

Outcome of Internal Fixation of Pott's Fractures of the Ankle Joint in Diabetic Patients

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ABSTRACT

Background: One of the most frequent injuries that orthopedic surgeons treat is an ankle fracture. There are more ankle fractures today prevalent in this patient population as the frequency of diabetes mellitus (DM) has increased.

Objective: The current study was to look at how well for Pott's fractures, open reduction internal fixation with plates and screws were successful of the ankle joint in diabetic patients.

Patients and methods: A descriptive follow up study was conducted on 30 patients with ankle Pott's fractures visiting the orthopedic outpatient clinic of Zagazig University Hospital. Internal fixation and open reduction were used to treat all patients. Operative fixation was done through ORIF by plate and screws according to AO principles of periarticular fracture fixation.

Results: The high union rate occurs mainly at week 10 at higher percent (74%) in controlled diabetic patients, while union rate in uncontrolled diabetic patients was delayed till 6 months. Patients with DM experience higher complication rates with both open and closed methods for ankle fractures. People with poorly controlled diabetes who have high HbA1c levels experience more complications than those with well-controlled diabetes.

Conclusion: Bimalleolar ankle fractures respond well to surgical treatment in controlled diabetic patients, providing good functional outcome.

Keywords: Ankle, Pott's fractures, Diabetes mellitus, Follow up study, Zagazig University.

INTRODUCTION

One of the most frequent injuries that orthopedic surgeons treat is an ankle fracture. With a rise in diabetes mellitus prevalence and ankle fractures are becoming more common in this patient population. Compared to any other risk factor, diabetes mellitus had the highest prevalence of postoperative complications and amputation after ankle fracture repair. Despite having the proper surgical care, diabetics are also more likely to need additional treatments and have worse scores for activity limitation. Despite this, sustained results are still uncertain because researchers frequently report inconsistent findings⁽¹⁾.

Diabetics make up about 1 in 8 patients who have rotational ankle fractures need surgical treatment. Diabetes patients have been found to have between 26% to 47% more problems following ankle fracture surgery than non-diabetic patients in comparable control groups⁽²⁾.

According to a recent large-scale investigation, diabetes mellitus had the highest likelihood of amputation following the treatment of ankle fractures. Due to the higher risk of infection and other major surgical complications, diabetics are also more likely to require secondary operations and have worse results in terms of the activity limitation score⁽³⁾.

The current study was to look at how well for Pott's fractures, open reduction internal fixation with plates and screws were successful of the ankle joint in diabetic patients.

PATIENTS AND METHODS

A descriptive follow up study was conducted on 30 diabetic patients with ankle Pott's fractures visiting the orthopedic outpatient clinic of Zagazig University Hospital. Internal fixation and open reduction were used to treat surgically all patients.

The most frequent form of injury was twisting, and the most frequent fracture type was supination-external rotation type. The average age was 50 years.

Inclusion criteria: Recent isolated or bimalleolar Pott's fracture. Adults Patients aged more than 18 years old.

Exclusion criteria: Poly trauma patient. Open fractures. Patients who are older than 70 or younger than 18 years old. Old Trauma. Non-Diabetic Patients. Bone deformity or diseases. Pathological fractures. If death occurred during the review period. Patient's ability to effectively fill out surveys was compromised by dementia or other mental health conditions.

Pre-operative: Anteroposterior, lateral, mortise, and other optional views such as manual stress and gravity stress views were used to evaluate ankle fractures.

HbA1C and blood glucose levels were measured randomly and after fasting in the lab. In addition, blood count, liver function tests, kidney function tests, HIV, HBV, and HCV screening were done before surgery.

Operative Technique: With both spinal and epidural anesthesia, the patient was lying on his back. To enhance lateral side exposure, the contralateral buttock was lifted

on a sandbag. In each occasion, a pneumatic tourniquet was used. The treatment was carried out in a blood-free environment, allowing for clear view to define anatomical reduction as a result of the fracture pattern.

1. The most crucial stage in the surgical care was the secured anatomic repair of a displaced lateral malleolus fracture of a malleolar fracture since this structure is crucial for maintaining tibiotalar alignment.

2. The medial malleolus, which can be shifted either anteriorly to better access the joint or posteriorly to reveal the back of the tibia, is the focal point of the medial approach to the ankle. A longitudinal or curvilinear incision was used, depending on how much exposure was needed.

