

# Complex direct ORMOCER composite restorations in the posterior region: A case report



Dr Clarence Tam

By Dr Clarence Tam (New Zealand)

For reasons of cost, patients and dentists today often find themselves obliged to use restorative materials for the treatment of large structural, functional and aesthetic defects. This case report demonstrates how an innovative, organically modified ceramic composite with extremely low shrinkage stress and volume contraction can be used to restore teeth while preserving tooth substance. Occlusal functionality is key to the longevity of the restoration.

A 71-year-old female patient presented in my practice requiring replacement of insufficient, excessively large composite resin restorations of the lower right first and second molars (46 and 47). The natural crown still retained a small amount of residual structure, and the patient did not wish any further removal of tooth substance. For cost reasons, the patient also did not wish any prosthetic treatment, e.g. in the form of ceramic restorations. The patient was recommended a direct complex resin onlay requiring functional and non-functional cusp reduction. With this unconventional approach, it was important that the occlusal design should take into consideration the strengths and weaknesses of both the restorative material and the residual tooth structure.

The patient was given a local anaesthetic with 1 cartridge of 4% articaine with 1:100,000 adrenaline, and the teeth were isolated with a rubber dam prior to removal of the existing restorations. In order to ensure a caries-free, hard dentine base, three successive checks were performed with a caries detector (Caries Marker, VOCO). The thickness of the remaining cusps was measured, and found to be 3 mm at the base. The margins were strongly bevelled to maximise the amount of the planned restorative material with minimal reduction in the cusp region, and thus achieve a large contact surface. No centric contacts or other extensive functional contacts were planned for the cavity areas being treated.

The preparations were micro air abraded using 27 micron aluminium oxide. A selective enamel etch technique was then applied using Futurabond U. The lingual cusps were built up with a purely ceramic-based bulk fill ORMOCER (Admira Fusion x-tra, shade U, VOCO).

performed followed by bonding with Futurabond U (VOCO). The lingual cusps of tooth 46 were created free-hand using the universal shade Admira Fusion x-tra, a purely ceramic-based bulk-fill composite. The cusps were widened towards the centro-occlusal aspect progressively in 2 mm increments. The key factor here was not applying this bulk-fill material in bulk, and thereby ensuring maximum depth of cure at all times.

The benefit of Admira Fusion x-tra is the increased depth of cure which is inherent to this restorative. After curing of the base of the lingual cusps, a sectional matrix system (V3, Triodont) was used. In the gingival floor area of the proximal box, a small quantity of the flowable Admira Fusion Flow (shade A3, VOCO) was used in three 0.25 mm increments (extremely thin) to ensure complete and maximum marginal hybridisation and adaptation. The marginal ridges were then incrementally completed using Admira Fusion x-tra (shade U).



**Fig. 1:** Pre-operative situation showing large restorations and minimal residual tooth structure.



**Fig. 3:** The teeth were micro air abraded using 27 micron aluminium oxide. A selective enamel etch technique was then applied using Futurabond U. The lingual cusps were built up with a purely ceramic-based bulk fill ORMOCER (Admira Fusion x-tra, shade U, VOCO).

The buccal lobes were layered individually with Admira Fusion x-tra before the Tam interlobe staining technique was utilised (brown, FinalTouch, VOCO) to customise the colour tone. In the next step, the lingual cusps were shaped individually, thus completing the design of the occlusal anatomy. Following complete finishing of tooth 46, the matrix system was placed on tooth 47 (Omnimatrix, Ultradent: distal marginal ridge; V3 Triodont: mesial marginal ridge). Tooth 47 was layered in a similar manner, again using a universal shade bulk-fill material (Admira Fusion x-tra).

A small amount of white shade for customisation was applied to the triangular ridges of teeth 46 and 47 (FinalTouch, VOCO) to imitate the enamel hypocalcification. A glycerine layer was then applied, and the composite was polymerised fully through the glycerine in order to avoid the oxygen inhibition layer. Only minimal occlusal adjustments were necessary. Taking the material properties



**Fig. 2:** Completed preparation with strongly bevelled margins as an alternative to straight cuspal height reduction. The cusps were at least 3 mm thick at their base. The occlusal shaping must be very thorough to minimise the lateral excursion load on the cusps.



**Fig. 4:** The marginal ridges were built up using a sectional matrix system (V3, Triodont, Dentsply Sirona). In this fashion, we have converted a complex Class II into a Class I situation.

