

Clinical evaluation of three different composite materials use in class - v noncarious cervical lesion

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Abstract

Background: Restoration of noncarious cervical lesions (NCCLs) remains challenging because of dentin sclerosis, cervical stresses, and difficulties in achieving durable adhesion. Selection of an appropriate restorative material is essential for long-term clinical success.

Aim: To compare the clinical performance of Filtek Supreme Ultra, Clearfil Photo Core, and resin-modified glass ionomer cement (RMGIC) in Class V noncarious cervical lesions over 12 months.

Materials and Methods: This prospective randomized comparative pilot study was designed to evaluate 30 NCCL restorations, divided equally into three groups (n=10 each). Group I received Filtek Supreme Ultra, Group II received Clearfil Photo Core, and Group III

received RMGIC. Restorations were assessed at baseline, 3, 6, and 12 months using modified USPHS criteria, including retention, marginal adaptation, marginal discoloration, surface texture, color match, postoperative sensitivity, and secondary caries.

Results: In the illustrative dataset, 12-month retention rates were 100%, 90%, and 80% in Groups I, II, and III, respectively. Filtek Supreme Ultra showed numerically favorable marginal adaptation, surface texture, and color match. Postoperative sensitivity decreased during follow-up, and no secondary caries was recorded. These values are hypothetical and do not represent observed clinical outcomes.

Conclusion: Filtek Supreme Ultra demonstrated favorable performance in the illustrative comparison.

However, actual clinical data and larger studies with longer follow-up are required to establish the comparative effectiveness of the three restorative materials.

Keywords: Noncarious cervical lesions, Class V restorations, Filtek Supreme Ultra, Clearfil Photo Core, Resin-modified glass ionomer cement, Clinical evaluation, USPHS criteria.

Introduction

Noncarious cervical lesions (NCCLs) are characterized by the progressive loss of tooth structure at the cemento-enamel junction without bacterial involvement. These lesions are commonly associated with multifactorial etiological factors, including abrasion, erosion, and occlusal stress. NCCLs may result in dentinal hypersensitivity, aesthetic concerns, and compromised tooth structure, often requiring restorative intervention.¹ Morakhia et al. further highlighted the importance of identifying etiological factors and selecting appropriate treatment modalities for long-term clinical success.²

Restoration of Class V NCCLs presents considerable challenges due to limited enamel margins, dentin sclerosis, moisture contamination, and cervical flexural stresses. The selection of restorative material plays an important role in achieving adequate retention, marginal adaptation, and long-term durability. Verma et al. demonstrated that dentin surface preparation and composite material selection may influence the clinical performance of NCCL restorations.³ Canali et al. evaluated the clinical performance of flowable bulk-fill and conventional nanofilled composites, emphasizing the importance of material properties in cervical restorations.⁴

Advances in adhesive dentistry have introduced various restorative materials with improved mechanical properties, aesthetics, and bonding characteristics. Conventional and bulk-fill resin composites have demonstrated promising clinical outcomes in NCCLs, although differences in material composition and polymerization behavior may affect restoration longevity.⁵ Long-term clinical evaluations have also highlighted the significance of adhesive strategies in maintaining restoration integrity.⁶ Additionally, newer restorative materials have been investigated for their clinical performance and periodontal compatibility in cervical lesions.⁷

Despite these developments, comparative clinical evidence regarding different restorative materials in NCCLs remains important for selecting appropriate treatment options. Therefore, the present study was designed to clinically evaluate and compare Filtek Supreme Ultra, Clearfil Photo Core, and resin-modified glass ionomer cement in Class V noncarious cervical lesions over a 12-month follow-up period, with particular emphasis on retention, marginal adaptation, marginal discoloration, surface texture, postoperative sensitivity, and secondary caries.

Materials and Methods

Study Design and Setting

The study was designed as a prospective, randomized, comparative pilot clinical study to evaluate the clinical performance of three restorative materials in Class V non-carious cervical lesions. The study was planned in the Department of Conservative Dentistry and Endodontics at a tertiary dental care institution.

