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ORIGINAL ARTICLE

CLINICAL EVALUATION OF FLOWABLE RESIN COMPOSITE AS A NOVEL PALATAL DRESSING VERSUS PERIODONTAL PACK TO REDUCE MORBIDITY FOLLOWING FREE GINGIVAL GRAFT HARVESTING: A RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Background: Free gingival grafting remains a standard technique for managing mucogingival defects, yet postoperative complications such as pain and delayed healing at the donor site are common challenges. Patient satisfaction is an increasingly important measure in periodontal procedures, reflecting the impact of treatment beyond clinical outcomes. Understanding how wound characteristics relate to postoperative experiences can guide improved management strategies. This study aimed to evaluate patient satisfaction following the use of flowable resin composite versus Coe-Pak as palatal wound dressings and to explore correlations between wound size, postoperative pain, analgesic use, and patient satisfaction after free gingival graft harvesting.

Materials and Methods: A randomized, parallel-group clinical trial was conducted with 34 patients undergoing free gingival graft harvesting. Participants received either Coe-Pak (Group I) or flowable resin composite (Group II) as palatal dressings. Patient satisfaction was assessed using standardized questionnaires. Statistical analysis included Independent T-tests for satisfaction comparisons and Spearman's correlation to examine relationships among wound size, pain, analgesic use, and satisfaction. Ethical approval and informed consent were secured.

Results: No statistically significant difference in patient satisfaction was found between the two dressing groups. Correlation analysis revealed a moderate negative relationship between wound size and patient satisfaction in the resin composite group, indicating that larger wounds were associated with lower satisfaction. Additionally, higher pain scores corresponded to decreased satisfaction in both groups, with a stronger correlation observed in the resin composite group. Analgesic use showed a weak to moderate negative association with satisfaction, though not statistically significant.

Conclusions: Patient satisfaction following palatal wound dressing is influenced by wound size and perceived pain levels, highlighting the importance of effective wound management strategies. These findings underscore the value of incorporating patient-centered measures in periodontal research and support further investigation into optimizing dressings to enhance the overall patient experience.

Keywords: Patient satisfaction; Palatal wound dressing; Flowable resin composite; Coe-Pak; Wound size; Postoperative pain

INTRODUCTION

Autogenous soft tissue grafts (STGs) are widely regarded as the gold standard for treating periodontal soft tissue deficiencies. They are effective in augmenting the width of keratinized gingiva, increasing residual gingival tissue, and improving vestibular depth. Utilizing native palatal mucosa as the

donor site leverages the intrinsic genetic and biological properties of the tissue, thereby promoting more favorable healing outcomes.[1 2]

Maynard and Oschenbein proposed that periodontal intervention is warranted when the width of keratinized tissue (KT) is equal to or less than 1 mm.[3]

Lang and Löe demonstrated that gingival health can be preserved in regions with a keratinized tissue (KT) width of ≥2 mm.[4] It is generally considered that approximately 2 mm of KT, including around 1 mm of attached gingiva, is favorable for maintaining periodontal stability. However, they also noted that in the presence of excellent plaque control, a minimum amount of keratinized tissue may not be essential to prevent clinical attachment loss.[5]

Various techniques have been developed to augment the width of keratinized tissue (KT) and achieve root coverage.[1]Among these, the free epithelialized mucosal graft (FEG) method, first introduced by Sullivan and Atkins in 1968, continues to be regarded as the gold standard for enhancing KT width.[6]

Harvesting a free gingival graft (FGG) is often associated with significant postoperative complications, including the formation of a large open wound at the donor site. This can lead to substantial intraoperative and postoperative bleeding, heightened discomfort, pain, and an increased risk of infection, which are considered the most critical adverse outcomes of the procedure.[7]

Due to the wide separation of wound margins following free gingival graft (FGG) harvesting, healing by secondary intention is significantly prolonged, often requiring approximately 2 to 4 weeks for complete epithelialization of the donor site.[8]

