CASE STUDY

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Mastering the Challenge of Adjacent Class II Defects: A Case Study with the Quad Matrix System

Since his graduation from Bharati Vidyapeeth Dental College, Pune in 1996, Dr. Anand has immersed himself in the field of dentistry with a special focus on aesthetic dentistry. His prime interest lies in treating complex full mouth rehabilitation and smile design where management of occlusal disorders and restoration of a balanced occlusion are key components in his restorative treatment protocol.

His keen eye for aesthetics extends beyond dentistry as he is an avid and globally acclaimed photographer with his photography appearing in a wide variety of publications, including dental, travel, auto media, wildlife, health, and architecture. He is a mentor at the leading photography forum, The Photography Club of India.

Dr. Anand's dental work is reflected in leading Asian dental magazines and publications. He is an adjunct faculty member at various private dental institutes as well as an MICD fellow and certified Clinical trainer for Minimally Invasive Cosmetic Dentistry (MICD). Recently he was honored as a Fellow of the Bangladesh Academy of Dentistry International.

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Introduction:

Restoring a Class II defect may seem simple—just place a slice of composite into the cavity and cure it—but this approach neglects crucial factors like contacts, contours, and gingival health. Any mistake in technique can compromise the entire quadrant, damaging both hard and soft tissues. Restoring Class II defects is one of the most complex challenges in restorative dentistry, and dealing with adjacent defects tests both your skills and knowledge. This case presentation demonstrates how to effectively restore improperly treated adjacent Class II defects using the right techniques, combined with the expertise required and the advanced Quad Matrix System from Garrison®.

Case History:

A 62-year-old male presented to our dental office with complaints of gum pain in the maxillary right quadrant and an inability to chew effectively.

Clinical examination reveals composite restoration was done in between the first molar and second premolar. It looks like the restoration was just placed without any sectional matrix system joining the adjacent Class II defect. The palatal view shows the composite was placed directly on the gums, leading to gingival inflammation and pain. Overall, the patient's teeth show signs of erosion with loss of a good amount of enamel, suggestive of acid reflux.

X-ray reveals adjacent Class II defects on tooth #15 and #16 with no close proximity to the nerve. The single composite restoration was placed in between these two defects.

Composite restoration placed in adjacent defects without use of any sectional matrix system. Occlusal erosion facets seen due to acid reflux with flat anatomy of the teeth.

Composite restoration impinging on gingival tissue, leading to pain for the patient.

IOPA radiograph revealing a restoration with improper contouring and noticeable overhangs.

Isolation & Preparation of New Cavity designs for better adhesive techniques

Rubber dam isolation: Use a wingless clamp with heavy rubber dam to achieve optimal bonding and increase the longevity of the restoration. Proper isolation is crucial for a successful adhesive process.

Caries removal: Utilize caries dye for the thorough removal of carious tissue in teeth #15 and #16. The old composite is removed and infected caries is removed using slow speed round carbide bur. It is essential to establish a peripheral seal zone free from infected and affected dentin to ensure the best bonding strength.

Enamel preparation: Remove all unsupported enamel using a super fine diamond bur (yellow band). For new cavity designs, employ Cala Lilly burs, which are specifically engineered for adhesive composite restorations and designed to resist tooth fracturing.

New cavity design technique: Following Dr. Richard Simonson's concept, aim to avoid connecting the occlusal to the interproximal areas during first-time interproximal caries restoration (see image 3). Finish the proximal walls with Shofu Super-Snap disks: start with the violet disk, followed by green and pink disks. This approach ensures optimal bonding to the enamel and helps prevent potential microleakage. Due to acid erosion, the dentin turned sclerotic, leading to very poor bonding strength. Because of this, I decided to do a proper air particle abrasion using 25-micron aluminum oxide powder for more than 10 seconds. This process cleaned the cavity preparation and enhanced bonding strength, particularly by increasing some microporosity in the sclerotic dentin.

Caries end point removal, achieving peripheral seal zone, and removing unsupported enamel. The picture was taken after air abrasion and selective etching was performed. Garrison® Strata-G™ wedge was placed as prewedging to protect rubber dam.

The 3D Fusion™ Firm band FXH200 was securely positioned using a large Quad wedge, placed from buccal, ensuring a tight seal.

Premolar is ready for the injection molding using Shofu Injectable Xsl A3O and Packable Shofu Beautifil LS II A3.5.

Selecting the appropriate sectional matrix system is crucial in such adjacent large defect cases, so we chose the Garrison® Quad Matrix System™. It is essential to ensure that the marginal ridge is correctly dimensioned and aligns with the occlusal anatomy. This alignment is vital for creating well-defined adjacent triangular fossae and a properly shaped occlusal embrasure. Therefore, the height of the marginal ridge largely depends on the choice of band height. Here we chose the Garrison 3D Fusion™ Firm band FXH200.

