

COMPARATIVE ASSESSMENT OF SURGICAL AND NON-SURGICAL MANAGEMENT OF THE PILON FRACTURE: A CLINICAL EVALUATION

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ABSTRACT

Background: Traumatic injuries in the distal tibia with involvement of articular surface of ankle joint are termed as Pilon fractures having high incidence in orthopedic subjects.

Aim: The present study aimed at comparing and assessing the outcomes following surgical and non-surgical management of the fractures of Pilon.

Materials and Methods: 58 study subjects were divided into two groups of 29 subjects each where one group was managed with surgical treatment and the other with non-surgical and conservative management for fracture of Pilon which were diagnosed using Ruedi-Allgower classification. Outcomes following management were assessed including union, functional outcomes, and complications seen in two groups.

Results: Malunion was seen in 13.79% (n=4) subjects and stiffness in 27.58% (n=8) subjects who were managed non-surgically, whereas, osteomyelitis, deep infection, and superficial infection was seen in 6.89% (n=2) subjects, 3.44% (n=1) subject, and in 10.34% (n=3) study subjects respectively from the surgical management group

Conclusion: The present study concluded that excellent and clinically acceptable results are associated with the surgical management of the Pilon fracture, whereas, non-surgical management resulted in poor clinical outcomes. Also, overall complications were higher in subjects managed conservatively compared to subjects managed by surgical treatment.

Keywords: Conservative Treatment, Operative Treatment, Pilon Fractures, surgical management, orthopaedic intervention.

INTRODUCTION

The French word used for pestle is Pilon which first came into existence in 1911 by Etienne Destot for the analogy of mechanical function on the talus of the distal tibia. Distal tibial plafond fractures are hence, also known as Pilon fractures which describe axial compression force of high energy of tibia which acts as pestle which vertically gets transmitted to the talus. Pilon fracture is responsible for nearly 10% of all the fractures seen in the tibia.^{1,2}

Nowadays, few orthopedic surgeons advocate the conservative management of Pilon fracture using pin traction or cast exclusively for nondisplaced articular fractures and in subjects where surgery is contraindicated owing to inoperable cases, low demand subjects, and subjects having medical comorbidities.³

Surgical treatment of Pilon fractures is aimed at anatomically reducing the fracture fragments to restore the congruity of the joint surface. Surgical treatment also promotes functional recovery and bony union with minimum soft tissue disruption.⁴

To omit these shortcomings, various surgical procedures and techniques are recently proposed for fracture management including external fixation (EF), MIPO (minimally invasive plate osteosynthesis), ORIF (open reduction internal fixation) followed by internal synthesis.⁵ The present clinical study was aimed at comparing and assessing the outcomes following surgical and non-surgical management of the fractures of Pilon.

Materials And Methods

The present comparative clinical study was aimed at comparing and assessing the outcomes following surgical and non-surgical management of the fractures of Pilon. The present study was conducted after obtaining clearance from the concerned Ethical committee. The study population was comprised of the subjects presenting to the Department of Orthopedics for management of Pilon fractures. 58 study subjects were divided into two groups of 29 subjects each where one group was managed with surgical treatment and the other with non-surgical and conservative management for fracture of Pilon which were diagnosed using Ruedi-Allgower classification.

The subjects who presented with 24 hours of fracture with unilateral and closed fracture were included in the study. The exclusion criteria for the study were subjects presenting after 24 hours of fracture, subjects having associated other bone fractures of the same limb, vascular complications, sickle cell anaemia, bleeding disorders, quadriplegia, paraplegia, or other spinal injuries.

After the final inclusion of the subjects, detailed history was recorded for all the subjects followed by an examination of the subjects. Radiographs of ankle joints were also taken in both lateral and anteroposterior views. The classification of Pilon fracture was done based on Ruedi-Allgower classification. After routine investigations, 58 study subjects were divided into two groups of 29 subjects each where one group was managed with surgical treatment and the other with non-surgical and conservative management for fracture of Pilon.

The subjects managed surgically with open reduction internal fixation for primary fixation of ankle and fibula with external fixation. Secondary fixation was then done after the soft tissues healed using distal tibial plate by Open reduction internal fixation.

For conservative management, calcaneal pin traction was given following reduction under fluoroscopy following immobilization using a cast for 3 weeks. At the follow-up visit, the assessment of the subjects was done following AOFAS guidelines. To assess the fracture union, implant conditions were assessed, deformities, ankle arthritis was seen, and follow-up radiographs were taken.

The outcomes assessed for the present study were complications, union, and functional outcomes. The assessment of the functional outcomes was done with AOFAS scores, fracture of union was assessed with the clinical and radiographic method which was then compared, and the radiologic union was seen at one cortex in lateral and anteroposterior view. Complications in the two groups were assessed radiologically and clinically. Final

comparison in two groups was carried out by complications, functional outcomes, and grades distribution between two groups.

RESULTS

The present comparative clinical study was aimed at comparing and assessing the outcomes following surgical and non-surgical management of the fractures of Pilon. 58 study subjects were divided into two groups of 29 subjects each where one group was managed with surgical treatment and the other with non-surgical and conservative management for fracture of Pilon which were diagnosed using Ruedi-Allgower classification. The mean operative time for the surgical group and non-surgical group was 19.2 and 18.1 weeks respectively. Poor outcomes were seen in 41.37% (n=25) subjects from the non-surgical management group, whereas, excellent results were seen in 53.44% (n=31) subjects who were managed surgically (Table 1).