Recent advancements in periodontal therapy have introduced more efficient techniques for harvesting connective tissue grafts (CTGs). One such innovation is the use of de-epithelialized gingival grafts (DGGs), which differ from traditional subepithelial connective tissue grafts (SCTGs) by offering a less fibrous composition. This approach has facilitated the development of more predictable and user-friendly grafting materials that can be easily adapted to palatal donor sites, thereby promoting faster and more consistent healing of extensive soft tissue defects. Recognizing that clot stability is fundamental to successful wound healing, a variety of dressing materials have been employed to safeguard the palatal clot during the healing process. An ideal dressing should possess properties such as biocompatibility, chemical inertness, and structural stability to effectively support tissue regeneration and minimize postoperative complications.[9]

Evaluating the patient's perception of the treatment received is essential for minimizing discomfort and enhancing overall satisfaction, despite the inherently subjective nature of such assessments. This patient-centred approach plays a crucial role in optimizing clinical outcomes and improving the quality of care.[10]

Patient-reported outcome measures (PROMs)—including pain, discomfort, esthetic satisfaction, and willingness to undergo retreatment are increasingly acknowledged as critical endpoints in periodontal research. Evidence suggests that therapeutic approaches which minimize pain and enhance aesthetic outcomes are particularly valued by patients, significantly influencing their treatment preferences and overall satisfaction with care.[11 12]

Various strategies have been proposed to reduce postoperative discomfort following periodontal procedures.[13] These include the application of palatal stents, collagen-gelatin scaffolds, resorbable gelatin sponges, oxidized cellulose, collagen membranes, medicinal plant extracts, and cyanoacrylate—either alone or in combination with other dressing materials such as Alvogyl, platelet concentrates, and platelet-rich fibrin (PRF). These approaches aim to protect the surgical site, promote hemostasis, and facilitate more comfortable and efficient healing.[14]

Multiple clinical trials have documented the application of resin composites in periodontal plastic surgery for the management of combined defects, specifically gingival recession in conjunction with non-carious cervical lesions (NCCLs). This integrated approach aims to address both esthetic and structural concerns, enhancing overall treatment outcomes.[15]

The application of a flowable resin composite coating over a hemostatic collagen sponge on the palatal wound following free gingival graft harvesting has been shown to effectively reduce postoperative pain. This combined approach enhances wound protection, promotes clot stability, and contributes to improved patient comfort during the healing process.[16]

The aim of the present study was to conduct a clinical comparison between two palatal wound dressing techniques following free gingival graft harvesting: the direct application of flowable resin composite and the use of Coe-Pak. The evaluation focused on key clinical parameters, including the correlation between baseline wound size and the severity of postoperative pain. In addition, the overall patient satisfaction after the healing process was evaluated.

MATERIALS AND METHODS

Study Design

This investigation was designed as a randomized, two-arm, parallel-group clinical trial and was carried out at the Department of Oral Medicine and Periodontology, Faculty of Dentistry, Cairo University, from March 2023 to January 2025.

The study was conducted in alignment with the ethical standards outlined in the Declaration of Helsinki and

complied with the CONSORT guidelines for the reporting of randomized controlled trials. Ethical approval was obtained from the Ethics Committee of the Faculty of Dentistry, Cairo University (Approval No.: 8|12|22), and written informed consent was secured from all participants prior to enrolment. Furthermore, the trial was prospectively registered on ClinicalTrials.gov under the identifier NCT05779800.

Sample Size

The sample size calculation was informed by a previous study, [17] which reported a standard deviation of 9 and a mean difference of 10 between the experimental and control groups. To achieve 80% statistical power for detecting a significant difference between groups, a minimum of 14 participants per group was required. This calculation was performed using a two-tailed t-test under the assumption of equal variances, with a significance level set at 0.05. To accommodate potential dropouts during the follow-up phase, the sample size was increased to 17 participants per group.

Recruitment of Participants

Participants were randomly allocated in a 1:1 ratio to receive either a flowable resin composite or Coe-Pak as a palatal wound dressing. Randomization was performed using computer-generated sequences from www.randomizer.org. Allocation concealment was ensured and overseen by a designated investigator (NS), who revealed the treatment assignment only after the preparation of the donor site, in accordance with the predetermined randomization sequence.

