

A case series of QuoroGel as a primary wound dressing for the treatment of hard-to-heal wounds

The aim of this prospective case series is to examine the efficacy of QuoroGel in wound healing. Five patient case studies treating a range of wound with QuoroGel were selected to evaluate the efficacy. The wound healing process was documented by photographing the wound and measuring its size. The wound size was reduced, and granulation tissues formed in all patients after 2–3 weeks of QuoroGel use. All of the cases demonstrated satisfactory results, with favourable clinical outcomes

Chronic wounds remain a persistent challenge in clinical practice, often necessitating advanced therapeutic interventions to facilitate healing and mitigate infection risks. QuoroGel, a topical formulation incorporating Natural Bovine Collagen, Nano-Silver, EDTA and Vitamin C, represents an innovative approach to wound care.

Bovine collagen provides a structural matrix that promotes cellular proliferation and collagen deposition, supporting tissue regeneration. Nano-silver, meanwhile, offers broad-spectrum antimicrobial properties, effectively controlling bacterial colonisation, while Vitamin C plays a pivotal role in collagen synthesis and tissue repair.

This case report examines the clinical application of QuoroGel in the management of chronic wounds, assessing its efficacy in accelerating wound closure, reducing infection rates and optimising patient outcomes.

The findings presented aim to underscore the therapeutic value of collagen-based, antimicrobial gels in enhancing chronic wound care.

Methodology

Participants were selected via convenient sampling that fulfilled the criteria for the suggested protocol for the usage of the product, from patients that attended as outpatients at the Hospital Kuala Lumpur Wound Clinic from May 2024 to August 2024, including five patients who underlying diabetes, hypertension and chronic wounds.

This case series involved patients with one diabetic foot ulcer case, one surgical wound carbuncle case, one venous ulcer case, and two plantar ulcer cases for a period of 3 months period. Patients who came to the unit during weekdays, from 8am until 1pm.

At the time of recruitment, every wounds

was evaluated using TIMES framework (Tissue, Infection or Inflammation, Moisture balance, Edges of the wound, Surrounding skin; Nair, 2017)

Each wound was washed with distilled water and debrided if necessary. In accordance with the wound evaluation, QuoroGel was utilised in the dressing. Subsequently the peri wound area was protected with a generous amount of barrier cream during each visit to the wound clinic. All patients with plantar wounds were also treated with offloading shoes.

Inclusion criteria.

- Patients aged 18 years and older
- Ulcers that are non-malignant, non-necrotic, and without signs of life-threatening infection.
- Diabetic foot ulcer, venous ulcer, and other lower extremity chronic wounds
- Patients with a known history of diabetes mellitus, hypertension and hyperlipidemia, controlled or managed with medication
- Patients who are likely to comply with the treatment protocol and follow-up.

Exclusion criteria.

- Patients with uncontrolled hypertension (e.g., blood pressure >180/110 mmHg), uncontrolled diabetes (e.g., HbA_{1c} >9%).
- Presence of sepsis, necrotising fasciitis, or other life-threatening infections that necessitate immediate systemic treatment or hospitalisation.
- Renal failure requiring dialysis, congestive heart failure, or liver cirrhosis that may impact wound healing or patient survival.
- Patients with malignant ulcers or cancers at the wound site.
- Pregnant or lactating women, as comorbidities and ulcers may require medications that pose risks to fetal development.
- Patients who are unable or unwilling to follow medical advice, treatment regimens or attend follow-up appointments.

Harikrishna K.R. Nair

Director, Hospital Kuala Lumpur, Malaysia;
President, World Union of Wound Healing Societies

Dr Sashitharan V. Ampalakam MD, CCWC

Post Graduate Wound Management

Dr Richard Ngju

Post Graduate Wound Management

Muhammad Afzanizam Abdul Khalib

Assistant Medical Officer, Wound Care Unit, Hospital Kuala Lumpur, Malaysia

Key words

- Chronic wounds
- QuoroGel
- Wound healing

Table 1: Results.

