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The use of policresulen concentrate in the management of hypergranulation in diabetic foot ulcers: A case report

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Case Report

ABSTRACT

Diabetic foot ulcers are a severe complication of diabetes, causing pain, infection risk, and reduced quality of life. Timely and effective wound management is crucial to prevent delayed healing, which may ultimately result in amputation. One of the complications often encountered in diabetic foot ulcers is hypergranulation tissue. Policresulen, known for its hemostatic and antimicrobial properties, presents a potential option for managing hypergranulation. This case report explores the effects of applying policresulen concentrate to a diabetic foot ulcer complicated by hypergranulation tissue. The case involved a 61-year-old male patient with a 15-year history of diabetes mellitus which developed a diabetic foot ulcer two years prior. Despite 10 months of various treatments, wound healing remained suboptimal due to persistence hypergranulation tissue. Policresulen concentrate was applied every three days for a total of 16 wound care sessions, and healing progress was evaluated using the Bates-Jensen Wound Assessment Tool. Over the course of treatment, the hypergranulation tissue gradually diminished, and the wound progressively closed until complete epithelialization was achieved. This case demonstrates that policresulen concentrate may be effective in managing hypergranulation and facilitating wound closure in diabetic foot ulcers. No adverse effects were observed during the treatment period.

INTRODUCTION

Diabetic foot ulcer (DFU) is one of the most common and serious complications in patients with diabetes mellitus. The increasing incidence of DFU poses significant challenges and leads to a higher risk of morbidity and mortality among patients. According to Stancu et al., approximately 15% to 25% of individuals with diabetes will develop DFUs at some point in their lives. Without proper management, these ulcers may result in limb amputation or even death. It is estimated that 15% of patients with DFUs undergo amputation, and nearly 48% may die within five years of diagnosis.[1-5]

Recent advances in the treatment of diabetic foot ulcers have introduced various innovative approaches. These include smart dressings, such as nanogel, and therapies using advanced technologies like Negative Pressure Wound Therapy (NPWT), and hyperbaric oxygen therapy. However, complications in the wound healing process still frequently occur.[1] One of the major contributing factors to poor healing outcomes is prolonged infection, which not only delays the healing process but also increases the risk of amputation.[6,7] Infections can also promote excessive tissue growth, leading to a condition known as hypergranulation.[8]

Hypergranulation is characterized by the excessive production of granulation tissue that extends beyond the level of the surrounding skin. This tissue is typically fragile and prone to bleeding

due to immature capillary formation.[9] The presence of hypergranulation hinders epithelial migration, thereby disrupting the healing process. Therefore, appropriate management of hypergranulation in DFUs is essential to promote optimal healing.

Treatment strategies should aim to address the underlying causes of hypergranulation.[10] One key contributing factor is a prolonged inflammatory phase, often triggered by high levels of bacterial contamination or repeated friction at the wound site.[11] One potential approach to address this complication is the application of policresulen concentrate. Policresulen is an organic polymolecular acid compound classified as both an antiseptic and a disinfectant. It possesses strong hemostatic and antimicrobial properties and has been commonly used in Indonesia for treating oral conditions.[12] Policresulen has been applied topically in the management of various types of wounds. According to Kim and Choi, the use of policresulen concentrate was effective in managing hypergranulation in drainage wounds.[13] However, to date, no studies have been published regarding its use in diabetic foot ulcers with hypergranulation.

Given the pathological similarities, policresulen may help suppress prolonged inflammation and reduce microbial load in DFUs, thereby minimizing hypergranulation. This study aimed to explore the effectiveness of policresulen concentrate in managing hypergranulation tissue in a diabetic foot ulcer case.

CASE DESCRIPTION

The patient in this case was Mr. H, a 61-year-old male who had been diagnosed with type 2 diabetes mellitus 15 years ago. At the time of wound treatment, his general condition was stable, with blood glucose levels ranging from 120 to 240 mg/dL. In addition to diabetes, the patient had a 17-year history of hypertension, wich began approximately two years before the diabetes diagnosis. He admitted to neglecting his hypertension due to the absence of noticeable symptoms. During the wound care period, his blood pressure ranged from 135/90 mmHg to 140/95 mmHg. The patient's weight was 55 kg and his height was 160 cm.

