



by Stevan Orser, D.D.S.

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## Accreditation Case Report, Case Type II: One or Two Indirect Restorations

### INTRODUCTION

Restoring an individual tooth amidst a natural dentition remains one of the biggest challenges for dentists and technicians. It truly requires a collaborative effort and tests each partner's skills. In the past, any porcelain restoration with a reasonable color match was the standard of care. Now, with porcelain bonding, we are able to provide translucent restorations that reflect light in a more natural way.

The use of color maps, prototype provisionals, and photography has emerged to help communicate details. By mimicking the microesthetics of a natural tooth, the ceramist can reproduce the minute details of surface textures and color patterns that are present in the surrounding natural teeth.<sup>1,2</sup> (Fig 1).

Achieving the goal of blending the restoration into the natural teeth is quite satisfying for the dentist. It is also a great service to the patient.

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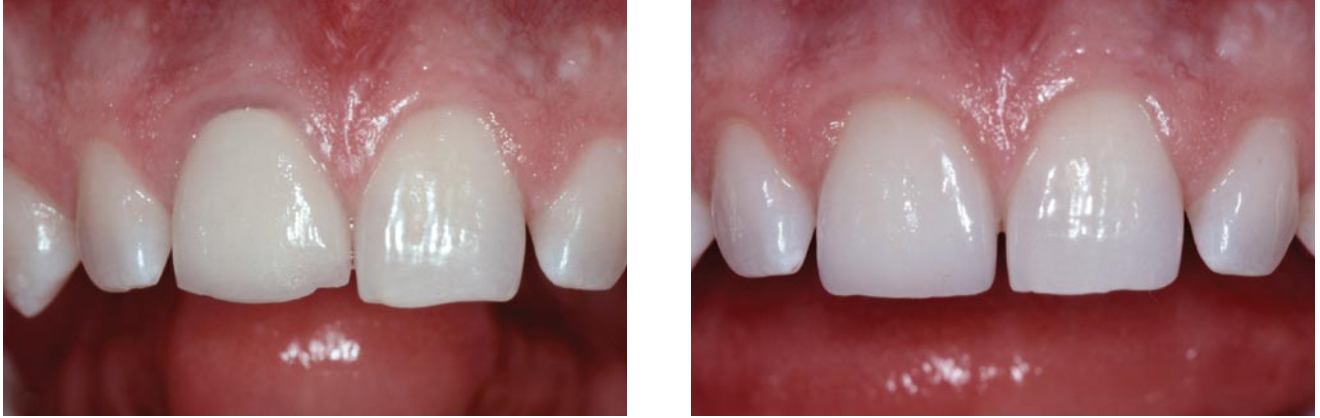
*Decay and bacterial leakage were noted on the lingual under the crown margin.*

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### HISTORY

The patient was a 23-year-old male in excellent health. Ten years earlier he had injured his front tooth during a wrestling meet. Because there was pulpal damage, root canal therapy was completed for tooth #8 at that time. Shortly after, a porcelain-fused-to-metal (PFM) crown was placed to restore the tooth. The tooth had been stable and comfortable for many years (Fig 2).

His medical history included childhood asthma and pneumonia. His experience in competitive wrestling in high school and college had left him with some occasional shoulder and neck pain.



*Figure 1: Retracted 1:1 view of the new crown. It replaced the chipped and dark crown done years earlier after endodontic therapy.*

### CLINICAL DATA

The old crown had chipped a bit over the years, but the tooth was feeling comfortable. Decay and bacterial leakage were noted on the lingual under the crown margin. There were conservative amalgam restorations on #3 and #14. No other restorations were evident. The third molars had been extracted and sealants had been placed as needed on the remaining posteriors. Some slight wear and chipping were noted on several anterior teeth. Stain was present at each hygiene interval.

