BlueM Active Oxygen Gel Versus Coe-Pak Following Scalpel Gingival Depigmentation: A Split-Mouth Randomized Clinical Trial

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Abstract

Background: Conventional scalpel gingival depigmentation is a simple and predictable esthetic periodontal procedure, but it leaves a denuded wound surface where early epithelial healing and patient comfort are important. Coe-Pak is commonly used as a protective periodontal dressing, whereas BlueM Active Oxygen Gel may biologically support early wound healing through local oxygen release.

Aim: To compare the effect of BlueM Active Oxygen Gel and Coe-Pak periodontal dressing on postoperative re-epithelialization and patient-centered recovery following scalpel gingival depigmentation.

Materials and Methods: This split-mouth randomized clinical trial included 28 systemically healthy, non-smoking adults with physiologic gingival pigmentation. Conventional scalpel depigmentation was performed in the maxillary anterior region. One side received BlueM Active Oxygen Gel, while the contralateral side received Coe-Pak. Re-epithelialization was assessed at 1, 2, and 4 weeks using toluidine blue staining. Oral health-related quality of life was assessed using OHIP-14. Patient satisfaction, comfort, inconvenience, dislodgement, and adverse events were also recorded.

Results: BlueM showed significantly better re-epithelialization than Coe-Pak at 1 week and 2 weeks. Complete re-epithelialization was higher with BlueM at 1 week and 2 weeks, while both groups showed comparable healing by 4 weeks. OHIP-14 scores were significantly lower with BlueM at 1 week and 2 weeks, with no significant difference at 4 weeks. Patient satisfaction and comfort were higher with BlueM, while inconvenience and dislodgement were more frequent with Coe-Pak. No serious adverse healing events were observed.

Conclusion: BlueM Active Oxygen Gel improved early re-epithelialization and patient comfort compared with Coe-Pak after scalpel gingival depigmentation. By 4 weeks, both materials showed comparable healing outcomes.

Keywords

Gingival depigmentation; BlueM Active Oxygen Gel; Coe-Pak; re-epithelialization; OHIP-14; periodontal dressing.

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Introduction

Gingival esthetics is an important component of an attractive smile, as the appearance of the gingiva depends not only on its contour and architecture but also on its color [1]. Physiologic gingival pigmentation is commonly caused by melanin deposition within the gingival epithelium and is not considered a pathological condition. However, it may become an esthetic concern, particularly in patients with a high smile line or excessive gingival display, where dark pigmentation becomes visible during smiling and speech [1,2]. With increasing awareness of periodontal esthetics, gingival depigmentation has become an accepted procedure for patients seeking improvement in smile appearance.

Several techniques have been used for gingival depigmentation, including scalpel surgery, abrasion, electrosurgery, cryosurgery, and lasers [2]. Among these, the conventional scalpel technique remains widely used because it is simple, economical, and clinically predictable. However, the procedure produces a denuded connective tissue surface, making the early postoperative healing phase particularly important [3]. After depigmentation, the exposed wound surface is susceptible to mechanical irritation, plaque accumulation, pain, and discomfort during speech, eating, and oral hygiene. Therefore, rapid and uneventful re-epithelialization is essential for restoring the mucosal barrier and improving patient comfort [2,3].

Periodontal dressings such as Coe-Pak are traditionally used to protect surgical wounds during the initial healing period [4]. Coe-Pak acts mainly as a passive physical barrier, but it may be associated with bulkiness, retention problems, unpleasant taste, plaque accumulation, and patient inconvenience [4]. In contrast, newer bioactive materials aim to support the biological events of wound healing. Oxygen has an important role in fibroblast activity, collagen

synthesis, angiogenesis, epithelial cell migration, and local host defense [5]. BlueM Active Oxygen Gel is designed to release oxygen at the wound surface and may therefore provide a more favorable environment for early healing [5].

Although oxygen-releasing gels are increasingly being used in oral wound care, clinical evidence regarding their role after gingival depigmentation remains limited. Existing studies often emphasize pain or comfort, while standardized assessment of re-epithelialization and oral health-related quality of life is less commonly reported. Hence, the present study aimed to compare BlueM Active Oxygen Gel with Coe-Pak following conventional scalpel gingival depigmentation. The specific objectives were to compare postoperative re-epithelialization, evaluate oral health-related quality of life using OHIP-14, assess patient satisfaction and acceptability, and document postoperative complications associated with both materials.