The diabetic foot ulcer had developed two years earlier, beginning suddenly when his blood glucose spiked to 500 mg/dL. Initially, the patient self-managed the wound, but the condition deteriorated. After approximately three months of informal treatment, he discontinued medical care and turned to traditional remedies. However, the wound worsened after one month of traditional care, leading to hospitalization for the subsequent three months.

During the hospital stay, a comprehensive examination revealed the presence of osteomyelitis and venous blockage. The patient subsequently underwent angioplasty to restore blood flow. Once stabilized, he was discharged and continued outpatient wound management at home.

Wound care resumed four months later, with regular sessions every three days. From the beginning, hypergranulation tissue was observed on the wound. The tissue measured approximately 1.0 cm in length, 0.8 cm in width, and 0.4 cm in height (Figure 3[2]). It appeared as a prominent, bright-red mass that was firm in texture and non-bleeding upon contact. Initially, wound care involved the application of silver ointment as the primary dressing, covered with foam, and secured with orthopedic wool and cohesive bandage. After 1.5 months, the wound showed general improvement, but the hypergranulation area remained unchanged.

Over the next two months, policresulen concentrate was introduced into the wound care regimen. It was added as a topical antimicrobial agent after the hypergranulation tissue showed minimal response to the silver-based treatment.

Wound care procedures

Wound care was carried out at the patient's home over a period of 1.5 months, from May 14, 2024, to June 28, 2024, with sessions conducted every three days. Before each session, the patient's blood glucose level was measured using a glucometer. The condition of the wound was then assessed using the Bates-Jensen Wound Assessment Tool (BJWAT) to evaluate healing progress.

The wound care procedure included the following steps: (1) Dressing removal: The existing dressing was carefully removed, (2) Wound cleansing: The wound was gently cleansed with normal saline (NaCl), followed by the application of a special wound soap to assist in removing debris and foreign material from the wound surface and surrounding skin, (3) Mechanical debridement: Using sterile gauze, light debridement was performed to remove biofilm from the wound bed. (4) Application of policresulen concentrate: A total of 2 mL of policresulen concentrate was applied directly to the hypergranulated area. Gauze was used to apply gentle pressure for 1 to 3 minutes to ensure proper absorption and hemostasis, (5) Secondary dressing: After policresulen application, silver ointment was reapplied to the wound, (6) Dressing and fixation: The wound was covered with a foam dressing, wrapped with orthopedic wool, and secured with a cohesive bandage as the outermost layer. Throughout the treatment period, this dressing protocol was applied consistently.

