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A Comparative Study of Medical Treatment with Antibiotics Alone vs Surgical Treatment with Antibiotics for Diabetic Osteomyelitis

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ABSTRACT

Managing diabetic foot osteomyelitis poses a significant clinical challenge and often requires aggressive interventions, including surgical procedures. However, the optimal treatment strategy remains a topic of debate, with conservative antibiotic therapy emerging as a potential alternative. We conducted a retrospective cohort study involving diabetic patients diagnosed with foot osteomyelitis. Patients were categorized into two groups based on their treatment approach: those who received antibiotics alone (Antibiotics group) and those who underwent conservative surgery in addition to antibiotics (Surgery group). We analyzed various clinical parameters, including demographics, infection characteristics, treatment modalities and outcomes. Our study included a total of 178 patients, with 89 in each group. The average age was 63 years and majority of the patients were male. In the Antibiotics group, the average duration of antibiotic therapy was 6 weeks, while patients in the Surgery group underwent surgical intervention within an average of 10 days from diagnosis. The rate of complete healing was 65.16% in the Antibiotics group and 80.89% in the Surgery group. The median time to healing was 11 weeks in the Antibiotics group compared to 9 weeks in the Surgery group. Complications such as wound dehiscence occurred in 14.61% of the Antibiotics group and 7.87% of the Surgery group. Our findings suggest that combining conservative surgery with antibiotics may lead to faster healing and lower complication rates compared to antibiotic therapy alone for diabetic foot osteomyelitis. However, further prospective studies are necessary to validate these results and provide guidance for clinical decision-making.

INTRODUCTION

Diabetic foot osteomyelitis presents a significant clinical challenge due to its chronic nature, risk of limb loss, and substantial healthcare burden. It commonly arises from the intricate interplay of peripheral neuropathy, peripheral vascular disease and compromised immune response, making individuals with diabetes susceptible to soft tissue and bone infections. Timely and effective management is crucial to halt the progression of osteomyelitis, which can lead to severe complications such as gangrene and lower extremity amputation^[1-3]. Traditionally, surgical debridement and removal of infected bone have been the mainstay of treatment for diabetic foot osteomyelitis, with the goal of eradicating the infectious focus and promoting wound healing. However, concerns regarding the invasiveness of surgery, extended hospital stays and potential complications have prompted exploration into alternative approaches, including conservative antibiotic therapy^[4,5]. Antibiotic therapy alone, without surgical intervention, has emerged as a potential strategy for managing diabetic foot osteomyelitis, particularly in patients with mild-to-moderate infections and those with medical conditions that heighten the surgical risk. Advocates of conservative antibiotic therapy argue that it can yield comparable outcomes to surgery while avoiding the morbidity associated with invasive procedures. Nonetheless, the comparative effectiveness and safety of antibiotics versus surgery in treating diabetic foot osteomyelitis remain contentious subjects, with conflicting evidence from clinical studies^[6-8]. This study aims to contribute to the existing body of literature by comparing the outcomes of conservative surgery combined with antibiotics versus antibiotic therapy alone in the management of diabetic foot osteomyelitis. Through an assessment of parameters such as healing rates, resolution time and complication rates, this study seeks to offer valuable insights into the optimal approach for addressing this challenging condition.

MATERIALS AND METHODS

This retrospective study focused on diabetic patients diagnosed with foot osteomyelitis who were identified from health records at an Indian Medical College and Hospital. Inclusion criteria encompassed adult patients (18 years or older) with a confirmed diagnosis of diabetic foot osteomyelitis. The diagnosis of osteomyelitis was done by clinical evaluation, imaging studies such as X-rays, MRI, or CT scans as needed and laboratory tests including blood cultures or biopsies to identify the causative organism. Patients with incomplete records or those lost to follow-up were excluded. Patient demographics, medical history, diabetes-related factors (e.g., diabetes duration, glyceria control), foot ulcer details, microbiological

findings, treatment approaches (including antibiotic regimens and surgeries) and clinical outcomes were collected from electronic health records.

Patients were Classified Into Two Groups Based on Treatment:

Antibiotics Group: Patients treated solely with antibiotics for diabetic foot osteomyelitis management.

Surgery Group: Patients who underwent conservative surgeries (e.g., debridement, amputation) alongside antibiotic therapy. Our study included a total of 178 patients, with 89 in each group. The primary outcome was complete healing rate, defined as osteomyelitis resolution and foot ulcer closure without further intervention. Secondary outcomes included healing time, treatment-related complications (e.g., wound dehiscence, infection recurrence) and hospital stay duration. Descriptive statistics summarized 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 utilized chi-square tests for categorical data and t-tests or Mann-Whitney U tests for continuous variables, as appropriate. Multi variate logistic regression identified independent predictors of treatment outcomes, with statistical significance set at $p < 0.05$. Data analysis employed SPSS 20.

