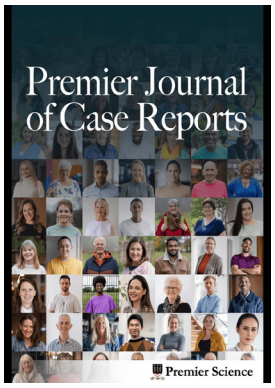

Management of Proximal Caries in a Mandibular Molar with Class II Composite Restoration: A Case Report

Hashir Ather

ABSTRACT

Managing dental caries which involves proximal surface of posterior teeth, is quite challenging and demands a skillful approach. While restoring such carious lesions secondary retention is also given, to ensure better treatment outcome. In this case report, a successful management of a carious lesion in tooth #46, which is a mandibular molar is done. The management involves a direct class II composite restoration.

The patient, a 26-year-old male, reported with discomfort during mastication. A proximal carious lesion was confirmed on the basis of clinical and radiographic examination. The caries was extending into dentin on the mesial aspect of tooth #46. The treatment started with isolating the tooth, by using rubber dam. After isolation, caries removal was achieved.

Before starting with placing composite, a sectional matrix and a wedge were inserted to ensure restoring the proximal wall contour and contact. A direct composite technique which includes using a nanohybrid composite resin was performed in increments to make sure that optimal adaptation and polymerization shrinkage is achieved. Final assessment of treatment was done with post operative radiograph, which confirmed that an ideal marginal seal was achieved, along with an established contact area. Furthermore, it was also confirmed by the radiograph that anatomical contours are restored.

The case explains well the importance of careful caries removal, appropriate use of matrix systems and layering of composite material in managing proximal caries. The case also highlights that predictable esthetics and durable results in posterior teeth is achieved by using modern adhesive techniques and light cured composites.

Keywords: Proximal caries, Sectional matrix system, Nanohybrid composite resin, Incremental layering technique, Mandibular first molar restoration

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Consent: 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

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Introduction

Dental caries has high prevalence in terms of oral health issues globally. It has affected individuals across all age groups. The teeth, which erupts earliest are more susceptible to early carious lesions i.e. mandibular first molars.[1] Caries involving proximal walls, particularly mesial or distal surfaces, requires a class II restoration to achieve proper tooth integrity and functionality.[2] Composite resin materials have changed the fate of restorative dentistry. It has provided better results in terms of superiority in aesthetics and conservative approach for tooth preservation as compared to amalgam.[3]

For better treatment outcome, the first and foremost step is to make a good diagnosis. This can only be done by clinical and radiographic findings. Along with such findings, good observation is also mandatory in achieving a good diagnosis. Pulp vitality testing, bitewing radiograph, assisted in forming the diagnosis in this case.

For class II composite restoration, it is mandatory to have a thorough understanding regarding tooth anatomy, managing polymerization shrinkage and techniques for creating proper contact and contour.[4] In proximal caries, integrity of proximal wall is compromised. This necessitates the use of matrix bands and wedges to rebuild this area during restoration. In comparison to class I restorations, Class II are more complex.[5] The reason behind this complexity is the additional need of replicating a natural proximal contact and contour.

The report highlights a clinical approach to manage proximal caries in tooth #46 with a direct class II composite restoration. The case emphasizes diagnosis, conservative cavity preparation, isolation, matrix band application, careful restoration to ensure functional and esthetic outcomes while achieving preserved tooth structure and pulpal health.

Methods

This case report was documented and was conducted with the patient's informed consent for both participation and publication, following SCARE 2025 guidelines.[5] Institutional policies were followed, and ethical approval was not required for this single case study.

Case Presentation

Patient Information

A 26-year-old male patient presented to the Operative Dentistry Department with a chief complaint of food impaction and occasional pain while chewing on the lower right side. The patient's medical history was non-contributory, and there were no systemic conditions or allergies reported.

Clinical Examination

On intraoral examination, it was revealed that a Class II carious lesion was present on the mesial surface of tooth #46 (mandibular right first molar). Clinical examination also indicates that no pulpal exposure was found. A normal response was observed when the tooth undergone a tooth vitality testing with cold and electric pulp testing. Furthermore, a slight discoloration was also seen on the occlusal surface which suggested decaying of tooth.

Radiographic Assessment

For assessment based on radiograph, a bitewing radiograph was taken, which revealed a well demarcated radiolucency. It also involved the enamel and has its extensions into the dentin on the mesial aspect of tooth

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#46. The periapical area was within normal limits, and the lesion was confirmed to be cavitated proximal carious lesion requiring restoration (Figure 1).