His periodontal health was good and he saw a hygienist every four months. Generally, there were fewer than five pockets or bleeding areas noted when seen at this interval. He had no recession, abfraction, or mobility. The gingival attachment widths were within normal limits and there was no furcal bone loss.

In the past, he had reported some jaw and muscle problems, particularly related to his wrestling competitions. The pains never persisted and

he felt no reason to seek treatment. He did hear some occasional noises from the joints. On examination there was no capsulitis or retrodis-citis noted, but ligament laxity was noted on both temporomandibular joints. Range of motion was within normal limits and the Doppler ultrasound indicated lateral pole crep-itus noises in both joints. Occlusal examination revealed working and balancing interferences on the posterior teeth. There was end-to-end disharmony during function on the anteriors. Some posterior contact was noted during crossover, which occurs when the cuspids pass beyond tip-to-tip; at this point, posterior teeth should not touch.

The tooth color ranged from A2 to A3, with spaces between the anteriors. Some chipping was evident on both the lower and upper front teeth. The patient revealed a moderate amount of gingiva when he smiled. Considering the dark margin around the crown and these other defects, he felt it was time to replace the old restoration (Fig 3).

We discussed treatment options, including orthodontics, to correct these defects. The patient chose to simply whiten the teeth and replace the crown. We also agreed to place composites in the chip on #23 and wear on #11 to restore the teeth back to normal contours.

### DIAGNOSIS AND TREATMENT PLAN

Decay and bacterial leakage were seen around #8, an endodontically treated tooth. Wear at #11 and chipping at #23 were present. Both joints had internal derangement at the lateral poles.

The patient was comfortable with his appearance. We advised that the anteriors would have more visual balance and the occlusion would benefit from bite balancing and also from restoring #11. The lower anteriors showed when he smiled, so bonding #23 with composite was also planned.

Because he showed all his upper teeth and tissue margins when he smiled, the esthetic appear-

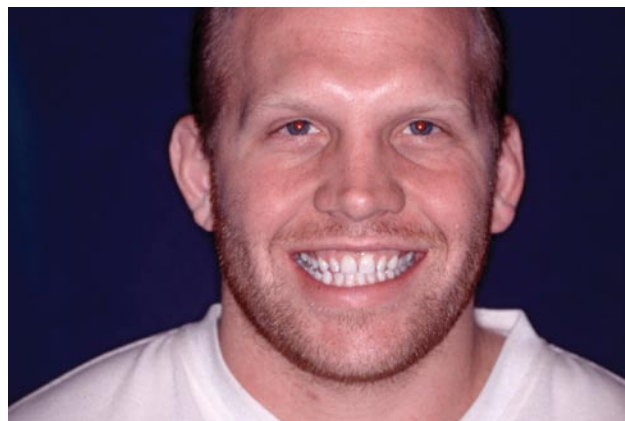


Figure 2: Full-face 1:10 view. Note how distracting the old crown is.

ance of the crown was accentuated. Sometimes when endodontics have been performed, the root is discolored so that the tissue margin is dark. A foundation restoration was required<sup>3</sup>; once the crown was removed, we could determine the best way to disguise this area.

The final treatment plan was done in phases, beginning with teeth whitening. Then a three-week delay was allowed for bleaching effects on bonding to decrease. We then began the bite balancing and restorative phase for teeth #8, #11 and #23.