The firmness of the band material facilitates easy placement and secure fitting; the bands maintain their shape and do not distort during the composite injection molding procedure, ensuring accurate and reliable restoration outcomes.

The Firm band (FXH200) was placed in the distal defect of tooth #15 and secured using a large Quad wedge (image 5).

Next, an identical band was inserted into the mesial defect of tooth #16 by slightly repositioning the wedge, allowing the band to pass beneath it. The wedge was then reinserted to its full length, holding the bands in place with gentle finger pressure, ensuring both bands were securely positioned beneath the wedge (image 5).

Restoring #15

Since the adjacent defects are larger with larger interdental space, we decided to repair the defects one by one. Due to small defect on tooth #15 compared to #16 we decided to begin with #15 using injection molding technique without placing the matrix ring.

After applying the bonding agent, we used a thin layer of Shofu Injectable Xsl—a high-strength, self-leveling, second generation injectable material—to seal the dentin. This initial layer, approximately 0.5 mm thick, is crucial for protecting the hybrid layer from shrinkage stress. The self-leveling properties of this material allow it to effectively adapt to uneven surfaces, ensuring a smooth application without air bubbles and minimizing post-operative sensitivity.

For the second increment, we placed a small quantity of Injectable Xsl A3O followed by packable composite Shofu Beautifil LS II A3.5 in injection molding technique manner. The excess composite is removed and marginal ridge is contoured properly.

After removal of the bands, note the contour without any excess flange.

The Quad large wedge was placed and secured with the FXH200 band from the palatal side, addressing the wider defect on that side and effectively eliminating any gaps at the gingival seat area.

The Quad ring was placed with its driver tip from the buccal side, and Teflon tape was used to shape the band to match the contour of the adjacent tooth, ensuring an ideal contact and contour.

After curing from all sides, the band and wedge are removed. Due to the rigidity of the band no excess flange and over contoured seen due to placing adjacent band (image 7).

Restoring #16

Due to the larger defect on the palatal side compared to the buccal, we inserted the Quad large wedge from the palatal. The unique design of the wedge, with its broader area, ensures that the band is securely positioned at the wider defect, eliminating any gaps at the gingival seat area (image 8).

Once the band is securely in place, the Quad ring is selected and positioned with its driver tip on the buccal side, following the placement of the wedge from the palatal. Teflon tape is then placed inside the defect to shape the band to the adjacent tooth, ensuring ideal contour and contact (image 9).

Converting Class II to Class I.

After restoring tooth #16, note the ideal contacts and contours, with no excess flange present.

IOPA radiograph demonstrating well-established natural contacts and contours, free from overhangs. Note the properly formed occlusal embrasures.

The bonding process and a thin layer of Shofu Injectable Xsl were applied in the same manner as for tooth #15. Due to the larger defect, we decided to convert the Class II into a Class I by first creating the wall. To achieve this, we used the snow plow technique with a stress-reducing layering approach. This involved building the walls separately on the palatal and buccal sides using Shofu Injectable XSL A3O and Packable Shofu Beautifil LS II A3.5 (image 10).

The remaining defect is restored using the same snow plow technique. Additionally, the occlusal erosion facets are also restored.

The contours and embrasures were well established and finished using a Shofu Super Snap purple disk. The oxygen inhibition layer was removed using sodium bicarbonate powder with an air polisher unit (image 11).

The rubber dam was removed, and high points were checked using 40-micron paper, followed by 8-micron foil in static occlusion. For dynamic occlusion, 200-micron paper was used, and adjustments were made to the cuspal slopes and non-functional cusps.

An IOPA was taken to ensure there are no overhangs (image 12).

Note the soft tissue defect produced by previously faulty restoration. The finished restoration shows no overhangs which allows tissue healing in a natural manner.

Papilla growth post 15 days.

A large soft tissue defect is visible due to the faulty restoration. The newly restored teeth will support healing and promote soft tissue growth (image 13).

The patient was recalled after two weeks for a soft tissue assessment, where it was noted that the interdental papilla had grown back naturally (image 14).

This wasn't a miracle, but rather the result of using the proper technique with the Quad matrix. The patient was advised to use a water flosser to maintain regular oral hygiene and was also encouraged to consult a physician about his gastric reflux to prevent further enamel damage.

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A photo collage illustrating the progression from the initial damage to the restoration, followed by the formation of the interdental papilla.

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Before and After Collage: The images illustrate the natural contacts, contours, and morphology of the restoration.

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Before and After Collage: The images illustrate the natural contacts, contours, and morphology of the restoration.