Accreditation Clinical Case Report, Case Type V: Six or More Direct Resin Veneers

by Scott W. Finlay, DDS, AAACD
Arnold, MD
www.annapolissmiles.com

Introduction

Direct resin veneers are the ultimate challenge for the restorative dentist as a clinician and artist. The culminating result measures the dentist's abilities in patient management, smile design, and understanding of the mechanical and physical properties of dental resins. Chairside, the dentist "morphs" into the laboratory technician. Resins, opaquers, and tints are layered as a ceramic artist would with porcelain. Today, there is no single direct restorative material that fulfills all the prerequisites for a predictable result—function, esthetics and biocompatibility—but the combination of materials and techniques can produce a beautiful synergistic result.[1]

Today, there is no single direct restorative material that fulfills all the prerequisites for a predictable result.

Patient History

A 21-year-old male presented with the chief complaint that his teeth were yellow, spotted, and chipping (Fig 1). He wanted a whiter, more esthetic appearance with natural contours that did not make his teeth look worn and aged. He liked the general contours of his teeth, but did not like the deterioration of their surface. The patient was in excellent health and was a junior in college, where he played lacrosse.

Clinical Examination and Findings

The patient presented with a complete dentition with the exception of the third molars, which had been removed when he was younger. He had had orthodontics as a teenager. Residual surface blemishes may have been the result of surface decalcification during periods of inadequate homecare during the orthodontic treatment. He also had had "a la carte" repair of isolated areas of caries with both direct and indirect restorations. Radio-

Heraeus

Venus® Temp C&B

Transforming Temporary into Extraordinary.

Venus® Temp C&B exceeds the expectations of both patients and professionals by giving temporary restorations a unique combination of beauty and strength. Patients undergoing a temporary restoration can now anticipate the same esthetics found in final restorations.

Temporary is extraordinary with new Venus Temp C&B.

Simply Beautiful.

To learn more about Venus Temp C&B call us at **1-800-431-1785** or visit us at www.**smile**by**venus**.com

Venus®

Heraeus is pleased to donate a portion of the proceeds from the sale of all Venus Temp C&B products to the National Children's Oral Health Foundation

© 2008 Heraeus Kulzer, LLC 300 Heraeus Way, South Bend, IN 46614 Phone (800) 431-1785 Fax (800) 522-1545 Venus® is a trademark of Heraeus Kulzer GmbH.

Figure 1: Preoperative full-face image.

graphic and clinical examination determined that the patient was free of active caries. Margins on existing restorations were well sealed and contiguous. Relative to the number of restored surfaces and location, caries risk assessment was slightly higher than average due to dietary and home care issues.

Inter-digitation of the teeth revealed a Class I occlusion with mild occlusal and incisal wear. The patient's temporomandibular joint was symptom-free. The joint hinged freely with light bimanual manipulation. He exhibited a full range of excursive movements. Anterior guidance was adequate, providing disclusion of posterior teeth on excursive movements from centric relation (CR). There was no clinical slide from CR to maximal interocclusal position (MI). Model analysis revealed a stable occlusal relationship with centric holding contacts on each tooth, and mild forensic evidence of parafunctional activity.[2]

Esthetic evaluation[3] (Fig 2) revealed the following findings:

- The incisal display was in an acceptable range at full smile and repose.
- Tooth #9 was chipped on the incisal edge.
- There was spacing between all teeth in the anterior segment.
- Generous incisal embrasures existed, which were uniform throughout the smile.
- The cuspid contours were bulbous relative to other teeth, which generally exhibited rather flat facial contours and embrasures.
- The teeth presented with acceptable proportions to each other. The centrals displayed appropriate dominance, without the laterals competing for attention as may be desired in a youthful smile.[4]
- Gingival zeniths of the six anterior teeth displayed a "gull wing" appearance that was consistent with our esthetic parameters.
- The tooth base shade was A3/2M3 as measured visually and verified with the Vita Easyshade spectrophotometer (Vident; Brea, CA). Incisal translucency was more noticeable on the centrals than the laterals, with moderate translucency and volume.
- Labial surfaces showed significant discoloration from enamel hypocalcification. Failing interproximal composite restorations exhibited marginal leakage, staining, and surface discoloration.
- Posterior teeth adequately filled the buccal corridor and the smile zone preoperatively included teeth ##3-14.