A total of five wounds were included in this case series and there were three males and two female patients. The wounds aetiologies included surgical wounds, venous leg ulcers, diabetic foot ulcers and pressure injury wound [Table 1]. All cases applied QuoroGel after cleansing with superoxide solution.

Each patient's demographic data, such as age, gender and wound type, were recorded. Table 1 illustrated the basic patient demographic.

All the wound (n=5) had achieved either complete closure or improvements from the initial baseline status.

Patient	Age	Gender	Types of Wound	Age of wound	Duration of treatment with QuoroGel	Baseline wound bed area in cm ²	Post treatment wound bed area in cm ²
1	62	M	Right foot pressure injury	4 months	4 weeks	1.9	0.2
2	44	M	Back Carbuncle	1 month	4 weeks	150.9	30.3
3	36	M	Venous Ulcer	4 years	4 weeks	30.5	12.5
4	66	F	Left foot abscess	1 months	4 weeks	14.2	4.5
5	21	F	Right heel pressure injury	2 month	4 weeks	11	8.0

Case studies 1-2.

Case 1: A 62-years old Malay gentleman, with underlying comorbidities of hypertension, was diagnosed with right plantar ulcer with the duration of 4 months with measurement of 1.8cm in length, 1.5cm width, and total area of 1.9 cm². Patient activities of daily life were affected due to the plantar wound



Before treatment
 T: 80% granulation, 20% slough
 I: Infection and Inflammation present
 M: Minimal exudate
 E: Non-advancing
 S: Macerated
 Harikrishna periwound skin : Class 2B
 Wound size in cm 1.8 x 1.5
 Wound area in cm² : 1.9



After 4 weeks of QuoroGel Application
 T: Wound completely close
 I: No infection or Inflammation
 M: No exudate
 E: Complete advancing wound edge
 S: Healthy periwound skin
 Harikrishna periwound skin : 0
 Wound size in cm : 0.1 x 0.1
 Wound area in cm² : 0.2

Case 2: A 44-years old man, with multiple underlying comorbidities of diabetes mellitus and hypertension, was diagnosed with back carbuncle and underwent back carbuncle saucerization. The case was recruited 1 month post operation, with measurement of 17.7cm in length, 12.3cm in width, and a total area of 150.9cm².



Before Treatment
 T: Viable tissue with 100% granulation
 I: No infection
 M: Mild exudate
 E: Non-advancing
 S: Dry
 Harikrishna periwound skin: Class 2A
 Wound size in cm 17.7 x 12.3
 Wound area in cm² : 150.9



After 4 weeks application of QuoroGel
 T: Granulation 80%; Epithelialisation 20%
 I: No infection or Inflammation
 M: Moisture balance
 E: Advancing wound edge
 S: Healthy periwound skin
 Harikrishna periwound skin: 0
 Wound size in cm 9.7 x 7.2
 Wound area in cm² : 30

Case studies 3–4.

Case 3: A 36-year-old man with underlying multiple comorbidities of hypertension and peripheral vascular disease, was diagnosed with Chronic Venous Ulcer of left leg. Duration of wound is 4 years with measurement of 7cm in length, 6.2cm in width and total area of 30.5cm². He is an ADL independent and ambulating with walking stick support, ABSi of right leg 1.4 and left leg is 1.7. In this case, we specifically comment on the wound above medial malleolus.



