Case Report

University J Dent Scie 2026; Vol. 12, Issue 1

Illuminating Smiles: Comparative Clinical Outcomes of Vital and Non-Vital Tooth Bleaching- A Dual Case Report

Abstract:

Background: Tooth discoloration, whether vital or post-endodontic, presents a major esthetic concern. Bleaching remains a conservative and biologically safe alternative when performed under controlled conditions.

Case Presentation: Two bleaching cases were managed under magnification. Case 1 involved in-office vital bleaching using 35% carbamide peroxide on anterior teeth. Case 2 involved non-vital bleaching of a root canal–treated maxillary central incisor using sodium perborate with 5% hydrogen peroxide, following a Lenhard–Serrano-based cervical barrier design to minimize peroxide diffusion and prevent external cervical resorption (ECR). Both cases showed stable 3-month results with no relapse or complications.

Conclusion: Meticulous isolation, controlled peroxide concentration, and correctly positioned cervical barriers ensure predictable esthetic and biological outcomes in vital and non-vital bleaching.

Key-words: Tooth whitening; carbamide peroxide; sodium perborate; cervical barrier; esthetic dentistry

Introduction:

Tooth discoloration may result from extrinsic stains, pulpal necrosis, or restorative procedures, and remains one of the most frequent esthetic concerns among patients. While restorative treatments like veneers or crowns offer immediate correction, they are invasive and sacrifice tooth structure. Vital and non-vital bleaching procedures, on the other hand, restore esthetics conservatively by chemically oxidizing chromogenic molecules within enamel or dentin. However, bleaching procedures must be carefully executed to avoid complications such as postoperative sensitivity, enamel softening, or external cervical resorption (ECR). ECR is a potentially destructive inflammatory condition linked to peroxide diffusion through dentinal tubules toward the cervical periodontium. Studies by Lenhard and Serrano (2002) and Lee and Park (2024, J Conserv Dent) have emphasized that the geometry and placement of the cervical barrier are key in mitigating such risks. The following report describes two bleaching cases—one vital and one non-vital—executed under magnification with evidence-based protocols and short-term successful outcomes.

Access this article online

Website:
www.ujds.in

DOI:
https://doi.org/10.21276/ujds.2026.12.1.14

Case Reports

Case 1: In-Office Vital Bleaching:

A 28-year-old female presented with generalized discoloration of maxillary anterior teeth (Vita shade C4) seeking improved esthetics. After initial scaling, polishing, and shade documentation, diagnostic impressions were made for custom tray fabrication (Fig. 1A, 1B). Following verification of tray adaptation, the procedure was performed under magnification with complete isolation using a rubber dam and light-cured gingival barrier to protect marginal tissues (Fig. 1C).

[1]**DIPTI CHAUHAN,** [2]**ANSHU MINOCHA,** [3]**SANJEEV CHAUHAN,** [4]**VISHAL SHARM**

[1-4]Department of Conservative Dentistry and Endodontics, Himachal Pradesh Government Dental College and Hospital Shimla

Address for Correspondence: Dr. Dipti Chauhan (Jr3), Room No. 108,
Department of Conservative Dentistry and Endodontics, Himachal Pradesh Government Dental College and Hospital
Shimla, Himachal Pradesh
Email : diptichauhan1997.dc@gmail.com

Received : 19 Oct., 2025, **Published :** 31 March, 2026

How to cite this article: Chauhan, D., Minocha, A., Chauhan, S., & Sharma, V. (2026). Illuminating Smiles: Comparative Clinical Outcomes of Vital and Non-Vital Tooth Bleaching — A Dual Case Report. UNIVERSITY JOURNAL OF DENTAL SCIENCES, 12(1).