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.

Treatment Plan

A direct class II composite restoration was planned following caries removal. The objectives of the treatment were quite clear, which includes eliminating carious lesion, restore proximal contact and wall integrity and achieve a functional and esthetic outcome.

Procedure

Anesthesia and Function

Local anesthesia (2% lidocaine with epinephrine 1:100,000) was administered. The techniques used for anesthesia administration was Inferior alveolar nerve block.

Isolation

Tooth #46 was isolated using a rubber dam to ensure moisture control. 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

Conservative access was gained through the occlusal surface using a high-speed handpiece. Carious dentin was removed with a spoon excavator and slow-speed round bur. Care was taken to preserve the pulp and avoid unnecessary removal of healthy tooth structure. A direct Class I access approach was modified to include the proximal lesion, converting it to a Class II cavity preparation.

Matrix Band Application

A sectional matrix system 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. Along with that, a wooden wedge was used to ensure tight interproximal adaptation and appropriate contact point recreation. The matrix helped contour the missing proximal wall and provided an anatomical framework for composite buildup (Figure 2).

Etching & Bonding

The prepared cavity was etched with 37% phosphoric acid of Scotchbond™ Universal Etchant, 3M ESPE; Batch no. E54129, using an applicator brush. The

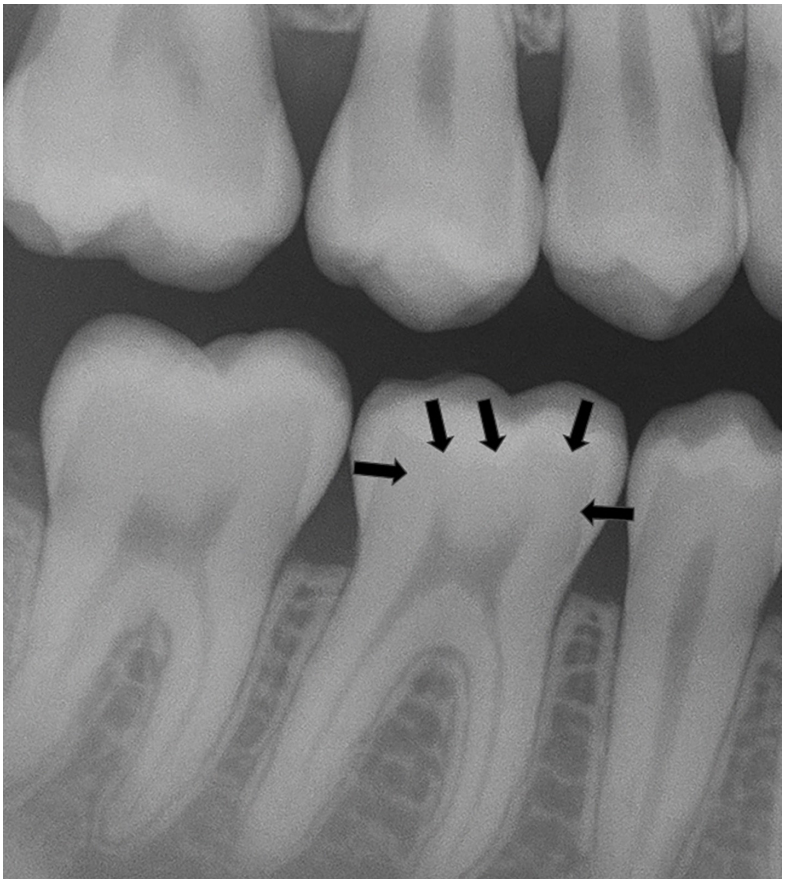

Fig 1 | Pre op X ray
Arrows indicating radiolucency extending mesial aspect of tooth#46 (Class II lesion)

