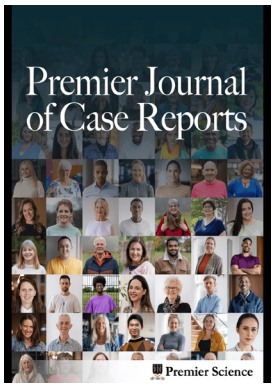

Conservative Management of Distal Caries in a Maxillary Premolar with Class II Composite Restoration: A Case Report

Hashir Ather

ABSTRACT

Restoring a posterior tooth which has proximal caries along with it is of a great clinical challenge. The long-term success in restoring such teeth is based on achieving proper contact and contour. This case report describes the diagnosis and management of distal caries in tooth #15 (maxillary second premolar). The management of such case is done using a direct Class II Composite restoration with a sectional matrix band system. A 32-year-old male patient presented with food impaction and sensitivity in the upper right posterior region. Clinical examination and radiographic evaluation revealed a carious lesion on the distal surface of tooth #15 without pulpal involvement. The carious tissue was removed, following isolation with rubber dam. This was done to preserve maximum sound tooth structure. Removal of carious tissue was done, followed by use of a sectional matrix, to achieve proper proximal contour and tight contact with adjacent tooth. The choice of material for restoration was nanohybrid composite resin. Nanohybrid composite resin was preferred on the basis of detailed restoration of occlusal anatomy. This material was placed in incremental layering technique. The incremental technique was done to avoid polymerization shrinkage stresses. For confirmation of success of treatment, a postoperative radiograph was made. The radiograph confirmed adequate marginal adaptation and contact integrity. The prognosis of the treatment was done by advising a follow up at 1 and 3 months. On follow ups, it was revealed that the restoration was intact, functional and symptom-free. This case highlights the clinical effectiveness of sectional matrix bands and adhesive composite restorations in the conservative management of proximal caries in premolar.

Keywords: Sectional matrix band system, Nanohybrid composite resin, Incremental layering technique, Distal caries maxillary second premolar, Proximal contact restoration

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Introduction

Restorative dentistry aims in preservation of natural tooth structure along with restoration of function, esthetics, and patient comfort.[1] A significant challenge is observed, while treating caries, which has involved proximal surfaces of premolars and molars.[2] The difficulty is due to proper access of the lesion along with achieving optimal contact and contour. The success of restoration is based on providing secondary retention, in cases of caries involving proximal walls.[3]

Among various restorative approaches, the material of choice is always the direct Class II Composite restoration. The reason behind this is due to excellent esthetics provided by this material.[3] Furthermore, conservative cavity preparation requirements and favorable physical properties also make this type of restoration suitable in treating proximal carious lesions.[4]

Obtaining an anatomically correct proximal contact is very difficult in posterior composite restorations.[5] Traditional circumferential matrix bands fail to provide tight contact and ideal contours.[6] This can lead to open contact, food impaction and periodontal problems.[7] On the other hand, sectional matrix band systems, coupled with separation rings has markedly shown improvements in the predictability of proximal restorations by enabling better adaptation, tighter contacts and more natural contours.[8]

The case report presents the conservative management of a distal carious lesion in a maxillary second premolar (tooth #15). The management was done by using a direct composite resin restoration and a sectional matrix band system. The clinical approach highlights conservative caries removal, optimal isolation and adhesive techniques that contributes to long term restorative success.

Methods

This case report was documented and was conducted with the patient's informed consent for both participation and publication, following SCARE 2025 guidelines.[9] Institutional policies were followed, and ethical approval was not required for this single case study.

Case Presentation

Patient Information

A 32-year-old male patient reported to the dental clinic with the chief complaint of food impaction and occasional sensitivity in the upper right back region of his mouth for the past 2 weeks. The patient's medical history was noncontributory, and there were no contraindications to the dental treatment.