Treatment Plan

The patient had two primary options to improve the appearance of the surface of his teeth: Direct resin veneers or indirect laminate veneers. Direct resin veneers were chosen because of the conservative nature of the technique. With appropriate management of the occlusion and an understanding of the physical properties of selected resins, this material can be used predictably for restorations to enhance a patient's smile.[5] Therefore the treatment plan was developed as follows:

- periodontal tissue management
- model analysis and diagnostic wax-up

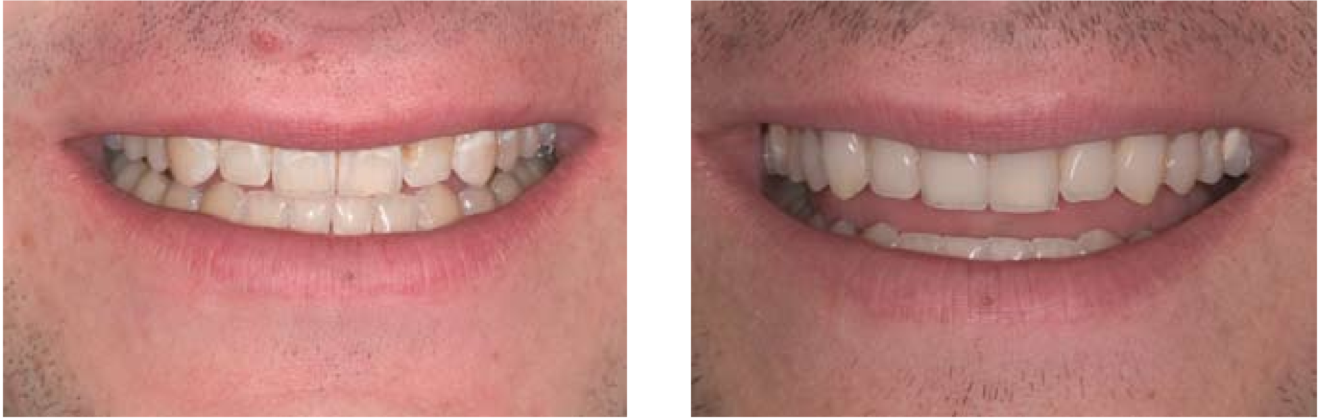


Figure 2: Before and after full smile; the patient shows an appropriate incisal display with a smile line that mimics the curvature of the lower lip.

- equilibration
- dental whitening
- direct bonded resin veneers ##5-12, with enamelplasty of #3, #4, #13, and #14
- occlusal appliance.

Armamentarium

- D100 digital camera (Nikon USA; Melville, NY)
- SAM 3 articulator (Great Lakes Orthodontics; Tonawanda, NY)
- Sil-Tech polyvinyl siloxane putty (Great Lakes Orthodontics)
- 15% Opalescence PF (Ultradent Products; South Jordan, UT)
- Vita Easyshade spectrophotometer (Vident; Brea, CA)
- 2.5x magnification loupes (Designs for Vision; Ronkonkoma, NY)
- T-Scan II (Tek Scan; Boston, Mass.)
- Douglas Terry Esthetic Composite Finishing Kit, (Brasseler USA; Savannah, GA)
- preparation diamond LVS3 (Brasseler USA)
- Jeltrate alginate (Dentsply Caulk; Milford, DE)
- AccuFilm articulating paper (Parkell; Edgewood, NY)
- Elipar Freelight 2 curing light (3M ESPE; St. Paul, MN)
- Clearfil Photo Bond bonding agent (Kuraray USA; New York, NY)
- Micro Prime desensitizer (Danville Materials; San Ramon, CA)
- Microbrush micro applicator (Microbrush International; Grafton, WI)
- 32% BAC Uni-Etch (Bisco; Schaumburg, IL)
- Filtek Supreme Plus composite (3M ESPE)
- OptraGate retractor (Ivoclar Vivadent; Amherst, NY)
- FlexiStrip finishing and polishing strips (Cosmedent; Chicago, IL)
- diamond polish (Ultradent)
- brush #3 (Cosmedent)
- Titanium Composite Instrument Kit (Cosmedent)
- Creative Color tints and opaque shades (Cosmedent)
- Renamel microfill composite (Cosmedent)

