Creating deluxe aesthetics with direct, layered composite resin veneers

Case Study 3

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Treatment list (FDI classification)
- Tooth 12BI: Direct acid-etched layered resin restoration
- Tooth 11BI: Direct acid-etched layered resin restoration
- Tooth 21BI: Direct acid-etched layered resin restoration

Restorative material
GC G-ænial Anterior
- Lingual Shelf: AE (Adult Enamel)
- Opaque layer: AO2 (Opaque A2)
- Incisal effects: IE (Incisal Enamel)
- Body shade: A1
- Facial enamel layer: AE (Adult Enamel)

Introduction and chief complaint
The patient presented to my service on referral from a dentist in Rotorua. She reports the historical placement of "three old (composite) veneers", where two in particular had suffered chipping and staining (21, 12). Her current dental aestheticsbothered her and she wanted an improvement. Tooth 11's composite veneer was intact, and she did not have a problem with this tooth. The patient reported no history of anterior dental trauma and believes the veneers were placed to hide discoloured and speckled tooth structure.

Diagnosis
The specific clinical review of the maxillary and mandibular anterior sextants revealed soft tissues within normal limits and featuring deepest peritooth probing depths of 2mm with bleeding on probing. There was localised mild marginal erythema noted in the 42/43 region. Occlusion with the lower anterior sextant was within normal limits and did not display any focal excursive interferences. The dental relationship was Class II on the left side and Class I on the right side featuring bilateral canine guidance and balanced anterior guidance. Tooth 12 and 21 exhibited stained composite restorations with marginal deficiencies. Tooth 12 revealed only an incisal composite with buccal speckling. There was no buccal staining on the 11 composite veneer, however, incisal view analysis revealed poor emergence profile and lack of proximal line angle development for all three restored teeth. Detectable composite veneer margins were noted for all of 12P, 11P and 21P. Teeth 26-13 tested negative to percussion and palpation, and mobility was within normal limits. Interestingly, the patient had a full maxillary body cant down to her left side with significant gingival show on full smile visible in the 1:10 ratio frontal smile view. This is classified as an aesthetically-critical case.

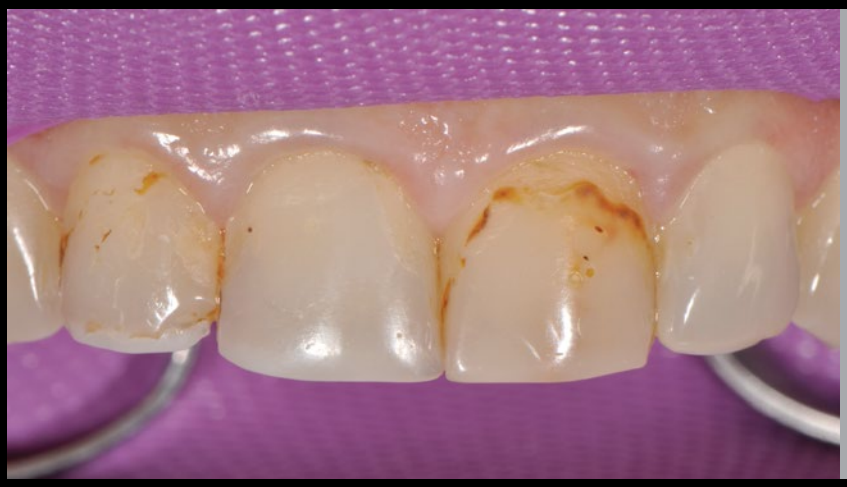
Radiographic examination involved two periapical radiographs. A liner space and/or recurrent caries was noted 12M3, and would be assessed clinically to see if replacement was necessary. Cervical burnout of the 22M region was evident. No restorations exist on tooth 22.

Discussions with the patient revolved around the placement of two or three composite veneers to correct her immediate esthetic concern. An option was also given to patient to have a comprehensive examination, study models taken, an earless facebow transfer and a diagnostic wax-up generated with the view to correct both soft tissue and hard tissue esthetics, particularly her maxillary cant extending incisally to her left side. Although the patient was interested in this latter option, both financial and temporal restraints would prevent her from accepting this more comprehensive treatment. The patient accepted my advice on the replacement of all three composite veneers.

Before.

Treatment Plan

- Cursory examination (hard and soft tissue): extra-oral and intra-oral
- Pre-operative periapical radiographs x 2
- Informed consent
- 12 pre-operative American Academy of Cosmetic Dentistry (AACD) photo series taken
- Colour mapping
- Anaesthesia, split rubber dam isolation and preparation
- Micro air abrasion (50 micron aluminum oxide)
- Etch, bond, direct, layered restoration with AE, AO2, IE, A1 and AE for teeth 12, 11 and 21
- Rough primary and secondary anatomy finishing on first day
- Confirm colour integration, modification as necessary, final contouring and polishing 48 hours later (to wait for resin to set optimally before final polish)
- 12 post-operative AACD photo series taken along with post-operative periapical radiograph.



Prior to split dam isolation, the colour map was immediately noted. This assessment is influenced by dehydration, time/aging, and is depending on 6 variables: hue, chroma, translucency, fluorescence and opalescence. Irfan Ahmad describes the color match at any given time is more ephemeral rather than eternal.[1]

After complete removal of the existing composite resin a light chamfer along the margin to control emergence profile and cervical shading was created. No caries was noted in the 12M region as suspected on radiographic examination.