Post-operative follow-up: All patients were immobilized with short-leg posterior slabs, and postoperative x-rays were taken for all patients to evaluate reduction and fixation. Patients were released from the hospital within two to three days after surgery, with diabetic patients being closely monitored for symptoms of infection and circulatory impairment.

Follow Up and evaluation of the patients was done by the following program: In the first follow up, all patients reviewed at 14 days for stitch removal, in the second follow up, at 4 weeks after surgery, clinical & radiological examination was done, All patients were monitored clinically and radiologically at three and six months after surgery, the end The scoring methodologies of the American Orthopedic Foot and Ankle Society were utilized to evaluate the results. To ensure that diabetes was under control during the follow-up period, laboratory tests such as fasting blood sugar and HBA1C were performed.

Ethics Approval:

This study was ethically approved by the Institutional Review Board [IRB] of the Faculty of Medicine, Zagazig University (ZU-IRB #9123). Written informed consent was obtained from all participants. This study was executed according to the code of ethics of the World Medical Association (Declaration of Helsinki) for studies on humans.

Statistical Analysis

The coding, entry, and analysis of historical data, fundamental clinical examinations, laboratory investigations, and outcome measurements were all done using Microsoft Excel software. The data was then imported and analyzed using the Statistical Package for Social Sciences (SPSS) version 20 for windows. Qualitative data were defined as numbers and percentages. Chi-Square test and Fisher’s exact test were used for comparison between categorical variables as appropriate. Quantitative data were tested for normality by Kolmogorov-Smirnov test. Normal distribution of variables was described as mean and standard deviation

(SD), and independent sample t-test was used for comparison between groups. P value ≤ 0.05 was considered to be statistically significant.

RESULTS

In our investigation, internal fixation was used to treat 30 cases of bimalleolar ankle fractures. Age on average was 40.09 (SD 13.2) According to **Table 1**, there were 18 men and 12 women, with a M: F ratio of 2:1. Right side injuries were present in 25 (62.5%) cases, whereas left ankle injuries were present in 15 (37.5%).

Table (1): Demographic distribution of studied patients.

Age in years	N	Age (%)
21-30	3	10
31-40	4	13.3
41-50	6	20
51-60	11	36.6
61-70	6	20
Sex		
Male	18	60
Female	12	40

Table 2 summarizes the mode of injury.

Table (2): Mode of injury of the studied patients.

Mode of injury	N	%
Road traffic accident	9	30
Fall	7	23.3
Twist injury	14	46.6

Table 3 summarizes fracture classification of studied patients.

Table (3): Fracture type (Lauge Hansen) of the 30 participants

Lauge Hansen type	N	%
Supination-external rotation type	15	50
Supination-adduction	8	26.6
Pronation-abduction	4	13.3
Pronation external rotation	3	10

Table 4 summarizes the functional outcomes of the studied patients.

Table (4): Functional results of the studied patients.

Functional score	No	%	Mean \pm SD
Excellent	15	50%	97.5 \pm 9
Good	9	30%	84.2 \pm 6
Fair	6	20%	67.5 \pm 5

Of all studied patients, we found that only 6 patients suffered from complications. Superficial infection occurred in 3 (10%) of cases and deep infection in 1 (3%)

Table (5). Complications of the studied group patients.

Variable	No	%
Delayed union	1	3%
Superficial Infection	3	10%
Deep Infection	1	3%
Stiffness	0	0%
Charcot	0	0%
Arthritis	1	3%

DISCUSSION

In our study, 30 diabetic individuals with ankle bimalleolar fractures underwent surgical treatment at a tertiary referral hospital. The majority of the patients ranged in age from 41 to 60 years old. Most of patients were males with a M: F ratio of 2:1.

In the study by **Malhotr et al.** (4), 109 prospective and 33 retrospective Patients with ORIF and ankle fractures were included. Young, energetic individuals who sustain high energy trauma most frequently develop ankle fractures, and the mean age described in the literature ranges from 32.3 to 64 years.

Fractures were common in people aged 21 to 30 years old in **Motwani et al.** (5) study's with a mean age of 39.28 years. About 82.5% of studied patients were men with a M: F ratio of 5:1.

Among our 30 patients twisting injuries were the most frequent type of trauma, followed by RTA, while falling from a height caused the least frequent type of trauma.