Treatment Description

Oral Hygiene

An enhanced oral hygiene regime was immediately implemented to ensure a stable and healthy periodontal condition. A dental prophylaxis was completed. Oral hygiene education included the use of a water irrigating device and a mechanical toothbrush. The patient's tissue improved remarkably from a 25% bleeding index to a 5% bleeding index. The patient was counseled about the effects of high soda and energy drink consumption over protracted periods of time. He was prescribed PreviDent 5000 (Colgate; New York, NY) to combat acids and aid in the re-mineralization of his enamel.[6]

Diagnostic Exam

A diagnostic exam was completed with a full radiographic series. Duplicate sets of diagnostic-quality

Figure 3: The initial preparation of the four incisors was accomplished to a minimal depth of .5 mm but extended in areas where necessary to eliminate the deeper blemishes and previous restorations.

Figure 4: The first layers of composite were applied using a hybrid interproximally and on the incisal edge to replace missing tooth structure, and a body shade microfill was applied in the gingival third.

models were then mounted on an articulator with a CR record. There was no significant discrepancy noted either clinically or on the models from CR to MI. Excursive movements revealed adequate disclusion of posterior teeth facilitated by the existing anterior guidance. The models were equilibrated to detail stable holding contacts and a diagnostic wax-up was completed to restore the missing incisal aspects primarily on ##9-11. The enhanced anterior contours allowed for all teeth to contact in centric occlusion (CO), but disclude all posterior teeth in excursive function.

Whitening

Dental whitening was completed utilizing a tray system.[7] Custom-fabricated vacuum-formed stents were created for both arches with small reservoirs on the facial aspects of the teeth. A 15% carbamide peroxide with potassium nitrate and .11% fluoride ion was utilized. Pre-whitening, the shade was documented as A3/2M3 visually with a shade guide and spectrophotometer. The patient applied the whitening agent for 14 consecutive days for a minimum of four hours each day. The result was that the incisor shade lightened to an A1. The patient was very pleased. However, dispersed on the surface, there remained the blotchiness of the hypo-calcified areas and residual staining of the existing composite restorations.

Model analysis revealed a stable occlusal relationship with centric holding contacts on each tooth, and mild forensic evidence of parafunctional activity.

Diagnostic Mock-Up

Prior to the preparation of the teeth, a mock-up was used to confirm the recipe for the layering technique. The intention was to use a base in the deeper interproximal repairs and in areas of planned extension on the incisal areas, which was a hybrid composite. A nanocomposite was selected because of its strength, wear resistance, and optical properties, which are similar to dentin. Layered over this was a microfill. In the gingival third of the tooth, the body shade A1 was used, and in the incisal area Medium Incisal was applied. The microfill was selected due to its consistent color, polishability, and resulting natural appearance. The intention was to keep the thickness of the restoration to a minimum. Tints and opaquers were not utilized because the desired result could be accomplished without them. This mock-up gave us the confidence that we were headed in the right direction.[8]

Preparation and Layering

Next, occlusal detailing via an equilibration process was completed. Preoperatively, CR coincided with CO. Minor detailing refined the stable holding contacts in CO. All excursive movements were verified to be free of any posterior interference. Initial preparation began with teeth ##7-10 and continued until the initial contours were layered with resin before beginning the adjacent teeth. The cuspids and bicuspids were managed in a similar fashion at a separate visit. Preparation involved the use of a tapered

Figure 5: A final veneering layer of a medium translucent, medium-value microfill was applied and sculpted to the approximate tooth contours.