A total of 34 participants were initially recruited for this randomized controlled clinical trial, with equal allocation of 17 individuals to each treatment group. However, due to loss to follow-up, three participants from each group did not complete the study, resulting in a final sample size of 28 patients who were included in the analysis (Figure 1).

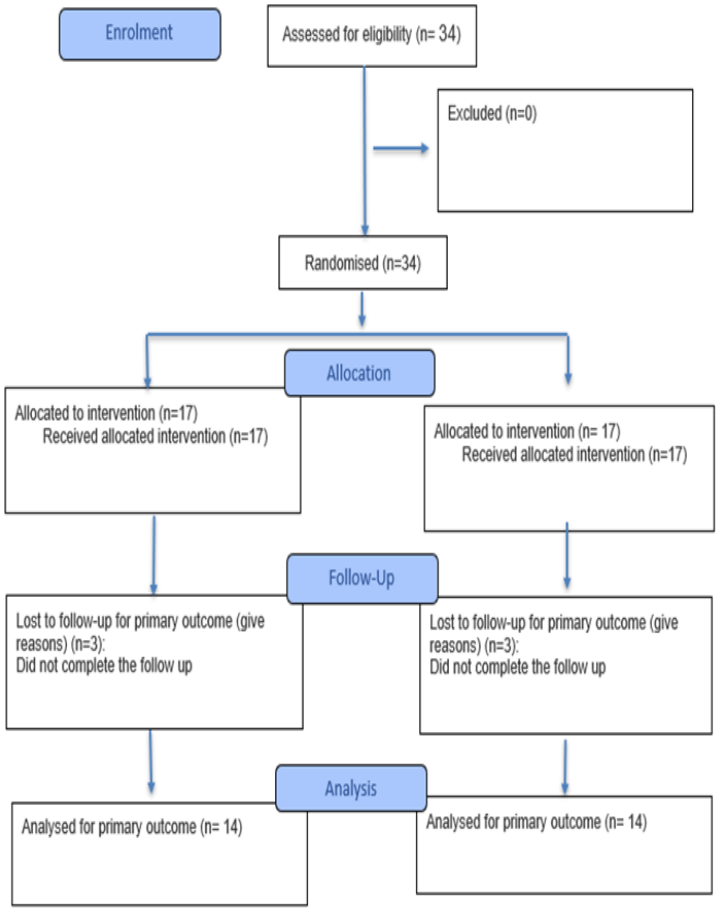

Figure 1. CONSORT Flowchart

Inclusion Criteria

Eligible participants for the study were individuals diagnosed with mucogingival defects who were scheduled to undergo either a free gingival graft (FGG) or a connective tissue graft (CTG) procedure. These patients were considered suitable candidates for periodontal plastic surgery involving soft tissue augmentation at the palatal donor site.

Exclusion Criteria

Participants were excluded from the study if they met any of the following conditions: a history of smoking, the presence of any uncontrolled local or systemic medical conditions that would contraindicate periodontal plastic surgical procedures, or a recent history of periodontal surgery at the intended donor site. Additional exclusion factors included a pronounced gag reflex that could interfere with the procedure, current pregnancy or lactation, and known allergies or hypersensitivity to any of the materials or agents used in the study.

Blinding

Blinding was implemented for both the outcome assessor and the biostatistician to minimize bias in data evaluation and analysis. However, blinding of the participants and the treating clinician was not feasible due to the nature of the interventions.

Procedure and postoperative care

During the surgical procedure, free gingival grafts were harvested using a standardized technique involving precise horizontal and vertical incisions to obtain a uniform graft thickness of 1–1.5 mm while preserving the underlying palatal periosteum. The harvested grafts were immediately kept moist on saline-soaked gauze to prevent shrinkage. [18]

After graft harvesting, bleeding was controlled with sterile gauze pressure for five minutes, and the donor site was sutured with a mesh-like pattern to help retain the protective dressing. The control group received the conventional Coe-Pak dressing, while the intervention group was treated with a flowable resin composite applied as a continuous layer and light-cured to securely interlock with the sutures.

Postoperative care included a course of antibiotics and analgesics, with ibuprofen intake recorded to indirectly evaluate pain. [19] Patients were advised to rinse twice daily with chlorhexidine for two weeks, avoid trauma to the surgical area for three weeks, and then resume gentle brushing with a soft toothbrush.