A 35% carbamide peroxide gel (Opalescence Boost PF, Ultradent, USA) was applied uniformly to the labial enamel surfaces and inside the custom tray to ensure even gel distribution (Fig. 1D). Each session consisted of three 15-minute applications with intermittent rinsing and re-application. Controlled light activation was used during each cycle to enhance peroxide breakdown and accelerate chromogen oxidation. Post-treatment, the gel was thoroughly rinsed and a desensitizing agent containing 5% potassium nitrate and fluoride was applied for 5 minutes.

Following three bleaching sessions, the tooth shade improved significantly to Vita Shade A1 (Fig. 1E). The patient was advised to avoid highly pigmented foods and beverages for 48 hours and use a desensitizing toothpaste for one week. At 3-month follow-up, the shade remained stable with intact enamel gloss, healthy gingival margins, and no post-treatment sensitivity (Fig. 1F). To correct the residual midline diastema, direct composite resin restoration was performed, achieving final aesthetic integration (Fig. 1F).

Case 2: Non-Vital Bleaching (Walking-Bleach Technique):

A 32-year-old male presented with intrinsic discoloration of a previously root canal–treated maxillary right central incisor (#11) corresponding to Vita 3D shade 5M2 (Fig. 2A). The patient reported no symptoms, and clinical examination revealed sound margins and adequate coronal seal. Radiographic evaluation confirmed satisfactory obturation with intact periapical and periodontal structures (Fig. 2B).

After rubber-dam isolation, the previous composite restoration was removed, and access to the pulp chamber was re-established. Gutta-percha was reduced approximately 2 mm below the cementoenamel junction (CEJ). Following the Lenhard–Serrano protocol, a double-layered cervical barrier was constructed to control peroxide diffusion. The first barrier of glass ionomer cement (Fuji IX, GC, Japan) was placed 1 mm below the facial CEJ and contoured parallel to the gingival margin to match cervical curvature (Fig. 2C). This layer was light-cured and gently finished.

A freshly mixed paste of sodium perborate and 5% hydrogen peroxide was then placed into the pulp chamber (Fig. 2D). A custom tray was fabricated and seated intraorally to enhance contact and control oxygen release, followed by gentle light activation for a few seconds to initiate the peroxide reaction. The access cavity was temporarily sealed with Cavit G (3M ESPE).

After seven days, the cavity was reopened, the bleaching paste was renewed, and the tray procedure was repeated. By this time, noticeable shade improvement was achieved (from Vita 3D 5M2 to B2) (Fig. 2E). At 14 days, the chamber was thoroughly rinsed, dried, and permanently restored with a nanohybrid composite resin.

At the 3-month follow-up, the treated tooth exhibited shade B1, with no signs of marginal leakage, gingival irritation, or external cervical resorption on radiographic evaluation (Fig. 2F). The surrounding soft tissues were healthy, and esthetic harmony was achieved with adjacent teeth.

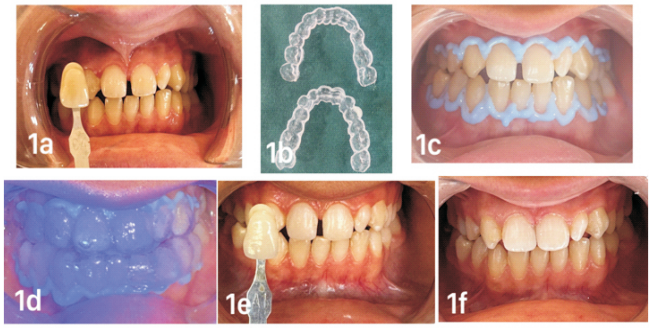

Figure 1. Vital bleaching procedure using 35% carbamide peroxide. A) Pre-operative view showing yellowish discoloration of maxillary anterior teeth (Vita shade C4)B) Tray fabrication C) Isolation with light-cured gingival barrier protecting marginal tissues D) Application of 35% carbamide peroxide gel (Opalescence Boost PF, Ultradent, USA) to labial surfaces and inside the tray and light activation done E) Result after three bleaching sessions showing post-operative result showing shade change toVita A1 F) Three-month follow-up showing stable shade, intact enamel surface, and healthy gingival margins. Diastema closure done with direct composite restoration