Materials and Methods

Study design

The present study was designed as a prospective, randomized, controlled, split-mouth, single-blinded clinical trial. Each participant served as his or her own control, with one side of the maxillary anterior gingiva allocated to BlueM Active Oxygen Gel and the contralateral side allocated to Coe-Pak periodontal dressing.

The study was conducted after obtaining approval from the Institutional Research and Ethical Board (IREB/2025/PERIO/6, dated 21/021/2026). All participants were informed in detail about the purpose of the study, surgical procedure, postoperative care, expected benefits, possible risks, confidentiality of records, and their right to withdraw from the study at any stage without affecting their treatment. Written informed consent was obtained from all participants before enrollment. All patient-related data were recorded using coded identifiers and were kept confidential throughout the study period.

Sample size determination

Sample size estimation was performed to detect a clinically meaningful difference of 2 units between the two treatment modalities, assuming a standard deviation of 2.5, a two-tailed alpha error of 0.05, and 80% power. The calculated minimum sample size was 25 participants. Considering an anticipated dropout rate of 10%, the final sample size was increased to 28 participants. As the study followed a split-mouth design, each participant contributed two surgical sites, giving a total of 56 treated sites, with 28 sites in the BlueM group and 28 sites in the Coe-Pak group.

Participant selection

Participants were recruited from patients reporting to the department with an esthetic concern related to physiologic gingival pigmentation and requesting depigmentation therapy. Eligibility was assessed through detailed medical and dental history, intraoral clinical examination, and confirmation of physiologic gingival hyperpigmentation.

Systemically healthy adults aged 18–40 years with physiologic gingival pigmentation classified as Dummett–Gupta Class III or IV, who were non-smokers and willing to undergo surgical depigmentation with scheduled follow-up visits, were included in the study. Patients were excluded if they had any systemic illness or immunocompromised status, history of periodontal surgery within the preceding 3 months, pregnancy or lactation, current smoking or tobacco use, or gingival pigmentation associated with syndromes, medications, or pathological lesions.

Preoperative assessment

At baseline, all participants underwent a detailed clinical assessment. Medical history, dental history, history of gingival pigmentation, previous depigmentation procedures, medication history, allergy history, and tobacco exposure were recorded. A standardized intraoral examination was performed to assess the extent and severity of gingival pigmentation. Baseline clinical photographs of the maxillary anterior gingiva were taken for documentation. Professional mechanical plaque removal was carried out before surgery, and individualized oral hygiene instructions were given to ensure good plaque control during the healing period. Baseline oral health-related quality of life was assessed using the OHIP-14 questionnaire before surgical intervention.

Randomization and blinding

For each participant, the maxillary anterior gingiva was divided into two symmetrical halves across the midline. The two halves were randomly allocated to receive either BlueM Active Oxygen Gel or Coe-Pak periodontal dressing after completion of the depigmentation procedure. Allocation was applied only after surgical depigmentation and achievement of hemostasis. The participant was not informed about which side received which postoperative material, thereby maintaining a single-blind design. Clinical scoring was performed according to predefined criteria at each follow-up visit.

Surgical procedure

All procedures were performed using a standardized conventional scalpel depigmentation technique in the maxillary anterior region. After aseptic preparation and administration of local anesthesia, the pigmented gingival epithelium, along with a thin superficial layer of the underlying connective tissue, was removed using a No. 15 scalpel blade. The procedure was carried out carefully and uniformly on both sides to ensure complete removal of the pigmented epithelial layer while avoiding unnecessary tissue trauma. Hemostasis was achieved using sterile gauze with gentle pressure. Once bleeding was controlled, the assigned

postoperative material was applied according to the randomized side allocation.

Postoperative material application

On the test side, BlueM Oral Gel was applied directly over the depigmented wound surface as a thin and uniform layer using an applicator tip. Care was taken to cover the exposed surgical area without creating excess bulk. The gel was left in place as a topical wound covering and did not require mechanical retention. Its viscous and bioadhesive consistency allowed it to remain over the moist oral tissues during the immediate postoperative period.