Outcomes

Patient Satisfaction:

Patient satisfaction was assessed using a 10-point numerical rating scale (0 = not satisfied at all, 10 = completely satisfied). This measure was recorded following complete palatal wound healing to capture the subjective experience of patients regarding the overall treatment process and outcomes.

Correlation Between Clinical and Patient-Reported Variables

To investigate the relationship between objective clinical parameters and subjective patient-reported outcomes, Spearman's rank correlation coefficient was employed. This analysis aimed to assess the associations between baseline wound size and both postoperative pain intensity (measured by the Visual Analog Scale, VAS) and total analgesic consumption. Additionally, the relationship between wound size and patient satisfaction was examined to determine whether the physical extent of the surgical site influenced the patient's subjective experience.

Further correlations were explored between VAS scores and analgesic intake, as well as between VAS scores and overall patient satisfaction, to evaluate how perceived pain levels impacted medication use and satisfaction with treatment. Lastly, the association between analgesic consumption and satisfaction was assessed to understand whether pharmacologic pain management influenced patients' overall contentment with the postoperative experience.

These analyses provided insights into the interplay between surgical wound characteristics and recovery-related outcomes, highlighting the importance of minimizing postoperative discomfort to enhance patient satisfaction and acceptance of periodontal surgical interventions.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics, version 25.0 (IBM Corp., Armonk, NY, USA). The Shapiro–Wilk test was initially used to assess the normality of the data distribution. Based on the results, the Independent t-test was

employed to compare patient satisfaction scores between the two groups, as these data were found to be normally distributed. To evaluate the relationships among wound size, postoperative pain intensity (VAS), analgesic consumption, and patient satisfaction scores, Spearman's rank correlation coefficient was applied. This non-parametric test was selected for its suitability in assessing associations between variables without assuming a normal distribution. Correlation strength was interpreted as follows: a coefficient of 0 indicated no correlation; values > 0 to 0.25 were considered weak; ≥ 0.25 to 0.75, moderate; ≥ 0.75 to < 1.0, strong; and a coefficient of 1.0 denoted a perfect correlation. Statistical significance was established at $p \leq 0.05$, with p-values ≤ 0.001 regarded as highly significant.

Results

Patient Satisfaction

The mean patient satisfaction score was slightly higher in the group treated with flowable resin composite (Group II: 9.07 ± 1.14) compared to the group that received Coe-Pak dressing (Group I: 8.64 ± 1.65. However, this difference was not statistically significant (p = 0.431), as determined by the independent t-test. Both groups reported high satisfaction levels, with median scores of 9 in each group)(Table1and Figure 2).

Table 1. Intergroup comparison of patient satisfaction scores.

	Mean	SD	Median	Range	P-value
Group I	8.64	1.65	9	(5-10)	0.431^{NS}
Group II	9.07	1.14	9	(6-10)	

- P-value for Inter-group comparison between the two groups (Independent T- test).*
- NS= Non-significant P >0.05