In **Motwani et al.** (5) study and in **Elsoe et al.** (6) study, the majority of instances were automobile accidents.

The bulk of research in the literature found that roadside incidents, falls, and twisting injuries were the main causes of malleolar fractures. Sometimes they are associated with assaults, sports injuries, or industrial accidents (6-9).

According to **Malhotr et al.** (4), the majority of patients (91.6%) suffered injuries from twisting injuries or falls from height, which were most likely caused by the area's steep environment and difficulty traveling there because patients frequently experience falls from height and slides on uneven surfaces.

Among our 30 cases the lauge Hansen classification showed that most of our patients were of supination-external rotation type, then patients with supination-adduction, and the least common types were pronation-abduction, and pronation external rotation.

In concordance with our study, **Motwani et al.** (5) research on 68 patients found that fractures with pronation

case. Both types of infection were treated by debridement, antibiotics and improved totally. There was 1 case with delayed union after 8 weeks, but the patient completely healed during the follow up period (**Table 5**). abduction, pronation external rotation, supination adduction, and pronation were all present in 42%, 34%, 17%, and 7% of the patients.

Supination-external rotation injuries were the most prevalent form of injury. According to **Beris et al.** (10) and **Baird et al.** (11), pronation-external rotation injuries made up the second-highest percentage of all reported injuries at 27.5%.

As regarding the functional outcomes, we found that the mean total score was excellent (87.3±12.1). Most of the patients were with excellent outcomes patients with mean score of 97.5

In **Colton et al.** (12) study, 75% of the patients in group one and 50% in group two had favorable to outstanding outcomes.

In their study of 132 patients with good diabetes management, **Burnwell et al.** (13) discovered that 102 (77.3%) of them got good grades, 16% got average grades, and 6% got bad grades results. This explains why improved post-operative outcomes are associated with better diabetic control.

Ankle fractures were treated in 150 cases in the study by **de Souza et al.** (14) using the AO/ASIF technique with open reduction and internal fixation, yielding 90% successful outcomes.

Only 6 of the investigated participants experienced problems, which were distributed as follows: 3 (10%) cases of surface infection and 1 (3%) case of deep infection were both successfully treated with antibiotics. In 1 (3%) case with a delayed union lasting longer than 8 weeks, the patient later recovered fully throughout the follow-up period.

Ankle fractures were treated surgically in 13 poorly controlled diabetic patients and 46 well-controlled diabetes patients in **Bibbo et al.** (15) retrospective's research. Six superficial infections, 3 episodes of Charcot neuroarthropathy, 1 delayed union, and 1 deep infection were among the complications. Six (46%) of the 13 poorly controlled Patients with diabetes experienced complications, as opposed to 8 (17%) of the 46 patients with well-controlled diabetes.

When **Flynn et al.** (16) found that the risk of infection was 4 times higher in the group of uncontrolled diabetics when they retrospectively examined the management of closed ankle fractures in 73 diabetic patients with well-controlled diabetes and 25 patients with uncontrolled DM (32%) than it was in the well-controlled diabetic group (8%).

In an examination of 44 surgically repaired ankle fractures in 21 individuals with poorly controlled diabetes and 46 patients with control diabetes, **Blotter et al.** (17).

Those with poorly treated diabetes had a statistically greater complication rate (43%) than those with properly managed diabetes (15%).

DM with an acute, closed, rotational ankle fracture was present in 42 patients retrospectively evaluated by Jones *et al.* (18) 21 patients did not have comorbidities, while 21 individuals did. Individual patient characteristics—such as 42 non-diabetic control patients were included as comparison groups for age, sex, fracture type, and surgical versus nonsurgical therapy. The issues between the diabetic patients without comorbidities, aside from the fact that the diabetic patients required long-term bracing and the non-diabetic control patients were not noticeably different. But compared to the non-diabetic control individuals (14%), the diabetes patients with comorbidities experienced greater problems (47%).

CONCLUSION

Diabetic individuals with well-controlled blood sugar levels, surgical treatment of bimalleolar ankle fractures yields positive functional results. If the fracture has had a stable surgical fixation, early mobilization can be carried out with a positive functional outcome. It is recommended that diabetic individuals who have undergone surgical treatment for ankle fractures stay immobile for a considerable amount of time after the procedure before transitioning to protect weight-bearing.

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