Before treatment
 T: Granulation 70%; Slough 30%
 I: Thin Biofilm with Inflammation
 M: Exudate and erythematous
 E: Non-advancing edge
 S: Macerated periwound skin
 Harikrishna periwound skin : Class 4
 Wound size in cm 7 x 6.2
 Wound area in cm² : 30.5



After 4 weeks of QuoroGel Application
 T: Viable tissue with good granulation
 I: Reduced bacteria burden & Inflammation
 M: Restored moisture balance in all part of wound
 E: Advancing wound edge
 S: Healthy periwound skin
 Harikrishna periwound skin : Class 1
 Wound size in cm 4.6 x 3.5
 Wound area in cm² : 12.5

Case 4: A 66-year-old female with multiple underlying comorbidities of diabetes mellitus, hypertension and dyslipemia, was diagnosed with left foot abscess, thus patient underwent with wound debridement and incision and drainage of left foot. Duration of wound is 1 month with measured length of 4.2cm, width of 5.1cm and total area of 14.2cm². She is an ADL independent and ambulating without aid.



Before Treatment
 T: Granulation 60%; Slough 30%; Epithelialisation 10%; Tendon expose
 I: Thick biofilm with Inflammation
 M: Heavy exudate
 E: Non-advancing edge
 S: Macerated periwound skin
 Harikrishna periwound skin : Class 4
 Wound size in cm : 4.2 x 5.1
 Wound area in cm² : 14.2



After 4 weeks application of QuoroGel
 T: Granulation 80%; Epithelialisation 20%
 I: No infection and Inflammation
 M: Moisture balance
 E: Advancing wound edge
 S: Healthy periwound skin
 Harikrishna periwound skin : 0
 Wound size in cm : 2 x 3
 Wound area in cm² : 4.5

Discussion

The majority of healthy wounds should heal in a 4-week period, depending on the size and underlying medical conditions of the patient; however, if appropriate care is not provided, chronic wounds that are difficult to heal may take longer to heal or remain stagnant. Hard-to-heal wounds are challenging for medical experts to treat because of their intricate nature, which includes factors like moisture regulation, the presence of tunneling or undermining, and/or the predominance of infection, particularly biofilm. Healthcare providers assess and treat chronic wounds using wound bed preparation and the TIME tool. It provides the medical practitioner treating the patient with a systematic approach to

managing chronic wounds, including the use of suitable therapies and the tracking and proper management of responses. Systemic issues need to be addressed before the wound bed is ready in order to increase a patient's ability to recover.

In this study, each of the five cases showed was assessed using the T.I.M.E concept for wound bed preparation as shown in the . Wound was cleaned with superoxide solution (SOS), thin layer of QuoroGel dressing applied over the wound bed and barrier cream was applied to wound periphery for protect the surrounding skin against from irritation and maceration of peri wound skin, secondary dressing was done with low adherent absorbent applied over the wound bed and secured with crepe bandage.

Case study 5.

Case 5: A 21-year-old Female with underlying comorbidities of Cauda Quina secondary to Prolapsed intervertebral disc, was diagnosed with right heel pressure injury. Duration of wound is 2 months with measurement of 3.9cm in length, 3.7cm in width and total area of 11cm². The patient is bedridden, and with prolonged hours in her wheelchair and related friction, she developed a pressure injury over the base of her heel.



Before treatment

T: Granulation 80%; Slough 20%
 I: Thin biofilm with Inflammation
 M: Exudate
 E: Non-advancing edge
 S: Macerated periwound skin
 Harikrishna periwound skin : Class 2B
 Wound size in cm: 3.9 x 3.7
 Wound area in cm² : 11



After 4 weeks of QuoroGel Application

T: Cleared wound bed; 70% granulation tissue; 30% epithelialisation tissue
 I: No Infection and Inflammation
 M: Moisture balanced
 E: Advancing wound edge
 S: Healthy periwound skin
 Harikrishna periwound skin : 0
 Wound size in cm: 2.5 x 2.3
 Wound area in cm² : 8

Patients were also advised for proper offloading for example diabetic foot wear for patient which having diabetic foot ulcer or pressure ulcer. These methods were repeated twice a week with 3-5 days interval based on exudate. Marked improvement of the exudate, epithelialisation and granulation tissue could be seen as early as 2-4 weeks of treatment shown in picture above. The dressings were continued to maintain an optimum environment for wound healing to ensure skin integrity is restored.

