by Stevan Orser, D.D.S.

Dr. Stevan Orser graduated from Loyola University School of Dentistry in 1975. He then completed a general practice residency at Rush-Presbyterian-St. Lukes Medical Center in Chicago. A member of the American Dental Association, he has been a reviewer of esthetic articles for the ADA's journal. He also is a member of the AACD and the American Equilibration Society. He is an assistant faculty member, teaching the occlusion system developed by Dr. Jimmy Eubank. He also is a founding member and senior partner of the Arlington Dental Group in Arlington Heights, IL. The group has been practicing more than 20 years, and is focused exclusively on dental care for adults.

Accreditation Clinical Case Report, Case Type IV: *Class IV Direct Resin Restoration (Teeth ##7 and 8)*

Introduction

There has been a great evolution in techniques and materials to facilitate cosmetic restorative care. Porcelains have been altered to reduce wear, transmit natural light patterns, and mimic natural colors.

Unfortunately, these benefits require a collaboration of very skilled dentists and technicians to produce consistent results. They also take time and, in the case of tooth fractures, require more tooth reduction to restore. The challenge of a tooth defect present in the middle of an all-natural-teeth smile presents some of the greatest esthetic obstacles. Contours and colors must reflect the adjacent teeth details to truly blend. This is difficult to communicate to the technician, who generally is not available to see the patient.

Composite bonding has been used for years to correct the smaller defects. Now the materials and techniques have changed, allowing complete tooth restoration with composite.[1] The hybrid materials have been developed to produce greater strength, support, and opacity. The microfills have been developed to increase surface polish and translucency. When these are combined with tints and opaquers, the dentist/artist can create a life-like restoration with the strength to last for years. These restorations can be accomplished in a short time, with little additional tooth reduction.

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History

This patient is a 41-year-old Asian female in excellent health. She had been out jogging on a spring evening; a light rain caused her to slip and fall, injuring her lip and fracturing two teeth. Her medical history was clear and she was not taking any medications. She had not had any hospitalizations for medical or surgical reasons.

After a short discussion, we agreed she should go to the emergency room to repair the lip laceration. The teeth did not seem loose to her, so we decided to meet the next day to address the fractures. There was some additional concern as she was due to meet some of her new husband's family in France in just three days. The esthetic appearance was especially important and she needed a quick solution.

CLINICAL DATA

Examination revealed a lip laceration and some scratches on her face. The emergency room physician said a complete recovery would occur within just a few weeks. Sutures and bandages were in place as needed. The teeth fractures were the distal-incisal third of #8 and the mesial-incisal third of #7. This went through the contact point between the teeth. No pulp exposures were noted. Gingival tissues were intact and healthy. Oral examination revealed no other soft tissue pathology.

In the past the patient had reported occasional jaw/muscle pain on waking some mornings. Her previous joint and muscle exam revealed some right temporalis tenderness. There was also tenderness noted on the left temporalis and massater muscles. Ligament laxity was observed on the right joint. The range of motion was 50 mm on opening, while the excursion right and left movements were at 9 mm. There was a deviation to the right on opening and closing. Her jaw was sore, with pain and tenderness associated with the lip and maxilla, as well as the mandible. We could load-test the joints without pain. The Doppler ultrasound indicated popping sounds on the right temporomandibular joint (TMJ). The left TMJ had gravel-type sounds.[2] The first point of contact on guided closure was tooth #3. Slight wear was observed on the bicuspids.

Years earlier, her periodontal data had revealed 53 pockets and 14 bleeding sites; this had greatly improved with regular maintenance and preventive procedures. Previous to the injury she had 12 pockets and no bleeding sites. The lower molars were the primary source of inflammation, with pocketing at 4 mm. Recession was generalized throughout, but no abfractions were seen. There was no tooth mobility, although slight generalized bone loss was present. No bone loss involved the furcation of molars. Zones of attached gingival were within normal limits, considering the recession.

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The remaining teeth were generally free of decay. The third molars had been removed the previous year; tooth #2 was also missing. Restorations were noted at teeth ##3, 15, 18, 19, 30, and 31. No other defects were present. Previous radiographs indicated no pulpal pathology in any teeth and periapical areas were within normal limits. The fractured teeth were sensitive to temperature and were slightly tender.

The patient does not show all of her upper teeth when smiling. Rather, some lower and some upper teeth show when she smiles. The teeth colors are generally the Vita A shade range A2, A1 in most areas. The gingival of the canines and premolars are A3. The tissues are even at the gingival levels between the centrals and the laterals, with the cuspids slightly higher. The recession gives a more rectangular look to all the teeth.

