Premolar case with a nano-hybrid, intuitive universal composite

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Case background

A stable ASA 2 65-year old female presented to the practice for restorative dentistry with a medical history significant for a non-descript immunoglobulin deficiency, for which she receives regular infusions. She reports no known drug allergies. Clinically, she was diagnosed with an occlusal peripheral rim fracture leaving a food trap on tooth 1.4 (FDI notation). Tooth 15 featured an extensive amalgam with extreme proximity to the distal marginal ridge, which exhibited distal vertical axial fractures as a result of cyclic expansion-contraction over time.

The restorative goal of minimally invasive direct dentistry would be complicated by the undoubtedly dark dentin substrate under the amalgam. A material was sought that featured both an excellent chameleon mechanism as well as physical properties to maximize the prognosis of direct restorations in this area.

Restorative procedure

The patient was subjected to topical anesthetic prior to buccal infiltration using 1 carpule of 2% Lignocaine with 1:100,000 epinephrine. A rubber dam was affixed prior to preparation of tooth 15MO with dissection of the distal vertical marginal ridge fracture. The margins of tooth 14O and 15MOD were refined before bevelling as the ends of enamel rods facilitate better bonding relative to the sides of enamel rods. A 27 micron aluminum oxide micro air abrasion treatment was completed prior to affixing, wedge and matrix to reconstruct the mesial marginal ridge of tooth 15. A matrix-in-matrix solution was used to recreate the proximoaxial contour of 15D This provided hermetic closure at the proximogingival cavosurface margin as well as an ideal contour for the missing axial wall.

Following a total etch technique, a 2% Chlorhexidine scrub was completed for 30 seconds and the dentin blot dried to a moist state. A 5th generation bond was applied, air thinned and cured as per manufacturer instructions. Microlayers are important during the delicate first 5 minutes of hybrid layer formation, and were completed using 0.25mm increments of CLEARFIL MAJESTY™ Flow (Kuraray Noritake Dental Inc.). This technique can be expected to increase significantly the shear bond strength to dentin[1,2]. This was completed both in the proximal box floor area as well as mid-occlusally. The marginal ridge was completed using CLEARFIL MAJESTY™ ES-2 Universal (Kuraray Noritake Dental Inc.). Since the dentin base was heavily stained, CLEARFIL MAJESTY™ Flow was used before utilizing CLEARFIL MAJESTY™ ES-2 Universal in a lobe-by-lobe creation of occlusal anatomy. Post-operative occlusal checks verify that the restoration is conformative to occlusion and esthetically excellent with no visible marginal show.

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Rationale for material choice

The marginal ridges were micro-layered horizontally as was the floor of the resulting Class I preparation as per a reduced layer thickness-technique modification of Nikolaenko et al,[3] whereas the highest shear bond strengths were found when a 1mm horizontal layering technique was used.

CLEARFIL MAJESTY™ ES-2 Universal is at the forefront of a simplified restorative armamentarium for the modern practice. It takes cloud-shading one step further by offering a "Universal" shaded composite featuring Light Diffusion Technology (LDT) with simultaneous ideal sculptability, optical metamerism and physical properties for use in any restorative situation in the mouth. Featuring barium glass nano fillers and proprietary pre-polymerized nanoparticle fillers, the latter boasts a high refractive matrix that is able to disperse light and fool the eye with even the thinnest of layers, obviating the need for opaquer composites in cases like the one featured. When paired with CLEARFIL MAJESTY™ Flow in a conservative layered technique, the 81% filled flowable produces a radiographically well-demarcated layer, and the superficial CLEARFIL MAJESTY™ ES-2 Universal boasts an easy-to-polish robust single shade restorative solution that will virtually fulfil all of your restorative needs for non-bleaching patients.

Physically, with compressive strength is rated at 348 MPa and flexural strength at 116 MPa, CLEARFIL MAJESTY™ ES-2 Universal is in the range of natural enamel and dentin. The built-in fluorescence is very enamelomimetic, which is excellent for nightclub social situations.

References

1. Bertschinger C, Paul SJ, Luthy H, Scharer P. Dual application of dentin bonding agents: effect on bond strength. Am J Dent. 1996;9(3):115-119

2. Magne P, Kim TH, Cassione D, Donovan TE. Immediate dentin sealing improves bond strengths of indirect restorations. J Prosthet Dent. 2005;94(6):511-519

3. Nikolaenko SA, Lohbauer U, Roggendorf M, Petschelt A, Dasch W, Franenberberger R. Influence of C-Factor and layering technique on microtensile bond strength to dentin. Dental Mater. 2004;20(6):579-585