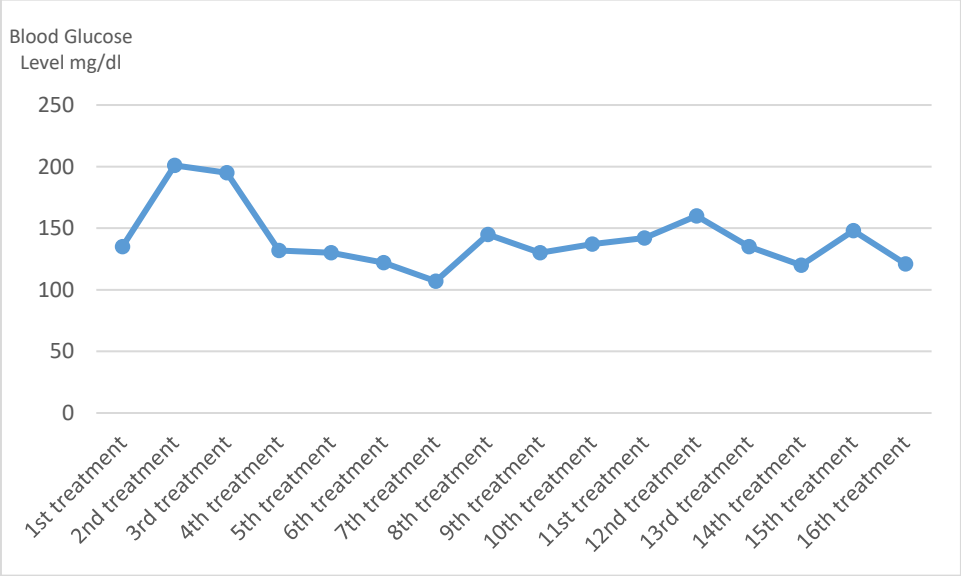

Figure 1. Blood Glucose Levels During The Treatment Period

As shown in Figure 1, the majority of the patient's blood glucose levels during the treatment period remained within a controlled range, generally below 200 mg/dL. This indicates that the patient's metabolic condition was relatively stable throughout the wound care period, providing a favorable environment for optimal wound healing.

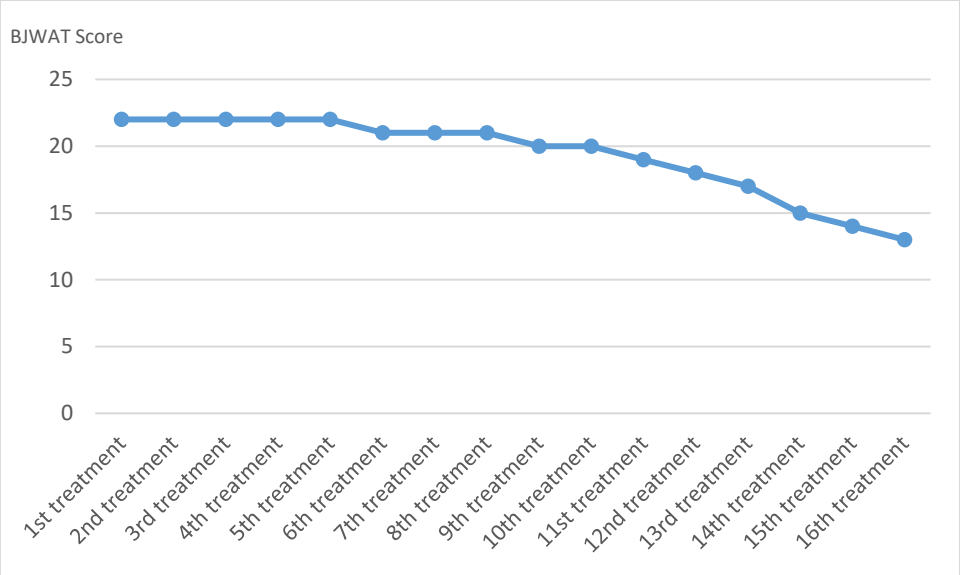

Figure 2. Progress of Wound Assessment Scores Based on BJWAT During Treatment

According to Figure 2, consistent improvements were observed in the patient's wound condition, as measured by the Bates-Jensen Wound Assessment Tool (BJWAT), throughout the course of treatment with policresulen concentrate.

All assessment parameters showed progressive improvement, with the total BJWAT score steadily decreasing from session 1 to session 16. The final score of 13 indicated complete epithelialization and wound closure, suggesting effective resolution of hypergranulation tissue and successful wound healing.

Tabel 1. Development of Wound Assessment Scores based on BJWAT Score During Treatment Period

	Treatment															
Item	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Size	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Depth	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Edges	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1
Undermining	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Necrotic tissue type	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Necrotic tissue amount	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Exudate type	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
Exudate amount	3	3	3	3	3	3	3	3	3	3	2	1	1	1	1	1
Skin color surrounding wound	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Peripheral tissue edema	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Peripheral tissue induration	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Granulation tissue	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
Ephitalization	5	5	5	5	5	5	5	5	5	5	5	5	5	3	2	1
Total Score	22	22	22	22	22	21	21	21	20	20	19	18	17	15	14	13

As presented in Table 1, five assessment parameters showed substantial improvement throughout the 16 wound care sessions. These parameters were wound edges, exudate type, exudate amount, granulation tissue and epithelialization. The progressive changes in these parameters

indicate a positive trend toward tissue regeneration and wound closure. Notably, for the epithelialization score, which remained constant at 5, began to decrease after session 12 and reached the values of 1 by the final session, indicating near-complete healing. Correspondingly, the total BJWAT score declined from 22 to 13, providing further objective evidence of the clinical improvement associated with the use of policresulen concentrate.