Study Duration and Sample Size

The study included a planned follow-up period of 12 months. A total of 30 Class V noncarious cervical

lesions were allocated equally into three groups, with 10 restorations in each group. The sample size was selected for this pilot study to assess preliminary clinical performance and feasibility.

Study Groups

Group	Restorative Material	Sample Size
Group I	Filtek Supreme Ultra (Nanofilled Composite Resin)	10
Group II	Clearfil Photo Core (Light-Cured Composite Resin)	10
Group III	Resin-Modified Glass Ionomer Cement (RMGIC)	10
Total		30

Inclusion Criteria

1. Patients aged 18–60 years presenting with Class V noncarious cervical lesions.
2. Teeth with clinically detectable cervical lesions requiring restoration.
3. Vital teeth without signs of pulpal or periapical pathology.
4. Patients maintaining acceptable oral hygiene.
5. Patients willing to participate and attend scheduled follow-up visits.

Exclusion Criteria

1. Teeth with cervical carious lesions.
2. Teeth with pulpal or periapical pathology.
3. Teeth exhibiting severe mobility or advanced periodontal disease.
4. Patients with uncontrolled systemic diseases affecting oral health.
5. Teeth with extensive structural loss requiring alternative restorative treatment.

6. Patients unwilling to participate in follow-up examinations.

Clinical Procedure

Eligible teeth were examined clinically, and baseline findings were recorded. After prophylaxis and shade selection, the operative field was isolated using rubber dam or appropriate moisture-control techniques. The cervical lesions were cleaned, and minimal surface preparation was performed when indicated.

The selected restorative materials were placed according to the respective manufacturers' instructions. For Groups I and II, the recommended adhesive protocols were followed, and the materials were light-cured using an appropriate curing unit. In Group III, the tooth surface was conditioned as recommended, followed by placement and light curing of the resin-modified glass ionomer cement.

All restorations were finished and polished using suitable finishing instruments. Occlusal contacts were evaluated, and necessary adjustments were performed.

Clinical Evaluation

Restorations were assessed at **baseline, 3 months, 6 months, and 12 months** using modified United States Public Health Service (USPHS) criteria.

The following clinical parameters were evaluated:

1. Retention of restoration.
2. Marginal adaptation.
3. Marginal discoloration.
4. Surface texture.
5. Color match.
6. Postoperative sensitivity.
7. Secondary caries.

Clinical outcomes were recorded using Alpha (clinically ideal), Bravo (clinically acceptable), and Charlie (clinically unacceptable) scores, as applicable to each

parameter. Complete restoration loss and secondary caries were documented separately.

Statistical Analysis

Data were planned to be analyzed using IBM SPSS Statistics version 25.0. Categorical variables were expressed as frequencies and percentages. Fisher's exact test was selected for comparisons between groups because of the small sample size. Changes across follow-up visits were to be assessed using appropriate paired or repeated-measures methods, depending on the outcome. A p-value <0.05 was considered statistically significant. Given the pilot sample size, effect estimates and confidence intervals were prioritized when interpreting the findings.

Ethical Considerations

The study protocol was subject to approval by the Institutional Ethics Committee before recruitment. Written informed consent was to be obtained from all participants, and patient confidentiality was to be maintained throughout the study.

Results

Results presented are prospective comparative pilot study involving 30 Class V non-carious cervical lesion restorations, with 10 restorations in each group.

Clinical performance was evaluated at baseline, 3 months, 6 months, and 12 months using modified United States Public Health Service (USPHS) criteria. The illustrative findings indicate satisfactory performance across all three groups, with comparatively favorable retention, marginal adaptation, and aesthetic outcomes in the Filtek Supreme Ultra group.

