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Effectiveness of BlueM gel in post-surgical depigmentation healing: a case series

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Abstract

Introduction: Gingival depigmentation removes excessive melanin for aesthetic improvement, especially in patients with high lip lines. Effective postoperative care is essential for optimal outcomes. This study examines BlueM Gel, an oxygen-releasing gel, in promoting healing and reducing complications after gingival depigmentation surgery.

Objective: To assess the effectiveness of BlueM Gel in accelerating healing and alleviating pain

Methodology: A split-mouth study was conducted on 5 patients (≥18 years) with moderate to severe gingival pigmentation treated with Diode Laser. One side received BlueM Gel, while other side was left untreated. Pain was evaluated using the Visual Analog Scale (VAS) at intervals, while reepithelization was assessed with Methylene Blue stain for four weeks.

Results: The BlueM Gel group reported significantly lower pain levels, experiencing no pain by day three compared to 20% in the control. Reepithelization was faster, with 90% achieving complete epithelialization by week two versus 30% in the control.

Conclusion: BlueM Gel accelerates healing, reduces pain proving to be a superior adjunct to conventional treatment in post-surgical care for gingival depigmentation.

Keywords: Gingival depigmentation, BlueM Gel, post-surgical healing, reepithelization

INTRODUCTION

Gingival depigmentation is a widely recognized esthetic procedure aimed at treating excessive melanin deposition in the gingiva, a condition that can cause cosmetic concerns, particularly for individuals with high lip lines or "gummy smiles." The visual appearance of gingiva plays a significant role in facial aesthetics, and pigmentation variations, especially those involving dark or unevenly pigmented gingiva, often prompt individuals to seek treatment [1]. Gingival pigmentation, while a physiological condition, is attributed to an increase in melanin synthesis by melanocytes found in the basal and suprabasal layers of the gingival epithelium. [2] This excessive melanin deposition leads to the dark coloration of the gingiva, which can be more pronounced in darker-skinned populations [3]. Although pigmentation in the gingiva is not necessarily indicative of any underlying pathology, it may become a source of social stigma in certain cultures, particularly in societies where lighter or more uniform gingival coloration is aesthetically preferred. [4] In fact, gingival pigmentation can result in the psychological discomfort of individuals who perceive their smile as less attractive.[5]

The prevalence of gingival pigmentation varies widely across different ethnic groups and geographical regions. Studies show that pigmentation in the gingiva is most common among individuals with darker skin tones, such as those from African, Asian, and Mediterranean descent, due to the higher melanin production in their oral mucosa. In contrast, individuals of Caucasian descent generally present with less pigmentation. [3] Despite being considered a normal physiological response, excessive gingival pigmentation is often seen as a cosmetic concern that drives patients to seek gingival depigmentation procedures.[4]

Several techniques have been developed to address gingival pigmentation, including scalpel surgery, cryotherapy, electrosurgery, and laser therapy. [4,6] Each of these methods has been shown to effectively remove or reduce pigmentation, but they come with varying degrees of invasiveness, post-operative pain, healing times, and risks. Among these techniques, scalpel surgery remains the most commonly employed method due to its simplicity, affordability, and well-documented effectiveness.[6] However, despite its advantages, scalpel surgery also has notable drawbacks, primarily the formation of an open wound after the tissue excision. The open wound left behind necessitates effective post-surgical management to avoid complications such as delayed healing, scarring, and persistent discomfort.[7]

Post-surgical healing is a crucial factor in determining the ultimate outcome of gingival depigmentation procedures. Efficient wound healing not only promotes faster recovery but also reduces the risk of complications such as infection and scarring, which can result in unsatisfactory esthetic outcomes. [7] Traditional methods for managing postoperative wounds include the application of periodontal dressings, such as Coe-Pak, which help to protect the wound, prevent infection, and provide some degree of comfort.[8] However, these dressings can sometimes be bulky and inconvenient, and they may not always accelerate the healing process as desired.[7] Furthermore, the presence of such dressings can lead to additional discomfort or irritation, potentially increasing the risk of inflammation.[8] Consequently, there has been increasing interest in finding alternative treatments that can promote more efficient healing with fewer complications.

