

Accreditation Clinical Case Report, Case Type I: Six or More Indirect Restorations



by Emil Hawary, D.D.S., F.A.G.D.

INTRODUCTION

Helping a patient to achieve his or her dream of a beautiful smile can be a very fulfilling experience for the dentist, both professionally and personally. Indirect porcelain veneers and/or crowns allow us to change the shape, color, and alignment of the existing dentition. With recent advances in life-like materials, we are able to closely mimic the natural tooth structure with restorations that provide long-term wear, stain resistance, and translucency. However, to create this “beautiful smile,” it is necessary to master the various principles, tools, and strategies involved in the art and science of smile design.¹ It has been well established that the smile design theory can be broken down into at least four parts: facial esthetics, gingival esthetics, microesthetics, and macroesthetics.²⁻⁴ These principles are weighted heavily on the “art” side of the “art and science” equation,⁵ which makes the dentist’s job far more enjoyable and fulfilling.

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HISTORY

The patient was a 35-year-old female in good health, except for smoking. Although she had been through many years of orthodontic treatment, she was still very unhappy with her smile, which she wanted to be more uniform, symmetrical, and attractive (Fig 1).



Figure 1: Before; full face, 1:10. The patient's smile was not esthetically pleasing and violated a number of ideal smile design principles. After; 1:10, an attractive, rejuvenated face due to the improved smile design.

CLINICAL EXAMINATION

Clinically, all soft and hard tissues were within normal parameters. The radiographs indicated sound bone support. Periodontally, the patient had some gingivitis with no significant pocketing and minimal bleeding upon probing. Her temporomandibular joint was asymptomatic with no internal derangement, and no crepitus or clicking. She had a Class I occlusion with moderate overjet and overbite relationship. The entire dentition was caries-free, with no tooth mobility, and radiographs revealed no periapical pathology. The patient had some wear facets and was aware that she ground her teeth at night.

Esthetically, her smile would benefit from cosmetic enhancement. Upon clinical examination, it was revealed that macroesthetics were violated. The midline was off to her right by approximately 1 mm and was canted toward her right side. There were large enamel defects in

the middle-third of teeth #8 and #9 that were stained and were esthetically unpleasing (Fig 2).

The patient's smile was not esthetically pleasing and violated a number of principles of the ideal smile design.

Tooth #9 appeared shorter and narrower than #8 due to the uneven wear of the incisal edges and the asymmetrical gingival architecture between them. Black triangles existed between #8 and #9; this was a violation of the gingival esthetics. Teeth #7 and #10 showed some rotation, causing asymmetrical incisal embrasure gradation. The axial inclination of tooth #6 was inclined distally and tooth #8 was in a linguoversion. There was excessive wear at the incisal edges of #6, #7, #9, #10, and #11, indicating some parafunctional activity. The buccal corridor was underdeveloped in the premolar area. In addition, there was some

crowding of the lower incisors; this did not concern the patient (Fig 3).

After analyzing the patient's study models, careful consideration was given to the midline and the smile design to achieve a symmetrical result.

DIAGNOSIS

The patient's smile was not esthetically pleasing and violated a number of principles of the ideal smile design, as follows:

- canted and shifted midline
- discrepancy in shape and size of the centrals
- uneven gingival architecture with obvious black triangle between teeth #8 and #9
- stained enamel defect in the middle one-third of the centrals
- rotation of the laterals and excessive wear of the incisal edges of the incisors and canines.



Figure 2: Before; full smile, 1:2. An esthetically unpleasing smile due to a black triangle between #8 and #9, large stained enamel defects in #8 and #9, uneven wear of the incisal edges, and deficient buccal corridor in the premolar area. After; full smile, 1:2; completed treatment reflects a more youthful, feminine, and pleasing smile.

TREATMENT PLAN

A complete set of records was taken. These included full radiographs, study models, and a set of 35-mm digital photographs showing all 12 views as recommended by the AACD.^{6,7} Facebow transfer, centric relation records, facial height and width measurements, and periodontal chart measurements were taken. The models were mounted on a semi-adjustable articulator and checked for occlusal discrepancy.⁸

A lengthy discussion of treatment modalities aided in the formation of the treatment plan. Different options were presented to the patient, including restoring teeth #5–12 with direct resin veneers or indirect feldspathic veneers, in addition to bleaching her teeth and fabricating a nightguard. The patient chose porcelain veneers because they can better maintain their polish and resist stain and fracture.⁹

After equilibrating her dentition,¹⁰ a maxillary impression was taken to construct a composite mock-up on study casts; this was done to evaluate proper tooth morphology and tooth length for best esthetics, proper gingival contours, and improved smile line. This mock-up was presented to the patient, utilizing preoperative models to assist in determining the options and course of treatment.