On the control side, Coe-Pak periodontal dressing was prepared according to the manufacturer's instructions. Equal lengths of base paste and catalyst paste were mixed until a uniform consistency was obtained. After allowing the material to become non-sticky, it was rolled into strips and adapted over the depigmented wound surface. The dressing was extended interproximally where required and gently pressed to achieve mechanical retention. Both materials were placed during the same appointment in the same participant, allowing direct comparison under similar intraoral and systemic conditions.

Postoperative instructions and follow-up

All participants received standardized postoperative instructions. Tablet paracetamol 500 mg was prescribed three times daily for 3 days, to be taken only if required for pain. Participants were advised to avoid hot, spicy, and hard foods for the first few days and to consume a soft diet. They were instructed not to brush directly over the operated maxillary anterior gingiva during the initial healing period, while maintaining gentle oral hygiene in the remaining areas. Manipulation of the surgical site with the tongue or fingers was discouraged. Participants were also instructed not to use any additional topical medicament or mouthwash over the treated area unless advised by the operator.

Follow-up visits were scheduled at 1 week, 2 weeks, and 4 weeks postoperatively. At each visit, both surgical sites were examined for healing, epithelialization, postoperative discomfort, material-related inconvenience, dislodgement, and adverse events. Any signs of infection, necrosis, delayed healing, excessive inflammation, abnormal bleeding, or persistent ulceration were recorded and managed according to standard clinical protocol.

Outcome measures

The primary outcome was postoperative re-epithelialization of the depigmented wound surface. It was assessed at 1 week, 2 weeks, and 4 weeks using toluidine blue staining and scored using the Re-epithelialization Index described by Sridharan and Shankar. Toluidine blue dye was applied to the surgical area to identify epithelial coverage. The degree of staining was interpreted as an indicator of epithelial continuity, with darker staining indicating incomplete epithelialization and absence of staining indicating complete epithelial coverage. Scores were recorded separately for the BlueM and Coe-Pak sides at each follow-up visit. The scoring was as follows: score 1 indicated dark blue staining suggestive of absence of epithelialization; score 2 indicated light blue staining suggestive of partial epithelialization; score 3 indicated very slight staining suggestive of near-complete epithelialization; and score 4 indicated no staining, representing complete epithelialization.

The secondary outcome was oral health-related quality of life, assessed using the Oral Health Impact Profile-14 questionnaire. The OHIP-14 consists of 14 items covering functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Each item was scored on a 5-point Likert scale from 0 to 4, where 0 indicated "never" and 4 indicated "very often." The total score ranged from 0 to 56, with higher scores indicating poorer oral health-related quality of life. OHIP-14 assessment was performed at baseline and at 1 week, 2 weeks, and 4 weeks postoperatively.

Patient acceptability was assessed during the early healing period by recording overall satisfaction, comfort during eating and speaking, dressing-related inconvenience, partial loss or dislodgement of the material, and overall participant preference. Safety was assessed by documenting postoperative complications or adverse healing events, including infection, tissue necrosis, excessive bleeding requiring intervention, persistent ulceration, or material-related irritation.

Data collection and management

All data were recorded in structured case report forms. The recorded variables included demographic details, relevant medical and dental history, Dummett–Gupta pigmentation classification, baseline oral hygiene status, side-wise treatment allocation, re-epithelialization scores at each follow-up, OHIP-14 scores, patient satisfaction and comfort scores, material-related inconvenience, dislodgement, participant preference, and adverse events. Data were checked for completeness before analysis and were maintained using coded identifiers to preserve participant confidentiality.

Statistical analysis

Data were analyzed using descriptive and inferential statistics. The level of statistical significance was set at $p<0.05$. Continuous variables were summarized as mean and standard deviation or median and interquartile range, depending on data distribution. Categorical variables were presented as frequencies and percentages. Normality of continuous variables was assessed using the Shapiro–Wilk test.

As the study followed a split-mouth design, paired statistical methods were used for comparison between BlueM and Coe-Pak sites. Re-epithelialization scores were treated as paired ordinal data and compared at each follow-up visit using the Wilcoxon signed-rank test. Complete re-

epithelialization was also analyzed as a binary endpoint, with score 4 considered complete epithelialization, and paired proportions were compared using the exact McNemar test. OHIP-14 scores and patient-reported acceptability scores were compared between the two postoperative modalities using paired tests according to the nature and distribution of the data. Effect estimates were reported as paired differences with 95% confidence intervals wherever applicable.