Clinical Examination

On intraoral examination, food impaction distal to tooth #15 (i.e., maxillary right second premolar) was observed. A visual inspection was done, which ensured that the occlusal surface appeared intact, but discoloration and cavitation were noted on the distal aspect. On percussion and palpation, it was revealed that the tooth was asymptomatic and there were no signs of swelling or sinus tract. A periodontal examination was also done. On probing it was observed that periodontal probing depths were within normal limits.

Radiographic Examination

A radiographic examination was done to confirm the diagnosis. A periapical radiograph of the region demonstrated that a radiolucent lesion is present on

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the distal surface of tooth #15. This lesion has its extension into dentin. However, it was not approximating the pulp chamber. The periodontal ligament space appeared normal, excluding endodontic and periodontal disease. No periapical pathology was evident as well. The adjacent tooth (#16) showed intact contact and it also revealed that the caries is only limited to tooth #15 and has not extended to the nearby tooth (Figure 1).

Diagnosis

Clinical and radiographic findings confirmed the diagnosis of distal caries in tooth #15 (FDI 15; Universal #4) without pulpal involvement. Caries risk assessment indicated a moderate risk status based on the patient's history of intermittent sweet snacking and presence of multiple initial enamel lesions, supporting the need for early operative intervention.

Caries assessment was performed using the International Caries Detection and Assessment System (ICDAS), and the lesion was scored as ICDAS 4, characterized by an underlying dentinal shadow beneath an apparently intact surface and no cavitation.

Pulp sensibility testing was performed using both cold testing (Endo-Ice) and electric pulp testing (EPT). The cold test elicited a normal, brief response comparable to the contralateral premolar, and the EPT reading was 32, consistent with a vital pulp without signs of reversible or irreversible pulpitis (Table 1).

Standardized bitewing radiographs, acquired pre-operatively, were used to confirm proximal caries involvement. Post-operative bitewings were obtained using the paralleling technique to verify the absence of overhangs and ensure appropriate proximal contour after restoration.

Treatment Planning

A treatment plan was advised to the patient, which included a conservative approach. This conservative

