

# Direct layered dual shade composite veneer restorations treating a high stress area

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## Treatment List (FDI classification)

- Tooth 31BI: direct acid-etched layered resin restoration
- Tooth 41BI: direct acid-etched layered resin restoration

## Restorative Material

- Lingual shelf formation: GrandioSO A3.5 (VOCO), body dentin formation: GrandioSO A3.5, enamel layer: GrandioSO A3.5. Incisal translucency: GrandioSO Flow Incisal
- Dual shade chameleon effect and characterization demonstration

## Adhesive System

- Teeth 31BI, 41BI: micro-air abrasion (50 micron aluminum oxide) followed by acid-etched 5th generation (Optibond Solo Plus, Kerr) preparation.

## Introduction and Chief Complaint

A 57 years old patient presented to my service to restore a chronically chipping region affecting the mandibular central incisors. He complained that the “sealants” that had been placed on the mesioincisal corners had chipped off again, most likely due to focal loading on these small restorations. The patient reported a history of his lower anterior teeth chipping as a result of a new porcelain-fused-to-metal bridge placed from 21-12 and a more accentuated cingulum emergence profile associated with this.

Indeed, on examination with the patient closed in maximum intercuspation, the mirror view revealed adequate space for addition of height, but once protrusive function was initiated the lower central incisors would be met not with a gentle guiding grade, but rather a vertical wall. It was thought that recontouring this region would allow us to create at least a fuller tooth volume as well as a slight increase in height overall, but without replacement of the

bridge and redesigning of the palatal form, full restoration of lost tooth height on 31 and 41 would not be possible. The patient wanted a stronger, longer-lasting solution, and was even keen on looking at full crown coverage, which of course I dissuaded him from pursuing in the interest of staying true to the minimally-invasive philosophy.

## Medical History

Conditions: none

Medications: none

Allergies: White Wine reported as an allergen

## Diagnosis and Treatment Plan

Prior to treatment planning for any esthetic and restorative correction of the teeth, a comprehensive examination was indicated. An extraoral examination was started, which revealed that lymph nodes, salivary glands, muscles of mastication and temporomandibular joint function were within normal limits. There was no clicking or crepitus noted, and the patient’s ROM (Range of Motion) was normal at 60mm. The patient reported no discomfort.

Intraoral soft tissue examination involved a visual and palpation cancer screen, which was found to be within normal limits with no findings, as well as full periodontal charting. The patient exhibited a firm, fibrotic biotype featuring coral pink gingival and knife-edged margins with no edema or erythema noted. His plaque score was 0/6 sites and his bleeding on probing score also 0/6. The patient thus exhibited excellent oral hygiene.

Dental examination of the affected 31, 41 region revealed mesioincisal chipping of both 31 and 41 with close contact of the cingulum area of the bridge extending from 21-12 during protrusive contact.

### Treatment Plan for Mandibular Anterior Sextant

- Comprehensive examination (hard and soft tissue): extra-oral and intra-oral
- Customized full mouth radiographs: 3 bitewings, 7 periapicals,
- Informed consent
- Preparations to be completed under rubber dam isolation (split dam technique)
- Mylar strip isolation from adjacent teeth, micro-air abrasion (50µm aluminum oxide) to be completed from 31, 41 buccal surfaces and incisal aspects
- Etch, bond, palatal wall placement on tooth 31 (GrandioSO A3.5 Shade), body dentin and transitional zones (GrandioSO A3.5 Shade) and enamel layer (GrandioSO A3.5 Shade). Translucency to be conferred using A3.5 scalloping/detailing in the incisal region prior to addition of GrandioSO Flow Incisal to “fill in the gaps”.

### Description of Treatment Including Rationale for Choice of Restorative Material

The Patient presented with what now appears to be iatrogenic wear of his 31BI and 41BI regions. As if this case was focusing on the restoration of upper central incisors, there would be no need to worry about adding length as long as: 1) there was enough room and 2) one could establish a balanced anterior guidance shared amongst the lower four incisors during protrusive and lateral excursive function (if canine guidance was absent). The strategy would be to reduce and recontour the cingulum region of 21-12 as much as possible without exposing the metal substructure in order to give a slight amount of room for increased resistance form of the composite veneer restorations. With the patient's consent, this was completed.

The lower anterior sextant was isolated with a split dam technique, comprised of #2A Hu-Friedy rubber dam clamps on teeth 34 and 44 and a Roeko rubber dam (Coltene). Following the minimal infinity bevel preparations on teeth 31BI and 41BI, Mylar strips were utilized distal to 31 and 41 and each tooth was subjected to micro air abrasion with 50 micron aluminum oxide on the facioincisal aspect in order to increase the amount of micromechanical retention. Each tooth was then etched with 33% H3PO4 (aq) followed by the application of three coats of Optibond Solo Plus (Kerr) before air-thinning to evaporate the solvent. This was light-cured with a Radium LED light source (SDI).

A putty palatal matrix was not created as there was no previous experience with the patient who regularly was seen by another dentist in the practice. Hence, a Mylar strip was applied to tooth 31 initially in a wrap-around fashion, prebending the strip to create defined line angles at the distolingual and mesiolingual line angles. The matrix was stabilized on the lingual aspect with a finger as the initial lingual shelf was applied freehand against the Mylar strip. This palatal shelf layer should measure approximately 0.3mm thickness and will act as the scaffold for the restoration. The Mylar strip was now removed and the composite veneer applied in layers first to the cervical half of the tooth, feathering incisally before addition of the second ball of composite material to the incisal half.