Results

A total of 28 systemically healthy, non-smoking adults with physiologic gingival pigmentation were included in the study. The mean age of the participants was 29.1 ± 5.4 years, with an age range of 19.3–39.9 years. Females constituted the majority of the study population, with 20 participants (71.4%), while 8 participants (28.6%) were males. Most participants presented with Dummett–Gupta Class III pigmentation (71.4%), while Class IV pigmentation was observed in 28.6% of participants. Baseline oral hygiene status was good in 39.3%, fair in 50.0%, and poor in 10.7% of participants. The mean baseline OHIP-14 score was 7.6 ± 4.9. Randomized side allocation was balanced, with BlueM assigned to the right side in 16 participants (57.1%) and to the left side in 12 participants (42.9%) (Table 1).

Table 1. Baseline demographic and clinical characteristics of participants

Variable	Overall (n = 28)
Age, years, mean ± SD (range)	29.1 ± 5.4 (19.3–39.9)
Age, years, median [IQR]	29.6 [24.9–33.7]
Male, n (%)	8 (28.6%)
Female, n (%)	20 (71.4%)
Dummett–Gupta Class III pigmentation, n (%)	20 (71.4%)
Dummett–Gupta Class IV pigmentation, n (%)	8 (28.6%)
Good oral hygiene status, n (%)	11 (39.3%)
Fair oral hygiene status, n (%)	14 (50.0%)
Poor oral hygiene status, n (%)	3 (10.7%)
Baseline OHIP-14 score, mean ± SD (range)	7.6 ± 4.9 (0–20)
Baseline OHIP-14 score, median [IQR]	7.0 [5.0–9.3]
BlueM-right/Coe-Pak-left allocation, n (%)	16 (57.1%)
BlueM-left/Coe-Pak-right allocation, n (%)	12 (42.9%)
Smoking status	Non-smokers: 28 (100%)
Systemic status	Systemically healthy: 28 (100%)
Site treated	Maxillary anterior gingiva

Abbreviations: SD, standard deviation; IQR, interquartile range; OHIP-14, Oral Health Impact Profile-14.

Re-epithelialization scores

Re-epithelialization scores showed a clear early difference between the two postoperative modalities. At 1 week, BlueM-treated sites had significantly higher re-epithelialization scores than Coe-Pak-treated sites, with a median score of 3.0 [IQR 2.8–3.0] compared with 2.0 [IQR 1.0–2.0] in the Coe-Pak group ($p < 0.0001$). At this time point, 23 out of 28 paired sites showed higher scores on the BlueM side, while 5 pairs showed equal scores.

At 2 weeks, both groups showed improvement in epithelial healing; however, BlueM continued to show significantly better re-epithelialization than Coe-Pak. The median score was 4.0 [IQR 3.0–4.0] for BlueM and 3.0 [IQR 3.0–4.0] for Coe-Pak ($p = 0.0009$). By 4 weeks, healing had progressed substantially in both groups, with both materials showing a median score of 4.0 [IQR 4.0–4.0]. The difference between groups at 4 weeks was not statistically significant ($p = 0.3173$) (Table 2).

When complete re-epithelialization was analyzed as a binary endpoint, defined as score 4, BlueM showed significantly higher complete epithelialization at 1 week and 2 weeks. At 1 week, complete re-epithelialization was observed in 6 BlueM sites (21.4%) and none of the Coe-Pak sites ($p = 0.031$). At 2 weeks, complete re-epithelialization was observed in 18 BlueM sites (64.3%) compared with 9 Coe-Pak sites (32.1%) ($p = 0.0039$). By 4 weeks, complete re-epithelialization rates were comparable between BlueM and Coe-Pak sites (82.1% vs 78.6%; $p = 1.000$) (Table 2).

Table 2. Re-epithelialization outcomes at 1, 2, and 4 weeks

Time point	BlueM re-epithelialization score, median [IQR]	Coe-Pak re-epithelialization score, median [IQR]	BlueM > Coe-Pak, n	Ties, n	Wilcoxon p-value	Complete re-epithelialization: BlueM, n (%)	Complete re-epithelialization: Coe-Pak, n (%)	McNemar p-value

1 week	3.0 [2.8–3.0]	2.0 [1.0–2.0]	23	5	<0.00001	6 (21.4%)	0 (0.0%)	0.031
2 weeks	4.0 [3.0–4.0]	3.0 [3.0–4.0]	11	17	0.00009	18 (64.3%)	9 (32.1%)	0.0039
4 weeks	4.0 [4.0–4.0]	4.0 [4.0–4.0]	1	27	0.31773	23 (82.1%)	22 (78.6%)	1.000

Complete re-epithelialization was defined as score 4 on the toluidine blue-based Re-epithelialization Index. Abbreviation: IQR, interquartile range.

