

G-ænia ANTERIOR/ POSTERIOR

International
case studies

Volume 2

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Complex composite bonding to peg laterals

Case Study 1

Dr Anthony Mak
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In general dentistry, clinicians have a wide variety of options when it comes to restoring fully matured teeth in adults. But in the case of children and in developing dentitions, the goal to be minimally invasive and still provide an excellent aesthetic result restricts the clinician to only limited options.

Modern composite resin as a form of restorative material has been developed to the point that truly natural aesthetics can be achieved predictably and systemically. An understanding of the shades available in each system and the simple science of colours in the natural teeth will give the knowledge to predictably achieve results that each clinician desires.

Sophie

Sophie has been a patient of my practice since it first opened and when she was just a very little girl. She was a model patient, regular in her appointments and had no caries and good oral hygiene.

So when her mum came to me concerned with the aesthetics of Sophie's teeth and the bilateral congenital peg maxillary lateral incisors, I knew something had to be done.

The treatment plan was for Sophie to have orthodontic treatment with a local orthodontist, then followed by restorative dentistry to improve the aesthetics of the peg maxillary lateral incisors. (Figs 1 and 2 pre-orthodontic treatment. Fig 3 post operative orthodontic treatment.)

Being eleven years old, we were limited in options to restore her peg laterals restoratively while minimising biological damage to her healthy dentition. The best treatment modality in this case was to use composite resin to aesthetically build up the tooth to ideal dimensions, contours, colours, occlusion, and emergence profile. Below are the steps that were used to achieve a successful aesthetic result.

After orthodontic treatment, and before final retainers were to be made, a diagnostic appointment was made with Sophie. At that time pre-operative photos were taken inclusive of a polarised picture to enhance the details in her existing and adjacent teeth. (Figs 3, 4, 7)

An aesthetic analysis was completed and it could be seen that the peg laterals had short clinical crown heights due to hyperplastic/excessive gingiva that were not in sync with the adjacent pink/white aesthetic interface. Hence it was decided that to achieve ideal aesthetics, some crown lengthening was required via a gingivectomy procedure. (Figs 5 & 6)

A diode laser was used to aesthetically sculpt the gingiva to increase clinical crown height of both maxillary peg lateral incisors. At the end of that same appointment, impressions were taken for a diagnostic wax up. From the wax up, a palatal putty key was fabricated to assist in the composite build-up using the layering technique.

After a 2 week healing period, Sophie returned for her composite bondings. See Fig 8 for her pre-restorative photo after laser gingivectomy to lengthen the lateral clinical crown height.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8

Complex composite bonding to peg laterals (continued)

The first composite layer was placed with the palatal putty key in situ. A translucent shade similar to natural enamel was used. (Shade JE). This layer was placed as thin as possible to allow the maximum amount of space for further colours to be placed on the tooth. (Fig 9)

Figures 10 and 11 show the thin palatal layer which is very translucent and almost transparent. Using the putty key that was made on an articulated diagnostic wax up minimised the need for occlusal adjustments at the end of the composite build up. This also minimised the loss of colour from a particular layer if modifications due to occlusion were required.

The palatal shelf is the keystone for success in this form of restoration.

Once the palatal layer was in place, the bulk of the tooth and the mamelons were built up with a body composite A2 shade.

Careful sculpting of the mamelons was required to create a natural appearance of the restoration. This was achieved using simple composite instruments and size 3 brushes. (Fig 12)

When the bulk of the dentine and the dentine mamelons were completed, the next objective was to give the restoration a depth of field to mimic the natural Dentino Enamel Junction (DEJ). A very translucent shade was used for this task (shade TE). This layer is not absolutely necessary, but would improve the final appearance by enhancing the dentine mamelons. (Fig 13)



Figure 9



Figure 10



Figure 11



Figure 12



Figure 13



Figure 14

Complex composite bonding to peg laterals (continued)

Prior to the final enamel layer, natural white enamel characteristics that are individual in every tooth were placed using a very white shade (BW). These characteristics are different in every single tooth and hence do not need to be copied exactly from adjacent teeth. (Fig 14)

Lastly, the final layer, using a high value low chroma enamel shade, was used to replicate the natural enamel. (shade JE). Final sculpting and time spent at this stage to achieve the contours required for natural aesthetics minimised the need for trimming and contouring with rotary instruments. (Fig 15)

Once the restoration is complete, a translucent gel is placed over the restoration immediately after final curing. (GC Air Barrier) The bonding is then cured again to minimise the amount of uncured resin at the surface, leading to improved polishability of the restoration.

The final restorations are then contoured with fine diamond instruments and polishing strips. (Fig 17) The majority of the polishing and creating of surface texture was completed using a series of polishing points and a final shine with a 1µm diamond polishing paste.

The end result was a successful, highly aesthetic restoration that was minimally invasive and natural in appearance. (Figs 18-22) Both mum and Sophie were extremely happy with the final result.



Figure 15



Figure 16



Figure 17



Figure 18



Figure 19



Figure 20



Figure 21



Figure 22

Aesthetic enhancement with veneers

Case Study 2

Dr Jason Smithson
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Figure 1 – Pre-treatment smile showing unaesthetic, poorly integrated existing upper central incisor resin veneers. Patient requested aesthetic enhancement following orthodontic treatment.



Figure 2 – Retracted shot showing wear on central incisors with loss of volume and length: these teeth were planned for restoration with direct resin veneers. The lateral incisors also show some degree of volume loss: these will be restored when the patient's funds allow.