(1)Before hypergranulation

(2) Before treatment

(3) 1st treatment

(4) 5th treatment

(5) 9th treatment

(6) 13th treatment

(7)14th treatment

(8) 15th treatment

(9) 16th treatment

Figure 3. Progression of Wound Closure During Treatment Period

Figure 3 illustrates the visual progression of wound healing over the 16 treatment sessions using policresulen concentrate. From the initial treatment to the final session, the wound showed progressive closure, characterized by a gradual reduction in wound size, diminishing hypergranulation tissue, improved epithelialization, and the absence of clinical signs of infection or inflammation. By the 16th treatment, the wound was fully epithelialized, with healthy surrounding skin and no remaining granulation tissue. There were also no visible adverse reactions or signs of irritation following the application of policresulen concentrate. This photographic documentation supports the objective findings from the BJWAT scores, providing further evidence that policresulen concentrate contributed positively to wound healing, particularly in managing hypergranulation in this diabetic foot ulcer case.

DISCUSSION

This case report highlights the potential effectiveness of policresulen concentrate in managing hypergranulation tissue in a chronic DFU. Over 16 treatment sessions, the wound exhibited a consistent reduction in hypergranulation, culminating in complete epithelialization without any adverse effects. This finding is clinically significant, as hypergranulation is a known barrier to wound closure, particularly in chronic wounds such as DFUs.

Effective wound care is a key strategy to prevent lower-extremity amputation among patients with diabetes mellitus. By providing proper wound care, the risk of amputation can be reduced.[14] However, wound care is often challenged by complications, includingmalnutrition, infection, concomitant diseases and prolonged inflammatory phases of wound healing such as hypergranulation.[15]

Hypergranulation is often observed in chronic wounds and may arise from persistent inflammation, occlusive dressings, or tissue imbalance. In the present case, the combined use of policresulen concentrate, silver ointment, and foam dressing addressed these potential etiological factors . The integration of these dressings aligns with current best practices, suggesting a synergistic approach that may accelerate wound resolution.[11,16] The dressing combination used here also aligns with Hollander's four key principles for managing hypergranulation. Specifically, policresulen served as both an antimicrobial and debriding agent, silver ointment contributed to biofilm control, and foam dressing maintained optimal moisture—resulting in wound progression consistent with Hollander's framework.[16]

The findings in this case are aligns with Kim et al. study who reported similar outcomes using policresulen concentrate in post-drainage wounds.[13] Both of study showed the capacity of policresulen concentrate to resolve hypergranulation and facilitate complete wound closure. However, the longer treatment duration in this case is likely attributable to the inherent difficulty of healing diabetic wounds, which are influenced by systemic metabolic dysfunction. Therefore, wound care in such cases must be accompanied by optimal blood glucose control and infection prevention.

Policresulen concentrate possesses multiple therapeutic functions that can help overcome hypergranulation such as a hemostatic agent, as a debridement agent and also as an antimicrobial agent.[17] As noted by Mitchell and Llumigusin, hypergranulation may occur due to the accumulation of microbes, which prolongs the inflammatory phase. [11] The combination of the three abilities of policresulen may therefore be particularly effective in resolving this complication. While policresulen's antimicrobial and debriding properties are well established, this case provides practical evidence of its effect on hypergranulation in a complex diabetic wound. Unlike oral mucosal applications, where improper use may cause tissue injury, the controlled application in this case did not result in adverse effects, reinforcing its safety in clinical practice.[18,19]

