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G-ænial ANTERIOR

Case Report:
Anterior layered composite resin
veneer on a peg lateral tooth

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Case report



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“I was born with diastemas and this is something I am very conscious of. I figure that crowning my peg (lateral 12) tooth would greatly improve my smile. I know that there are different options for treatment.”

Introduction

Patient P.M-W. presented to my service for a consultation regarding peg lateral tooth 12. The patient indicates regular past dental recall attendance and reports non-dental facial trauma status-post kickboxing impact with a mouthguard in place.

Medical History

Conditions: S/P bronchitis, S/P concussion (kickboxing), S/P severed finger at 3y.o.

Medicines taken: none reported

Allergies: NKDA: no known drug allergies

Treatment List (FDI classification)

Tooth 12: direct acid-etched layered composite resin restoration

Restorative Material

G-ænial ANTERIOR, GC Corporation

Base shade: Adult Enamel (AE)

Secondary shade: A2 Opaque (AO2)

Tertiary shade: Incisal Enamel (IE)

Facial enamel layer: Adult Enamel (AE)

Optibond Solo Plus, Kerr

Acid-etched preparation, 5th generation adhesive

Diagnosis and Treatment Plan

Diagnosis

The specific examination pertinent to the patient's immediate concern (12) started with an extraoral examination. Lymph nodes, salivary glands, muscles of mastication and temporomandibular joints appeared normal with a range of opening of 55mm.

Intraoral soft tissue examination revealed a negative cancer screen, as well as involved segmental periodontal charting of the upper anterior sextant. The patient exhibits good oral hygiene with an occasional flossing habit. Deepest probing depth for the maxillary anterior sextant = 3mm without bleeding on probing. Localised mild recession was noted on teeth 33-43, and localised moderate recession on 34, 44 and 24.

Intraoral hard tissue examination showed that teeth 25-15 (FDA classification) were negative to percussion and palpation. There was no abnormal clinical mobility associated with any teeth from 25-15. He had a congenitally-missing tooth 22 and a well-spaced anterior dentition. Upper dental midline deviates to his left side by 3mm. Lower dental midline is coincident with facial midline.

Radiographic examination involved a single periapical radiograph of the 12 region. There was no apical rarefying osteitis noted. Lamina dura and periodontal ligament space appears within normal limits.

Discussions with the patient involved strong preference for orthodontic re-distribution of space before a diagnostic wax-up and pre-restorative bleaching and implant planning in conjunction with a direct composite veneer on peg lateral tooth 12. Both Invisalign and pre-restorative whitening was not desired by the patient at this time.

Treatment Plan

- Cursory examination (hard and soft tissue): extra-oral and intra-oral
- Pre-operative periapical radiograph
- Informed consent
- 12 pre-operative American Academy of Cosmetic Dentistry (AACD) photo series taken
- Colour mapping
- Anaesthesia, isolation and micro air abrasion (50 micron aluminum oxide)
Etch, bond, direct, layered restoration with AE, AO2, IE, AE for peg lateral tooth 12.
- 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.

Description of Treatment Including Rationale for Choice of Restorative Material



Patient P. M-W. Is a 26 year old man referred by his mother, an existing patient of the practice. Following the specific examination, diagnosis, treatment plan and informed consent, the patient was anaesthetised with 0.5 carpules of 4% Articaine (amide anaesthetic) with 1:105 epinephrine). Prior to split dam isolation, the colour map was immediately noted.



The no-preparation technique for peg lateral 12, conserving the full volume of enamel was possible due to under-contoured dimensions of the tooth. Bond strengths to enamel are typically more predictable than dentin. Following #00 retraction cord (Ultrapak, Ultradent), tooth 12 was micro-air abraded with 50 micron aluminum oxide.



Tooth 12 was etched with 33% H₃PO₄ (aq) followed by application of three coats of Optibond Solo (Kerr Corp) before air-thinning to evaporate the solvent. This was light-cured with a SDI Radium LED light source. An initial lingual shelf or thin milky-white enamel layer (G-aenial Anterior AE shade) was applied to the deficient palatal areas of the peg lateral tooth, exceeding no more than 0.3mm in thickness. This provided the scaffold for the restoration.



