

## ORIGINAL RESEARCH

# Antibiotics versus conservative surgery for treating diabetic foot osteomyelitis

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### ABSTRACT

**Background:** Diabetic foot osteomyelitis presents a significant challenge in clinical management, often necessitating aggressive interventions such as surgery. However, the optimal approach remains debated, with conservative antibiotic therapy emerging as a potential alternative. **Materials and Methods:** A retrospective cohort study was conducted involving diabetic patients diagnosed with foot osteomyelitis. Patients were divided into two groups: those treated with antibiotics alone (Antibiotics group) and those treated with conservative surgery in addition to antibiotics (Surgery group). Clinical data, including demographics, infection characteristics, treatment modalities, and outcomes, were analyzed. **Results:** A total of 150 patients were included, with 75 in each group. The mean age was 62 years, and 60% were male. In the Antibiotics group, the mean duration of antibiotic therapy was 6 weeks, while the Surgery group underwent surgical intervention within a mean of 10 days from diagnosis. The rate of complete healing was 65% in the Antibiotics group and 82% in the Surgery group. The median time to healing was 12 weeks in the Antibiotics group compared to 8 weeks in the Surgery group. Complications such as wound dehiscence occurred in 15% of the Antibiotics group and 8% of the Surgery group. **Conclusion:** Conservative surgery combined with antibiotics appears to be associated with faster healing and lower complication rates compared to antibiotic therapy alone in diabetic foot osteomyelitis. However, further prospective studies are warranted to validate these findings and guide clinical decision-making.

**Keywords:** Diabetic foot, Osteomyelitis, Antibiotics, Conservative surgery, Treatment.

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### INTRODUCTION

Diabetic foot osteomyelitis poses a significant clinical challenge due to its chronicity, risk of limb loss, and considerable healthcare burden (1). The condition often results from the complex interplay of peripheral neuropathy, peripheral vascular disease, and impaired immune response, predisposing individuals with diabetes to soft tissue and bone infections (2). Prompt and effective management is essential to prevent the progression of osteomyelitis, which can lead to severe complications such as gangrene and lower extremity amputation (3).

Traditionally, surgical debridement and resection of infected bone has been the cornerstone of treatment for diabetic foot osteomyelitis, aiming to eradicate the infectious focus and facilitate wound healing (4).

However, concerns regarding the invasiveness of surgery, prolonged hospitalization, and potential complications have led to the exploration of alternative approaches, including conservative antibiotic therapy (5).

Antibiotic therapy alone, without surgical intervention, has gained attention as a potential strategy for managing diabetic foot osteomyelitis, particularly in patients with mild-to-moderate infections and those with medical comorbidities that increase the surgical risk (6). Proponents of conservative antibiotic therapy argue that it can achieve comparable outcomes to surgery while avoiding the morbidity associated with invasive procedures (7). Nevertheless, the comparative efficacy and safety of antibiotics versus surgery in the

treatment of diabetic foot osteomyelitis remain contentious topics, with conflicting evidence from clinical studies (8).

This study aims to contribute to the existing literature by comparing the outcomes of conservative surgery combined with antibiotics versus antibiotic therapy alone in the management of diabetic foot osteomyelitis. By evaluating factors such as healing rates, time to resolution, and complication rates, this study seeks to provide valuable insights into the optimal approach for treating this challenging condition.

## MATERIALS AND METHODS

**Study Design and Population:** This retrospective cohort study involved diabetic patients diagnosed with foot osteomyelitis between September 2022 and August 2023. Patients were identified through electronic medical records from Kalpana Chawla Govt. Medical College and Hospital, Karnal, Haryana. Inclusion criteria comprised adult patients (aged 18 years or older) with a confirmed diagnosis of diabetic foot osteomyelitis based on clinical and radiological findings. Patients with incomplete medical records or those lost to follow-up were excluded from the study.

**Data Collection:** Data on patient demographics, medical history, diabetes-related variables (e.g., duration of diabetes, glycemic control), foot ulcer characteristics, microbiological findings, treatment modalities (including antibiotic regimen and surgical procedures), and clinical outcomes were collected from electronic medical records.

**Treatment Groups:** Patients were categorized into two groups based on their treatment modality:

- 1. Antibiotics Group:** Patients who received antibiotic therapy alone for the management of diabetic foot osteomyelitis.
- 2. Surgery Group:** Patients who underwent conservative surgery (e.g., debridement, amputation) in addition to antibiotic therapy.

**Outcome Measures:** The primary outcome measure was the rate of complete healing, defined as the resolution of osteomyelitis and closure of the foot ulcer without the need for further intervention. Secondary outcome measures included the time to healing, incidence of treatment-related complications (e.g., wound dehiscence, recurrence of infection), and length of hospital stay.

**Statistical Analysis:** Descriptive statistics were used to summarize patient characteristics and clinical variables. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as means with standard deviations or medians with interquartile ranges, depending on the distribution. Group comparisons were performed using chi-square tests for categorical

variables and t-tests or Mann-Whitney U tests for continuous variables, as appropriate. Multivariate logistic regression analysis was conducted to identify independent predictors of treatment outcomes. Statistical significance was set at  $p < 0.05$ . Data analysis was performed using SPSS 23.

## RESULTS

### Patient Characteristics

A total of 150 diabetic patients with foot osteomyelitis were included in the study, with 75 patients in each treatment group. Table 1 summarizes the baseline demographic and clinical characteristics of the study population.

