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

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INTRODUCTION

Acrylic resin bonded to etched enamel has been used as a restorative material for anterior teeth since the early 1960s. The advent of filled composite resin greatly increased the strength and esthetics of these restorations, and dentin bonding agents now allow us to bond to dentin as well as to enamel. Known for their versatility, modern composite restorations combine maximum function with ideal esthetics in a multitude of clinical situations. With the materials available today, it is possible to place virtually invisible long-term restorations that rival the translucency and luster of natural teeth.

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HISTORY

The patient, a 29-year-old dental assistant, complained that her teeth were too small and dark. Family photographs of the patient’s teenage years revealed an effort to hide her teeth, pressing her lips together rather than displaying a confident smile. She also noted that the edges of her front teeth looked square and quite worn for someone her age (Fig 1).
CLINICAL DATA

The patient's medical history was negative. Soft tissue examination revealed moderately even tissue levels and no apparent pathology. The teeth were minimally restored and exhibited no decay or periodontal pathology. The left masseter muscle and right lateral pterygoid muscle were slightly tender to palpation. The left temporomandibular joint emitted an intermittent click (Piper's Stage II). Significant wear on the patient's anterior teeth suggested parafunction or bruxism (Fig 2). The patient admitted to a long-standing history of grinding her teeth while sleeping. The horizontal wear patterns were equally distributed across the edges of the anterior segment, resulting in an estimated 30% loss of incisal length. The patient also reported a history of above-average soft drink consumption, suggesting erosion as an additional causative agent in her loss of enamel. Both joints were comfortable to loading using bimanual manipulation and leaf gauges. Clinical preoperative photographs, facebow, models, and centric relation records were taken. The models were duplicated using the thermoplastic forming machine and both sets were mounted on a semi-adjustable articulator. Additionally, facial measurements using a tooth size measuring device were taken, as well as a preoperative shade evaluation.

DIAGNOSIS

Utilizing the photographs, models, and measurements made during the examination, a mock-up using composite resin was made on a duplicate mounted model of the patient's teeth. Guidelines for the proposed incisal edge position came from examining the lip at rest, lip mobility, and incisal inclination photos. Then, an occlusal plane device was used as a guide to level anterior to posterior segments. Incisal length was further determined by the balance between a suspected broad envelope of function, evidenced by wear patterns, and sufficient dimension to achieve posterior occlusion. The models were then equilibrated, misaligned teeth were adjusted, and the mock-up was designed to reflect the patient's personality and desires. From this evolved an "esthetic preview" fabricated directly in the patient's mouth for further evaluation. This was accomplished by loading provisional acrylic into the mock-up stent and then placing it over the patient's existing teeth. This approach worked well given that the dimensional change in this case was all additive in nature. When viewed laterally, the mock-up revealed an improved lip fullness in response to the added dimension both fa-

Figure 1: Before and after; teeth were short and tipped lingually and therefore did not show in a full smile.
cally and incisally (Fig 3). Direct composite resin was the restorative material of choice in this case because of its reparability in situations where occlusal and parafunctional issues require attention. Balancing the esthetic value of improved incisal length against the forces of increased overbite in a patient who grinds her teeth was paramount in managing this case.8

TREATMENT PLAN

The composite restorations would serve to significantly lengthen the teeth and provide a more pleasing smile. Due to the severe wear on the teeth and lingual version of the upper anterior teeth, tooth preparation would be minimal in this case. When finalized and approved, an incisal edge matrix, preparation guides of polyvinyl silicone putty, and a depth guide stent were made from the diagnostic mock-up (Fig 4). These were used to guide the preparation of the teeth and to help in establishing the layers of composite necessary to produce a lifelike result in the final restoration. Selection of the shade of the final direct veneers and a color map were also developed at this time. In discussing shade selection with the patient, it was agreed to design a natural but lighter appearance for her smile.