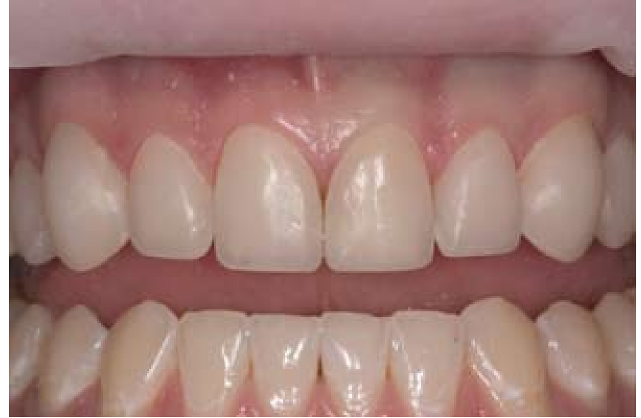


Figure 6: All teeth that were to be restored were built up prior to the development of the final labial contours.

diamond bur to the initial depth of approximately .5 mm to .7 mm (Fig 3). In many areas the surface discolorations disappeared at this point, but in several areas they remained visually present. These areas were prepared additionally. It was important to ensure that the cavosurface of the restoration blended onto solid, well-organized enamel. The preparations on the balance of the teeth thinned to less than .5 mm in the gingival areas. Interproximally, there were several pre-existing restorations that were removed to ensure a sealed and well-bonded restoration to sound tooth structure.

Teeth were managed on an individual basis and built up to full contour before final contouring and polishing was initiated as a group. Each tooth was conditioned with 35% phosphoric acid for 15 seconds, then washed for 30 seconds, with only the excess moisture removed, being careful not to dehydrate the tooth and collapse the unsupported collagen network of the hybrid layer.[9] Three coats of a primer were then applied to the exposed dentin, mostly in the interproximal areas, until shiny and evaporated between each coat with the vacuum. Next, multiple coats of an unfilled resin were applied to the entire surface of the tooth and air-thinned prior to being cured.

The hybrid composite shade B2B was then applied to the interproximal areas (if required due to pre-existing interproximal restorations that required restoration) and leveled to the collateral prepared surface areas (Fig 4). This was cured and additional hybrid was added to the incisal areas of ##9-11, individually, with the assistance of a putty matrix fabricated from the diagnostic wax-up. This allowed for functional areas to have the added benefit of support from the hybrid composite.

Layering of the microfill composite then proceeded (Fig 5). The gingival third was layered with shade A1B, thinning to the mid portion of the tooth. Composite was applied to the intended tooth contours, and smoothed with a flat-end sable brush. Medium Incisal was then applied from the incisal edge, reciprocally feathering into the gingival area.[10] This stratification method of layering composite was completed on all teeth before detailing of final contours was initiated (Fig 6).

The essentials of esthetic tooth contour were developed with a tapering fine diamond. The intention was to create a natural appearance. Preoperatively, the patient had presented with generous incisal embrasures with minimal spacing that he liked. The incisal embrasure design was maintained to harmonize with the remaining dentition (Figs 7 & 8). Final contours were detailed through a multi-step process involving chairside visualization, photography, and diagnostic models.

Contouring and Polishing

Detailing contours of multiple anterior direct restorations can be a relentless pursuit. The three most common challenges are typically contour, polish, and tissue response (Fig 9). A critical eye can always reveal additional areas to enhance. In this case, limiting the time spent chairside at each appointment and