Artistic scalloping and dentinal detail was sculpted into the incisal 1.5mm with the goal of allowing for some optical characterization in the final product. These scalloped regions were “filled in” using GrandioSO Flow Incisal (VOCO). The final enamel layer was then applied in a single ball increment, burnished and feathered using a Greenstein instrument, brushed and shaped interproximally with the Ronvig silicon brush and blended seamlessly over the surface of the entire tooth. It is important at this stage to always be viewing the proposed restoration from the incisal view. This will allow for identification of excess thicknesses of material not visible from the frontal view as well ensure adequate material for good definition of mesial and distal line angles. Incremental addition worked to minimize polymerization shrinkage of the resin composite, which is a remarkably low 1.61% volumetric shrinkage in GrandioSO's case.

Few “body” dentin shades are able to simultaneously opaque and optically blend to the respective environment. Often, multiple dentin shades are required to create the block-out effect and elevate the value of the restoration before needing to select an enamel-like microfill to replace the enamel and allow light penetration into the tooth for visual dimensionality. I was pleasantly surprised at the “universality” of GrandioSO and its ability to be a chameleon, whether of dentin or enamel.

The final layers not only restored slightly the lost tooth volume from iatrogenic attrition, but also created an imperceptible restoration.

At this point, the patent contact was confirmed, and the interdental region finished with a 12b scalpel blade and polishing initiated using EpiteX strips (GC America). After confirming patent contacts, pencil markings were placed over the facial surfaces defining the line angles to be preserved. Primary and secondary anatomy was defined using needle-point fine diamond burs (Mani Dia-burs) and large, coarse Soflex discs (3M), both without water irrigation<sup>1</sup>. The restorations were polished with the polishing system Dimanto (VOCO) at 5000rpm to high shine. Overall, the patient was pleased with a fine, well polished, biomimetic result that we knew would need to be shortened again slightly according to the occlusion. The important factor is that the new restorations not only have increased resistance form, but by selecting this nanohybrid composite with outstanding physical properties, both clinician and patient can rest assured not only that the restoration will perform well over the long-term, but also look good doing it.

#### Rationale for Choice of Restorative Material

For patient, the factors of consideration stemmed from the risk:benefit balance between aggressive reduction of tooth structure to gain adequate occlusal clearance from the opposing dentition for bonded porcelain restoration (BPR) resistance form (even if IPS e-max was used, a minimum of 1.5mm would be required) and preserve the maximal volume of healthy tooth structure.

This case embodies a situation where maximal amount of healthy, unaffected tooth structure was available for bonding. It is no secret that enamel-bonding is more predictable and secure over the long-term compared to dentin bonding, the strength of which usually succumbs to the action of matrix metalloproteinases over time. Resin bonding allows both predictability in esthetics and predictability in repair over time. If the enamel shell had been significantly compromised, bonded porcelain restorations as postulated by Pascal Magne would be essential to restore coronal stiffness. He states, “when a more flexible material replaces the enamel shell, only partial recovery of crown rigidity can be expected.” [4] It is important to point out that the enamel shell in this case has not been compromised at all, and thus an additive technique is possible and preferable.

A report by Weston (2011) indicates that an addition of 0.5mm to the buccal surfaces will be adequate for resistance form if within the confines of occlusion [3]. Hence, our preparation form strived to create this 0.5mm of clearance. Additional space was procured by the palatal recontouring of the bridge 21-12.

Pure nanohybrid layered resin was used in a single chromatic shade chameleon effect technique in this case. Shade selection was achieved by using the middle of the shade tab (provided by VOCO) and comparing this to the value, chroma and hue of the target tooth as per Vargas’ technique [2]. The single shade technique allows for simplicity in placement as the material works to opaque and blend in seamlessly to tooth structure simultaneously. There are few other products on the market that can boast this feature. The chromatic layering technique utilized here is a single shade modification of Dr. Newton Fahl’s technique [1].

This case reinforces the minimally-invasive nature and versatility of composite bonding by using a material that not only is set up to last for the long haul but is prepared to work as hard as you do to create esthetic excellence. It is true that on occasion, bonded porcelain restorations must be the treatment of choice [4], but as long as there is a sufficient, solid enamel shell present as your canvas, GrandioSO presents a biomimetic solution that allows you to repair nature in an ethical and excellent manner.

#### Clinical Case



Fig. 01: Pre-operative view showing attrition facets and chipping from pronounced antagonist functional contact



Fig. 02: Initial preparations with infinity bevel cervically



Fig. 06: Filling in of the scalloped incisal form with GrandioSO Flow Incisal



Fig. 03: Result after micro air abrasion with 50 micron aluminum oxide



Fig. 07: Placement of final enamel layer with GrandioSO A3.5



Fig. 04: Fabrication of lingual shelf (0.3mm) on tooth 31



Fig. 08: Final contour of final enamel layer after curing



Fig. 05: View after placement of cervical and incisal increments of GrandioSO A3.5 (VOCO). Note incisal scalloping.



Fig. 09: Lingual shelf fabrication for tooth 41



Fig. 10: Final full contour restoration 41 after layering as per tooth 31



Fig. 14: Fully-polished restorations



Fig. 11: Establishment of primary anatomy contours



Fig. 15: Intraoral situation after adjusting for occlusion. Improvement in contours from initial situation. Protected tooth structure.



Fig. 12: Initiation of polishing with Single Step Polishing System (Dimanto, VOCO)



Fig. 13: Establishment of perikymata in mid-polished state

## References

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### **The Author**

Dr Clarence Tam maintains a private practice in Newmarket, Auckland (New Zealand), with a special focus on cosmetic and restorative dentistry. Born and raised in Canada, she is a graduate of the University of Western Ontario also having completed a General Practice Residency at the University of Toronto/Hospital for Sick Children. She is the Director and Chairperson of the New Zealand Academy of Cosmetic Dentistry.

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