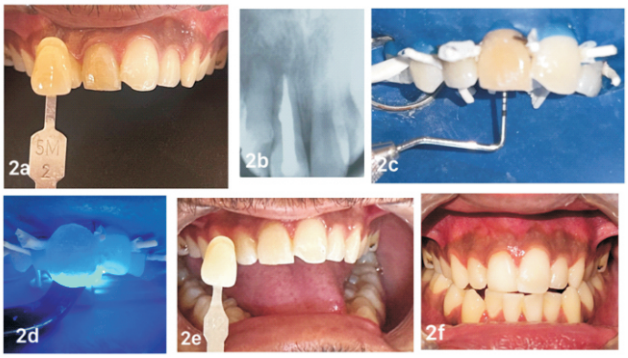

Figure 2. Non-vital internal bleaching of tooth #11 with sodium perborate + 5% H_2 O_2 using Lenhard–Serrano barrier designA) Pre-operative discoloration (Vita 3D 5M2) of root canal–treated tooth #11B) Radiograph confirming adequate obturation and absence of periapical pathologyC) Gutta-percha removal 2 mm below CEJ and placement of first GIC barrier 1 mm below the facial CEJ, parallel to gingival margin D) Insertion of sodium perborate + 5% hydrogen peroxide paste inside cavity and custom tray seated on tooth and light activation done followed by cavit G placement E)

Renewal after seven days showing progressive lightening. (Vita B2)F) Three-month follow-up showing same shade and no radiographic evidence of external cervical resorption.

Discussion;

Tooth bleaching represents one of the most conservative approaches to restoring esthetics. Vital bleaching using carbamide peroxide and internal bleaching using sodium perborate–peroxide combinations are both supported by extensive clinical evidence. In the present cases, outcomes were stable and biologically safe at three months, demonstrating that meticulous technique selection and concentration control remain key determinants of success.

In-office bleaching with 35% carbamide peroxide provides a controlled release of active oxygen species, achieving effective oxidation with minimal pulpal irritation. Zaki et al. (2023, J Conserv Dent) reported that carbamide peroxide achieves predictable shade improvement with negligible effects on enamel microhardness. Similarly, Yildirim et al. (2022) found that multiple short applications produce optimal results with minimal post-operative sensitivity. Use of potassium-nitrate and fluoride-based desensitizers further reduces transient irritation (Loguercio et al., 2023). Li et al. (2024, Dent Mater) and Irusa et al. (2022, J Esthet Restor Dent) reported stable shade maintenance at 3–6 months when bleaching is followed by enamel rehydration and remineralization.

Non-vital bleaching demands even greater precision to prevent external cervical resorption (ECR). Lenhard and Serrano (2002) demonstrated that barrier geometry—specifically placement 1 mm below the facial CEJ and parallel to the gingival margin—critically influences diffusion control. This anatomical positioning deflects peroxide vapors coronally, reducing lateral diffusion toward cementum. Lee and Park (2024, J Conserv Dent) and Khan et al. (2023, J Endod) confirmed that glass ionomer–composite double barriers significantly reduce peroxide leakage. Coelho et al. (2021, Int Endod J) and Singh et al. (2025, Br Dent J) found sodium perborate + 5% hydrogen peroxide mixtures safer than high-concentration peroxide, as they maintain whitening efficacy while minimizing oxidative stress. The slow oxygen release allows gradual oxidation of dentinal pigments without creating pressure differentials that could trigger ECR. In the present report, this low-peroxide, barrier-protected protocol resulted in consistent color improvement with no clinical or radiographic complications.