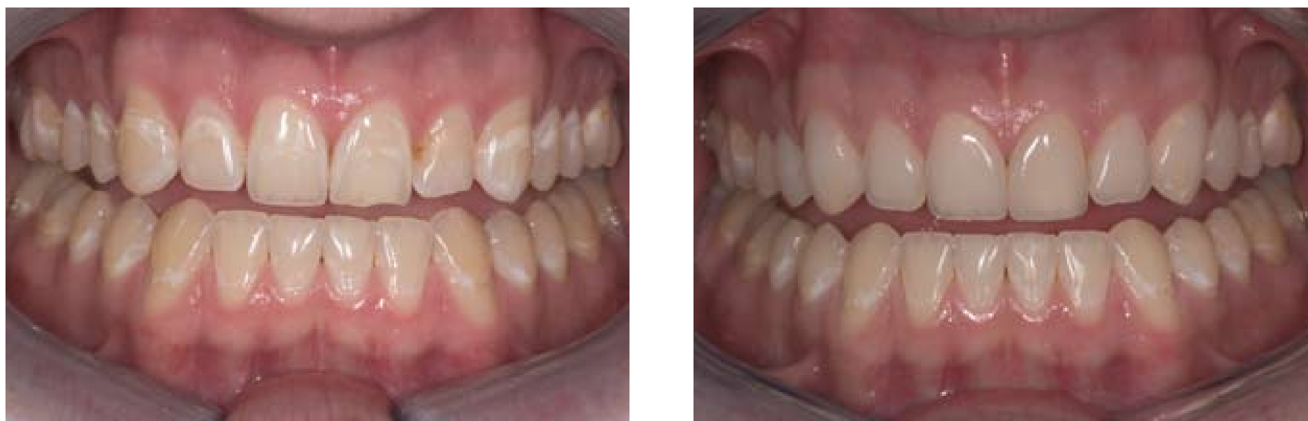


Figure 7: Before and after retracted 2:1 view. The incisal translucency of the newly restored teeth harmonizes with the balance of the smile. The unique incisal edge contours enhance the natural appearance as the direct composites blend into the surrounding natural teeth.

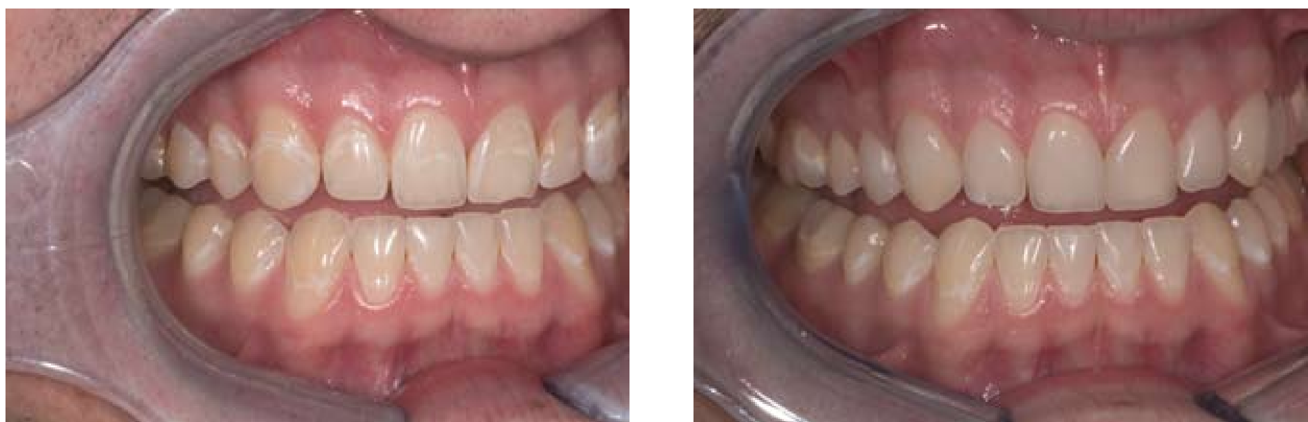


Figure 8: Before and after right lateral retracted 2:1 view. The incisal embrasures gradate toward the posterior. Enhancement of the labial anatomy and facial embrasures in the final restorations creates a balanced and natural appearance.

to detailing the case over several appointments was most effective. At the end of each visit, diagnostic impressions were taken to create models that could then be evaluated prior to the patient's next visit. This greatly aided in visualization and in designing naturally balanced contours that harmonized with the rest of the patient's teeth.

Nature, although esthetically symmetrical, is not identically mirrored from side to side. Direct layering of resin can approach wonderful depth of color and the appearance of natural tooth structure; however, our greatest illusions can come from contour. Specifically, in this case, the goal was to develop unique incisal effects in contour and light refraction. I used incisal contours that were uniquely symmetrical and not necessarily perfectly mirrored to create a natural look (Fig 10). Translucency was beautifully managed with the selection of appropriate composite materials. In nature, an incisal halo is created by the refraction of light at the incisal edge through the enamel. In this case, it was subtly created by the bevel at the incisal edge of composite and the interaction of either natural tooth or hybrid composite to alter the reflection of light through this area.