One such alternative is BlueM gel, an innovative treatment that utilizes active oxygen-releasing agents to facilitate wound healing.[9] Active oxygen, as delivered by BlueM gel, plays a critical role in tissue regeneration, promoting cellular functions essential for wound repair. These

include neovascularization, fibroblast proliferation, and collagen synthesis, all of which contribute to more rapid tissue healing. In addition to the oxygen-releasing agents, BlueM gel contains honey enzymes, which have well-established antibacterial properties and have been shown to reduce microbial contamination at wound sites.[10] Honey's enzymatic action also supports the process of granulation tissue formation, further enhancing the healing process. Furthermore, sodium perborate, another component of BlueM gel, has been shown to aid in tissue oxygenation, thereby enhancing the wound healing environment.[11,12] The combined effects of these components—active oxygen, honey enzymes, and sodium perborate—provide BlueM gel with potent regenerative properties that make it an attractive adjunct for post-surgical care in gingival depigmentation procedures.

Given these considerations, the present study aims to evaluate the clinical efficacy of BlueM gel in promoting faster healing, reducing postoperative pain, and enhancing reepithelization. [8]

In addition to standard clinical observation, methylene blue staining was employed in this case series to assess re-epithelialization. Methylene blue is a vital dye that selectively stains areas where epithelialization has not occurred, leaving re-epithelialized surfaces unstained. This simple yet effective staining technique provided a clear visual distinction between healed and unhealed tissue, enabling a more accurate evaluation of wound healing progression. Its non-invasive nature and immediate results made it especially valuable in the outpatient setting

METHODS

Study Design and Ethical Considerations

This prospective clinical study was conducted between April and October 2024 in the Department of Periodontology ,focusing on evaluating the effectiveness of BlueM Gel in enhancing post-surgical healing after gingival depigmentation. Ethical approval was obtained from the institutional review board (IRB), and informed consent was provided by all participants prior to their enrollment in the study.

Inclusion and Exclusion Criteria

Patients were selected based on specific inclusion criteria, which included individuals aged between 18 and 38 years, with moderate to severe gingival pigmentation graded as Dummet-Gupta Oral Pigmentation Index (DOP Index)grade III or IV.[3] The participants were required to be in good systemic health, with no underlying illnesses that could affect wound healing. Additionally, only non-smokers and non-alcoholic individuals were included in the study to avoid potential confounding factors, as smoking and alcohol consumption are known to negatively impact tissue repair and healing. Those with a history of periodontal surgery within the past six months, pregnant or lactating women, individuals on medications that could interfere with healing (such as steroids), or those with gingival pigmentation linked to systemic conditions or lesions were excluded from the study.

Study Design: Split-Mouth Approach

The study followed a randomized, split-mouth design, wherein each patient received gingival depigmentation treatment on both sides of their upper or lower arch. This design allowed for a direct comparison of the treatment modalities on the test and control sides within the same patient, minimizing variability between subjects. The study enrolled a total of 5 patients, all of whom met the inclusion criteria and consented to participate.

Preoperative Preparation

Preoperatively, all patients underwent oral prophylaxis one week before the procedure to ensure optimal oral hygiene and minimize the risk of postoperative infection. Local anesthesia (2% lidocaine) was then given to the gingival surface to ensure patient comfort during the surgical procedure. (Fig 1|)

Figure 1: Pre Surgery

Surgical Procedure

The depigmentation surgery was carried out under sterile conditions, using diode laser with wavelength 980nm , whereby pigmented gingival epithelium and underlying connective tissue were removed (Fig 2). Hemostasis was achieved with sterile gauze.