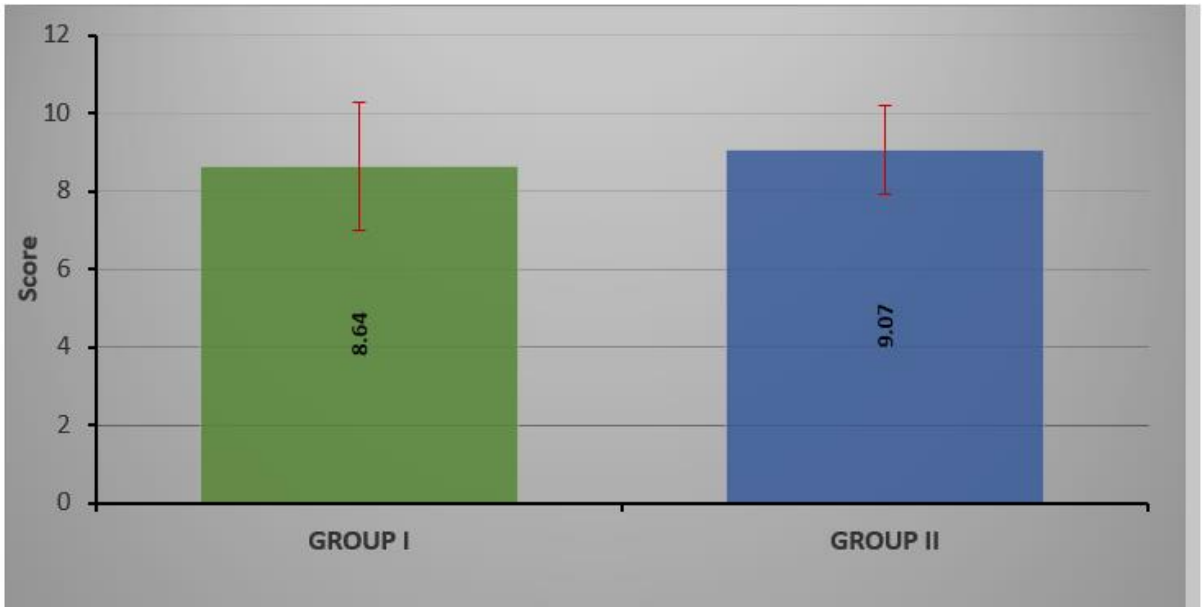

Figure 2. Bar chart comparing mean patient satisfaction scores between groups
This figure illustrates the mean ± standard deviation of patient satisfaction scores for Group I (Coe-Pak dressing) and Group II (flowable resin composite). Despite a slightly higher average in Group II, the difference did not reach statistical significance (p = 0.431).

Correlation Between Wound Size and Clinical Parameters

A statistically significant moderate positive correlation was observed between baseline wound size and postoperative VAS pain scores in both groups, with correlation coefficients of r = 0.337 (p = 0.024) in Group I and r = 0.528 (p < 0.001) in Group II. These findings suggest that larger palatal wounds were associated with greater pain perception, particularly in the resin composite group.

Additionally, a moderate positive correlation was found between VAS scores and analgesic dosage in both groups (Group I: r = 0.328, p = 0.034; Group II: r = 0.384, p = 0.012), indicating that higher pain scores were associated with greater use of analgesics (Figure 3).