This patient's smile zone displayed teeth from #4 to #13. After whitening, a majority of the hypocalcified areas had diminished in the bicuspid region. Enamelplasty was all that was needed to successfully remove those surface blemishes that remained on #4 and #13. This was accomplished with fine diamond burs.

Finishing and polishing were initiated with ultra-fine diamonds and carbides. Silicon and diamond impregnated discs and cups were then

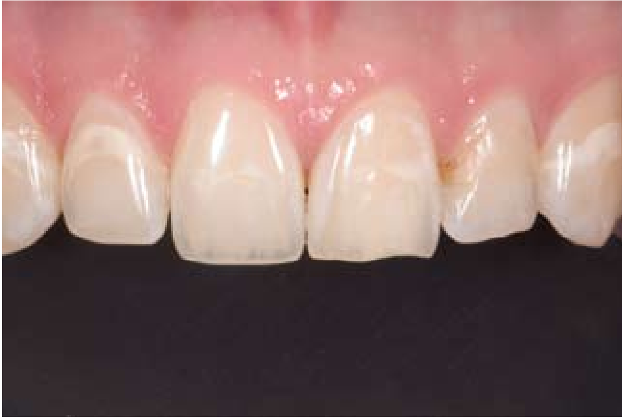
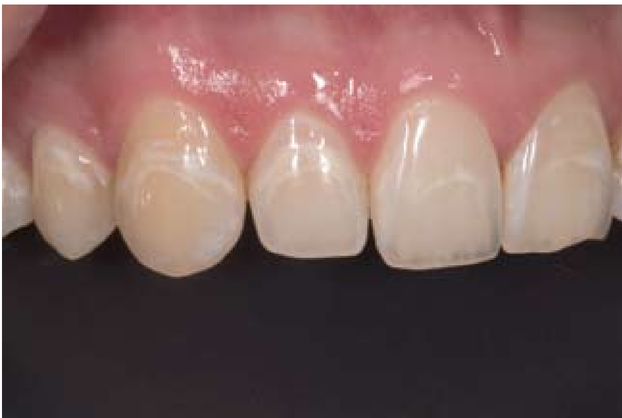


Figure 9: Before and after retracted 1:1 view. Optimal periodontal tissue health is supported and the gingival zeniths are positioned just distal of center, creating a converging axial inclination. Central incisors reveal symmetrical contours and balanced reflective surfaces in the final result.



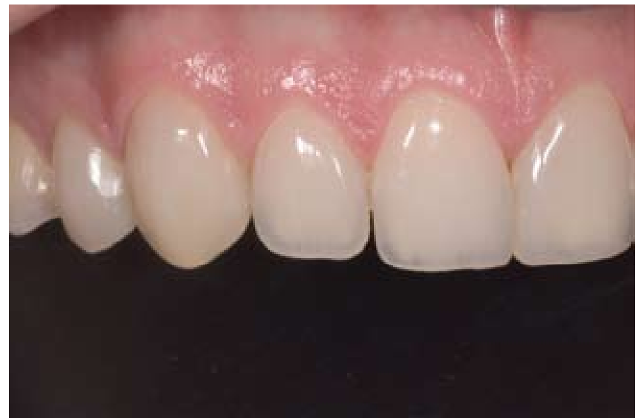


Figure 10: Before and after right lateral 1:1 view. Incisal translucencies and halo effect create a lifelike appearance due to the refractive properties in the composite material selection.

used, followed by a composite silicon polishing brush. The final luster was created with diamond polishing paste and a goat hair wheel. Patience and technique were critical to ensure a beautiful result. Care was taken not to abuse adjacent tissue, alter contours, or over-heat the composite causing visible damage at the margins.

Respecting the active lifestyle of our patient, both an athletic soft guard and an occlusal appliance were fabricated to help ensure the long-term success of his restorations.

Summary and Conclusion

The impact that a smile enhancement has on an individual can be easily demonstrated by the effect it has on the "smile zone." A broader and more confident smile is certainly a reflection of how this patient perceives himself. Direct resin veneers can be a very conservative treatment modality to enhance the smile and restore the confidence of our patients. With an understanding of occlusal concepts and material selection, a predictable result and a happy patient is a validating experience for the dentist (Fig 11).