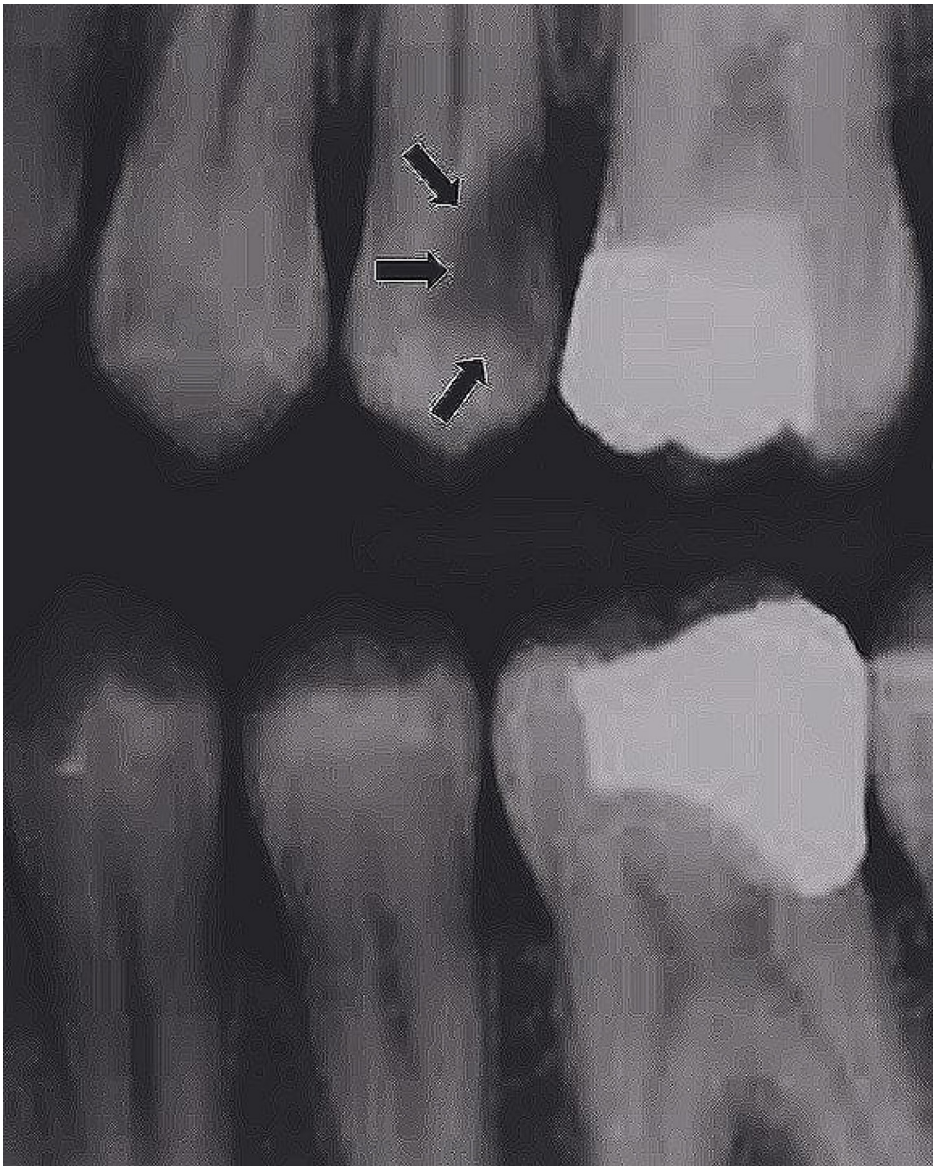

Fig 1 | Pre op bitewing X-ray (arrows marking radiolucency on distal aspect of tooth #15 indicating class II lesion)

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Table 1 | Electric pulp testing readings

Tooth Examined	Test Method	[1]EPT Reading	Patient Response	Interpretation
15 (FDI 15; Universal 4)	Analytic Technology Pulp Tester with lip clip and conducting medium	32	Immediate, non-lingering response	Vital pulp; normal response
Contralateral premolar (control)	Same method	30	Immediate, non-lingering response	Normal baseline

[1]EPT reading indicates the numerical value at which sensation was first perceived. Interpretation is relative to the response of a control tooth.

approach ensures removal of caries and placement of a direct Class II Composite restoration. The placement of restoration was done with the help of a sectional matrix band system. The use of sectional matrix band system was mandatory to restore function, contour and proximal contact.

Informed Consent

The patient was given a briefing regarding the procedure, benefits, risks and alternatives. Before beginning with the treatment, an informed consent was obtained in a written form, to ensure that patient's approval is in the favor of the treatment.

Clinical Procedure

Administration of Local Anesthesia

Local anesthesia (2% lidocaine with epinephrine 1:100,000) was administered. The techniques used for anesthesia administration was infiltration and palatal nerve anesthesia. For palatal nerve, a topical anesthesia was also used, to ensure that the patient undergoes less pain.

Isolation

Isolation of tooth #15 was done by using a rubber dam. The rubber dam was of medium gauge, non-latex type rubber dam sheet (Sanctuary Dental Dam; Batch no. RD45219). Clamp used was winged clamp #2 (Hu-Friedy; Batch no. CL29863). Rubber dam isolation was mandatory for moisture control and to ensure a proper visibility of the operating field.

Cavity Preparation

Caries excavation was done by using handpiece and manual instrumentation. High-speed handpiece along with a round diamond bur, was used to excavate caries. Following high speed handpiece, a slow-speed handpiece was done to excavate infected dentin. Manual instrumentation was also done along with slow speed hand piece, to ensure that infected dentin is excavated and healthy tissue is preserved. The preparation was limited to the distal aspect, conserving maximum sound enamel and dentin.