Oral health-related quality of life

OHIP-14 scores increased at 1 week in both groups compared with baseline, indicating a temporary postoperative impact on oral health-related quality of life. However, the increase was lower on the BlueM side than on the Coe-Pak side. At 1 week, the mean OHIP-14 score was 9.4 ± 4.8 for BlueM and 11.7 ± 5.4 for Coe-Pak, with a significant paired difference favoring BlueM (p = 0.00003).

At 2 weeks, OHIP-14 scores decreased in both groups as postoperative recovery progressed. BlueM continued to show significantly lower OHIP-14 scores than Coe-Pak, with mean scores of 6.1 ± 4.9 and 7.2 ± 4.9, respectively (p = 0.015). At 4 weeks, OHIP-14 scores improved further in both groups and were similar between BlueM and Coe-Pak sites (4.6 ± 4.6 vs 4.8 ± 4.4; p = 0.775) (Table 3).

Table 3. OHIP-14 total scores over time

Time point	BlueM, mean ± SD	Coe-Pak, mean ± SD	Mean paired difference (BlueM − Coe-Pak), 95% CI	Paired comparison p-value
Preoperative baseline	7.6 ± 4.9	7.6 ± 4.9	—	—
1 week	9.4 ± 4.8	11.7 ± 5.4	−2.32 (−3.02 to −1.62)	0.00003
2 weeks	6.1 ± 4.9	7.2 ± 4.9	−1.04 (−1.79 to −0.28)	0.015
4 weeks	4.6 ± 4.6	4.8 ± 4.4	−0.11 (−0.95 to 0.73)	0.775

Lower OHIP-14 scores indicate better oral health-related quality of life. Abbreviations: OHIP-14, Oral Health Impact Profile-14; SD, standard deviation; CI, confidence interval.

Patient satisfaction, acceptability, and safety

At 1 week, patient-reported satisfaction and functional comfort were higher with BlueM than with Coe-Pak. The median overall satisfaction score was 5 (IQR 4–5) for BlueM and 4 (IQR 3–4) for Coe-Pak, with a significant paired difference (p = 0.000005). Comfort during eating and speaking was also significantly better with BlueM, with a median score of 5 (IQR 4–5) compared with 3 (IQR 3–4) for Coe-Pak (p = 0.000001).

Dressing-related inconvenience was reported in 2 BlueM sites (7.1%) and 10 Coe-Pak sites (35.7%). Partial loss or dislodgement requiring repair or re-application was recorded in 1 BlueM site (3.6%) and 6 Coe-Pak sites (21.4%). Overall, 21 participants (75.0%) preferred BlueM, while 3 participants (10.7%) preferred Coe-Pak and 4 participants (14.3%) reported no preference.

No serious postoperative adverse events were observed in either group. There were no cases of wound infection, tissue necrosis or sloughing, persistent ulceration beyond the expected healing period, excessive postoperative bleeding requiring intervention, or material-related irritation requiring discontinuation in either group (Table 4). The only recorded postoperative management issue was partial material loss or dislodgement, which was more frequent with Coe-Pak than with BlueM.

Table 4. Patient-reported acceptability and postoperative safety outcomes

Outcome	BlueM	Coe-Pak	p-value / observation
Overall satisfaction at 1 week, median [IQR]	5 [4–5]	4 [3–4]	0.000005
Comfort during eating/speaking at 1 week, median [IQR]	5 [4–5]	3 [3–4]	0.000001
Dressing-related inconvenience, n (%)	2 (7.1%)	10 (35.7%)	More frequent with Coe-Pak
Partial loss/dislodgement requiring repair/re-application, n (%)	1 (3.6%)	6 (21.4%)	More frequent with Coe-Pak

Overall preference, n (%)	21 (75.0 %)	3 (10.7 %)	No preference: 4 (14.3%)
Wound infection, n (%)	0 (0.0%)	0 (0.0%)	Nil in both groups
Tissue necrosis/sloughing, n (%)	0 (0.0%)	0 (0.0%)	Nil in both groups
Persistent ulceration beyond expected healing window, n (%)	0 (0.0%)	0 (0.0%)	Nil in both groups
Excessive postoperative bleeding requiring intervention, n (%)	0 (0.0%)	0 (0.0%)	Nil in both groups
Material-related irritation requiring discontinuation, n (%)	0 (0.0%)	0 (0.0%)	Nil in both groups

Likert scale for satisfaction and comfort: 1 = very dissatisfied, 2 = dissatisfied, 3 = neutral, 4 = satisfied, 5 = very satisfied. Abbreviation: IQR, interquartile range.