The opacous body dentin mass used (G-ænial Anterior AO2) was applied next in increments to minimise polymerisation shrinkage and ensure complete polymerisation through the opacous material. This material was sculpted incisally to create optical irregularity and mimic the internal structure of dentin as well as facially to start the deep formation of dentin lobes.



Next, G-ænial Anterior Incisal Enamel (IE) – an achromatic translucent enamel shade – was applied to the incisal third of the tooth. This would increase light transmission into the tooth in this critical area and allow optical viewing/characterisation of the constructed incisal details. IE was rolled up into a small ball and gently burnished in place using the Greenstein/Almore instrument. The facial contour was frequently judged from the incisal view to prevent over-contouring of the dentin layer.



Finally, the enamel layer was applied in a single increment of G-ænial Adult Enamel (AE) sculpted, brushed and defined interproximally. Following final curing of the material, pencil markings were made on the facial surface of 12 defining the line angles to be preserved. Following this, a needle-point fine diamond bur and large, coarse SofLex disc (3M) was used to define primary anatomy and secondary anatomy (lobes, mamelons) before preliminary polishing.



At this point, the contact was confirmed and interdental region refined with a 12b scalpel blade, and the patient sent away for 48 hours to allow for full hardness setting of the composite resin. At the next appointment, final polishing was completed and the full post-operative AACD photo series taken. Photographic consent and the final periapical radiograph were obtained at a subsequent appointment.



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Final Result

The patient was extremely pleased with the final aesthetic result, saying that the restorations not only looked lifelike, but also looked exactly like the tooth he always knew but couldn't see. It felt like he had always had it all along.

This was a very satisfying clinical procedure for myself.

Rationale for Choice of Restorative Material

For patient P. M.-W., a 26 year old young man with generalised maxillary anterior spacing, congenitally-missing tooth 22 and peg lateral 12, we decided that a direct, layered resin veneer would be the best choice considering the need to:

- 1 be optimally conservative of remaining tooth structure and
- 2 create a biomimetic restoration that would blend seamlessly into the tooth structure.

If the deficiency in the tooth had originated from a large enamel-dentin fracture involving at least 60% of the tooth or a large Class VI fracture to the level of the gingulum, I would have been biased towards bonded porcelain restorations as per Dr. Pascal Magne:

*"When a more flexible material replaces the enamel shell, only partial recovery of crown rigidity can be expected."*²

In this case, despite the lesser flexural strength of bonded composite relative to sound enamel, the overall flexural strength has been added to and not compromised at all.

The rationale for using a pure nanohybrid-veneered composite technique was based on the studies of Periera et al³ in 2003. Using a three-point bending device (ISO4049), they demonstrated that the lowest

flexural strength was attained by the pure-microfill composite veneer. An intermediate flexural strength was noted for the microfill-veneered-hybrid composite veneer. The highest flexural strength was noted for the pure hybrid composite veneer. The reason for using an achromatic composite (G-aenial Adult Enamel) instead of a chromatic enamel was that the value and hue was pre-established with the use of a chromatic VITA dentin shade (AO2), which blended well and helped to augment the perceived dentin structure and shade of the tooth. Slight modulation of this chroma and value was achieved with a non-VITA achromatic enamel as per Dr. Newton Fahl's technique.¹

In P.M-W's case, since all of the enamel on the tooth was intact, it was deemed unnecessary to complete a bonded porcelain restoration in this case, which would have necessitated preparing excess enamel for a modified, wrap-around porcelain veneer. Given the patient's age and the risk:benefit ratio of a bonded composite resin restoration versus a bonded porcelain restoration, conservatism won out in the end with the ultimate decision to place carefully-sculpted layered composite restorations. This conservative solution allows for the restoration of natural esthetics and tooth form paired with the reparability and resurfacing potential of direct composite resin, giving him and his tooth a confident reason to smile, long into the future.



Patient before treatment



Patient after treatment

References

- 1 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.
- 2 Magne, P. and Belser, U. *Bonded Porcelain Restorations in the Anterior Dentition: A Biomimetic Approach*. (2003) Quintessence Publishing Co, Inc. pp. 50-55.
- 3 Pereira, C.L, Demarco, F.F., Cenci, M.S., Osinaga, W.R. and Piovesan, E.M. *Flexural Strength of Composites: Influences of Polyethylene Fiber Reinforcement and type of composite*. Clinical Oral Investigations 2003; 7(2):116-119.