Matrix Placement

For matrix placement, a pre-contoured sectional matrix band of Composi-Tight 3D Fusion sectional matrix (Garrison Dental Solutions; Batch no. SM38421) was used. A separation ring of Composi-Tight 3D Fusion Soft-Face separation (Garrison Dental Solutions; Batch no. R39872) was used as well. Ring was placed on the distal surface of tooth #15. This was done to achieve tight proximal contact with tooth #16. A wooden wedge was inserted gingivally to ensure proper matrix adaptation and to prevent overhanging restoration (Figure 2).

Etching and Bonding

The prepared cavity was then etched with 37% phosphoric acid of Scotchbond™ Universal Etchant, 3M ESPE; Batch no. E54129, using an applicator brush. The etchant was applied for 15 seconds, after which it was rinsed and gently air-dried. A bonding agent of brand Adhese® Universal (Ivoclar Vivadent; Batch no. U18354) was then also applied with use of applicator brush. The bonding agent was air thinned and was then light cured for 20 seconds. The light used was of Bluephase® N, Ivoclar Vivadent; Batch no. C29471; 1,200 mW/cm^2; wavelength 430–490 nm.

Composite Placement

A nanohybrid composite (Filtek™ Z350 XT Universal Restorative; 3M ESPE; Batch no. N629487; shade A2) was placed using an incremental layering technique. Each increment was limited to 2.0 mm thickness to ensure adequate polymerization and minimize shrinkage.

Each increment was light-cured for 20 seconds using an LED curing unit. The curing light output was verified with a radiometer immediately prior to use, recording an irradiance of 1,200 mW·cm^{-2}. The curing tip was positioned 1 mm from the composite surface and maintained at 90° angulation. The radiant exposure delivered per increment was 24 J·cm^{-2}. For proximal areas, an additional 10-second angled cure at approximately 45° was performed, delivering 12 J·cm^{-2} of supplementary radiant exposure.

A thin layer of glycerin gel was applied before final curing to eliminate the oxygen-inhibited layer. After removal of the barrier, finishing and polishing were performed using a sequential polishing system to obtain optimal surface smoothness and gloss.

Finishing and Polishing

After placement of composite, the matrix and wedge were removed. The restoration was finished using fine diamond burs (Komet Dental; Batch no. DB41782). The polishing of the restoration was done with composite polishing discs and silicone points. Occlusion was checked with articulating paper, to remove any high spots.

Postoperative Radiograph

A post-operative radiograph was taken to check restoration. The postoperative radiograph ensured that the restoration is intact and has achieved proximal contour. It was also revealed that no polymerization shrinkage is present and the restoration is free of voids (Figure 3).

Outcome and Follow-Up

The patient was recalled at 1 week, 1 month, 3 months, 6 months, and 12 months post-treatment. At the

Fig 2 | Use of sectional matrix and class II cavity preparation on tooth #15

1-week follow-up, the restoration was functional, the proximal contact was maintained, and food impaction had resolved.

At the 1- and 3-month evaluations, the restoration remained intact and esthetically acceptable, with complete resolution of symptoms. Patient satisfaction was confirmed using a visual analogue scale (VAS) for comfort (0 = no discomfort; 10 = severe pain), with a score of 0/10 at both timepoints.

At the 6-month recall, the restoration demonstrated stable marginal integrity, normal surface smoothness, proper anatomic contour, and a firm proximal contact. Objective assessment of contact tightness was performed using dental floss resistance (Waxed floss: slight resistance without shredding), and absence of overhangs was verified on standardized bitewing radiographs.

At the 12-month recall, the restoration was re-evaluated using both modified USPHS and FDI World Dental Federation criteria. The USPHS criteria were not assessed at this visit due to a clinic protocol shift toward exclusive FDI scoring for annual follow-up evaluations. The FDI criteria indicated clinically excellent performance in esthetic, functional, and biological domains (score = 1). Occlusion remained stable and no secondary caries, marginal defects, discoloration, or postoperative sensitivity were noted (Table 2).

