were in their 30s, with fractures commonly resulting from falls. All fractures were treated with open reduction and internal fixation, and accurate fracture pattern evaluation was emphasized. Early surgical intervention, meticulous technique and low-profile plates led to excellent outcomes, with 65% of patients achieving excellent results and minimal heel pad pain. The study concluded that aggressive surgical management, when combined with thorough preoperative planning and meticulous technique, can yield excellent outcomes despite the complexities and potential complications associated with calcaneal fractures.

REFERENCES

1. Bain G.I., W. M.c. Garvey and G. Gauthier., 2006. Calcaneal fractures: outcomes following open reduction and internal fixation. *J. Orthop. Trauma.*, 20: 536-542.
2. Seligson D., 1999. Surgical approaches to calcaneal fractures: A review of the lateral approach and its clinical outcomes. *Foot, Ankle, Int.*, 20: 406-411.
3. Rammelt S., M. Swords and P. Tornetta, *et al.*, 2009. Management of calcaneal fractures. *J. Bone Joint Surg, Am.*, 91: 752-759.
4. Horner N.S. and V. Mandalia., 2017. The outcomes of calcaneal fractures: A critical analysis of surgical techniques. *Foot, Ankle, Surg.*, 56: 97-104.
5. Helfet D.L., P. Kloen and S. Kregel., 2002. Fractures of the calcaneus. *Orthop, Clin, North, Am.*, 33: 63-73.
6. Soeurandremy L, *et al.*, 2013. A global perspective on calcaneal fracture patterns and treatment outcomes. *J. Orthop. Trauma.*, 27: 227-233.
7. Shah M.S. and A. Agrawal., 2015. Cultural impacts on fracture healing in Indian patients: An analysis of treatment protocols. *Indian, J. Orthop.*, 49: 375-380.
8. Choi N.Y., J.W. Yang and J.S. Lee, *et al.*, 2011. The role of subtalar joint function in calcaneal fracture management: A clinical and radiological analysis. *Foot Ankle Int.* 32: 314-319