Following dry #0 (Ultrapak, Ultradent) retraction cord placement via the continuous buccal sulcus packing technique, micro air abrasion using 50 micron aluminum oxide was completed for increased micromechanical retention.

Etching with 33% orthophosphoric acid was completed, followed by application of a 4th generation, 3-step total etch adhesive system (Optibond FL, Kerr).

A lingual shelf was created freehand for 11 and 21 using a Mylar matrix strip. This initial layer is approximately 0.3mm thick and it re-establishes the desired length and proportions of the tooth. A milky-white translucent enamel shade was selected, G-ænial Anterior AE (adult enamel).

To mask out the visible transitional edge an opaque dentine shade, G-ænial Anterior AO2 (Opaque A2), was used in the incisal 2/3rds. It was feathered and blended cervically, and characterised incisally with dentin fingerlings and the beginnings of internal lobe formation. This layer is critical because it is the backbone of internal optical effects and ensures invisibility of the join line.

The penultimate layer involved two sublayers. A greyish translucent enamel, G-ænial Anterior IE (Incisal Enamel) creates optical depth in the incisal 1/3rd. A bodyshade, G-ænial Anterior A1 modulates chroma in the cervical 2/3rds. By viewing from the incisal aspect when placing these layers you can avoid over contouring and ensure enough room to place the final enamel layer.

G-ænial Anterior AE (Adult Enamel), which is the same shade used for the lingual enamel layer, is applied to finish the reconstruction. Tooth 12 was then completed in the same multi-layer fashion. The final result recreates the once-lost volume of tooth structure with natural looking internal characterisation. Confirmation of volume and line angle sufficiency was judged from all angles.

Following final curing, contacts were opened using light interdental separating force and finished using fine abrasive metal strips (GC) and Epitex abrasive polymer strips (GC). Pencil markings were established on the labial surface guiding preservation of line angles. Primary and secondary anatomy finishing was completed using coarse abrasive discs (Soflex, 3M ESPE) and fine needle-shaped diamond grit burs (Mani Dia-Burs). Polishing was completed using the Double Diamond two-step (Clinician's Choice) System at 5000 rpm to high shine, followed by final buffing using an aluminum oxide paste (Enamelize, Cosmedent). The patient was sent away for gingival healing and final composite set before recall and final polishing.

Rationale for choice of restorative material

For the patient, a 36 year old young female with largely intact enamel volume and minimally-restored teeth, the goal of corrective treatment would involve maximal conservation of remaining tooth structure and the use of a composite system to create advanced shading that would recreate the optical nuances of an unrestored, virgin tooth.

Tooth reduction required in this case was minimal, perhaps 10% of total tooth volume. Pascal Magne advocates bonded porcelain restorations in cases where structural coronal compromise is greater than 60% of the original tooth volume. This figure represents the critical threshold of minimal crown stiffness needed for long-term performance where increased loss will require a material with heightened physical properties. A composite material is more flexible than porcelain and when used to regain stiffness in a critically-weakened tooth renders it still highly susceptible to fracture.3 In this case, the enamel shell and coronal tooth structure has not been compromised to any significant degree, and thus bonded composite can be expected to last well.

This case utilised the achromatic enamel technique according to Newton Fahl.[2] The reason a non-Vita shaded enamel layer (GC G-ænial Anterior Adult Enamel) was able to be used was due to the internal construction of chroma by two Vita-shaded shades: GC G-ænial Anterior AO2 (Opaque A2) and A1 (body A1) shades. Often if the chromatic dentin shades are too low in value or too great in chroma, this can be modulated to a small degree using Vita-shaded chromatic enamels with the target final shade. Precision of incremental layer thickness is crucial to the development of the shade match.[1] This was judged frequently and systematically from the incisal edge as volume was rebuilt.

In the patient's case, since nearly all of the enamel was intact, it was deemed unnecessary to complete a bonded porcelain restoration, which would have necessitated proximal preparation to eliminate old restorations, essentially a wrap-around porcelain veneer design. The patient's age as well as risk:benefit and benefit:cost ratios were weighed with the nod given to this highly-characterisable composite veneer system. The ease of placement and simplicity of internal characterisation creation puts this system at the cutting edge of conservative aestheticsin dentistry today. The ability of the material's chameleon effect to blend seamlessly into the background with a precise, natural shade palate is representative of a modern, supercomposite material that truly works as hard as you do. This case study has been about more than building a few teeth. It has been about working with a system that facilitates clinician confidence at the same time as it builds a confident, beautiful smile on your patients for years to come.

Before.

After.

References

1) Ahmad, I. Chromatically-Crafted Restorations: Shade Matching with Resin-Based Composites. J. Cosmetic Dent. 2013; 29(1): 43-50.
2) Fahl, N. Jr. Step-by-Step Approaches for Anterior Direct Restorative Challenges: Mastering Composite Artistry to Creat Anterior Masterpieces – Part 2. J. Cosmetic Dent. 2010; 26(4): 42-55.
3) Magne, P. and Belser, U. Bonded Porcelain Restorations in the Anterior Dentition: A Biomimetic Approach. (2003) Quintessence Publishing Co, Inc. pp. 50-55.