Clinical Discussion

Restoring proximal caries in pre molars is a common but challenging procedure in the field of restorative dentistry. This procedure has its primary objective as to restore the tooth's anatomical form and function along with maintenance of periodontal and health and patient comfort.[10]

This case provides an insight regarding management of distal caries in maxillary second premolar (tooth #15) with the help of a class II Composite matrix in a sectional matrix band system.

Conservative Caries Management

For managing this case, a minimally invasive approach was adopted, based on selective caries removal, preservation of sound enamel and dentin, and the use of adhesive restorative materials. Cavity preparation was restricted to diseased tissue only[11] to conserve maximum tooth structure, reduce the risk of pulpal injury, and improve the longevity of the restoration.

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Fig 3 | Post op bitewing X-ray (arrows indicating direct class II composite restoration of tooth #15)

Table 2 | Follow up intervals

Follow-Up Interval	USPHS Criteria	FDI Criteria (1–5)[1]	Clinical Notes
1 week	Not assessed	Not assessed	Functional; proximal contact maintained; food impaction eliminated
1 month	Alpha for all categories	1	Intact; esthetically pleasing; symptoms relieved
3 months	Alpha for all categories	1	Stable restoration; patient satisfied
6 months	Alpha for marginal integrity, surface roughness, anatomic form, proximal contact	1	Healthy gingiva; no discoloration or secondary caries
12 months	Not assessed[2]	1	Stable occlusion; no complications

[1] FDI Scoring: 1 = Clinically excellent/very good, 2 = Good, 3 = Sufficient, 4 = Unsatisfactory, 5 = Clinically poor.
[2] USPHS not evaluated at 12 months due to clinic protocol shift toward FDI-only annual evaluation.

The patient was assessed as having moderate caries risk, with localized plaque accumulation at the involved proximal contact (Plaque Index = 2) and mild gingival inflammation (Gingival Index = 1) in the same area.

Preventive measures included dietary counseling focusing on reduction of fermentable carbohydrate intake and snacking frequency, reinforcement of interproximal plaque control, and a topical fluoride regimen (twice-daily use of 1,000–1,450 ppm fluoride toothpaste with professional fluoride application as indicated). These measures complemented the conservative restorative strategy.

Composite as Restorative Material

The material of choice in this case was composite resin. The reason behind this was its ability to provide micromechanical and chemical bonding with tooth structure.[12] Along with that this material also provides excellent esthetics and improved mechanical properties.[13]

Selecting nanohybrid composite from the rest of types of composites was done on several factors. One of them is its superiority in providing better polish. Along with that, this material also provides wear resistance and esthetic bonding with enamel. Moreover, incremental layering aids in controlling polymerization shrinkage, ensuring better adaptation and reduced marginal leakage.[14]

Role of Sectional Matrix Band

Establishing correct proximal contact and contour is of prime significance. This aids in longevity of the class II restoration and increases its success rate to a great extent. Flat contacts are observed along with marginal discrepancies and food impaction, when traditional Tofflemire circumferential matrix systems are being used.[15] To avoid such problems, this case highlighted the use of sectional matrix system, along with separation rings and wedge. This was done to produce tighter, anatomically correct contacts along with enhancements in gingival adaptation. This also aided in preventing overhangs, which is of major concern regarding periodontal health. The sectional matrix system used in this case, enabled the restoration of a natural proximal contour that was stable at follow up.

Adhesive Protocol

Implementation of etching, bonding and light curing techniques are essential. This aids in maximizing bonds strength and reduces marginal staining and microleakage.[16] The universal adhesive system was used in this case. This provided a reliable bond between composite and enamel/dentin, which ensures a long-term success of the restoration.