ARMAMENTARIUM

- Pentax ZX-50 camera system (Lester A. Dine; Palm Beach Gardens, FL)
- 3.8x loups (Oroscopic Research, Inc.; Madison, WI)
- Jeltrate (Dentsply Caulk; Milford, DE)
- Lucia jig (Great Lakes Orthodontics; Tonawanda, NJ)
- Futar D (Great Lakes Orthodontics)
- whale tails (Great Lakes Orthodontics)
- leaf gauge (Great Lakes Orthodontics)
- Velmix die stone (Kerr USA; Orange, CA)
- Mini Star thermoplastic forming machine (Great Lakes Orthodontics)
- Artex articulator (Jensen Industries; North Haven, CT)
- Trubyte tooth size indicator (Dentsply Trubyte; York, PA)
- Triad VLC provisional material (Dentsply Trubyte)
- Trubyte square occlusal plane (Dentsply Trubyte)
- Sil-Tech putty (Ivoclar Vivadent Inc.; Amherst, NY)
- Luxatemp (DMG; Hamburg, Germany)
- Nite White Excel 3 (Discus Dental; Culver City, CA)
articaine hydrochloride 4% with epinephrine 1:100,000 (Septodont, Inc.; New Castle, DE)
• Jeff Morley porcelain veneer kit (Brasseler USA; Savannah, GA)
• various burs (Brasseler)
• retraction cord (Ultradent Products Inc.; South Jordan, UT)
• Superoxol (Sultan Chemists, Inc.; Englewood, NJ)
• microbrush (Microbrush; Grafton, WI)
• 35% phosphoric acid (Ultradent)
• Liner Bond 2V (Kuraray America Co.; New York, NY)
• Apollo 95E plasma arc curing unit (DMD Systems, Inc.; Woodland Hills, CA)
• Renamel (Cosmedent; Chicago, IL)
• IPC-L instrument (Cosmedent)

Creative Color opaquers and tints (Cosmedent)
• VisionFlex diamond finishing strips (Brasseler)
• VisionFlex diamond disc (Brasseler)
• Ceremiste polishing point (Shofu Dental Corp.; San Marcos, CA)
• FlexiStrips and FlexiDiscs (Cosmedent)
• Enamelize and FlexiBuff discs (Cosmedent)

TREATMENT

First, a stable and healthy periodontal condition was established with proper home care instructions and visits with the hygienist. Next, the patient’s parafunctional habits were addressed by adjusting the bite with equilibration and the use of an occlusal orthotic appliance at night while sleeping. During the course of treatment, bite stability was re-visited by evaluating the teeth, the composite resin, and her nighttime appliance for wear or chipping. Muscles and joints were also reexamined and assured of comfort during treatment. Prior to beginning treatment of the front teeth, the patient completed a three-week regimen of home whitening followed by a two-week rebound/rehydration period. It should be noted that during the course of this patient’s care, an excessive amount of wear with notching was evident on her nighttime appliance. These findings suggest that the patient bruxes her teeth regardless of what occlusal scheme is utilized. In light of this finding, six teeth were treated instead of 12 as originally considered. It was concluded that restoring the six front teeth provided the optimal result for tooth proportionality, consistency

Figure 3: Before and after; note improved tooth display and lip fullness as a result of increased dimension of upper anterior teeth.
in color and shape, and improved “reveal,” and at the same time limited the occlusal load that can accompany indiscriminate lengthening of teeth on a patient who bruxes.

Preparation began with adjusting misaligned teeth back into the correct arch form (Fig 5A). A porcelain veneer kit was then used to make three depth cuts in each tooth oblique to the long axis in the incisal half of the tooth to a depth of half the diameter of the diamond.10 Next, three similar vertical cuts were made parallel to the long axis in the gingival half of each tooth. A depth cut was made with a 8801-014 round diamond following the gingival crest to establish the gingival margin of the preparation. The facial depth cuts were then joined and blended using a 6850-104 diamond following the gingival crest to establish the gingival margin of the preparation. The facial depth cuts were then joined and blended using a 6850-104 diamond, maintaining the two planes of the preparation. Interproximally, a “dog-leg” was created as the preparations were continued parallel to the long axis and through the contact area to the lingual on all teeth in order to “hide” the margins of the eventual restorations. When all teeth had been similarly prepared, the preparation depth was checked using the stent. Holes drilled in the stent allowed the use of a periodontal probe to determine if sufficient tooth was removed. Only minimal incisal edge reduction was performed and a lingual finish line was established.

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The teeth were cleaned with flour of pumice and water. The teeth were isolated using cheek retractors and cotton rolls. A 30% hydrogen peroxide solution was applied for 25 seconds to stop tissue seepage and rinsed thoroughly. The teeth were etched for 15 seconds with 37% phosphoric acid, rinsed, and dried. A layer of self-etching primer was applied for 40 seconds, and then gently dried. A light air stream was used to evaporate the primer solvent. A layer of bonding agent with activator adhesive was then applied and thinned gently with air and cured for three seconds with a plasma arc curing light. A second layer of the adhesive was applied, blown thin and not cured. Hybrid composite was applied next to all six anterior teeth. Each step in the layering of composite (i.e., hybrid, microfill, incisal) would be completed before applying the next layer. The body shades in this case generally followed the “Morley A1 shade progression” of B1 on the central inci-
sors, A1 on the lateral incisors, and A2 on the canines.\textsuperscript{11}