Disclaimer: Although Dr. Finlay submitted an armamentarium within his report for this particular clinical case submission, current Accreditation protocol (dated June 1, 2008) does not allow for the submission of armamentariums within clinical case reports for Accreditation.

AACD Acknowledgment

The American Academy of Cosmetic Dentistry recognizes Dr. Scott Finlay as an AACD Accredited Member.

References

1. Terry D. *Natural Esthetics with Composite Resin* (chapter 2). Mahwah, NJ; Montage Media; 2004.
2. Dawson P. *Evaluation, Diagnosis and Treatment of Occlusal Problems* (2nd ed., chapter 2). St. Louis, MO: Mosby; 1989.
3. Blitz N, Steel C, Willhite C. *Diagnosis and Treatment Evaluation in Cosmetic Dentistry: A Guide to Accreditation Criteria*. Madison, WI: American Academy of Cosmetic Dentistry; 2001.
4. Chiche G. *Modern Esthetics, Complex Esthetics and Laboratory Advancements* [lecture]. Presented at the 22nd Annual American Academy of Cosmetic Dentistry Scientific Session, San Diego, CA; May 2006.
5. Willhite, C. Freehand resin bonding *Aesthetics* 3:77-80, 2006.
6. Perkins S, Wetmore ML. Acid induced erosion of teeth. *Dent Today* 20(4):82-87, 2001.
7. Leonard RH Jr., Eagle JC, et al. Nightguard vital bleaching and its effect on enamel surface morphology *J Esthet Dent* 13(2)132-139, 2001.
8. Jackson R. *The Art of Direct Resin* [course]. Presented at the Las Vegas Institute, Las Vegas, NV; March 30–April 1, 2006
9. Swift E. Bonding to enamel and dentin: A brief history and state of the art. *Quintessence Int* 26(2):95-110, 1995.
10. ibid Terry (chapter 7).

❖

Figure 11: The happy, satisfied patient.

Examiners' Perspective for Scott W. Finlay, DDS, AAACD

by J. Fred Arnold, III, DMD, AFAACD
Lexington, KY
www.lexingtonsmiles.com

The ability to handle composite resin well while applying smile design principles are the key skills needed to pass Case Type V, Six or More Direct Resin Veneers,. For dentists, this is the only case type in which technique photographic views are required. Members in the Accreditation process can have fun with this case, showing off their artistic skills to the examiners, as they layer and finish composite to replicate nature.

Dr. Scott Finlay certainly impressed examiners with his skills with Case Type V. His case selection was excellent, choosing a classic post-orthodontic decalcification case. His patient presented with moderate decalcified areas, minor incisal chips, good tooth alignment, healthy gingivae with symmetrical architecture, and teeth that did not require much of a value change—all ideal conditions for conservative direct resin veneers for Accreditation.

Dr. Finlay achieved a beautiful polychromatic result with realistic incisal halos and deep translucencies that highlighted the internal lobe development with a depth of color that rivaled nature. Dr. Finlay was also able to finish and polish the veneers to achieve excellent dental anatomy and a surface luster that matched the natural dentition.

This case passed unanimously, with only minor faults. Common faults noted included the open contact between teeth #9 and #10. Examiners also noted the minor value difference between the central incisors. The cuspids were slightly bulky with poor line angle development on the distal, as noted from the occlusal view.

Accreditation clinical cases are scored on a fault system, based on the dentistry meeting the Accreditation Examination Criteria. Faults are minor (-2 points), major (-4 points), or catastrophic (-8 points), with any score that adds up to a -8 or more being a failure. It is possible to get a bonus +1 for a positive overall look of the case. This is usually given if in the portrait view the dentistry is undetectable and natural-looking, with a pleasing, attractive smile. Three examiners did give Dr. Finlay's case a +1 for the overall look of the case. Note that if there is a catastrophic fault, it is an automatic failure and a +1 may not be granted. It is very important to remember that Accreditation success is not about perfection. It is about excellence!

Dr. Finlay should be very proud of his direct resin veneer case. His passion for excellence is what Accreditation is all about.

❖