#### ARMENTARIUM

- anesthetic syringe
- Lidocaine 2% 1:200 (Patterson Dental; St. Paul, MN)
- Benzocaine topical gel (Patterson)
- Morley veneer kit (Brasseler; Savannah, GA)
- assorted carbide burs (Brasseler)
- Night White gel 16% (Discus Dental; Culver City, CA)
- High- and low-speed handpieces (Midwest America Co.; Elk Grove Village, IL)
- Polyvinyl siloxane (Kerr; Orange, CA)
- Blu-Mousse paste (Parkell; Edgewood, NY)
- Renamel hybrid composite (Cosmedent; Chicago, IL)
- OptiBond Solo (Kerr)
- phosphoric acid 37% (Kerr)
- Seek cavity detecting dye (Ultra-dent; South Jordan, UT)
- FlexiDiscs and cups (Cosmedent)
- Optilux curing light (Demetron Kerr; Orange, CA)
- Artex articulator (Jensen Industries; North Haven, CT)
- Clear mylar strips
- Fine-Shred resistant floss (Sunstar Butler; Chicago, IL)
- Yashica Dental Eye II & III cameras (Kyocera; Kyoto, Japan)
- Aurora diode laser (Premier Dental Products; Plymouth Meeting, PA)
- Insure bonding cement (Cosmedent)
- Integrity provisional material (Dentsply Caulk; Milford, DE)
- micro-etcher (Danville Engineering; San Ramon, CA)
- Silanator silane coping agent (Cosmedent)
- Superoxol (Sultan Chemists; Englewood, NJ)
- Ektachrome EPP 100 film (Kodak; New Haven, CT)
- AccuFilm II articulating ribbon (Parkell)
- Madam Butterfly articulating ribbon (Almore; Portland OR)
- shim stock (Artus Corp.; Englewood, NJ)
- restorative instruments (office tray set-up)



Figure 3: Retracted 1:2 view of the old crown, revealing the dark margin and contours needed to match the other central.

### PREPARATION

Once we had discussed the treatment plan and agreed to the process, the patient began teeth whitening. This was completed in three weeks. He returned for an evaluation and stated that he was very pleased with the results. We reviewed the treatment sequence and scheduled him for the bite balancing and crown preparation after another three weeks.

We had constructed a deprogrammer so that the patient could wear it the night before his occlusal adjustment. On the day of the preparation appointment we selected our tooth colors, took shade photographs, and drew color maps for our laboratory. We then balanced the patient's bite. Prior to this appointment the patient's models were adjusted on an articulator to determine how extensive the bite adjustment would be. As a result of the adjustment we gained even and simultaneous posterior contact on both sides. The anteriors were recontoured to fit the

improved occlusion. Then, composite restorations were placed on #23 and #11 to complete the anterior function.

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*The patient chose to simply whiten the teeth and replace the crown.*

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Upon completing the preoperative balancing, we moved on to the preparation. Topical and local anesthesia were applied to make the patient comfortable. The old PFM crown was removed with diamond and carbide burs. A sound stump remained under the crown with more than enough tooth structure, including the shoulder and collar, to retain the new crown.<sup>4</sup> No previous post had been done so we removed the gutta percha in the coronal aspect of the tooth. This reduction was carried to slightly below the gingival level. Hybrid composite was used to rebuild the internal structure and bond the coronal portion together. Slight discoloration was still present at the gingival margin, leaving

the stump too dark.<sup>5</sup> Our goal was a brighter stump shade, such as A2. This was achieved by making a notch behind the enamel at the gingival margin, and then reducing the labial face all the way up to the incisal edge of the preparation. This space was then filled with the A2 hybrid composite to create the desired stump shade

Polishing the preparation was completed with rubber cups and ceramiste points. We then used a diode laser to form a gingival trough prior to taking the final impression. The impressions were done in phases, starting with placement of the polyvinyl putty in two stock trays to form a custom fit. This was done before removing the crown so it could completely set. Two final impressions were then made using the injectible light body in a syringe with the heavy-body paste in the tray. Bite records were completed and a face-bow was made to mount the models on an articulator.