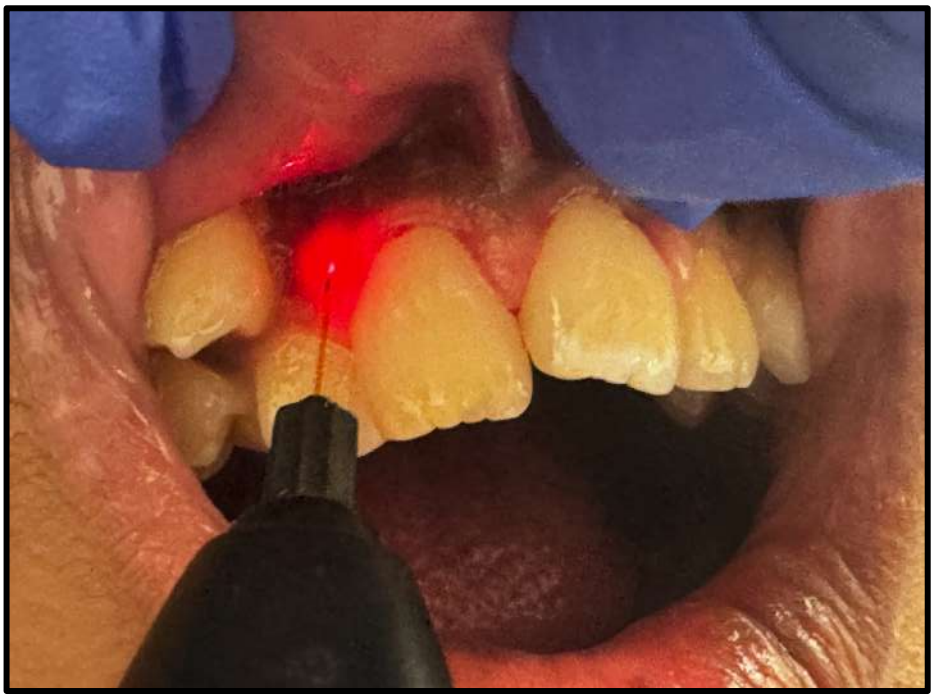

Figure 2: Depigmentation by Diode laser

Postoperative Treatment

After the surgery, the gingiva was divided into two symmetrical halves for comparison, while no treatment was rendered to control site the test site was applied BlueM gel 3 times daily for

1 week.(Fig 3)

Figure 3: Application of BlueMgel

Pain and Reepithelization Assessment

Reepithelization and healing were assessed at regular intervals. Postoperative pain was evaluated using the Visual Analog Scale (VAS) at several time points: 2 hours, 24 hours, 48 hours, and 3 days following the surgery. This scale allows patients to rate their pain from 0 (no pain) to 10 (the worst pain imaginable), providing a subjective measure of postoperative discomfort. Reepithelization was evaluated weekly for four weeks using a modified scoring system. A score of 1 indicated no epithelialization, while scores of 2, 3, and 4 indicated partial, near-complete, and complete epithelialization, respectively. Complete epithelialization was considered a sign of full recovery.

Follow-Up and Clinical Monitoring

Patients were also followed up for four weeks post-surgery to monitor the healing process. During each follow-up visit, clinical observations were made regarding the healing of the gingival tissue, including any signs of inflammation, infection, or scarring.

As part of the wound monitoring process, methylene blue staining was carried out during each follow-up visit (Fig 4 a to c) A small amount of 1% methylene blue solution was gently applied to the wound surface and allowed to remain for a few seconds before being rinsed with normal saline. Areas lacking epithelial coverage retained the blue stain, whereas epithelialized zones remained clear. This contrast provided a straightforward and reproducible method to assess the extent of re-epithelialization and helped guide further management.

Figure 4a: Week 1

Figure 4b:Week 2

Figure 4c: Week 3

Postoperative Care Instructions

Throughout the study, patients were instructed to avoid vigorous oral hygiene practices that could disrupt the healing process on the surgical site, though they were allowed to gently brush the non-treated areas of the mouth. This precaution was essential to ensure that the observed effects were primarily attributable to the treatment modalities being compared.

RESULTS

The following sections outline the results based on these key parameters.

Figure 5: Post surgery

Pain Reduction

The majority of patients in the BlueM Gel group reported no pain by the third day post-surgery, while a significant proportion of patients in the control group continued to experience mild pain.

At 48 hours post-surgery, 90% of the BlueM Gel-treated patients reported no pain, compared to only 30% in the control group. By the third day, 100% of the BlueM Gel group reported no pain, whereas the control group still had 80% reporting mild pain. These results indicate that BlueM Gel significantly reduced postoperative pain and contributed to a more comfortable recovery.

The following table summarizes the pain levels observed at each time point:

Table 1: The following table summarizes the pain levels observed at each time point		
Time Interval	**BlueM Gel (Test Group)**	**(Control Group)**
After 2 hours	No pain: 50%, Mild pain: 50%	No pain: 30%, Mild pain: 70%
After 24 hours	No pain: 50%, Mild pain: 50%	No pain: 20%, Mild pain: 50%, Moderate pain: 30%
After 48 hours	No pain: 90%, Mild pain: 10%	No pain: 30%, Mild pain: 40%, Moderate pain: 30%
After 3 days	No pain: 100%	No pain: 20%, Mild pain: 80%

Reepithelization

Reepithelization was monitored weekly over a four-week period to assess the speed and extent of tissue healing.