The patient chose porcelain veneers because they can better maintain their polish and resist stain and fracture.

An impression of the composite mock-up was made in polyvinyl siloxane putty material to create accurate temporaries. The composite mock-up was duplicated in stone to create a vacuum-formed stint that was used as a reduction guide (pin-hole preparation guide) to help in

proper tooth reduction at the preparation appointment.

Armamentarium

- 3.5 magnification loupes (Designs For Vision; Ronkonkoma, NY)
- EOS Digital Rebel camera (Canon; Tokyo, Japan)
- EOS 20D Digital camera (Canon)
- Jeltrate Plus alginate (Dentsply Caulk; Milford, DE)
- yellow stone
- Denar facebow (Waterpik; Fort Collins, CO)
- Truebite tooth indicator (Dentsply)
- Denar semi-adjustable articulator (Waterpik)
- AccuFilm articulating paper (Parkell; Edgewood, NY)



Figure 3: Before; retracted frontal view, 1:2. Asymmetrical gingival architecture between #8 and #9, which made #9 appear shorter and narrower than #8. Uneven rotation of #7 and #10 contributed to asymmetrical incisal embrasures. After; retracted frontal view, 1:2. Final restorations with even gingival architecture, symmetrically shaped and sized centrals, and similar incisal embrasure gradation.

- Sil-Tech putty impression material (Ivoclar Vivadent; Amherst, NY)
- Splash polyvinyl siloxane impression material (Discus Dental; Culver City, CA)
- Vacuum-formed copyplast pin-hole preparation guide (Schofu; San Marcus, CA)
- Vacuum-formed copyplast stent for temporary fabrication (Schofu)
- Vaseline petroleum jelly (Chesebrough Ponds USA; Greenwich, CT)
- Luxatemp temporary material shade B1 (Zenith/DMG, Englewood, NJ)
- Septocaine with 1:100,000 epinephrine (Septodont; New Castle, DE)
- The Wand (Milestone Scientific; Livingston, NJ)
- Sensimatic electrosurge (Parkell)
- diamond burs 6844 0141, 6844-016, 6850-014, 6850-018 (Brasseler USA; Savannah, GA)
- Morley anterior preparation and contouring kit (Brasseler)
- Ceramiste points (Shofu)
- Vita 3D shade guide (Vident; Brea, CA)
- Superoxol hydrogen peroxide (EPR Industries Chemists; Pennsauken, NJ)
- gingival retraction cord (Ultradent; South Jordan, UT)
- Impregum impression material (3M ESPE; St. Paul, MN)
- TempBond Clear temporary bonding material (Kerr; Orange, CA)
- Zoom2 whitening system (Discus Dental)
- Peridex chlorhexidine gluconate rinse 0.12% (Omni; West Palm Beach, FL)
- ConsepSis chlorhexidine rinse (Ultradent)
- MicroEtcher (Danville Engineering; San Ramon, CA)
- Ultra-Etch 35% phosphoric acid (Ultradent)
- Gluma desensitizer (Hereaus Kulzer; Armonk, NY)
- Optibond Solo Plus adhesive (Kerr)
- Optilux 501 curing light (Kerr)
- silane (Ultradent)
- RelyX veneer cement, shade TR (3M ESPE)
- #12 scalpel (Bard-Parker; Franklin Lakes, NJ)
- DeOx oxygen barrier gel (Ultradent)
- Enamelize composite polishing paste (Cosmedent; Chicago, IL)
- Dialite porcelain diamond polishers (Brasseler)
- blue and pink cups and points (Cosmedent)
- FlexiStrips and FlexiDiscs (Cosmedent)



Figure 4: Before; frontal, 1:1. Note the uneven gingival architecture; the black triangle between #8 and #9; the rotation of #7 and #10; and the uneven wear at the incisal edges, causing an unpleasing, asymmetrical smile. After; frontal, 1:1. Close-up view of the final restorations demonstrates natural translucency with polychromicity within each restoration, in addition to a pleasing symmetrical smile after correction of the axial inclination and rotation problems.

- Vision Flex diamond strips, WS37ET (Brasseler)
- Glide floss (Gore; Flagstaff, AZ)
- CeriSaw (Den-Mat Corp.; Santa Maria, CA)

PREPARATION

At the preparation appointment, the patient was given a sneak preview of her new smile by lubricating the teeth with petroleum jelly; and shade B1 temporary material was injected into the clear stents (which were made from the composite mock-up) and placed over her teeth. This gave the patient a rough idea of what her new smile would look like after the procedure was done. When she saw that her smile was symmetrical and made her look younger, she was eager to proceed with the proposed treatment of eight feldspathic porcelain veneers.