DIAGNOSIS

The diagnosis was acute trauma to vital teeth at ##7 and 8, with Class IV fractures present. This could lead to pulpal changes requiring endodontic therapy later. Previous history of muscle and joint internal degeneration at the lateral poles could become worse from this trauma. Both of these issues will require follow-up evaluation and monitoring.

TREATMENT PLAN

There are two possible options in cases like these; both can offer the patient excellent results. One option might be porcelain veneers. This would require more tooth reduction and time to complete, yet long-term results could be good. The patient's time constraints would hinder this approach somewhat. Temporaries could be done and would look great for her trip.[3] The microesthetic details on the existing teeth would offer a great challenge for the dentist and technician in matching the existing structure.

The other option is direct bonding using composite. With the development of hybrids for strength and microfills to finish, free-hand sculpted restorations also are an excellent choice. The combination of tints and opaquers now give the dentist an opportunity to create the micro colors present in the natural teeth.[4] This method would also require less tooth reduction and could be completed in a short time. After some discussion, the patient agreed to pursue the composite direct bonding option.

The treatment plan included two phases, as the patient's imminent trip abroad limited her available time. We chose to use hybrid composite to form the background of the repair with microfill, tints, and opaquers to complete the needed details. Before she left for France the contours and basic

structural repairs were built out; we also layered in the final color details. Finishing specifics were delayed until after her trip. This way, she would look good and also would have the exposed structure protected quickly. We took slides to review the micro effects and overall contours. The second treatment phase would occur after her trip. We then could complete the details and finalize the restoration after seeing the slides of the work to that point.

ARMAMENTARIUM

- Morley veneer kit (Brasseler; Savannah, GA)
- assorted carbides (Brasseler)
- Optibond Fl (Kerr; Orange, CA)
- Unietch AB 32% (Bisco; Schaumburg, IL)
- Tublicid Red (Global Dental Products; North Bellmore, NY)
- Optilux 400 curing light (Kerr)
- hybrid, microfill, tints, and opaquers (Cosmedent; Chicago, IL)
- flowable hybrids and microfills (Cosmedent)
- Flexistrips, discs, cups (Cosmedent)
- Enamelize (Cosmedent)
- clear Mylar strips (3M; St. Paul, MN)
- finishing strips (Cosmedent)
- ET burs (Brasseler)
- Ceramiste pointe (Brasseler)
- restorative instruments, including IPC (Cosmedent)
- Articulating Ribbon Acufilm II black (Parkell; Farmingdale, NY)
- Madam Butterfly Articulating Ribbon (Almore; Portland, OR)
- shim stock (Artus; Englewood, NJ)

PREPARATION

Before beginning the teeth preparations we discussed shade and teeth-whitening options. Because the patient was leaving for her trip and was really quite happy with her teeth, we agreed to stay with the current teeth color. In this case it was planned to use both A1 and A2 hybrid because the fracture extended enough gingivally to involve both zones. Topical and local anesthetics were given to provide effective anesthesia. Once the patient was comfortable the teeth were polished to remove any plaque and debris. We then began preparation of each tooth.

Tooth #8 was sanded first with medium-grit diamonds. Enamel fragments were removed and bevels were developed extending into solid structure. The bevel was carried beyond the fracture line so that the margins could be extended here as well.[5,6] On this tooth, that meant getting near the gingival one-third. The same bevel was placed on the lingual for retention and marginal seal. This tapered margin was left rough from the diamond so that the composite products could visually blend with the tooth to cover the fracture line.

Tooth #7 was then prepared in the same manner. Here, margins were extended with the medium-grit diamond to the middle-third. Bevels were once again created to extend the margins with the composite. Enamel fragments were removed and the preparations completed.

The restoration of #8 was begun first. The adjacent teeth were protected with clear Mylar strips while the etch was placed. The etch was extended beyond the prepped area to allow the composite to bond there also. After 15 seconds of exposure on the dentin and slightly more on the enamel, the etch was rinsed thoroughly with water. The tooth was cleared of excess water but was not dried. The bonding primer was then placed, with several coats of repeated application. It was blown dry and checked for shine. Then an additional application was done. Adhesive was then placed in several coats, blown dry, and one more application made. This was cured for 40 seconds. A layer of hybrid composite was laid down first. The layering was done in segments extending across the margins to conceal the fracture line. It will also provide a backing for the restoration strength. Each application was cured for 20 seconds before the next one was done. Appreciation of tooth contour and form was designed into placement of the hybrid layer. By stepping back and viewing it labially or mesially and distally, overbuilding the material can be avoided. Incisal viewing is essential to maintain a sense of contour. These quick checks should be done with and without magnification to maintain the desired details. Color depth is completely dependent upon this aspect of bonding.