The following table presents the reepithelization scores for both treatment groups over the four-week period: These results demonstrate the accelerated healing effects of BlueM Gel.

Table 2: Results for reepithelization scores for both treatment groups over the four-week period:

Table 2: Results for reepithelization scores for both treatment groups over the four-week period:		
Time Interval	**BlueM Gel (Test Group)**	**(Control Group)**
Week 1	Complete: 10%, Moderate: 50%, Mild: 40%	Complete: 0%, Moderate: 30%, Mild: 70%
Week 2	Complete: 90%, Moderate: 10%, Mild: 0%	Complete: 30%, Moderate: 60%, Mild: 10%
Week 3	Complete: 100%	Complete: 80%
Week 4	Complete: 100%	Complete: 100%

Overall Healing

In terms of overall healing and esthetic outcomes, the BlueM Gel-treated sites showed significantly better results compared to the control sites. By the third week post-surgery, the gingiva treated with BlueM Gel appeared uniformly pink and healthy, with no residual inflammation or scarring. In contrast, the control side exhibited delayed healing, with persistent redness and uneven pigmentation, suggesting slower recovery and suboptimal healing. These observations highlight the superior ability of BlueM Gel to promote optimal healing and esthetic results after gingival depigmentation procedures.

Table 3: Overall Healing		
Time Interval	**BlueM Gel (Test Group)**	**Control Group**
Week 3	Uniformly pink, healthy gingiva with no residual inflammation or scarring	Delayed healing, persistent redness, uneven pigmentation

DISCUSSION

This prospective clinical study was designed to evaluate the effectiveness of BlueM Gel in post-surgical healing after gingival depigmentation. The treatment outcomes were analyzed by comparing pain levels, reepithelization, overall healing, between the group treated with BlueM Gel and the group treated with no dressing. The clinical findings from this study demonstrated significant improvements in these areas for the BlueM Gel-treated group, which aligns with results from other studies in the field of wound healing and periodontal care. The following sections detail these results in greater depth.

Pain Reduction

Pain management is an essential component of post-surgical care, particularly for soft tissue procedures like gingival depigmentation. Effective pain management ensures not only patient comfort but also supports quicker recovery by minimizing discomfort that can delay the healing process.

The superior pain management seen in the BlueM Gel group can be attributed to the gel's active oxygen components, which enhance tissue oxygenation, thus promoting a reduction in pain associated with inflammation and cellular stress .[13]

Reepithelization

Reepithelization is a key indicator of the success of gingival depigmentation surgery, as it reflects the extent of tissue healing and regeneration. Faster and more complete reepithelization not only signifies improved wound healing but also leads to more favourable esthetic outcomes. The gel's oxygen-releasing properties and the presence of honey enzymes likely contributed to enhanced fibroblast activity and angiogenesis, both essential for accelerating tissue regeneration. [14]

The superior reepithelization observed in the BlueM Gel-treated sites can be attributed to the gel's ability to optimize oxygen levels at the wound site, promoting better cellular metabolism and faster healing. The findings in this study echo those of previous studies where the use of oxygen-releasing gels resulted in faster reepithelization compared to conventional treatments. [13,15]

Overall Healing

Overall healing encompasses both the physical restoration of the tissue and the aesthetic appearance of the gingiva. The ultimate goal of gingival depigmentation surgery is not only functional recovery but also a favorable cosmetic outcome. In this study, the BlueM Gel-treated sites displayed superior overall healing compared to the control sites.

These findings are consistent with research by Tsai et al, who found that oxygen-releasing agents such as BlueM Gel significantly reduced scarring and promoted better tissue regeneration, resulting in enhanced esthetic outcomes. Similarly, studies by Baloch et al. (2021) and Patel et al. (2020) have shown that oxygen therapies facilitate faster healing, leading

to less scarring and more uniform tissue appearance.[14,15,16,17]

The BlueM Gel-treated sites exhibited a significant result within the first 24 hours post-surgery. This reduction was likely due to the antimicrobial properties of the honey enzymes and the oxygen-releasing agents present in the gel. These agents create an oxygen-rich environment that inhibits bacterial growth and promotes the growth of healthy tissue. Previous studies, such as those by Chaturvedi et al have demonstrated the effectiveness of oxygen-releasing gels in reducing bacterial colonization at surgical sites, which ultimately contributes to faster and more effective healing.[18]

CONCLUSION

This study demonstrates the clinical effectiveness of BlueM Gel in enhancing the healing process after gingival depigmentation surgery. The results indicate that BlueM Gel accelerates reepithelization, significantly reduces pain, and improves overall tissue healing when compared to the traditional periodontal dressing.