**Table 1: Baseline Characteristics of Study Population**

Characteristic	Antibiotics Group (n=75)	Surgery Group (n=75)	p-value
Age (years), Mean $\pm$ SD	63.2 $\pm$ 8.5	61.8 $\pm$ 7.9	0.312
Male, n (%)	42 (56.0)	45 (60.0)	0.589
Duration of diabetes (years), Median (IQR)	15 (10-20)	17 (12-22)	0.178
HbA1c (%), Mean $\pm$ SD	8.5 $\pm$ 1.2	8.8 $\pm$ 1.4	0.231
Neuropathy, n (%)	58 (77.3)	60 (80.0)	0.713
Peripheral vascular disease, n (%)	35 (46.7)	40 (53.3)	0.428
Ulcer size (cm <sup>2</sup> ), Mean $\pm$ SD	5.2 $\pm$ 1.8	5.6 $\pm$ 2.0	0.189

Note: SD = Standard Deviation; IQR = Interquartile Range; HbA1c = Hemoglobin A1c.

The two groups were well-balanced in terms of age, gender distribution, duration of diabetes, glycemic control (HbA1c levels), and prevalence of neuropathy and peripheral vascular disease.

### Treatment Outcomes

Table 2 presents the treatment outcomes and clinical variables of interest in the Antibiotics and Surgery groups.

**Table 2: Treatment Outcomes and Clinical Variables**

Outcome	Antibiotics Group (n=75)	Surgery Group (n=75)	p-value
Complete Healing, n (%)	49 (65.3)	61 (81.3)	0.032
Time to Healing (weeks), Median (IQR)	12 (10-16)	8 (6-12)	<0.001
Complications,	11 (14.7)	6 (8.0)	0.204

n (%)			
Wound Dehiscence, n (%)	11 (14.7)	4 (5.3)	0.091
Recurrence of Infection, n (%)	6 (8.0)	3 (4.0)	0.358
Length of Hospital Stay (days), Mean $\pm$ SD	10.5 $\pm$ 3.2	13.2 $\pm$ 4.5	<0.001

Note: SD = Standard Deviation; IQR = Interquartile Range.

The Surgery group demonstrated significantly higher rates of complete healing compared to the Antibiotics group (81.3% vs. 65.3%,  $p = 0.032$ ). Additionally, patients in the Surgery group had a shorter median time to healing (8 weeks vs. 12 weeks,  $p < 0.001$ ) and a shorter mean length of hospital stay (13.2 days vs. 10.5 days,  $p < 0.001$ ) compared to those in the Antibiotics group. While the incidence of complications and specific complications such as wound dehiscence and recurrence of infection appeared lower in the Surgery group, the differences were not statistically significant ( $p > 0.05$ ).

## DISCUSSION

Diabetic foot osteomyelitis presents a challenging clinical scenario due to its chronic nature and potential for severe complications, including lower extremity amputation. In this study, we compared the outcomes of conservative surgery combined with antibiotics versus antibiotic therapy alone in the management of diabetic foot osteomyelitis.

Our findings indicate that conservative surgery in addition to antibiotic therapy was associated with significantly higher rates of complete healing compared to antibiotic therapy alone. This aligns with previous studies that have demonstrated the efficacy of surgical debridement in eradicating infected bone and promoting wound healing (1). The shorter time to healing observed in the Surgery group further supports the beneficial role of surgical intervention in accelerating the resolution of diabetic foot osteomyelitis.

Despite the favorable outcomes associated with surgery, it is essential to consider the potential risks and drawbacks of invasive procedures. Surgical interventions may increase the risk of complications such as wound dehiscence and surgical site infections, which can prolong hospitalization and delay recovery (2). However, in our study, the incidence of complications was comparable between the two treatment groups, with no significant difference observed in the rates of wound dehiscence or recurrence of infection. This suggests that conservative surgery, when performed judiciously, can be a safe and effective treatment option for diabetic foot osteomyelitis.

The optimal selection of treatment modality should be guided by various factors, including the severity of infection, extent of bone involvement, patient's overall health status, and preferences. While surgery may offer advantages in terms of faster healing and higher rates of complete resolution, antibiotic therapy alone may be considered in patients with mild-to-moderate infections or those who are not surgical candidates due to medical comorbidities or patient preference (3). It is important to acknowledge the limitations of our study, including its retrospective design and potential for selection bias. The decision to pursue conservative surgery versus antibiotic therapy alone may have been influenced by factors not captured in our analysis, such as surgeon preference or patient-specific considerations. Additionally, the generalizability of our findings may be limited by the single-center nature of the study and the heterogeneity of the patient population.

Further prospective studies are warranted to validate our findings and provide additional insights into the optimal management of diabetic foot osteomyelitis. Future research should aim to compare different surgical approaches, evaluate the long-term outcomes of treatment, and explore novel therapeutic strategies, such as advanced wound care modalities and targeted antibiotic therapies.

## CONCLUSION

In conclusion, our study suggests that conservative surgery combined with antibiotics is associated with superior outcomes compared to antibiotic therapy alone in the treatment of diabetic foot osteomyelitis. However, individualized treatment decisions should be made based on a comprehensive assessment of the patient's clinical status and preferences, taking into account the risks and benefits of each treatment approach.

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