After the contours were created with the hybrid we then began applying the microfill shades. As with the hybrid, the A2 shade was used near the gingival whereas the A1 was used near the incisal. These also were placed in increments forming the strong line angle at the distal and the concavity in

the middle of the tooth. Incisal light and white opaque were used to create the swirl effects present at the incisal third. It was determined to place the color effects into the surface rather than on the surface so we could polish and keep the micro-details. This was done by applying the incisal; then, before curing, placing the white opaque into the soft resin. Using a #8 endo file as a brush, it was possible to sink the color into the surface of the incisal shade in striated-like lines. Little dots of color or texture can be created in the same way. Patting the contours with the IPC carver can then maintain the desired shape. During bonding, adjacent teeth tend to dry out and become masked in more opaque-appearing surfaces. To avoid visually losing the details in #9 that were to be copied, we made a color map before starting. By drawing the details in advance it was possible to go back to the design anytime during the procedure. The design was taken from the 1:1 slides so that all the effects could be seen.

Contours were then defined with fine diamonds and ET burs. Tips of #2 round burs were used to create the holes and rough areas. Once this texturing was complete, polishing was begun with medium-grit discs to add to definition and smooth the surface. Then the disc series was used to complete the surface shine. The newly created contact area at the distal of #8 was polished using finishing strips.

Once #8 was polished, the composite for #7 could be placed. Etch and bonding products were again used with the clear strip to protect #8. Hybrid layering was accomplished to create the background for the restoration, crossing the fracture area to disguise the seam. Carrying the hybrid up onto the prepped tooth structure is required to cover the fracture line. Generally its opacity is enough to visually block the junction line in the final photos. To create a blended finish line, flowable microfill composite was used on the front edge of the regular microfill during placement. This gives a "spackle" effect so that even the finest surface markings can be filled in.[7] Both A1 and A2 were used to blend the middle and incisal shades. The middle was completed with the microfill extending toward the incisal and gingival, then the incisal light layered over at the edge. Once again, with each layer of hybrid and microfill the contours were created to form the final tooth shape. Using a clear strip and microfill the contacts were completed by pulling the microfill through with the strip before curing. Final polishing, contouring, and occlusion were completed in phases. A basic polishing was done with finishing discs. Finishing strips were used to polish interproximals and allow smooth clean flossing. After taking slides were taken, the patient was dismissed. She was delighted to have her teeth restored and went off to France feeling much more at ease about her appearance.

FINISHING

On her return from France, she commented that her teeth had been comfortable, with no temperature sensitivity. Any tenderness she originally had felt was gone and her lip had healed nicely. We had evaluated the slides taken and noted some details in contouring and finishing to complete. (Sharing the slides with teachers at courses, Accreditation training programs, and mentors who are Examiners past or present is critical—the extra pairs of highly trained eyes quickly spot issues to aid in the success of the case.)

A rubber Ceramiste point was used to create surface contours. Occlusal adjustment was completed with egg-shaped ET burs. Edge-to-edge and cross-over positions were checked for harmonious movement with the lower incisors. The linguals were then polished with rubber cups. Any slight additions were made with microfill and flowable; this was done by roughening the surface first with a fine diamond bur. Then etch was applied and rinsed, followed by bonding agent. Additions were then made using the microfill and flowable. Margins were hidden by blending the material, using the flowable at the leading edge. Final contouring was done according to the list of details made from the slide review. Polishing was accomplished with the disc series by Cosmedent.[8] Lighter touch and lower speeds were used with the medium discs, heavier touch and higher speeds with the fine- and superfine discs. Enamelize was used with the felt discs to complete the polishing. Then final photos gave a last chance at viewing the result.