The teeth were anesthetized. Before preparing the teeth, the gingival zenith of tooth #9 was raised slightly

to be symmetrical with tooth #8, using an electrosurge. The crestal bone was sounded and founded to be 3.5 mm from the free gingival margin¹¹ (Fig 4).

Excellent communication between the dentist and the ceramist about the patient's likes and dislikes is critical to the success of such cases.

The tooth preparation was initiated using a 6850-018 diamond bur. The use of reduction templates (pin-hole preparation guide) ensured proper tooth reduction. The preparations extended 0.5 mm subgingival, with a 1.0-mm chamfer margin on the facial. The preparations extended lingually over the incisal edge, ending in a 1.0-mm shoulder just above the cingulum. The teeth were prepared in such a way as to give the laboratory 2 mm of incisal and 1.5 mm of facial room to develop subtle internal characterizations with the

porcelain. The gingival proximal area extended lingually at the crest of the papilla, to provide adequate porcelain to eliminate black triangles.¹²

The preparations were polished to round off any sharp line angles or point angles. Stump shades were chosen and photographs were taken of the preparations with stump guides in view for the laboratory's use. A small amount of gingival contouring was also done with the electrosurge. Hydrogen peroxide was used to control any slight hemorrhage or gingival seepage. The hydrogen peroxide was rinsed off thoroughly before impressions were taken. An impression was taken, blowing the impression material into the sulcus. A facebow transfer of the maxillary teeth was taken to aid the laboratory technician in mounting her cast.

Using the polyvinyl siloxane impression from the mock-up study casts, and with the use of shade B1 temporary material, the provisional



Figure 5: Before; right lateral view, 1:2. Note the rotation of #7 and #10, the linguoversion of #8, and the distal axial inclination of #6. After; right lateral view, 1:2. Final restorations demonstrate proper axial inclination, alignment of labial surfaces, and appropriate incisal embrasure progression.

restorations were made, trimmed, polished, and cemented on the patient's teeth with clear temporary bond. The occlusion was adjusted and postoperative instructions were given. The patient was scheduled for an appointment the next day for any possible adjustments. She was also given a temporary nightguard for her bruxism.

The next day, the patient was very excited about her new smile, and only very minor adjustments needed to be made. She had no discomfort and was very pleased with how the provisionals looked. An alginate impression of her provisional restorations was taken and poured in stone to be sent to the laboratory. Photographs of her provisionals and her face with the provisionals were taken for better communication with the laboratory.

LABORATORY INSTRUCTIONS

A detailed prescription was sent to the laboratory, along with the

mock-up and a smile analysis. Also sent was a full series of 35-mm digital photographs showing the following:

- the 12 preoperative views recommended by the AACD
- preparations for stump shading
- stick-bite for proper establishment of midline and horizontal plane
- face and full smile with the provisional restorations seated in the mouth.

Models of the provisionals, along with the bite records, original face-bow-mounted casts, and a bite fork of the prepared maxillary teeth and shade-mapping instructions were sent to the laboratory. Progressive shades were selected to blend with her natural teeth (Figs 5 & 6).

After receiving the case, the ceramist and I discussed the goals of, and expectations for, the case. Excellent communication between the dentist and the ceramist about the

patient's likes and dislikes is critical to the success of such cases.

Before glazing the veneers, the ceramist e-mailed me the photographs of the finished case and, after reviewing them, we discussed some minor changes for a perfect outcome¹³ (microesthetics and macroesthetics were addressed).

CEMENTATION

Three weeks after the preparation appointment, the patient was seen to seat the restorations. The patient was anesthetized. She rinsed with chlorhexidine gluconate and then the provisionals were removed. After the teeth were rinsed with disinfectant, each veneer was checked individually on the teeth; they then were checked again on the prepared teeth as a group. Interproximal contacts were checked and adjusted as needed. When the patient saw them she was very pleased and she approved them for final cementation.



Figure 6: Before; left lateral view, 1:2. Note the excessive wear at the incisal edges, giving the smile an aged appearance. After; left lateral view, 1:2. The final restoration reflects a more pleasing, youthful smile.

