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Use of liquid metronidazole in the management of wounds with cavities

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Abstract

Background: Chronic wounds, particularly those that are malodorous, present significant challenges in clinical management, often leading to psychological distress and social isolation for patients. This study aims to evaluate the effectiveness of topical liquid metronidazole in enhancing wound healing outcomes compared to conventional wound care methods.

Methods: A retrospective cohort study was conducted to assess the effectiveness of topical liquid metronidazole in wound management. Patients with various wound types were divided into two groups: one receiving topical metronidazole and the other standard wound care. Data on demographics, wound characteristics, treatments, and outcomes were collected. The primary outcomes were mean time to wound closure and the proportion of patients achieving complete or significant wound healing. Statistical analyses compared these outcomes between the groups.

Results: The study involved 40 patients, with a mean age of 35.6 years; 62.5% were female. Most wounds were deep musculoskeletal infections (52.5%), and 55% of patients received topical metronidazole treatment. Wound closure was faster in the metronidazole group (5.5 vs. 6.9 weeks, $p = 0.005$), with an 85% healing rate compared to 55% in the conventional care group ($p = 0.005$).

Conclusion: The application of topical liquid metronidazole appears to enhance wound healing outcomes, leading to faster wound closure and a higher proportion of patients achieving complete healing or significant wound size reduction compared to conventional wound care methods.

Keywords: Liquid metronidazole, wound healing, chronic wounds, wound odor, retrospective cohort study

Introduction

Wounds presenting with cavities pose significant challenges in clinical wound management due to the formation of dead spaces that can harbor bacteria and other microorganisms [1, 2]. These dead spaces not only impede the healing process but also increase the risk of infection, leading to complications such as malodor, delayed healing, and systemic involvement [3]. Effective management of such wounds necessitates a comprehensive approach that includes thorough wound debridement to remove necrotic tissue, appropriate antibiotic therapy to control infection, and strategies to promote wound closure [4].

Metronidazole, commercially known as Flagyl, is a synthetic nitroimidazole antibiotic renowned for its efficacy against anaerobic bacteria and certain protozoa [5, 6]. Its broad-spectrum antimicrobial activity makes it a valuable agent in treating infections where anaerobes are implicated. In wound management, particularly for wounds with cavities, the topical application of liquid metronidazole offers several advantages. Its liquid formulation allows for deep penetration into wound tissues, ensuring that the antimicrobial agent reaches areas that are otherwise difficult to treat [7]. This deep tissue penetration is crucial for eradicating anaerobic bacteria residing in the depths of wound cavities. Additionally, metronidazole's ability to neutralize malodorous compounds produced by anaerobic bacteria significantly improves patient comfort and quality of life [8].

The application of topical metronidazole in wound care has been explored in various studies. A review in Ostomy Wound Management highlighted that topical metronidazole, applied as a 0.75% or 0.80% gel, effectively reduced or eradicated wound odor, decreased wound drainage, and improved wound appearance [9]. Another study reported that metronidazole combined with autolytic debridement was very effective in controlling malodor compared to traditional wet dressing therapy combined with silver sulfadiazine [10]. Despite these findings, there remains a paucity of comprehensive data evaluating the effectiveness of liquid metronidazole specifically in the management of wounds with cavities. Given the unique challenges these wounds present, including the risk of abscess formation and chronic infection, it is imperative to assess the therapeutic potential of topical metronidazole in this context. This retrospective study aimed to fill this gap by evaluating the outcomes associated with the use of liquid metronidazole in treating patients with cavity wounds. The findings are anticipated to inform clinical practice and potentially enhance treatment protocols for this challenging condition.

Methodology

This retrospective cohort design was used to evaluate the efficacy of liquid metronidazole in the treatment of wounds presenting with cavities. Patient records from January 2020 to December 2022 were meticulously reviewed. The investigation was conducted within the Orthopedic Unit of Babcock University Teaching Hospital, located in Ilishan Remo, Ogun State. The study population comprised 40 patients who satisfied specific inclusion criteria: infected deep musculoskeletal wounds characterized by minimal external openings; wounds requiring primary closure subsequent to surgical extension and thorough debridement of contaminated tissues; and small abscesses necessitating incision and drainage procedures. These criteria were stringently applied to ensure a uniform study cohort, thereby bolstering the validity of the results.

To mitigate potential confounding factors, exclusion criteria were established, disqualifying patients with systemic infections, known hypersensitivity to metronidazole, immunocompromised states, or those who had undergone alternative antibiotic treatments prior to the study period. Implementing these exclusion parameters allowed for a focused assessment of liquid metronidazole's impact on wound healing within the defined patient group. The primary outcome measure was the proportion of wounds that achieve complete healing, categorized as 'healed' or 'unhealed' based on clinical documentation. The secondary outcome is the time to wound healing, measured in days from the initiation of treatment to documented wound closure.