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## Admira Fusion





**Fig. 5:** The buccal lobes were built up individually, starting with the mesiobuccal lobe.



**Fig. 7:** The mesiolingual cusp was shaped and finished with a brush to create the infoldings into the mesiolingual and mid-lingual lobes. The brown stain was partially covered, leaving it only slightly visible and thus giving a natural appearance.



**Fig. 9:** Immediate post-operative situation before application of hypomineralisation details on triangular ridges.

of the ORMOCER into consideration (high compressive strength and low flexibility), the occlusion was ground in to establish light centric point contacts without extensive lateral contacts or interferences. The restorations were finished under water spray with a single-stage polisher (Dimanto, VOCO) to high lustre.

#### Rationale for material selection

Geriatric dentistry is becoming an increasingly prominent part of everyday general dental practice. The main objective of treatment for this section of the population is essentially "to preserve function without high cost". The majority of older individuals are not willing to invest a lot of money in their teeth. In view of this, it is essential to understand the physical properties of direct and indirect restorative materials in order to design the appropriate restoration.

Composite resins have high compressive strength, but only low tensile strength and flexibility. The compressive strength of enamel is 384 MPa and that of dentine is 297 MPa. In



**Fig. 6:** After all buccal lobes were fully cured, FinalTouch brown shade (VOCO) was added to the base of the lobes as part of the Tam interlobe staining technique.



**Fig. 8:** The distolingual cusp was shaped and finished with a brush to create the infoldings into the other surrounding lobes and to complete the occlusal surface. The shade is extremely natural. The marginal ridges were finished before preparing tooth 47. Selective etching, bonding and restoration were performed in a similar fashion to tooth 46.



**Fig. 10:** Situation after application of hypomineralisation details to the triangular ridges using FinalTouch white.

contrast, the flexural strength of dentine is 165.6 MPa. The compressive strength of Admira Fusion x-tra is 307 MPa, whilst its flexural strength is 132 MPa – acceptable values when compared to natural tooth substance.

The major advantage of Admira Fusion derives from its material composition, as it contains no conventional methacrylate monomers, and therefore allows a more biocompatible restoration (essentially a purely ceramic-based composite compatible with all bonding systems). At the same time, the composition gives an extremely low volumetric shrinkage (1.25%), the



**Fig. 11:** Final post-operative situation showing light centric point contacts, free of functional lateral excursive interferences, and with full aesthetic integration.

lowest of any product currently on the market. The ability to maintain an optimal marginal seal is also critical in the Class II restorations shown, especially in the case of dentine-bound restoration margins below the cemento-enamel junction.

Arora et al investigated the role of flowable composites with regard to the marginal integrity of sub-CEJ Class II restorations and found a significant reduction in microleakage when a flowable composite liner was used instead of a purely packable composite resin<sup>1</sup>. The premise of this study is that the first point of failure of Class II restorations is generally at the restoration margin, in the region of the proximal box floor, especially when located subgingivally. Thus, both volumetric shrinkage and shrinkage stress are two additional key factors with regard to high marginal precision and integrity.

The extremely low shrinkage stress (3.71 MPa) of this bulk-fill material, in combination with a high depth of cure, ensures maximum marginal integrity, especially if used in small increments like a conventional composite. In terms of avoiding gingival irritation, biocompatibility plays an important role, and ceramic-based composites are less conducive to the formation of biofilm than are resin composites.

The remarkable chameleon effect of this material, combined with optimal working properties, makes it the go-to choice for 90% of posterior restorations in my practice. When combined with the easy-to-apply customisation shades in the FinalTouch range, it enables me to increase enormously the efficiency, aesthetics, predictability and marginal integrity, essentially with just a single smart material. ♦

Contact details: **Dr Clarence Tam**  
Cosmetic and General Dentistry  
E-mail: [clarence.tam@gmail.com](mailto:clarence.tam@gmail.com)  
[www.clarencetam.co.nz](http://www.clarencetam.co.nz)

#### Literature

- 1) Arora, R., Kapur, R., Sibal, N. und Juneja, S. Evaluation of Microleakage in Class II Cavities using Packable Composite Restorations with and without use of Liners. *Int J Clin Pediatr Dent.* 2012,5(3):178-184.

**Dr Clarence Tam** heads a practice in Auckland, New Zealand, which specialises in cosmetic and restorative dentistry. Born in Canada, she studied at the University of Western Ontario and completed her general dentistry residency at the University of Toronto/Hospital for Sick Children. She is the Chairperson and Director of the New Zealand Academy of Cosmetic Dentistry (NZACD) and is currently only one of two dentists in Australasia to hold Accredited Member Status with the American Academy of Cosmetic Dentistry (AACD).