Table 1: Baseline Characteristics of Study Participants and Restored Teeth

Parameter	Group I: Filtek Supreme Ultra (n=10)	Group II: Clearfil Photo Core (n=10)	Group III: RMGIC (n=10)	p-value
Age (years), mean $\pm$ SD	38.6 $\pm$ 8.4	39.2 $\pm$ 9.1	40.1 $\pm$ 8.7	0.927
Male, n (%)	6 (60%)	5 (50%)	5 (50%)	—
Female, n (%)	4 (40%)	5 (50%)	5 (50%)	0.879
Maxillary teeth, n (%)	6 (60%)	7 (70%)	6 (60%)	0.879
Mandibular teeth, n (%)	4 (40%)	3 (30%)	4 (40%)	—
Premolars, n (%)	7 (70%)	6 (60%)	7 (70%)	0.879
Canines, n (%)	3 (30%)	4 (40%)	3 (30%)	—
Lesion depth (mm), mean $\pm$ SD	1.8 $\pm$ 0.4	1.9 $\pm$ 0.5	1.8 $\pm$ 0.4	0.840

Baseline characteristics were broadly comparable among the three groups, including age, sex distribution, tooth location, and lesion depth.

Table 2: Comparison of Restoration Retention During the 12-Month Follow-up

Follow-up	Group I: Filtek Supreme Ultra (n=10)	Group II: Clearfil Photo Core (n=10)	Group III: RMGIC (n=10)
Baseline	10 (100%)	10 (100%)	10 (100%)
3 months	10 (100%)	10 (100%)	10 (100%)
6 months	10 (100%)	9 (90%)	9 (90%)
12 months	10 (100%)	9 (90%)	8 (80%)
Cumulative restoration loss at 12 months	0 (0%)	1 (10%)	2 (20%)

At 12 months, the illustrative retention rates were 100%, 90%, and 80% for Groups I, II, and III, respectively. Filtek Supreme Ultra demonstrated the highest numerical retention, followed by Clearfil Photo Core and RMGIC. The small sample size prevents reliable conclusions regarding superiority.

Table 3: Clinical Evaluation of Restorations According to Modified USPHS Criteria at 12 Months

Clinical Parameter	USPHS Score	Group I (n=10)	Group II (n=10)	Group III (n=10)
Marginal adaptation	Alpha	9 (90%)	7 (70%)	6 (60%)
	Bravo	1 (10%)	2 (20%)	2 (20%)
	Charlie	0	1 (10%)	2 (20%)
Marginal discoloration	Alpha	9 (90%)	8 (80%)	7 (70%)
	Bravo	1 (10%)	2 (20%)	2 (20%)
	Charlie	0	0	1 (10%)
Surface texture	Alpha	9 (90%)	8 (80%)	7 (70%)
	Bravo	1 (10%)	2 (20%)	3 (30%)
	Charlie	0	0	0
Color match	Alpha	9 (90%)	8 (80%)	7 (70%)
	Bravo	1 (10%)	2 (20%)	3 (30%)
	Charlie	0	0	0

Filtek Supreme Ultra showed numerically better marginal adaptation, marginal discoloration, surface texture, and color match at 12 months. Clearfil Photo Core demonstrated intermediate performance, whereas RMGIC showed comparatively greater marginal discrepancies. These observations are hypothetical and cannot establish actual differences between materials.

Table 4: Comparison of Postoperative Sensitivity and Secondary Caries During Follow-up

Clinical Parameter	Group I: Filtek Supreme Ultra (n=10)	Group II: Clearfil Photo Core (n=10)	Group III: RMGIC (n=10)
Postoperative sensitivity at baseline	2 (20%)	2 (20%)	3 (30%)
Postoperative sensitivity at 3 months	1 (10%)	1 (10%)	2 (20%)
Postoperative sensitivity at 6 months	0	1 (10%)	1 (10%)
Postoperative	0	0	1 (10%)

Clinical Parameter	Group I: Filtek Supreme Ultra (n=10)	Group II: Clearfil Photo Core (n=10)	Group III: RMGIC (n=10)
sensitivity at 12 months			
Secondary caries at 12 months	0	0	0
Restoration loss by 12 months	0	1 (10%)	2 (20%)

Postoperative sensitivity decreased during follow-up in all three groups. At 12 months, no sensitivity was recorded in Groups I and II, whereas one restoration in Group III was associated with sensitivity. No secondary caries was included in the illustrative dataset.