RESULTS AND DISCUSSIONS

A total of 178 diabetic patients diagnosed with foot osteomyelitis were enrolled in our study, with 89 patients assigned to each treatment group. (Table 1) provides an overview of the baseline demographic and clinical characteristics of the study cohort. Notably, both treatment groups exhibited similar distributions in terms of age, gender, diabetes duration, glycemic control (HbA1c levels) and the prevalence of neuropathy and peripheral vascular disease. Comparative analysis revealed that the Surgery group

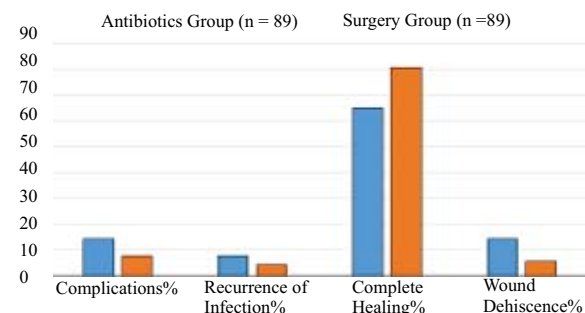


Fig. 1: Comparison of Outcomes Between Two Groups

Table 1: Baseline Variables of the Two Study Groups with Diabetic Foot Osteomyelitis

Characteristics	Antibiotics Group (n = 89)	Surgery Group (n = 89)	p-value
Age in years, Mean±SD	63.7±8.9	62.4±7.6	0.35
Males, n (%)	50 (28.08)	53 (29.77)	0.56
Ulcer size in cm ² , Mean±SD	5.0±1.7	5.4±1.8	0.21
Duration of diabetes in years, Median (IQR)	16 (10-21)	18 (12-23)	0.19
HbA1c %, Mean±SD	8.3±1.3	8.6±1.1	0.25
Peripheral vascular disease, n (%)	42 (23.59)	47 (26.40)	0.44
Neuropathy, n (%)	69 (38.76)	71 (39.88)	0.77

Table 2: Treatment Outcomes in the Two Study Groups

Outcome measures	Antibiotics Group (n = 89)	Surgery Group (n = 89)	p-value
Complications, n (%)	13 (14.61)	7 (7.87)	0.23
Recurrence of Infection, n (%)	7 (7.87)	4 (4.49)	0.39
Complete Healing, n (%)	58 (65.17)	72 (80.9)	<0.05
Duration of Hospital Stay in days, Mean±SD	11.2±2.9	13.8±4.1	<0.05
Time till Healing in weeks, Median	11 (10-15)	9 (6-12)	<0.05
Wound Dehiscence, n (%)	13 (14.61)	5 (5.62)	<0.05

exhibited markedly higher rates of complete healing in contrast to the Antibiotics group. Moreover, patients in the Surgery group experienced a shorter median time to healing and a reduced mean hospitalization duration compared to their counterparts in the Antibiotics group. Although the occurrence of complications, including specific events such as wound dehiscence and infection recurrence, seemed less frequent in the Surgery group, these differences did not reach statistical significance (refer to Table 2 and Fig. 1). 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 managing diabetic foot osteomyelitis. Our findings show that conservative surgery, alongside antibiotic therapy, led to significantly higher rates of complete healing compared to antibiotic therapy alone. This observation aligns with prior studies demonstrating the efficacy of surgical debridement in eradicating infected bone and promoting wound healing^[1]. The Surgery group exhibited a shorter time to healing, further supporting the beneficial role of surgical intervention in accelerating the resolution of diabetic foot osteomyelitis.

Despite the favorable outcomes associated with surgery, it's crucial to consider the potential risks and drawbacks of invasive procedures. Surgical interventions may elevate the risk of complications like wound dehiscence and surgical site infections, which could prolong hospital stays and recovery^[2]. However, in our study, the incidence of complications was similar between the two treatment groups, with no significant difference in rates of wound dehiscence or infection recurrence. This suggests that conservative surgery, when done thoughtfully, can be a safe and effective treatment option for diabetic foot osteomyelitis. The choice of treatment modality should consider various factors such as infection severity, bone involvement extent, overall patient health and preferences. While

surgery may offer benefits like quicker healing and higher resolution rates, antibiotic therapy alone may be suitable for patients with mild-to-moderate infections or those unsuitable for surgery due to medical reasons or personal choice^[3]. Similar results were reported by previous research^[9-13]. Our study has limitations, including its retrospective nature and potential for selection bias. The decision between conservative surgery and antibiotic therapy alone might have been influenced by factors not captured in our analysis, like surgeon preferences or patient-specific considerations. Additionally, the study's single-center scope and patient population heterogeneity may limit the generalizability of our findings. Future prospective studies should validate our results, explore different surgical approaches, assess long-term treatment outcomes and investigate new therapeutic strategies like advanced wound care and targeted antibiotics.

CONCLUSION

In summary, our findings indicate that combining conservative surgery with antibiotics yields better outcomes than using antibiotics alone for treating diabetic foot osteomyelitis. Nevertheless, treatment decisions should be tailored to each patient after a thorough evaluation of their clinical condition and preferences, weighing the advantages and disadvantages of each treatment method.

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