Comparative literature suggests that internal bleaching offers long-lasting results when the cervical barrier is intact. Amer (2023, Aust Dent J) and Tavşan et al. (2024, J Conserv Dent) demonstrated that low-peroxide regimens achieve comparable esthetic outcomes to high-concentration systems with significantly lower adverse event rates. Overall, the present dual-case report reinforces that the success of bleaching depends less on peroxide strength and more on control of diffusion, exposure duration, and barrier integrity.

Conclusion:

Both in-office vital bleaching using 35% carbamide peroxide and internal non-vital bleaching using sodium perborate + 5% hydrogen peroxide yielded predictable, stable, and biologically safe results at three months. Following evidence-based protocols—careful isolation, controlled peroxide concentration, and anatomically precise barrier placement—ensures long-term esthetic success while minimizing biological risk.

Patient Consent:

Written informed consent was obtained from both patients for publication of data and clinical images.

Ethics Statement:

Institutional ethics approval was not required for this dual case report.

References:

1. Lenhard M, Serrano S. Understanding and preventing external cervical resorption during internal bleaching. J Cosmet Dent. 2002;18(1):44–53.
2. Yildirim S et al. Comparison of carbamide peroxide concentrations in vital bleaching: randomized trial. J Conserv Dent. 2022;25(3):212–218.3. Coelho A et al. Systematic review of walking-bleach and internal bleaching protocols. Int Endod J. 2021;54(12):2209–2223.4
4. Khan R et al. Internal bleaching outcomes in endodontically treated teeth: 6-month follow-up. J Endod. 2023;49(7):1054–1062.
5. Singh AK et al. Sodium perborate vs hydrogen peroxide mixture in internal bleaching: comparative study. Br Dent J. 2025;238(4):215–221.
6. Amer M. Intracoronal tooth bleaching: review and clinical guidelines. Aust Dent J. 2023;68 Suppl 1:S141–S152.
7. Irusa K et al. Tooth whitening: mechanisms, materials, and safety. J Esthet Restor Dent. 2022;34(2):167–180.
8. Li Y et al. Color stability of bleached teeth: 3-month randomized trial. Dent Mater. 2024;40(3):e145–e153.
9. Loguercio AD et al. Low peroxide gels: balancing efficacy and safety. Oper Dent. 2023;48(2):150–160.

10. Tavşan O et al. Effects of bleaching agents on restorative materials: systematic review. J Conserv Dent. 2024;27(3):189–197.
11. Rotstein I et al. External cervical resorption associated with internal bleaching: case series. J Endod. 2020;46(8):1231–1238.
12. Patel S et al. CBCT evaluation of cervical resorption risk post bleaching. J Endod. 2022;48(5):585–592.
13. Niu LN et al. Effects of peroxide on dentin sensitivity and structure. J Dent Res. 2022;101(7):819–827.
14. Yusof EM et al. Influence of activation methods on enamel microhardness post bleaching. J Conserv Dent. 2020;23(4):350–355.
15. Haywood VB. Nightguard vital bleaching: long-term update. J Esthet Restor Dent. 2022;34(1):35–44.
16. Loguercio AD et al. Role of fluoride/potassium nitrate in minimizing sensitivity. J Clin Dent. 2021;32(4):87–92.
17. Pandya A. Endodontics: The sequel or the surgical? Dent Update. 2024;51(9):644–651.
18. Ingle JI, Bakland LK, Baumgartner JC. Ingle's Endodontics. 7th ed. Hamilton: BC Decker; 2019.
19. Cohen S, Hargreaves KM. Pathways of the Pulp. 12th ed. St. Louis: Elsevier; 2021.
20. Sundfeld RH et al. Historical bleaching methods and safety review. J Esthet Restor Dent. 2025;37(3):431–445.
21. Koch MJ et al. Use of regenerative methods in esthetic dentistry: update. Clin Oral Investig. 2024;28(5):1521–1530.
22. Dietz W et al. Principles of conservative esthetic dentistry. Dent Clin North Am. 2023;67(2):261–276.
23. Grossman LI. Endodontic Practice. 12th ed. BC Decker; 2020.