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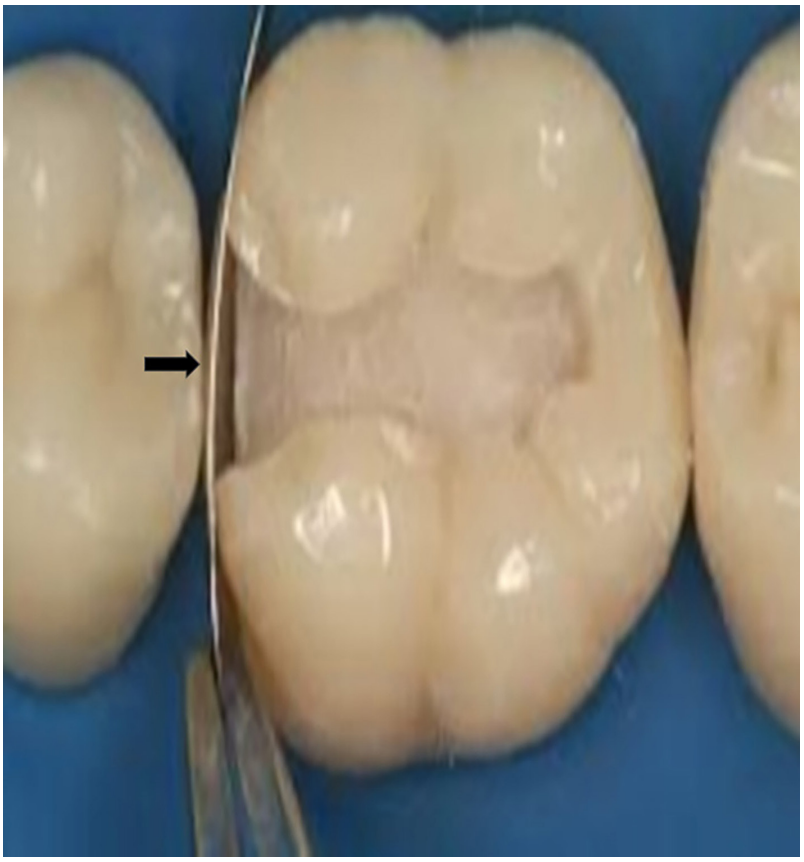

Fig 2 | Sectional matrix use (arrow)

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; 1200 mW/cm²; wavelength 430–490 nm.

Composite Restoration

A nanohybrid composite of Filtek™ Z350 XT Universal Restorative composite resin (3M ESPE; Batch no. N629487; shade A2) was placed in incremental layering technique. Each increment was also light cured for 20 seconds. This was done to minimize polymerization shrinkage along with optimal adaptation. The occlusal anatomy was also sculpted to mimic natural morphology of tooth.

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

Post-operative Radiograph

A final bitewing radiograph showed excellent proximal contact, no overhangs, and an ideal marginal adaptation.

The patient was advised on oral hygiene practices and scheduled for a review in two weeks. Follow up is mandatory to keep the record of prognosis of the treatment (Figure 3).

Follow-up and Outcome Assessment

Clinical and radiographic follow-up was planned to document the short and mid-term performance of the restoration. The patient attended recall visits at 1 week, 1 month, and 3 months post-operatively. At 1 week the restoration was functional, proximal contact was maintained subjectively on flossing, and the patient reported resolution of food impaction and chewing discomfort. At 1-month and 3-month reviews the restoration remained intact, esthetically acceptable, and the patient remained asymptomatic. At 3 months a periapical/bitewing radiograph showed maintained marginal adaptation with no evidence of secondary caries or periapical pathology.

A 6-month clinical and radiographic recall was planned; however, the patient was unable to attend the 6-month appointment due to relocation for work and could not provide radiographs from another clinic. Therefore, a formal 6-month assessment is not available for this report. The absence of a 6-month radiograph is acknowledged as a limitation; nevertheless, the documented 1-week, 1-month and 3-month clinical and radiographic reviews provide early evidence of a successful outcome (Table 1).