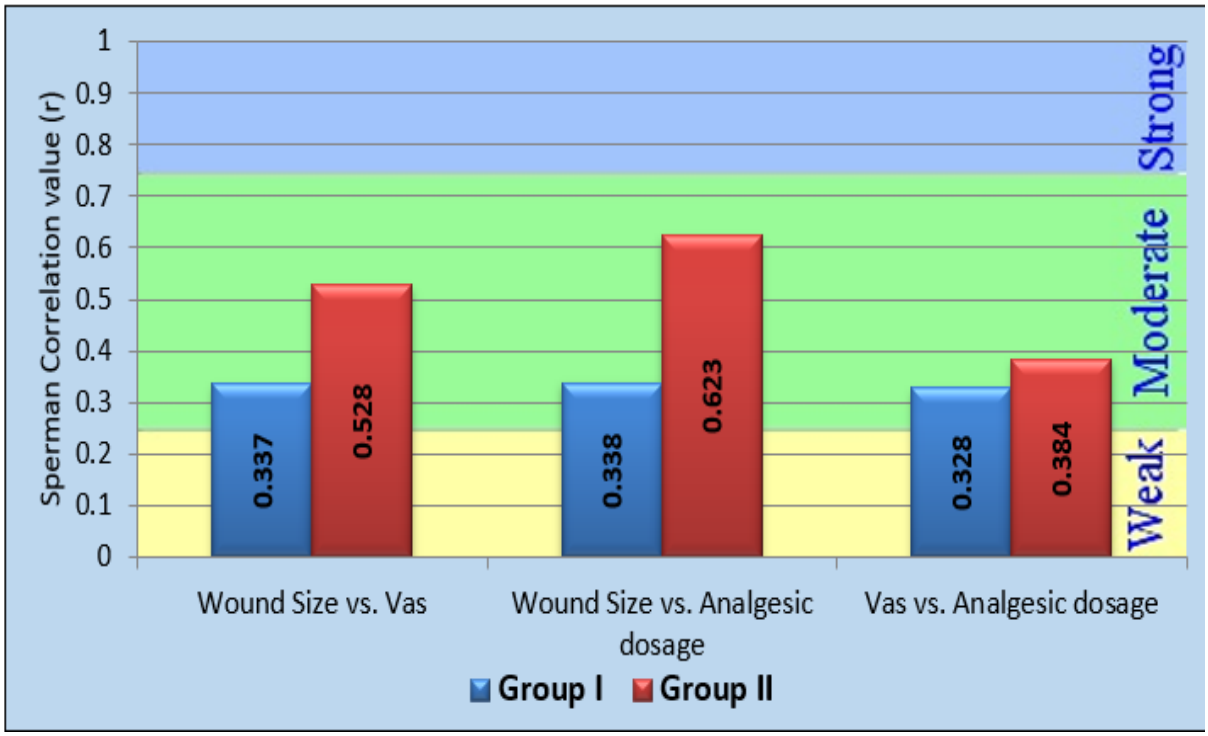

Figure 3. Correlation coefficients between wound size and clinical parameters (VAS pain score and analgesic consumption)
This bar chart displays Spearman's correlation coefficients (r) indicating the strength of associations between baseline wound size and postoperative pain (VAS), as well as analgesic dosage, for both groups. Group II shows stronger correlations, with values ranging from moderate to highly significant ($p < 0.001$).

3. Correlation Between Patient Satisfaction and Other Parameters
A moderate negative correlation was found between patient satisfaction and VAS scores in both groups, with stronger correlation in Group II ($r = -0.536$, $p < 0.001$) compared to Group I ($r = -0.398$, $p = 0.026$), indicating that higher levels of reported pain were associated with lower patient satisfaction.

The correlation between patient satisfaction and wound size showed a weak and non-significant relationship in Group I ($r = -0.076$, $p = 0.796$), but a statistically significant moderate negative correlation in Group II ($r = -0.383$, $p = 0.037$), suggesting that larger wounds tended to reduce satisfaction more in the resin group.

A weak negative, non-significant correlation was noted between patient satisfaction and analgesic dosage in both groups (Group I: $r = -0.062$, $p = 0.832$; Group II: $r = -0.267$, $p = 0.053$), indicating only a marginal tendency for higher analgesic intake to correlate with reduced satisfaction (Table 2 and Figure 4).

Table 2. Correlation between patient satisfaction and other parameters (wound size, VAS, and analgesic dosage) for both groups.

Comparison	Group	r**	P-value	Correlation type
Patient satisfaction vs. Wound Size	Group I	-0.076	0.796^{NS}	Weak Negative
	Group II	-0.383	0.037^{S}	Moderate Negative
Patient satisfaction vs. VAS	Group I	-0.398	0.026^{S}	Moderate Negative
	Group II	-0.536	$< 0.001^{HS}$	Moderate Negative
Patient satisfaction vs. Analgesic dosage	Group I	-0.062	0.832^{NS}	Weak Negative
	Group II	-0.267	0.053^{NS}	Moderate Negative

- ** Sperman Correlation value -^{S} Significant (Correlation is significant at the 0.05 level). -^{HS} Highly significant (Correlation is significant at the 0.01 level). -^{NS} Non-significant (P-value > 0.05)