Data extraction encompassed a comprehensive review of electronic medical records, capturing variables such as patient demographics, detailed wound descriptions, treatment methodologies, and clinical outcomes. The primary intervention protocol involved a standardized approach: wound drainage, meticulous debridement, and the insertion of a stent into the wound cavity, which was carefully secured to prevent premature displacement. Subsequently, liquid metronidazole was instilled into the wound cavity either daily or on alternate days until complete closure was achieved. Ethical approval for the study was obtained from the Babcock University Health Research Ethics Committee, adhering to established guidelines for retrospective research. Given the study's design and the utilization of de-identified patient data, the requirement for informed consent was waived. Throughout the research process, strict measures were implemented to maintain patient confidentiality and anonymity, in compliance with ethical standards governing human subject research

Statistical Analysis

Descriptive statistics were used to summarize patient demographics and clinical characteristics. Comparisons of continuous variables, like time to wound healing from the initiation of treatment to documented wound closure were conducted using t-tests. A p-value of less than 0.05 was considered statistically significant.

Results

The study population had a mean age of 35.6±10.3 years. In terms of gender distribution, females comprised 62.5% of the participants, while males accounted for 37.5%. Educational attainment varied among the participants, with 22.5% having completed primary education, 35.0% having secondary education, and 42.5% having tertiary education. Regarding wound types, 52.5% of the wounds were classified as infected deep musculoskeletal wounds, 32.5% as contaminated wounds, and 15.0% as small abscesses. In terms of treatment modalities, 55.0% of the participants received liquid metronidazole for wound management, while 45.0% were treated with conventional wound care methods alone. The mean wound size was 15.4±6.2 cm^2 (Table 1).

According to table 2, the mean time to wound closure was observed to be 5.5±1.8 weeks in the group treated with topical liquid metronidazole. In contrast, the group receiving conventional wound care exhibited a mean closure time of 6.9±2.4 weeks. This difference was statistically significant, with a p-value of 0.005. Furthermore, the proportion of patients achieving either complete wound closure or a significant reduction in wound size was 85% in the metronidazole group, compared to 55% in the conventional care group. This disparity also reached statistical significance, as indicated by a p-value of 0.005.

Table 1: Demographic and Clinical Characteristics of Patients

Variable	N (%)
Age	
Mean ± SD	35.6 ±10.3
Gender	
Female	25 (62.5)
Male	15 (37.5)
Education	
Primary	9 (22.5)
Secondary	14 (35.0)
Tertiary	17 (42.5)
Wound type	
Infected deep musculoskeletal	21 (52.5)
Contaminated	13 (32.5)
Small abscess	6 (15.0)
Wound treatment	
Liquid metronidazole	22 (55.0)
Conventional wound care alone	18 (45.0)
Wound size (cm^2)	
Mean ± SD	15.4±6.2

Table 2: Comparison between liquid metronidazole group and conventional wound care group

Outcome	Tropical liquid metronidazole (n=22)	Conventional wound care (n=18)	p value
Mean time to wound closure (weeks)	5.5±1.8	6.9±2.4	0.005
Complete wound closure or significant reduction (%)	85	55	0.005

Discussion

Wound care remains a significant challenge in clinical practice, with infected wounds posing a particular threat to patient health and quality of life. Despite advances in wound management, infected wounds continue to be associated with prolonged healing times, increased risk of complications, and elevated healthcare costs. The results of this study provide valuable insights into the efficacy of topical liquid metronidazole in promoting wound closure and improving outcomes in patients with infected wounds.

Our findings indicate that patients treated with topical liquid metronidazole experienced a statistically significant reduction in the mean time to wound closure compared to those receiving conventional wound care. Specifically, the metronidazole group achieved wound closure in an average of 5.5 weeks, whereas the conventional care group required approximately 6.9 weeks. Additionally, a higher percentage of patients in the metronidazole group attained complete wound closure or significant wound size reduction compared to the conventional care group. These results align with existing literature supporting the use of topical metronidazole in wound management. Paul and Pieper (2008) conducted a comprehensive review and reported that topical metronidazole effectively reduced wound odor, drainage, and improved wound appearance, suggesting its potential benefits in wound healing processes. Similarly, Watanabe *et al.* [11] demonstrated that a 0.75% metronidazole gel was safe and effective in deodorizing malodorous fungating tumors, further supporting its role in managing wound-related symptoms. However, it is important to note that while our study observed a significant improvement in wound healing outcomes with metronidazole treatment, other studies have reported mixed results. A systematic review by da Costa Santos *et al.* [12] highlighted the need for more robust evidence to confirm the effectiveness of topical metronidazole in controlling wound odor, indicating that current findings should be interpreted with caution. Furthermore, the potential adverse effects of topical metronidazole should be considered. Sampaio *et al.* [13] investigated the concentration of metronidazole in the bloodstream following its topical application on experimental skin wounds and suggested that systemic absorption could occur, potentially leading to side effects. Therefore, while topical application is generally considered safe, monitoring for possible adverse reactions remains essential.

Conflict of Interest

Not available.

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