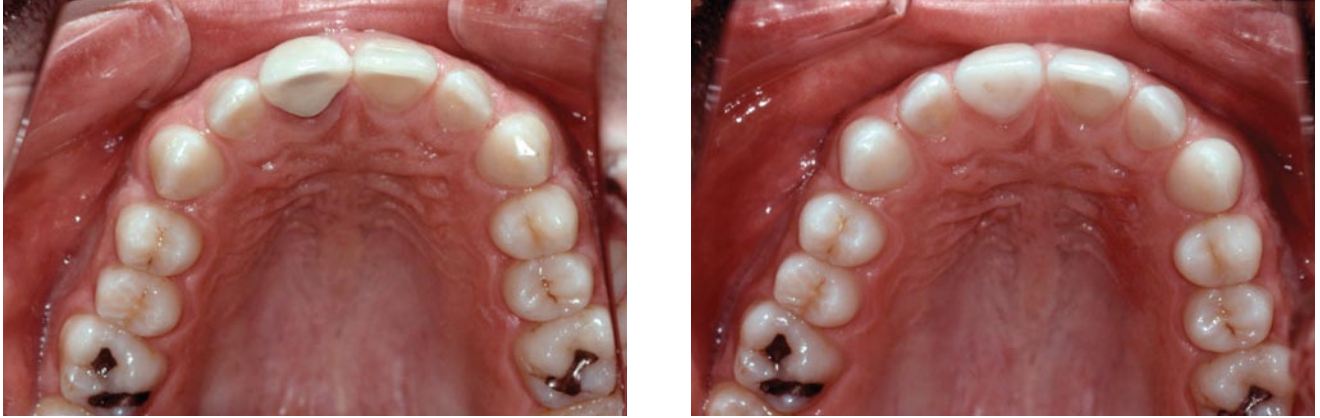


Figure 4: Occlusal 1:2 view. The lingual contours of the new crown are designed to meet the "two point rule" for protusive guidance.

A bis-acryl provisional was constructed from preoperative models where the chipped areas had been filled in to obtain ideal contours. The labial surface of the provisional was cut back to make room for bonded composite. To create proper color zones, and blend with the natural dentition. The temporary was then contoured with discs and glazed. It was spot-bonded with unfilled resin. Photographs were taken of the provisional to facilitate laboratory communication. Anterior, lateral, and protrusive movements were checked for contact and function. The incisal end-to-end position was also evaluated for proper function.

*Because he showed all his upper teeth and tissue margins when he smiled, the esthetic appearance of the crown was accentuated.*

#### LABORATORY SERVICES

Pouring, mounting, and die trimming were done in our office by our

laboratory technician. A contact model was also poured for reference during construction. Everything was then set aside for inspection. Using shim stock, the occlusal contacts were confirmed. The die, the margin, and clearance for function were reviewed. The master models were then ready for the ceramist. Our photographs were completed, along with the color map and laboratory slip to be shipped to the laboratory. The second master model was saved to retro-fit our ceramic unit when it was returned from the laboratory.

After review by the ceramist, we agreed to use Empress and cut it back so we could layer color in the porcelain and minimize the use of surface stains.

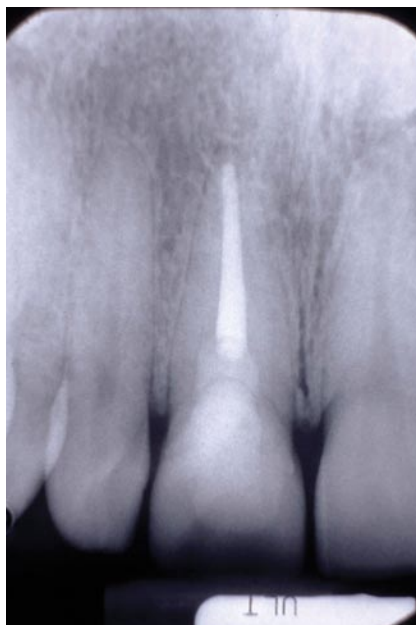
#### INSERTION

After the restoration was complete it was returned for review. The margin fit, contours, and color were evaluated against the laboratory order. The crown required three try-in appointments for slight modi-

fications to perfect the shade and texture. Once the restoration was completed to our satisfaction, the patient was scheduled for bonding. We then returned to our saved master model retained from the second impression. Using a soft lead pencil, our technician marked the die and reseated the unit to eliminate spots that interfered with seating the crown. When the patient returned for insertion, the temporary was removed by sectioning with a carbide bur using the high-speed handpiece without anesthesia.