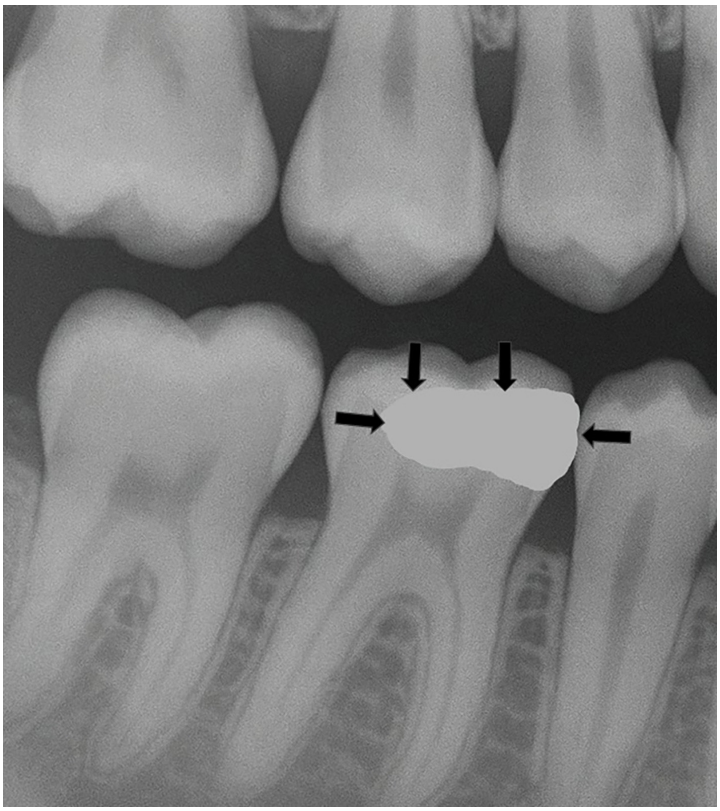

Fig 3 | Post op X ray
Arrows indicating direct class II composite restoration of tooth #46

Discussion

Posterior teeth such as tooth #46, when involved with proximal carious lesion, require careful diagnostic and clinical approaches. On comparison of class II restorations with Class I restoration, one can observe complexity in terms of challenges faced during recreation of proximal wall. The recreation of proximal wall is of great significance, as it ensures tight contact and prevents post-operative complications, such as food impaction or marginal leakage.[6]

This case, also highlights the abovementioned complications. The patient complaint of food trapping and sensitivity was linked to a proximal carious lesion. It is critical to handle such cases with early identification. This can only be achieved by using both clinical and radiographic assessment. Bitewing radiographs remain the gold standard in terms of detecting proximal decay in posterior teeth. The use of pulp vitality tests also ensured that the tooth was still vital and could undergo a conservative restorative approach.

To maintain a balance between tooth conservation and aesthetics, Class II composite restorative technique was indicated. The choice of material is also very important. In this case, modern composites, especially nano-hybrid composite, was used. This was done to ensure that the restoration attains a superior wear resistance, excellent polishing and low polymerization shrinkage.

Use of Matrix Band and Proximal Wall Reconstruction

Class II restorations come with many challenges. One of them is achieving a well contoured and sealed proximal wall.[7] This can only be achieved by using a sectional matrix system. In this case, a sectional matrix system was also employed. The sectional matrix

Table 1 | Summary of clinical and radiographic follow-up findings

Follow-up Interval	Clinical Findings	Radiographic Findings	Interpretation
1 Week	Restoration functional; proximal contact maintained; no postoperative sensitivity.	Not taken.	Successful immediate outcome; good proximal contact.
1 Month	Restoration intact; esthetics satisfactory; no symptoms.	No marginal gaps or recurrent caries visible.	Stable and well-adapted restoration.
3 Months	Restoration intact; no food impaction; patient asymptomatic.	Maintained marginal adaptation; no periapical changes.	Successful short-term clinical and radiographic outcome.
6 Months	Patient did not return (relocated).	—	Follow-up data unavailable (limitation)

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system offered a significant advantage over traditional Tofflemire bands. Sectional matrices allow for better anatomical form and strong proximal contact, reducing chances of food impaction and open contacts, which were a key concern for the presented patient.[8]

The use of wooden wedge was done along with the sectional matrix system. The wooden wedge allows proper adaptation of the matrix to the cervical margin and it also slightly separates the teeth.[9] This helps in achieving tight interproximal contact once the matrix is removed. This is very crucial to make sure that no overhangs are formed and periodontal health is maintained to a great extent.

Incremental Composite Placement

Incremental layering was done to place the composite in the prepared cavity. This type of layering is very essential to control polymerization shrinkage stress and to ensure proper adaption to the cavity walls. To reduce the C-factor, the use of small increments is mandatory.[10] This helps in improving long-term success. In this case, the proximal wall was intentionally built first using a thin increment cured against the matrix band. This step helps in creating a foundation over which the rest of cavity is filled. It also allows for optimal contouring of the interproximal area.

Moisture Control and Adhesion

Moisture contamination has a great impact on the success of composite restoration. To ensure that moisture is well controlled, rubber dam isolation was made in this case. Rubber dam isolation provides a clean, dry field, which is critical for adhesive success. Using a universal adhesive system aims a simplified technique along with providing a strong bond strength to enamel and dentin.