Clinical Outcome

The success of this case, as confirmed in follow-ups, highlights the effectiveness of combining conservative caries removal, adhesive composite resin, and sectional matrix systems. The patient remained symptom-free, with improved function and no postoperative sensitivity.

Literature Support

Use of sectional matrix is favored in several studies. A systematic review by Kamble et al. highlighted that such matrix band systems when applied in treatment, ensures a tighter contact.[17]

Furthermore, Ferracane also reported that composite restorations when placed with modern adhesives and matrices paves a way for long term outcomes in posterior teeth.[18]

Universal adhesives simplify bonding protocols and allow multiple application modes. Current meta-analyses indicate that selective-enamel etching or etch-and-rinse modes achieve better marginal adaptation than self-etch use alone in Class II restorations, enhancing enamel seal integrity and reducing marginal staining.[19]

Clinical Significance

The case highlighted how adapting modern restorative techniques can be important for long term success of the restoration. It emphasizes the importance of sectional matrices, to avoid open contacts, recurrent caries and overhangs, which is of great concern in treatment outcome.

Limitations

This case report represents a single-patient observation; therefore, its findings cannot be generalized. Longer follow-up and comparative clinical trials are necessary to validate these outcomes. Additionally, minor variations in operator skill and patient-specific oral hygiene may influence the long-term prognosis.

Conclusion

Managing proximal caries in premolar depends on combination of conservative preparation of cavity walls, appropriate restorative materials and effective matrix systems. This case highlighted how the treatment of tooth #15 got success, by using a direct Class II Composite restoration, which was supported by a sectional matrix band.

The procedure highlighted the preservation of sound tooth structure to aid in tooth integrity and to ensure that an optimal proximal contact is achieved along with restored functionality of the tooth. The follow up was done to make sure that the restoration has achieved durability and is successful.

The case highlighted the advantage of minimally invasive dentistry and use of sectional matrix systems. By incorporating such principles in restoring such cases, clinicians can achieve tight anatomical proximal contours. This case emphasizes the implementation of such techniques to make sure that treatment outcomes achieve success to a great extent.

Patient Perspective and Ethical Consideration

The patient was satisfied with the outcome of treatment and was relieved from food impaction. During mastication, patient was comfortable, which ensured success of the treatment. Written informed consent was taken from the patient for publication of this case report. Images attached in this case report were also done with consent of patient. Ethical approval was not required for this single-patient case report.

References

1 Yu OY, Zaeneldin AM, Hamama HH, Mei ML, Patel N, Chu CH. Conservative composite resin restoration for proximal caries–two case reports. Clin Cosmet Investig Dent. 2020;12:415–22. https://doi.org/10.2147/CCIDE.S270453

2 Bonilla ED, Tom E, Al-Rasheed R, Hayashi M, Ferng D, McClure C. Caries clearance management: a clinical diagnostic restorative procedure—case studies. Prosthesis. 2025;7(5):103. https://doi.org/10.3390/prosthesis7050103

3 dos Santos Letieri A, Jural LA, Lima PM, Sperduto CM, dos Santos JB, Borges LP, et al. Multidisciplinary conservative management of dental fracture in young patient: case report. Rev Cient CRO-RJ. 2020;5(1):87–91. https://doi.org/10.29327/24816.5.1-15

4 Walid MA. A new approach for management of carious premolars. A case report. Med Forum Mon. 2024;35(9):83–86. https://doi.org/10.60110/medforum.350918

5 Soliman S, Meyer-Marcotty P, Hahn B, Halbleib K, Krastl G. Treatment of an adolescent patient with dentinogenesis imperfecta using indirect composite restorations-a case report and literature review. J Adhes Dent. 2018;20(4):345–54. https://doi.org/10.3290/j.jad.a40991

6 Chu CH, Mei ML, Cheung C, Nalliah RP. Restoring proximal caries lesions conservatively with tunnel restorations. Clin Cosmet Investig Dent. 2013;5:43–50. https://doi.org/10.2147/CCIDE.S48567

7 Ivanoff CS, Marchesan MA, Andonov B, Hottel TL, Dandarov Y, Mandova S, et al. Fracture resistance of mandibular premolars with contracted or traditional endodontic access cavities and class II temporary composite restorations. Endo. 2017;11(1):7–14.