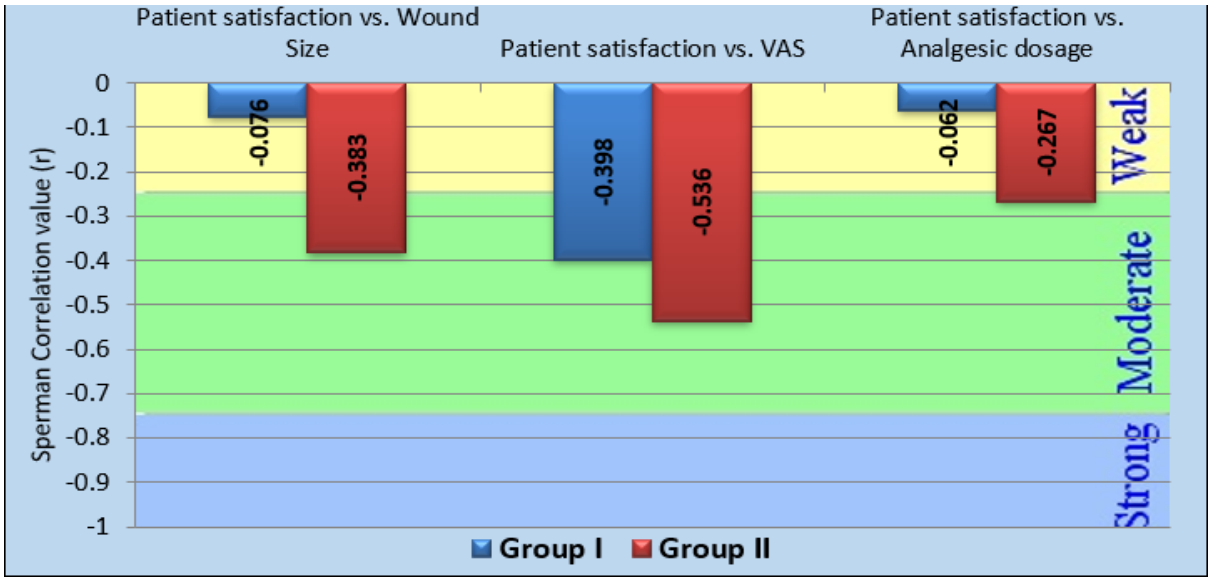

Figure 4. Correlation coefficients between patient satisfaction and wound size, VAS pain score, and analgesic consumption

This figure presents the negative correlations of patient satisfaction with wound size, pain scores, and analgesic use in Groups I and II. Notably, Group II exhibits a moderate negative correlation between wound size and satisfaction, emphasizing the impact of larger wounds on patient perception.

DISCUSSION

In our study, the flowable resin composite dressing provided a markedly better patient experience than Coe-Pak. Patients in the resin group reported higher overall satisfaction (for example, a greater willingness to undergo the procedure again) and used fewer analgesics postoperatively. This aligns with a growing body of evidence that novel palatal dressings – whether resins, gels, or biological membranes – tend to improve comfort and satisfaction compared to traditional packings. For instance, Baroudi & Othman (2024) found that patients treated with a polyvinylpyrrolidone–sodium hyaluronate gel were significantly more willing to receive the same treatment again than those receiving Coe-Pak.[20]Similarly, Basma et al. (2023) reported that every test group (including collagen + cyanoacrylate, PRF, or palatal stent) showed lower pain, lower analgesic intake, and higher willingness for retreatment compared to a collagen-sponge control.[21]

In our case, the superior satisfaction with the resin dressing likely reflects its better sealing of the wound and protection of exposed nerves. Meza-Mauricio et al. (2023) showed that adding a flowable resin coating over a collagen sponge significantly reduced pain and analgesic use versus collagen alone[16], supporting the idea that resin-derived dressings can enhance patient comfort. Thus, our findings are congruent with recent trials showing that advanced dressings (resin, adhesive sealants, hyaluronic acid gels, etc.) not only hasten healing but also shift patient-reported outcomes positively relative to Coe-Pak or no-dressings.[20,21,22]

The correlations between wound area, pain, and analgesic use observed in our study deserve careful interpretation. We found that larger palatal wounds tended to be associated with higher VAS pain scores and greater analgesic consumption. This gradient is biologically plausible – a larger denuded area means more nerve endings exposed and more inflammatory mediators, driving more discomfort and a need for pain medication. In fact, Escobar et al. (2022) systematically reviewed graft dimensions and pain, finding that each additional millimeter of graft thickness raised VAS pain significantly (e.g. ~11–17 points more per mm on days 1–7).[23]

Our positive correlations echo those findings, suggesting that wound area is a determinant of postoperative morbidity. That said, not all studies agree: Basma et al. (2023) reported that palatal thickness, graft length and width did not significantly affect patient morbidity.[21]The discrepancy may arise because most studies, including ours, standardize anesthesia and surgical technique to minimize pain regardless of wound size. In Basma's work, for example, all groups had extensive pain reduction simply by using dressings (adhesives or PRF) instead of plain collagen, possibly masking size effects.[21]Practically, however, even if graft size per se is not a dominant predictor after adjustment, our raw correlations underscore that patients with larger donor wounds experienced more pain and consumed more painkillers. This reinforces the clinical importance of

minimizing graft dimensions when possible, and of using effective dressings to mitigate pain regardless of wound size.