Quorogel contains Bovine collagen, nano-silver, Vitamin C and EDTA, which all play important roles in wound healing.

Bovine collagen plays a crucial role in wound healing due to its structural role in the extracellular matrix (ECM), by promoting cellular proliferation and tissue formation. Recent studies have demonstrated its effectiveness in accelerating healing times, reducing scarring, and improving tissue repair outcomes. Its high biocompatibility makes it a favoured choice for enhancing wound healing.

Vitamin C is essential for collagen synthesis and wound healing, as it stabilises collagen structure and protects cells from oxidative stress. Studies show it improves healing outcomes, especially in pressure ulcers. However, larger studies are needed to establish its role in tissue regeneration. Adequate vitamin C levels support faster healing and reduce infection risk.

Nano-silver's antimicrobial efficacy in wound care is well-documented, inhibiting bacterial growth and preventing biofilm formation. Its small size allows deep penetration into wound tissues, providing sustained antimicrobial activity

without cytotoxic effects. Recent studies highlight its broad-spectrum efficacy against antibiotic-resistant strains. Additionally, nano-silver's anti-inflammatory properties help modulate the immune response, reducing excessive inflammation and promoting tissue regeneration, creating an optimal environment for faster and more effective wound healing.

EDTA in QuoroGel plays a crucial role in wound healing by acting as a chelating agent that binds to metal ions, such as calcium, magnesium, and iron, which bacteria need to thrive.

By sequestering these ions, EDTA disrupts bacterial biofilms, structures that protect bacteria from antibiotics and the immune system, making infections harder to treat. In QuoroGel, EDTA enhances the effectiveness of antimicrobial agents by weakening biofilms and promoting antibiotic penetration. This helps reduce bacterial load, prevent infections and autolytic debridement and create an optimal environment for wound healing, particularly in chronic or non-healing wounds where biofilm formation is a significant barrier.

The use of QuoroGel demonstrated a multifaceted approach to wound care, addressing several key factors that promote healing: inflammation control, bacterial management and tissue regeneration. The natural bovine collagen scaffold helped to accelerate tissue regeneration, while the nano-silver prevented infection – a critical factor in diabetic wound management. Vitamin C played a supportive role in enhancing collagen production and protecting cells from oxidative damage.

Limitation

- Patient may have sensitivities or allergic reactions to bovine collagen, although such reactions are relatively rare
- Prolonged or excessive use of silver-based products may lead to silver toxicity, though the nano-silver used in QuoroGel is designed to be effective at low concentrations, reducing this risk
- Advance wound care products such as QuoroGel may be more expensive than traditional wound dressings, which could impact accessibility particularly in low-resource settings
- This study lacks a control or active comparison, patient and physician blinding, and standardised procedures. In addition, this report is based solely on a small sample size of five case series. Therefore, it is suggested to conduct a randomised clinical trial to investigate the wound-healing rate with increased sample size.

Conclusion

The combination of natural bovine collagen, vitamin C, nano-silver, EDTA represents a comprehensive approach to optimising chronic wound healing. Each element plays a distinct role, yet their integration offers synergistic effects, enhancing the overall healing process. Bovine collagen provides the structural foundation for tissue regeneration, while vitamin C ensures effective collagen synthesis.

Nano-silver's antimicrobial properties prevent infection. EDTA enhance autolytic debridement facilitates clean wound beds, essential for healing and not only maintain an optimal environment but also enhance the bioavailability of these therapeutic agents.

Future research should focus on the clinical application of these combined treatments, particularly in randomised controlled trials,

to establish standardised protocols and further validate the therapeutic potential of these agents in various wound care settings. The development of innovative wound care products that integrate these components will likely lead to improved outcomes for patients suffering from chronic wounds, significantly reducing healing times and improving quality of life. ●

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