The veneers were seated, cured, and finished one at a time, except for #8 and #9, which were seated together in order to control the midline. The teeth were microetched to remove any remaining cement. The teeth were then etched with 35% phosphoric acid for 15 seconds, and then rinsed with water. Maintaining a moistened surface, a dentin sealer was placed on the teeth, followed by a dentin primer and adhesive, which was then light-cured for 20 seconds. The veneers were microetched and cleaned using 32% phosphoric acid semi-gel. After they were dried, the silane was applied. Luting cement was used to bond the teeth. The centrals were seated together and the excess cement was removed. The two centrals were then completely light-cured and cleaned with a #12 scalpel and rotary instruments. The subsequent restorations were seated one at a time following the same procedure. Teeth #7, #10, #6, #11, #5, and #12 were seated in that order. When tooth #7 was seated, #6 was held in

position without cement to ensure proper seating of #7; this same procedure was followed for the remaining teeth. To avoid an oxygen-inhibited layer, an oxygen-barrier glycerin gel was applied to all veneer margins and then each tooth was light-cured for an additional 40 seconds on the facial and the lingual. The margins were polished with diamond polishing paste and a prophy cup.

The artistic component of cosmetic dentistry lies in perfecting the various esthetic principles, while incorporating each patient's individual needs.

The occlusion was adjusted in centric occlusion and eccentric excursions, and those surfaces that needed adjustment were polished once more.

An occlusal guard was made for the patient so as to protect the porcelain restorations from bruxism. The patient was advised to wear it

every night to maximize the longevity of her new restorations (Fig 7).

SUMMARY AND CONCLUSIONS

Combining art and science is not only fulfilling to the dentist, but it also can change the patient's life. When a patient's asymmetrical smile and misaligned teeth are transformed, their new image boosts their self-confidence, both personally and professionally. As more and more patients—influenced by the media, marketing, and in-office patient education—want the “perfect smile,” dentists regularly face the challenge of pleasing these appearance-related requirements. These demands are based on the patient's perception of beauty, which is highly individualized and subjective.⁵ The artistic component of cosmetic dentistry lies in perfecting the various esthetic principles, while incorporating each patient's individual needs.



Figure 7: Before; maxillary occlusal view, 1:2. Note the excessive wear of the incisal edges, rotation of #7 and #10, linguoversion of #8, and deficiency of the buccal corridor in the premolar area. After; maxillary occlusal view, 1:2. The final restoration after correcting the rotations and filling the buccal corridor.

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Examiners' Perspective for Emil Hawary, D.D.S.



by Bradley J. Olson, D.D.S., F.A.G.D.

Dr. Olson is a 1983 graduate of The Baltimore College of Dental Surgery, Dental School, University of Maryland. He graduated with honors in prosthodontics and endodontics and has been in private practice in Southern Maryland for 23 years. He achieved Accreditation in the AACD in 1998, became an examiner the following year, and is the most recent past chair of Accreditation. Dr. Olson became the Academy's 39th Fellow in 2004, is a Fellowship examiner and remains active in the Credentialing Workshops. He also is a Fellow in the Academy of General Dentistry.

Washingtonian Magazine has named Dr. Olson as one of the metro area's top general and cosmetic dentists. He volunteers with the State of Maryland's Donated Dental Service and the AACD's Give Back a Smile™ program. He and his wife, Sharon, live with their eight-year-old twins outside Annapolis, Maryland.

A recent poll of examiners indicated that the second most common reason contributing to failed Accreditation cases is case selection. The ideal case can be difficult to find, but including your staff and specialists in the search can be a great benefit. In addition, evaluating cases for multidisciplinary treatment can turn an average outcome into an excellent one. This year at the Annual Scientific Session in Atlanta, staff members are eligible to attend the Accreditation and Criteria workshops on Friday, May 18th.

Dr. Hawary made a fine choice for his Case Type I submission and achieved an excellent result. The careful attention given to the preoperative condition and the measures needed to ensure the result paid great dividends. The rich chroma, detailed characterization, and natural blend to the opposing dentition further accentuated the outcome.

In the informal poll of examiners, the number one reason for failed Accreditation cases is tissue health. Each examiner for this case noted the inflamed tissue and two of them indicated it was a major fault. There are numerous reasons for compromised tissue health; these can include invasion of the biological width, aggressive finishing techniques, over-hanging margins, and residual cement. The most common reason for the appearance of inflamed gingival tissue is inadequate healing time from final cementation to final images prior to submission. Remember that the examiners can judge only what they see on the screen, not what might happen in the future. If the tissue is not ready, wait until the next exam session in six months.

The majority of examiners passed this case, with most giving a +1 score for the overall appearance. Both the doctor and ceramist are to be congratulated on a job well done. *AB*