The patient's history of osteomyelitis further complicated the wound environment, potentially sustaining microbial presence despite prior systemic treatment. Ongoing management of osteomyelitis is necessary, including regular examinations for suspected osteomyelitis and other

medical management. Management of hypergranulation wounds will not be effective if the underlying osteomyelitis is not fully treated. [20]

Although policresulen concentrate is generally safe for diabetic wounds with hypergranulation, its high acidity necessitates careful application, particularly in areas of fragile tissue to avoid potential mucosal injuries in the mouth.[21] So that the use of different wound conditions requires caution. When used appropriately, its acidic properties of policresulen concentrate can effectively halt excessive tissue growth while eliminating debris and microbes. In this case, no adverse effects were observed throughout the treatment period. Policresulen concentrate also offers practical advantages such as inexpensive, easy to use and effective in treating hypergranulation in wounds. [13]

Overall, this case supports the feasibility, safety, and efficacy of policresulen concentrate in the management of hypergranulation in diabetic foot ulcers. Further clinical studies, especially with larger cohorts and comparative designs are warranted to confirm these findings and establish standard treatment protocols.

CONCLUSION

The application of policresulen concentrate was associated with the resolution of hypergranulation tissue and complete wound closure in a patient with a chronic diabetic foot ulcer. No adverse effects were observed throughout the treatment period, suggesting that policresulen is safe and well-tolerated when applied appropriately. Given its antimicrobial, hemostatic, and debriding properties, policresulen concentrate may offer a valuable addition to current wound care strategies, particularly for wounds complicated by hypergranulation. However, due to the limited evidence, further clinical studies involving larger sample sizes and comparative designs are necessary to validate its effectiveness and safety in broader diabetic wound care practice.

CONFLICT OF INTEREST

The authors declare no potential conflicts of interest relevant to this study.

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All procedures were conducted with full informed consent from the patient. Prior to administering policresulen concentrate, the procedure and safety profile were clearly explained, and informed consent was obtained in writing.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are not publicly available. However, further information may be obtained by contacting the corresponding author via email.

SUPPLEMENTARY MATERIALS

No supplementary materials are included in this manuscript.

AUTHOR CONTRIBUTIONS

Four authors contributed to this study: The first author was responsible for designing the study and drafting the manuscript. The second and third authors were involved in implementing the wound care and assisting with manuscript preparation. The fourth author was responsible for preparing materials and equipment for wound care. All authors participated in the clinical care and approved the final version of the manuscript.

DECLARATION OF USING AI IN THE WRITING PROCESS

There is no use of AI in this manuscript.

LIST OF ABBREVIATIONS

IDF: International Diabetes Federation; DM: Diabetes Mellitus; BJWAT: Bates Jensen Wound Assessment Tool.