The emphasis on patient-reported outcomes (PROs) and satisfaction in our discussion reflects a larger trend in periodontal therapy. PROs – including pain scores, analgesic needs, quality-of-life measures, and overall satisfaction – are now considered fundamental measures of success, not just adjuncts.[24] As one recent review notes, patients' perspectives on the impact of disease and treatment are being treated as primary outcomes in trials.[24]

In practical terms, a dressing that makes patients feel more comfortable, eat more easily, and feel confident about retreatment is clinically valuable, even if traditional healing parameters (like epithelialization time) differ only marginally. Our findings contribute to this patient-centered literature. By demonstrating higher satisfaction and reduced pain with the resin dressing, we highlight that subjective experience matters. This complements and extends prior research: for instance, Baroudi et al. specifically measured patient willingness to be retreated, and found a significant preference for the newer gel dressing.[20] Similarly, Basma et al. used "willingness for retreatment" as a satisfaction proxy and reported it improved with any modern dressing vs. collagen.[21] Even periodontal flap studies have noted less pain with dressings[25] , underscoring the general importance of patient comfort. In comparing dressing materials, Coe-Pak remains a common control despite known downsides. It provides a mechanical cover but has no inherent biologic or analgesic properties. Our results – like many in the literature – show that Coe-Pak often performs worse than newer approaches. For example, Eltas et al. (2020) reported mean VAS ~67/100 with Coe-Pak, versus ~41–45/100 with various palatal stents.[26]

In periodontal flap surgery, dressings have reduced pain vs. no dressing[25], but comparisons among dressings show that eugenol-free packs (e.g. Coe-Pak) are only one option among many. Collagen sponges, platelet-rich fibrin membranes, hyaluronic acid gels, and even low-level laser therapy have all been trialed with the goal of reducing discomfort. In general, these advanced materials have either matched or outperformed Coe-Pak/standard treatments in terms of pain relief and patient acceptance. For instance, collagen-based dressings (CollaCote) allowed faster healing and better symptomatic relief than Coe-Pak in older trials[27] , and photobiomodulation or topical drugs have similarly improved VAS scores and healing indices in recent studies.[22]

Our resin composite dressing can be seen as part of this evolution: it is essentially a light-cured sealant that interlocks with the suturing beneath, making a fixed protective layer. Meza-Mauricio et al. credited the resin coating with minimizing pain post-harvest[16], and our data corroborate that advantage over Coe-Pak.

Despite these positive patient outcomes, we also note that healing occurred in all cases without major complication. Neither our study nor others have found dressings to cause harm, though some questioned their necessity altogether.[25]

In contrast, our results reinforce that the choice of dressing can enhance comfort. Given that free gingival graft harvesting is inherently painful, anything that improves patients' experience is clinically meaningful. Patients who tolerate the donor site better are more likely to comply with instructions (easier diet) and to agree to future periodontal surgery if needed.

The study's reliance on patient-reported data such as pain scores, analgesic use, and satisfaction introduces potential recall errors and subjective bias. Visual assessments of wound appearance may also vary between evaluators or overtime. While analgesic intake is more objective, individual thresholds and attitudes can still affect its consistency.

In conclusion, our findings highlight that patient satisfaction and comfort are critical endpoints in periodontal therapy. Our correlations between wound size and pain further suggest that clinicians should tailor graft dimensions and dressings to optimize patient comfort. Ultimately, emphasizing patient-reported outcomes and satisfaction not only aligns with modern periodontal practice but also leads to better overall care. By improving the postoperative experience, we may improve long-term adherence and outcomes in mucogingival surgery.

DECLARATIONS

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None

Conflict of Interest

None declared

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