8 Adou-Assoumou MN, Djolé SX, Krah-Sinan AA, Adou JA, Siendou D, Mansilla EC. Direct technique premolar coronal restorations: from metallic material to "complete adhesive restoration." J Conserv Dent Endod. 2019;22(6):568–72. https://doi.org/10.4103/JCD.JCD_330_19

9 Kerwan A, Al-Jabir A, Mathew G, Sohrabi C, Rashid R, Franchi T, et al. Revised surgical case report (SCARE) guideline: an update for the age of artificial intelligence. Premier J Sci. 2025:10;100079. https://doi.org/10.70389/PJS.100079

10 Anirudhan S. Conservative posterior indirect bonded restoration using morphologically driven preparation technique–a case series. Int J. 2024;7(5):205.

11 Favoreto MW, Cochinski GD, Martini EC, de Paris Matos T, Bandeca MC, Loguercio AD. A 48-month clinical performance of hybrid ceramic fragment restorations manufactured in CAD/CAM in non-carious cervical lesions: case report. Restor Dent Endod. 2024;49(3):e32. https://doi.org/10.5395/rde.2024.49.e32

12 Cortés-Bretón Brinkmann J, Albanchez-González MI, Lobato Peña DM, García Gil I, Suárez García MJ, Peláez Rico J. Improvement of aesthetics in a patient with tetracycline stains using the injectable composite resin technique: case report with 24-month follow-up. Br Dent J. 2020;229(12):774–8. https://doi.org/10.1038/s41415-020-2405-x

13 Tew IM, Ho EH. Minimally invasive rehabilitation of posterior erosive tooth wear: two case reports of the one-stage Dahl approach. Cureus. 2022;14(2):e22235. https://doi.org/10.7759/cureus.22235

14 Sengupta A, Naka O, Mehta SB, Banerji S. The clinical performance of bulk-fill versus the incremental layered application of direct resin composite restorations: a systematic review. Evid Based Dent. 2023;24(3):143. https://doi.org/10.1038/s41432-023-00905-4

15 Alshardan R, Rozi A, AlSenan D, Rozi A, AlJohani B, Almusallam J, et al. Evaluation of matrix systems on the proximal contact of class II composite restorations: a systematic review. Cureus. 2023;15(12):e50835. https://doi.org/10.7759/cureus.50835

16 Cuevas-Suarez CE, de Oliveira da Rosa WL, Lund RG, da Silva AF, Piva E. Bonding performance of universal adhesives: an updated systematic review and meta-analysis. J Adhes Dent. 2019;21(1):7–26. http://doi.org/10.3290/j.jad.a41975

17 Kamble S, Ramugade M, Sayed A, Sapkale K, Gulhane A, Magar A. The effectiveness of circumferential and sectional matrix systems in obtaining optimum proximal contact in class II composite restorations: a systematic review. Cureus. 2025;17(5):e84967. https://doi.org/10.7759/cureus.84967

18 Ferracane JL. A historical perspective on dental composite restorative materials. J Funct Biomater. 2024;15(7):173. https://doi.org/10.3390/jfb15070173

19 Bourgi R, Kharouf N, Cuevas-Suárez CE, Kassis C, Monjaras-Avila AJ, Qaddomi M, et al. Assessment of clinical performance of universal adhesives versus other adhesive systems: a systematic review and meta-analysis of clinical trials. Int Arab J Dent. 2024;15(2):204–30. https://doi.org/10.70174/iajd.v15i2.1046