Finishing and Polishing

Finishing and polishing when done properly, not only provides improvement in the esthetic outcome, but is also essential in reducing plaque accumulation. This aids in improvement in gingival health and prolongs restoration life. In this case, multi-step polishing protocol was done to achieve a high polish. This aided in providing patient comfort and visual integration with natural dentition.

Direct Composite vs Indirect Restoration

Indirect restorations provide advantages in certain cases. However, when compared with direct restoration, a direct restoration is always preferred. The reason behind this is the minimally invasive nature of direct restoration, along with lower cost and reduction in multiple visit completion. Given that the pulp was vital and the lesion was confined, a direct restoration was deemed sufficient and appropriate. The case was decided to be treated with a conservative approach and composite restoration was decided to handle this case.

Long-term Prognosis

Proper technique and long term follow up is mandatory for direct Class II Composite restorations. The reason behind this is that such restorations show high longevity, by following such protocols. Review of patient periodically is important to check for signs of wear, secondary caries or marginal discoloration. Good oral hygiene and diet control is also of great significance in maintenance of the restoration.

This case highlighted the reason behind predictable success in managing proximal caries. The reason is the use of proper diagnostic tools, following a systematic protocol and use of modern restorative materials. The patient satisfaction was also achieved in this case.

Literature Review

The use of nanohybrid composite was allowed on the basis of the balanced strength, wear resistance and polishability. This material is suitable for load bearing restorations. Universal adhesive was used to ensure bonding by a material that has reliable bonding performance and flexibility with selective etch technique.

Alternative approaches such as bulk fill composites and indirect on lays were also considered; however, the advantage of direct nanohybrid composite over these materials was that it offered a more conservative, single visit option, that maintained tooth structure and provided a predictable outcome.[11]

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.

Diagnostic Clarity

The pulpal and periapical status were recorded using the AAE diagnostic terminology as “Normal pulp” and “Normal periapical tissues.” Caries was classified using ICDAS code 4–5 and ICCMS Category 3, representing a moderate cavitated lesion extending into dentin. Caries removal end-points were guided by tactile hardness, color, and caries detector dye confirmation. The remaining dentin thickness in the deepest area was approximately 0.7–1.0 mm.

Adhesive Protocol

A selective enamel-etch technique was employed with Adhese® Universal (Ivoclar Vivadent). Enamel was etched with 37% phosphoric acid for 15 seconds. Dentin was left visibly moist (not desiccated). The adhesive was ethanol/water-based, scrubbed for 20 seconds, air-thinned, and light-cured for 20 seconds. No liner or base was placed due to adequate remaining dentin and the adhesive’s strong dentin-sealing ability.

Curing Details and Quality Control

Each composite increment was ≤2 mm thick and light-cured with the Bluephase® N curing unit (Ivoclar Vivadent) at 1200 mW/cm² intensity. The curing-tip was held 1–2 mm from the surface at a perpendicular angle. Irradiance was verified within the previous 6

months. The total radiant exposure per in crement was approximately 24 J/cm².

Objective Outcomes

Proximal contact tightness was confirmed clinically as Floss Resistance Grade 2 (normal tight contact) and objectively using a PTM gauge showing 0.12 mm deflection. Radiographic analysis demonstrated no marginal overhang or gap exceeding 0.1 mm. Patient-reported outcomes included 0/10 postoperative sensitivity and complete resolution of chewing discomfort at all follow-up intervals.

Prevention and Prognosis

The patient's caries risk was categorized as low-to-moderate based on plaque control and dietary assessment. Preventive measures included instruction on plaque control, dietary counseling, twice-daily brushing with 1450 ppm fluoride toothpaste, and 6-month recall intervals for fluoride varnish application. Long-term success was attributed to proper adhesive handling, moisture control, and regular maintenance.

Conclusion

This case report demonstrates the effective management of a proximal carious lesion in tooth #46 using a direct Class II composite restoration. In order to make the procedure successful, it was mandatory to have a proper diagnosis, isolation, caries removal, and use of a sectional matrix system. All of the mentioned measures lead to accuracy in rebuilding the proximal wall. A strong esthetic and functional restoration are achieved by using incremental layering technique and careful curing light curing of the composite resin.

Application of a matrix band, use of wedges for proper adaptation along with finishing and polishing provides contribution in favorable outcome of the treatment. Clinicians can achieve excellent long-term outcomes by following current restorative protocols and utilizing modern materials. This case helps in highlighting the clinical value of direct Composite restoration techniques in posterior teeth. It also highlights the importance of attention to detail in each step of the restorative process for achieving optimal patient care.

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