Figure 3 – Split rubber dam in combination with retraction cord was employed for isolation. The existing resin veneers were removed and any sharp line angles rounded with discs.



Figure 4 – Following application of a dentin bonding agent, palatal shells were built using a palatal stent and GC G-aenial JE.



Figure 5 – The mesial and distal line angles and contact points were formed also with GC G-aenial JE.



Figure 6 – GC G-aenial Opaque (AO2) was placed to mask restoration margin and reduce 'shine through' in mid third of tooth.



Figure 7 – GC G-ænial A2 was placed as a dentin replacement from gingival margin to mamelon lobes. The enamel "halo" was formed with high value XBW GC G-ænial.



Figure 8 – GC G-ænial B1 was employed in incisal third to increase value and reduce chroma of lobes.



Figure 9 – Incisal effects were created with GC Gradia Lab (T1) and IC9 to form blue/grey opalescence and white intra-enamel crack lines.



Figure 10 – Final enamel layer (GC G-ænial JE) was placed over entire facial surface and smoothed with GC Composite Primer on a sable brush.



Figure 11 – Line angles and lobe form were marked with a pencil.



Figure 12 – Final outcome at 2 week review.

Creating deluxe aesthetics with direct, layered composite resin veneers

Case Study 3

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Academy of Cosmetic Dentistry

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 aesthetics bothered 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. Teeth 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 aesthetic concern. An option was also given to the 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 aesthetics, 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 aluminium 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/ageing, and is depending on 6 variables: hue, chroma, translucency, fluorescence and opalescence. Ifan Ahmad describes the colour match at any given time as more ephemeral rather than eternal.¹



After complete removal of the existing composite resin, a light chamfer was created along the margin to control emergence profile and cervical shading. 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 body shade, 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 to achieve 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 aesthetics in 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 for 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 Create 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.

Extensive posterior restoration

Case Study 4

Dr Graeme Milicich
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Challenge

A patient presented complaining of pain in 16 as a result of biting on confectionery the previous day. The tooth had a MO amalgam and a small DO amalgam. No painful response could be elicited when pressure testing any of the cusps, but the tooth was cold sensitive. The decision was made to remove the old amalgams to visually assess for internal fracturing under any of the cusps.



1 The MB cusp is reduced and a fracture dissected out.

Building the substructure



2 Tooth after enamel etching and bond placement. Note the use of a small plug of Teflon tape to help close the matrix on the mesio-palatal gingival floor.



3 A thin layer of G-aenial Flo X radiopaque flowable is placed and cured.



4 The cavity wall is built using G-aenial POSTERIOR composite.



5 A 1mm layer of everX Posterior is placed on the floor of the cavity and cured.

Completing the restoration



6 A 1mm layer of A2 G-aenial POSTERIOR is placed and cured.



7 A final layer of A1 G-aenial POSTERIOR is placed, contoured and cured.

Result



In large posterior composite restorations, excellent marginal integrity is achieved by using an incremental build-up technique to control shrinkage stress.

Strong and beautiful



Before.



After.
G-æniel Universal Flo A3,
G-æniel ANTERIOR JE.

Dr Matteo Basso
Milan, Italy



Before.



After.
G-æniel ANTERIOR A3.

Dr Jason Smithson
London, United Kingdom



Before.



After.
G-ænial Universal Flo A3
G-ænial POSTERIOR A3

Dr Ayad Mouayad Al-Obaidi
Baghdad, Iraq



Before.



After.
G-ænial Universal Flo A3
G-ænial POSTERIOR A2
G-ænial POSTERIOR JE
White effect with XBW

Dr Ayad Mouayad Al-Obaidi,
Baghdad, Iraq

G-ænial ANTERIOR



G-ænial ANTERIOR is perfect for beautiful and natural looking high gloss restorations.

It features enhanced light scattering abilities to bring a more natural vitality, with exceptional shade matching for superior aesthetics. This is achieved through an extremely diverse structural composition, which enables light movement to mimic the optical properties of a natural tooth.

G-ænial ANTERIOR gives more working time, so you are free to shape, flow and sculpt to obtain anatomical form with ease. Its smooth, non-sticky consistency can be shaped with either an instrument or a brush, giving you total control over your results.

Standard shades:

XBW, BW, A1, A2, A3, A3.5, A4, B1, B2, B3, C3, CV, CVD

Inside special shades:

AO2, AO3, AO4

Outside special shades:

JE, AE, SE, IE, TE, CVE

G-ænial POSTERIOR



G-ænial POSTERIOR features a similar diverse filler structure to G-ænial ANTERIOR, but introduces shades with a deeper concentration of colour to better match the optical properties of posterior teeth.

G-ænial POSTERIOR is formulated for both strength and low shrinkage stress. It also features high fracture toughness and reduced polymerisation shrinkage stress to help reduce the risk of long term failure.

G-ænial POSTERIOR has an increased filler loading to give firmer consistency and greater control when contouring anatomical form in posterior restorations. The packable consistency will still wet and flow when manipulated to ensure intimate adaptation to cavity walls.

Standard shades:

P-A1, P-A2, P-A3, P-A3.5

Outside special shades:

P-JE, P-IE

Both ANTERIOR and POSTERIOR shades of G-ænial are formulated for universal applications (ie anterior shades can be used in posterior restorations and vice versa).



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