REFERENCES

1. Akkus G, Sert M. Diabetic foot ulcers: A devastating complication of diabetes mellitus continues non-stop in spite of new medical treatment modalities. World J Diabetes. 2022.15;13(12):1106–21. DOI: 10.4239/wjd.v13.i12.1106
2. Zhang P, Lu J, Jing Y, Tang S, Zhu D, Bi Y. Global epidemiology of diabetic foot ulceration: a systematic review and meta-analysis†. Ann Med. 2017.17;49(2):106–16. DOI: 10.1080/07853890.2016.1231932
3. Stancu B, Ilyés T, Farcas M, Coman HF, Chiș BA, Andercou OA. Diabetic Foot Complications: A Retrospective Cohort Study. Int J Environ Res Public Health. 2023.1;20(1). DOI: 10.3390/ijerph20010187
4. Magliano DJ, Boyko EJ. IDF Diabetes Atlas 10 th edition. Diabetes Research and Clinical Practice. Brussels: International Diabetes Federation; 2021. ISBN-13: 978-2-930229-98-0
5. IDF. IDF Clinical Practice Recommendations on the Diabetic Foot-2017 A guide for healthcare professionals. Diabetes Res Clin Pract. 2017.127:285-287. DOI: 10.1016/j.diabres.2017.04.013
6. Boulton AJM, Armstrong DG, School K, Kirsner RS, Blank H, Attinger CE, et al. Diagnosis and Management of Diabetic Foot Complications. American Diabetes Association; 2018. http://diabetesjournals.org/compendia/article-pdf/doi/10.2337/db20182-1/673335/toc.pdf
7. Złoch M, Maślak E, Kupczyk W, Jackowski M, Pomastowski P, Buszewski B. Culturomics approach to identify diabetic foot infection bacteria. Int J Mol Sci. 2021.1;22(17). DOI: 10.3390/ijms22179574
8. Girlane SA Brandão M, M Ximenes MA, Strachan R, Costa IG. Photodynamic therapy associated with mesalt® in the treatment of hypergranulation in diabetic foot ulcer. Wound Care Canada. 2024.12;22(2):86-93. DOI: 10.56885/RLJP2492
9. Saikaly SK, Saikaly LE, Ramos-Caro FA. Treatment of postoperative hypergranulation tissue with topical corticosteroids: A case report and review of the literature. Dermatol Therap. 2021. 34:e14836. DOI: 10.1111/dth.14836
10. Hirotsu K, Kannan S, Brian Jiang SI. Treatment of Hypertrophic Granulation Tissue: A Literature Review. Dermatol Surg. 2019.45(12):1507–16. DOI: 10.1097/DSS.0000000000002059
11. Mitchell A, Llumigusin D. The assessment and management of hypergranulation. British J Nurs. 2021.15;30(5). DOI: 10.12968/bjon.2021.30.5.S6.
12. Wardhany II, Wimardhani YS, Soegyanto AI. Oral Mucosal Burn Caused by Topical Application of 36% Policresulen Solution – A Case Series. J Int Dental Med Res. 2016.9:387–91.
13. Kim SH, Choi BG, Ok JS, Chun HJ, Lee HG. Policresulen to treat hypergranulation tissue around drainage tubes. J Wound Care. 2023.1;32(12):S11–4. DOI: 10.12968/jowc.2023.32.Sup12.S11.
14. Mirhaj M, Labbaf S, Tavakoli M, Seifalian AM. Emerging treatment strategies in wound care. Int Wound J. 2022.19(7):1934–54. DOI: 10.1111/iwj.13786
15. Ritonga SH, Daulay NM. Effectiveness of using sialang honey on wound bed preparation in diabetic foot ulcer. Enferm Clin. 2019;29. DOI: 10.1016/j.enfcli.2018.11.028
16. Hollander D. Invited Commentary: Management of Hypergranulation Requires a Multimodal Approach. World Journal of Surgery. 2023. 47(12):3105–6. DOI: 10.1007/s00268-023-07227-7
17. Froehner JI, Kotze PG, Rocha JG, Miranda EF, Sartor MC, Martins JF, et al. Analgesia tópica com policresuleno e cinchocaína no pós-operatório de hemorroidectomias: Um estudo prospectivo e controlado. Rev Col Bras Cir. 2014.41(2):92–8. DOI: 10.1590/s0100-69912014000200004

18. De La Hoz FJE. Efficacy and tolerance of policresulen in the treatment of the genitourinary syndrome of menopause. International Journal of Family & Community Medicine. 2019. 26;3(3). DOI: 10.15406/ijfcm.2019.03.00145
19. Simamora H, Lestari P, Bangun K, Sudjatmiko G. Curettage and Policresulen Tampon as A Modality Treatment in Management of Verucca. Jurnal Plastik Rekonstruksi. 2012.1(5):460–4. DOI: 10.14228/jpr.v1i5.98
20. Faramarzi MR, Farid GA, Babamiri B, Lotfy H, Goli R, Faraji N, et al. Management of an infected wound complicated by osteomyelitis secondary to neuropathy caused by previous leprosy; successful treatment with gauze ribbon, Multivitamins, and maggot therapy. Clin Infect Pract. 2024.1(23). DOI: 10.1016/j.clinpr.2024.100370
21. Chae HS, Kang S. Oral chemical burns caused by topical application of policresulen: a case report. Journal of Yeungnam Medical Science. 2023.40(3):293–6. DOI: 10.12701/jyms.2022.00472