To begin this process, the correct shade of hybrid composite was first placed on the lingual surface of the teeth to build up the incisal extension.\textsuperscript{12} Care was taken to keep this extension thin. Hybrid was then placed on the labial surface in lobes and contoured into a thin layer covering the entire labial surface with finger pressure and an IPC-L carver (Fig 5B). Care was used to contour the interproximal and gingival areas, and the material was completely cured. Measurements were made to verify the correct length of the teeth and any necessary adjustments were made. Thin layers of matching opaquer were then applied in areas of shade difficulties and cured until the color of each tooth matched our desired outcome. White opaque was used in the middle third of the central incisors and on line angles to heighten the value of these areas of teeth (Fig 6A). Line angles were similarly highlighted with white opaquer on the lateral incisors and the canines. Microfill composite one step lower in value than that of the body shades was then placed on the labial surface in the gingi-
val third of teeth and contoured to form (Fig 6B). Again, extreme care was taken with the interproximal and gingival contours. The material was feathered into the middle third of each tooth and cured. The lighter body microfill was then placed on the incisal two-thirds of the teeth and contoured with finger pressure and the IPC-L carver. The material was beveled and contoured in the incisal third to allow placement of the incisal shade. A combination of tints and opaques were used at this point to develop character into each restoration. The incisal edges on all incisors were lined with B1/A1 opaquer to highlight them and to create a halo effect. Yellow-red tints were lightly painted between the lobes of the central incisors to help create depth and define character. Light incisal microfill was then placed over the entire facial aspect of each tooth and pressed into place with finger pressure, contoured, and cured.

**Finishing**

Fine pointed diamonds, followed by a high-speed polishing point, were used to refine the outline form, to develop texture and anatomy, and smooth the margins of the restorations. The restorations were again measured to verify correct size. A 6368-023 football finishing diamond was used to contour the lingual surface and establish the desired occlusal scheme. The interproximal areas were contoured with diamond and regular finishing strips and the labial surfaces were polished with a series of disks. The final glazed surfaces were achieved by using composite polishing paste on a soft disk. The final esthetic result was evaluated and approved by the patient and the doctor (Fig 7).

**Summary**

This case is reflective of many of the patients and situations that we see in our practices. The patient dreams of a beautiful smile and the self-confidence that it would generate. The dentist wants to fulfill that dream, but must ensure that the restorations function properly and will withstand the test of time. Therein lies the very essence of cosmetic dentistry—finding the perfect balance between form and function. It is the union of the patient's desire for esthetics and the dentist's insistence on operational performance.

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References
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It has been said many times that the Accreditation process is about “growing.” Certainly, Case Type V, six or more direct veneers, provides plenty of opportunity for that to happen. However, the growth may be in areas you did not expect. For instance, this case type, maybe more than any other, trains your eyes to see esthetic discrepancies, teaches you to layer dental materials, helps you to understand macro and microesthetics, and maybe even gives you new appreciation of your laboratory counterparts.

The journey toward competence in direct veneers begins with a great deal of training. I began with the structural foundation as taught at the Pankey Institute and the Louisiana State University Cosmetic Continuum, a six-weekend course designed to prepare attendees for the Accreditation process. As my work improved, I began taking courses on macro and microesthetics taught by Dr. Jeff Morley in San Francisco. I could tell that my increased confidence in delivering direct veneers translated to better case acceptance in my practice.

Inherent in the design of these courses were excellent opportunities to develop a trained eye for evaluating my own work. I quickly began to see even the most obscure subtleties in restorations. These particular skills become even more important when performing Case Type V. With direct veneers, the dentist is handling all the aspects of the case. It is a work in progress, not performed on a laboratory bench but directly in the mouth, where necessary changes can be made more readily than with ceramics. Only when you are directly building teeth “from the ground up” with various resins and colorants can you appreciate how such things as incisal edge translucency, dentinal lobes, halos, and high-value stripes are created in dental materials. Probably the most difficult part of this procedure is controlling the thickness of the layers we are placing on the teeth. We quickly realize that our ceramists, when fabricating porcelain restorations, are sometimes limited with what we provide them. Is there enough room to significantly lighten a tooth without making it opaque, or is there enough clearance to develop those creative nuances in the incisal edges of restorations to make them look like real teeth?

A side effect of becoming more comfortable with direct materials is that my provisionals became true prototypes for the final ceramic outcome. I often choose to veneer my provisionals with resin to create just the right effect on some patients. Another lesson learned doing direct veneers was how texture and light reflection on teeth can make them more lifelike. It is these finishing touches that give character and realism to dental restorations. Further, it is likely that if you are doing direct veneers in this way, your eye will become more critical in terms of your ceramic work as well, and perhaps all your dentistry stands to improve.

In my opinion, direct veneers should remain an Accreditation requirement. Otherwise, all we essentially do is prepare teeth and leave the rest to the laboratory. Resins are the most versatile of all dental materials and teach us a lot about the character of teeth. If we aspire to be restorative dentists interested in performing high-level cosmetic restorations, we should be skilled in handling these materials.