The results of the present study have shown that type 1 fracture was seen in 24.13% (n=7) and 20.68% (n=6) subjects from non-surgical and surgical groups respectively, type 2 fracture in 41.37% (n=12) and 48.27% (n=14) subjects from non-surgical and surgical group respectively, and type 3 fracture in 34.48% (n=10) and 31.03% (n=9) study subjects from non-surgical and surgical group respectively (Table 1). The outcomes of the study were poor in 41.37% (n=12) and in 10.34% (n=3) subjects from non-surgical and surgical group, fair in 10.34% (n=3) and 17.24% (n=5) subjects from non-surgical and surgical group respectively, good outcomes in 17.24% (n=5) and in 20.68% (n=6) subjects from non-surgical and surgical group respectively, and excellent outcome in 31.03% (n=9) and 51.72% (n=15) subjects from non-surgical and surgical group respectively (Table 2).

On assessing the postoperative complications following management of the Pilon fracture, it was seen that malunion was seen in 13.79% (n=4) subjects and stiffness in 27.58% (n=8) subjects who were managed non-surgically, whereas, osteomyelitis, deep infection, and superficial infection was seen in 6.89% (n=2) subjects, 3.44% (n=1) subject, and in 10.34% (n=3) study subjects respectively from the surgical management group as shown in Table 3.

DISCUSSION

The present comparative clinical study was aimed at comparing and assessing the outcomes following surgical and non-surgical management of the fractures of Pilon. 58 study subjects were divided into two groups of 29 subjects each where one group was managed with surgical treatment and the other with non-surgical and conservative management for fracture of Pilon which were diagnosed using Ruedi-Allgower classification. The mean operative time for the surgical group and non-surgical group was 19.2 and 18.1 weeks respectively. Poor outcomes were seen in 41.37% (n=25) subjects from the non-surgical management group, whereas, excellent results were seen in 53.44% (n=31) subjects who were managed surgically. These results were consistent with the studies of Richards JE et al⁶ in 2012 and Thordarson DB⁷ in 2000 where authors showed similar outcomes as in the present study.

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non-surgical and surgical group respectively. The outcomes of the study were poor in 41.37% (n=12) and in 10.34% (n=3) subjects from non-surgical and surgical group, fair in 10.34% (n=3) and 17.24% (n=5) subjects from non-surgical and surgical group respectively, good outcomes in 17.24% (n=5) and in 20.68% (n=6) subjects from non-surgical and surgical group respectively, and excellent outcome in 31.03% (n=9) and 51.72% (n=15) subjects from non-surgical and surgical group respectively. These results were in agreement with the studies of Pai V et al⁸ in 2007 and Lau TW et al⁹ in 2008 where authors have reported similar distribution of fracture types and similar outcomes in subjects of their study.

The postoperative complications following management of the Pilon fracture in the present study when assessed, it was seen that malunion was seen in 13.79% (n=4) subjects and stiffness in 27.58% (n=8) subjects who were managed non-surgically, whereas, osteomyelitis, deep infection, and superficial infection was seen in 6.89% (n=2) subjects, 3.44% (n=1) subject, and in 10.34% (n=3) study subjects respectively from the surgical management group. These results were comparable to the studies of Scolaro J et al¹⁰ in 2011 and Jacob N et al¹¹ in 2015, Singh AP et al¹² in 2018 and Murarka K et al¹³ in 2019 where authors have reported similar postoperative complications in their studies following treatment of Pilon fractures.

CONCLUSION

Within its limitations, the present study concludes that following conservative treatment of Pilon fracture, poor outcomes were seen in the majority of subjects, whereas, following surgical management, clinical outcomes were excellent in the majority of the subjects. Also, the complications were higher in the non-surgical group compared to the surgical group. However, the present study had a few limitations including small sample size, cross-section nature, and geographical area biases. Hence, more longitudinal studies with larger sample size and longer monitoring period will help reach a definitive conclusion.

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TABLES

Parameter	Non-surgical treatment % (n=29)	Surgical treatment % (n=29)
Fracture Type		
Type 1	24.13 (7)	20.68 (6)
Type 2	41.37 (12)	48.27 (14)
Type 3	34.48 (10)	31.03 (9)
Mean radiographic union time (weeks)	19.2	18.1

Table 1: Fracture type and radiographic union time in the study subjects

Outcomes	Non-surgical treatment % (n=29)	Surgical treatment % (n=29)
Poor	41.37 (12)	10.34 (3)
Fair	10.34 (3)	17.24 (5)
Good	17.24 (5)	20.68 (6)
Excellent	31.03 (9)	51.72 (15)

Table 2: Clinical outcomes in the two groups of study subjects

Complications	Non-surgical treatment % (n=29)	Surgical treatment % (n=29)
Delayed/Non-union	-	-
Malunion	13.79 (4)	-
Stiffness	27.58 (8)	-
Osteomyelitis	-	6.89 (2)

Deep infection	-	3.44 (1)
Superficial infection	-	10.34 (3)

Table 3: Postoperative complications in the two groups of study subjects