Future studies with larger sample sizes and longer follow-up periods could further validate these results and establish BlueM Gel as a standard in post-surgical care for gingival procedures.

REFERENCES

1. Alasmari DS. An insight into gingival depigmentation techniques: The pros and cons. Int J Health Sci. 2018;12(5):84–9.
2. Sanadi RM, Deshmukh RS. Evaluation of gingival depigmentation using different surgical techniques and preventionof repigmentation with vitamin C: A clinical study. Cureus. 2023;17(1):e76925.
3. Dummett CO. Physiologic pigmentation of the oral and cutaneous tissues in the Negro. J Dent Res. 1946;25(6):421–32.
4. Rijal A, Dhami B, Pandey N, Aryal D. Prevalence of gingival pigmentation and its association with gingival biotype and skin colour. J Nepal Soc Periodontol Oral Implantol. 2021;5:19–25.
5. Raj P, Nagesh S, Boyapati R. Impact of gingival pigmentation on laypersons' perception of smile aesthetics: an observational study. Explor Med. 2025.
6. Suragimath G, et al. A split mouth randomized clinical comparative study to evaluate the efficacy of gingival depigmentation procedure using conventional scalpel technique or diode laser. J Lasers Med Sci. 2016;7(4):227–32.
7. Patil KP, Joshi V, Waghmode V, KanakdandeV. Gingival depigmentation: A split mouth comparative study between scalpel and cryosurgery. Contemp Clin Dent. 2015;6(Suppl 1):S97–101.
8. Gupta G, Kumar A, Khatri M, Puri K, Jain D, Bansal M. Comparison of two different depigmentation techniques for treatment of hyperpigmented gingiva. J Indian Soc Periodontol. 2014;18(6):705–9.
9. Juliana H, Tarek S. Comparative study of the effect of BlueM active oxygen gel and coe-pack dressing on postoperative surgical depigmentation healing. Saudi Dent J. 2022;34(4):328–34.
10. Yaghoobi R, Kazerouni A, Kazerouni O. Evidence for clinical use of honey in wound healing as an anti-bacterial, anti-inflammatory, anti-oxidant and anti-viral agent: A review.

Jundishapur J Nat Pharm Prod. 2013;8(3):100–4.
11. Grootveld M, Lynch E, Page G, Chan W, Percival B, Anagnostaki E, et al. Potential advantages of peroxoborates and their ester adducts over hydrogen peroxide as therapeutic agents in oral healthcareproducts:Chemical/biochemical reactivity considerations in vitro, ex vivo and in vivo. Dent J. 2020;8(3):89.
12. Alayadi H, Talakey A, Aldulaijan H, Shaheen MY. The impact of a topical oxygen-releasing gel (blue®m) on deep periodontal pockets: A case report. Medicina (Kaunas). 2024;60(9):1527.
13. Basudan AM, Abas I, Shaheen MY, Alghamdi HS. Effectiveness of topical oxygen therapy in gingivitis and periodontitis: Clinical case reports and review of the literature. J Clin Med. 2024;13(5):1451.
14. Alayadi H, Talakey A, Aldulaijan H, Shaheen MY. The impact of a topical oxygen-releasing gel (blue®m) on deep periodontal pockets: A case report. Medicina (Kaunas). 2024;60(9):1527.
15. Gupta S, Mujawdiya P, Maheshwari G, Sagar S. Dynamic role of oxygen in wound healing: A microbial, immunological, and biochemical perspective. Arch Razi Inst. 2022;77(2):513–23.
16. Rodriguez PG, et al. The role of oxygen in wound healing: A review of the literature. Dermatol Surg. 2008;34(9):1159–69.
17. Cho YD, Kim KH, Lee YM, Ku Y, Seol YJ. Periodontal wound healing and tissue regeneration: A narrative review. Pharmaceuticals(Basel). 2021;14(5):456.
18. Niveda R, Kaarthikeyan G. Effect of oxygen releasing oral gel compared to chlorhexidine gel in the treatment of periodontitis. J Pharm Res Int. 2020;32(19):75–82.