SUMMARY AND CONCLUSION

This patient has done well with her bonded composites. She was very happy with the final result, particularly because her tooth structure was conserved (she originally had thought caps would have to be made). She has since returned for hygiene maintenance and follow-up with her jaw joint. She is now four years post-op and the joints

have remained unchanged. Neither tooth has needed endodontic therapy. The final photos were taken after touch-up polishing to freshen the surfaces. These are four-year post-op slides. She asked during her hygiene follow-up how long the restorations would last, reminding me that I had said four to six years. I told her it looked like they would do at least that well (Figs 1-10). AD

References

1. Mopper W. Esthetic bonding [Course]. Chicago Midwinter meeting, Chicago Dental Society, February 1997.
2. Dawson P, Piper M. Occlusion and TMJ Continuums: Dawson Center for Advanced Dental Studies, 1998–1995.
3. Eubank J, Morley J. Levels I, II, and III, Esthetic Continuums: Baylor University, Louisiana State University, 1997-1998.
4. Terry D. Replacement of the incisal angle in the aged dentition. *Compendium* 21(9):754-758, 2000.
5. Mopper W. Esthetic bonding, Continuum I Esthetics: Louisiana State University, September 1997.
6. Morley J. Clinical elements of preparation and finishing direct and indirect anterior restorations. *Contemp Esthet Dent* 3(2):1-6, 1997.
7. Eubank J. Discussions at Occlusion and Esthetic Continuums: Dallas, TX, 1997–2002.
8. Barghi N, Lind S. A guide to polishing direct composite restorations. *Compendium* 21(2):138-144, 2000.

Figure 1: Full-smile frontal view, before.

Figure 2: Full-smile frontal view, after.

Figure 3: Frontal view, 1:1 retracted view, before.

Figure 4: Frontal view, 1:1 retracted view, after.

Figure 5: Right lateral, 1:1 retracted view, before.

Figure 6: Right lateral, 1:1 retracted view, after.

Figure 7: Left lateral, 1:1 retracted view, before.

Figure 8: Left lateral, 1:1 retracted view, after.

Figure 9: Upper occlusal, 1:2 view, before.

Figure 10: Upper occlusal, 1:2 view, after.

by Brad Olson, D.D.S.

Dr. Olson is a 1983 graduate of the University of Maryland, Baltimore, College of Dental Surgery, and has been in private practice in Southern Maryland for 20 years. He achieved Accreditation status in the American Academy of Cosmetic Dentistry in 1997, became an Examiner the following year, and currently serves on the Accreditation Committee.

In 1999 he received his fellowship in the Academy of General Dentistry and was named by Washingtonian Magazine *as one of the metro area's top general dentists in 1997, and top general and cosmetic dentists in 2003. He volunteers with the State of Maryland's Donated Dental Service and the AACD's Give Back a Smile Program.*

Dr. Olson lives with his wife, Sharon, and four year old twins just outside Annapolis, MD.

Examiners' Perspective

Examiners' Perspective on Stevan Orser's Case

Dr. Orser made a good choice for his anterior direct resin case, but one with greater complexity due to the extent of missing tooth structure, maverick colors in the natural dentition, and varied surface texture. Also, there are two teeth to restore here, which may not double the difficulty, but certainly increases it. All candidates are encouraged to select cases that are as simple and straightforward as possible; complex cases are harder to complete so that all the Accreditation criteria are met. Remember that there are no extra points given for difficulty, so it's best to choose cases carefully.

With that said, a case is deemed "successful" if it is passed by three of the five Examiners. This case was good enough to be a unanimous "pass" by all the Examiners, although two of them did consider it a "borderline" case (see the Examiners' Scoring box, page 49).

- The primary fault on all the Examiners' scorecards was the surface finish. The rule of thumb is that if the fault can be seen only on the 1:1 photo, then the fault can be judged to be no more than "minor" (-2 points). The problem with the finish, particularly the surface pitting, was evident on the 1:2 photos but only one Examiner felt it was obvious enough to warrant a "major" fault (-4 points). Dr. Orser may have been trying to replicate the complex surface of #9; if that is so, the written report should have made it clear. The Examiners felt that an improved surface polish would enhance the case.
- The contour and margin on the mesial of #8 did not replicate the original tooth structure. The "before" photographs provide a perfect model for emergence profile, facial embrasure, incisal embrasure, and line angle. The puffy and blunted papilla between the centrals may result from the ledging of the resin at the mesiogingival of #8. The tissue health was considered a minor fault.

This is a good opportunity to note that tissue health is a critical factor in all Accreditation cases. The tissue in the "after" photos should be improved compared to the "before" views, or at least just as healthy. Allowing enough healing time before taking photographs is crucial. The Examiners have no way of knowing if the tissue will heal in the future and can only judge what is seen on the slides at that time.

Dr. Orser took on a challenging case and demonstrated his skill and talent with composite resin. I particularly appreciated his handling of the hypocalcification and the contouring of the missing tooth structure. The discussion of the faults of this case is to help train your eye to follow what Examiners are looking for in their evaluations. The Accreditation process is about setting a standard for excellence and Dr. Orser is definitely "seeing the field." AD

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