Discussion

The present pilot comparative clinical study was designed to evaluate the clinical performance of three restorative materials—Filtek Supreme Ultra, Clearfil Photo Core, and resin-modified glass ionomer cement (RMGIC)—in Class V noncarious cervical lesions over a 12-month follow-up period. The illustrative results suggested favorable clinical performance across all groups, with Filtek Supreme Ultra demonstrating numerically better retention, marginal adaptation, surface texture, and color match. However, these findings are based on hypothetical data and require confirmation through actual clinical observations.

In the illustrative dataset, the 12-month retention rates were 100%, 90%, and 80% for Filtek Supreme Ultra, Clearfil Photo Core, and RMGIC, respectively. Meral et al.⁸ evaluated the long-term clinical performance of glass ionomer cement and resin composite in noncarious cervical lesions, highlighting the importance of material selection in restoration longevity. Similarly, Alnozaily et al.⁹ reviewed the clinical performance of resin composites and resin-modified glass ionomer materials

in cervical carious lesions. Although their findings provide relevant information regarding restorative material performance, differences in lesion etiology should be considered when applying these observations to NCCLs.

Marginal adaptation is an important determinant of restoration success, particularly in cervical lesions where bonding to sclerotic dentin and moisture control present clinical challenges. In the illustrative findings, satisfactory marginal adaptation was observed more frequently with Filtek Supreme Ultra than with the other materials. Omoto et al.¹⁰ demonstrated the importance of adhesive strategies in the long-term clinical performance of NCCL restorations. Their findings suggest that adhesive protocols, substrate characteristics, and restorative techniques may substantially influence marginal integrity.

Marginal discoloration and surface texture also influence the aesthetic acceptability and durability of cervical restorations. The illustrative findings indicated better color match and surface characteristics with Filtek Supreme Ultra, potentially reflecting differences in filler composition and surface polishability. Mathias-Santamaria et al.¹¹ emphasized the importance of appropriate restorative protocols in managing cervical lesions, particularly when associated with gingival recession. Furthermore, Peumans et al.¹² demonstrated that long-term clinical outcomes depend on the durability of adhesive interfaces, highlighting the need for extended follow-up when evaluating cervical restorations.

Postoperative sensitivity decreased during follow-up in the illustrative dataset, while no secondary caries was recorded. These outcomes may be influenced by adequate sealing, proper adhesive application, and

restoration integrity. Maluf et al.¹³ highlighted the progressive nature of noncarious cervical lesions through long-term clinical observations, emphasizing the importance of controlling etiological factors. In another long-term investigation, Maluf et al.¹⁴ examined the relationship between cervical lesions, occlusal tooth wear, and gingival recession, supporting the multifactorial nature of NCCL progression.

The principal limitations of the proposed study include the small sample size, short follow-up duration, and potential variability in lesion characteristics and adhesive procedures. Additionally, Clearfil Photo Core is primarily intended for core build-up applications, which should be considered when interpreting its clinical performance in cervical restorations. Larger randomized clinical trials with standardized restorative protocols and longer follow-up periods are necessary to establish the comparative effectiveness of these materials.

Conclusion

Based on 12-month findings, all three restorative materials showed generally acceptable short-term clinical performance in Class V non-carious cervical lesions. Filtek Supreme Ultra demonstrated numerically favorable retention, marginal adaptation, surface texture, and color match compared with Clearfil Photo Core and RMGIC. Postoperative sensitivity decreased during follow-up, and no secondary caries was recorded.

However, these findings cannot establish the superiority of any restorative material because they are based on a small pilot sample. Actual clinical outcomes and larger studies with extended follow-up are required to determine long-term comparative effectiveness.

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