Overall, BlueM-treated sites demonstrated better early re-epithelialization and lower early patient-reported postoperative burden than Coe-Pak-treated sites. These differences were evident at 1 week and 2 weeks, while both groups showed comparable healing and oral health-related quality of life by 4 weeks.

Discussion

The present split-mouth randomized clinical trial compared BlueM Active Oxygen Gel with Coe-Pak periodontal dressing following conventional scalpel gingival depigmentation. The main finding was that BlueM showed better early postoperative recovery, demonstrated by higher re-epithelialization scores at 1 and 2 weeks, lower early OHIP-14 scores, better patient satisfaction and comfort, and fewer dressing-related inconveniences. However, by 4 weeks, both groups showed comparable healing, indicating that the benefit of BlueM was mainly related to acceleration of early recovery rather than alteration of the final healing outcome.

The study population was relatively homogeneous, as all participants were systemically healthy, non-smoking adults with physiologic gingival pigmentation. This is relevant because wound healing was assessed in individuals with generally favorable healing potential. The split-mouth design further strengthened the comparison, as each participant acted as his or her own control, thereby reducing the influence of inter-individual differences in pain perception, oral hygiene practices, vascularity, and tissue response. This is an important design advantage in periodontal clinical studies where paired intraoral comparisons are possible, as emphasized by Lesaffre et al. (2009) [6].

Re-epithelialization was the primary outcome of the study because scalpel depigmentation creates an intentionally denuded connective tissue surface that heals by secondary intention. At 1 week, BlueM-treated sites showed significantly better epithelial coverage than Coe-Pak-treated sites. This early difference is clinically important because the first postoperative week is usually the most uncomfortable period, when the wound is more exposed to trauma during mastication, speech, and oral hygiene. Faster epithelial coverage helps restore the mucosal barrier and may reduce sensitivity, irritation, and plaque-related inflammation. The present finding is in agreement with Juliana and Shwaiki (2022), who reported better early re-epithelialization and lower postoperative pain with BlueM than Coe-Pak after surgical depigmentation [7]. Similar early healing advantages were also reported by Sharma et al. (2024) and Garg et al. (2025) [8,9].

The better early healing observed with BlueM may be explained by its bioactive mode of action. Unlike Coe-Pak, which mainly serves as a passive physical dressing, BlueM releases active oxygen locally at the wound surface. Oxygen is important for epithelial cell migration, fibroblast activity, collagen synthesis, angiogenesis, and host defense, all of which contribute to soft tissue repair [5]. In contrast, Coe-Pak primarily protects the wound mechanically but does not actively support these biological events. Therefore, in a depigmentation wound where early epithelial closure is critical, an oxygen-releasing gel may provide a more favorable microenvironment for early healing.

At 2 weeks, BlueM continued to show better re-epithelialization and lower OHIP-14 scores, suggesting that the clinical healing advantage was also reflected in patient-perceived recovery. However, by 4 weeks, both groups showed similar re-epithelialization and OHIP-14 scores. This pattern suggests that Coe-Pak also allowed uneventful healing over time, but BlueM shortened the early vulnerable phase. This interpretation is consistent with the broader periodontal dressing literature, where Cheshire et al. (1996) and Soheilifar et al. (2015) reported that conventional dressings may improve comfort but do not always produce clear differences in final tissue healing [10,11].

Patient acceptability also favored BlueM. Participants reported better satisfaction and comfort during eating and speaking, while inconvenience and partial dislodgement were more frequent with Coe-Pak. This finding is clinically meaningful

because gingival depigmentation is an elective esthetic procedure, and the postoperative experience strongly influences patient satisfaction. Similar concerns regarding plaque retention, handling, taste, and preference with conventional dressings have been reported by Kakar et al. (2018) and Sadighi et al. (2022), who found better patient acceptance with newer dressing alternatives compared with Coe-Pak [12,13].