The temporary was fractured off with a crown remover. The preparation was cleaned with a rubber cup, removing any excess bonding adhesive. We tried in the crown to confirm the fit. The patient was pleased with the outcome and approved the final restoration for placement.

The restoration was sandblasted with the chairside microetcher, rinsed with water, and blown dry with compressed air. The dental assistant applied hydrofluoric acid for



*Figure 5: Postoperative radiograph, two months after the new restoration was placed.*

two minutes to etch the inside of the crown. After thoroughly rinsing, she then painted on silane to prepare for bonding. The tooth was sandblasted and rinsed to remove any debris. A small hemorrhage caused by sandblasting was relieved by applying Superoxol at the site. The tooth was thoroughly rinsed before placing 37% phosphoric acid over the entire tooth structure. This was left for 15 seconds, then completely removed with water rinsing and suction. Using a wet-bonding technique, we applied OptiBond Solo copiously over the preparation. After several applications and scrubbing, air was used to blow the excess to thin the layer and a final coat was applied and again dried. This was cured for 30 seconds. The Solo bond was placed inside the crown and thinned with air. Insure luting resin, light viscos-

ity, was placed inside the crown with sufficient volume to have excess around the margins on seating.<sup>6</sup> Before it was placed an additional thin layer of Solo bond was painted on the tooth.

After seating, excess luting cement was removed with a plastic instrument. Then a first cure was done on the lingual. Floss was used to carefully clear contacts. All margins were cleared of excess cement with an explorer. The crown was cured from the labial, lingual, and incisal for a total of 60 seconds.<sup>7</sup>

#### FINISHING

Carbide finishing burs were used to remove any slight excess luting resin. Fine rubber cups were used to polish the margins. We then checked centric occlusion and excursive jaw

movements. Protrusive guidance on both centrals was adjusted for balance (Fig 4). Metal FlexiStrips were used to clean the interproximal. It was then checked with fine floss for smoothness. The patient was given oral hygiene instructions following bonding and recommended to not chew for four to six hours. At follow-up he looked good and reported the bite felt comfortable. We recommended hygiene maintenance to keep the tissues healthy. After eight weeks he returned for photographs and x-rays (Fig 5). We then completed the finishes on the composite and any final contouring required.

#### SUMMARY AND CONCLUSION

The patient was quite pleased with the result (Fig 6). Since he no longer wrestles, we hope the risks to his front teeth are reduced. He has



Figure 6: Straight smile view of the old and the new restoration, showing the improved color and contours.

done very well on hygiene follow-up despite his busy work schedule. We expect many years of stability with the new crown, particularly since there is substantial sound tooth structure under the crown.

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## Examiners' Perspective for Stevan Orser, D.D.S.

by Nils Olson, D.D.S., F.A.A.C.D., F.A.G.D.

Dr. Stevan Orser has achieved a very fine result for Accreditation Case Type II.

Because only two nonadjacent teeth were treated, smile design was not central to this case. For that reason, Dr. Orser was able to treat one central incisor and a cuspid while leaving multiple diastemas intact. Judicious recontouring of the cuspid tip of the right cuspid improved the smile line without restoring a larger number of the teeth in the arch.

The restoration of the right central incisor was very well executed. Minor adjustment of the incisal edge of the left central incisor enabled the restoration of the contralateral tooth to be very symmetrical.

Dr. Orser has shown skill and good judgement in treating two teeth with indirect restorations. By addressing various other less dominant esthetic issues, Dr. Orser has demonstrated genuine mastery in restoring a smile without comprehensively having to restore all maxillary teeth in the esthetic zone. *AO*