No serious adverse healing events were observed in either group, indicating that both materials were safe within the 4-week follow-up period. The main limitations of the study include the small sample size, single-blinded design, short follow-up duration, and absence of long-term assessment of repigmentation or esthetic stability. Overall, BlueM may be considered a useful postoperative adjunct after scalpel gingival depigmentation, particularly for improving early epithelial healing, comfort, and patient acceptability, while Coe-Pak remains an effective conventional option for achieving comparable healing by 4 weeks.

Conclusion

Within the limitations of this split-mouth clinical trial, BlueM Active Oxygen Gel showed better early re-epithelialization and patient comfort than Coe-Pak following scalpel gingival depigmentation. By four weeks, both materials showed comparable healing outcomes, suggesting that the main benefit of BlueM was in improving early postoperative recovery. Both materials were well tolerated, with no serious adverse healing events observed.

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Figure Legends:

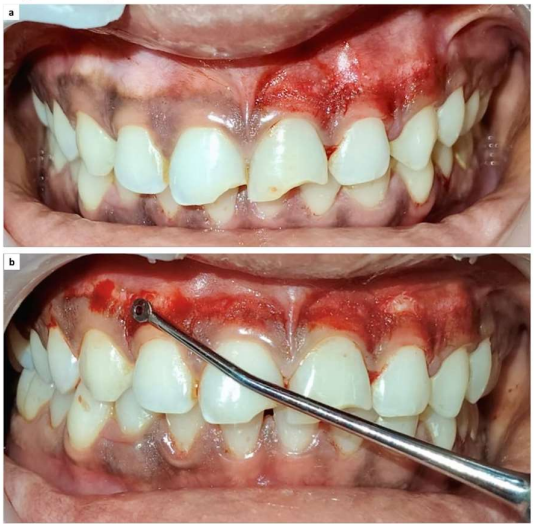

Figure 1: a) Removal of the pigmented gingival tissue using a number 15 scalpel blade, and b) use of Eyelet Curette for the removal of remnants of pigmented tissue

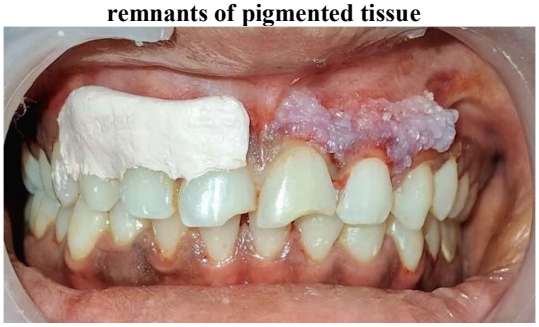

Figure 2: Post-operative image showing Coe Pak applied on the right side and BlueM applied on the left side

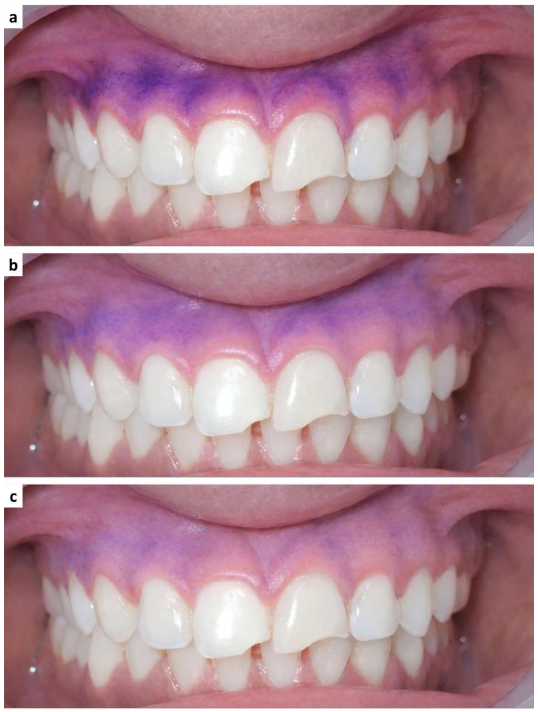

Figure 3: Toluidine blue staining to observe re-epithelialization at follow-up visits after a) one week, b) two weeks, and c) four weeks