Enhancing or rehabilitating a smile using directly sculpted and polished composite resin veneers can be one of the most rewarding challenges in cosmetic dentistry. Direct resin veneers give the cosmetic dentist full control over color, contour, and surface texture. Occlusion must be carefully studied in advance to minimize unfavorable forces on these restorations and ensure that they will provide years of service. The result can be a fabulous smile that is gratifying for both the patient and the dentist.

HISTORY

The patient is a 14-year-old female with a history of asthma. She carries a Proventil® inhaler, but does not need it on a regular basis. A local pedodontist and orthodontist referred her. The orthodontist had been forced to remove her brackets early due to severe decay of the upper anterior teeth. Although she had been warned in advance of the consequences of her poor home care, the patient and her mother were horrified to see her smile when the upper brackets came off.

CLINICAL DATA

Upon clinical examination, no soft or hard tissue pathology was noted either externally or within the oral cavity. Her temporomandibular joint and associated musculature was free from pain and she had good range of motion with no parafuncional habits. Her occlusion was class 1 molar and class 1 cuspids with 3 mm vertical and 3 mm horizontal overbite. Some minor rotations remained in the upper anterior segment after early removal of the orthodontic appliances. Her upper lip was thin relative to her lower, which was full and symmetrical.

The patient presented with long-standing moderate to severe gingivitis, which was compounded by a tendency for mouth breathing. The etiology was plaque and poor oral hygiene. All upper anterior teeth were ravaged by caries, both facially and interproximally. Additionally, the weakened facial surfaces were severely stained and had been damaged by removal of her brackets.
DIAGNOSIS

- Facial caries #4-13 with interproximal caries #6M, #7M,D; #8M,D; #9M,D; #10M,D; and #11M.
- Recurrent decay around occlusal composites #12MO, #13O.
- Moderate to severe gingivitis with swollen papillae. Unesthetic gingival contours.
- Short clinical crown of upper bicuspids.

TREATMENT PLAN

The goal of this patient’s treatment was to restore her smile in a manner that would provide a beautiful and durable result. The treatment sequence was as follows:

1. Diagnostic photos and study casts. These were used for analysis of tooth and face proportions, as well as to study occlusal considerations.
2. Oral hygiene instruction and prophylaxis. No subgingival calculus was evident, but poor oral hygiene and severe inflammation of gingiva are not compatible with excellent results. This would be our biggest challenge.
3. Gingivectomies as needed to improve height-to-width ratio. This will also be necessary to improve gingival form.
4. Direct resin restorations of deep interproximal caries #7M, #8M,D; #9M,D; and #10M.
5. Direct resin veneers to lengthen and align #4-13.
6. Replacement of direct composites on #12, #13 occlusal.
7. Reinforcement of home care.

ARMAMENTARIUM

1. Alginate (Teledyne; Elk Grove Village, IL) and stone for diagnostic models
2. 35 mm camera (Yashica Dental Eye III [Kyocera Corp; Tokyo, Japan])
3. Oroscoptic 4.2X loupes
4. Diamond burs #5856L-016, #8856-018, 8392-016 (Brasseler; Savannah, GA)
5. ET9 and ET9F finishing burs (Brasseler)
6. Diamond finishing strips (Brasseler)
7. #245 Carbide bur (Midwest Dental Products Corp.; Des Plaines, IL)
8. #6 Latch type round bur (Midwest)
9. #7408 bur (Midwest)
10. Caries detector (Kuraray; Bethpage, NY)
11. Mylar strips
12. Cut stainless steel matrix strips
13. ViscoStat® (Ultradent; South Jordan, UT)
14. Optibond Solo Plus (Kerr; Orange, CA)
15. Optilux 400 curing light (Demetron; Danbury, CT)
16. Apollo 95E PAC light (DMD; Woodland Hills, CA)
17. Bard Parker (Franklin Lakes, NJ) #12 and #15 blade
18. Thompson Dental Mfg. Co. (Missoula, MT) #6 Composite instrument
19. IPC instrument (Cosmedent; Chicago, IL)
20. Astropol(Ivoclar/Vivadent; Amherst, NY) polishing cups, wheels, and points
21. Point 4 microhybrid composite (Kerr)
22. Renamel microfill composite (Cosmedent)
23. Creative Color opaquers and tints (Cosmedent)
24. Enamelize and Flexibuff disks (Cosmedent)
25. FlexiDisks and FlexiStrips (Cosmedent)
26. Gingival retraction cord (Ultradent)
27. Perforated stock trays (COE; Chicago, IL)
28. 35% phosphoric acid (Ultradent)
accreditation essentials

PREPARATION

Three weeks prior to preparation, diagnostic photos and impressions were taken to document and study the case (Figs 1–4). Prophylaxis was combined with oral hygiene instructions. It was made clear to the patient that the gingival inflammation had to be reduced markedly prior to restoring her case. The mother and patient were motivated and returned for two additional visits for reinforcement of oral hygiene and rubber cup polishing using a fluoride paste. Although not eliminated, the gingival inflammation was reduced significantly. The irregular gingival architecture did not change and gingivectomies would be necessary to improve height-to-width ratios of all the teeth. It was decided to proceed with the case.

Preparation started on the four upper anterior teeth by treating the interproximal decay on #7M, #8D, #8M, #9M, #9D, and #10M as separate class III restorations. A rubber dam was placed from teeth #5–12. Decay was removed with a 245 carbide bur and #6 round bur (Midwest) on a slow-speed handpiece. The preparations were checked with a caries detector (Kuraray) and residual caries removed. Marginal enamel was beveled using an 8392-016 medium flamed-shaped diamond (Brasseler). The facial enamel was severely decalciﬁed, but this would be prepared at a later step.

The interproximal lesions were restored two at a time. Mylar matrix strips were placed to protect adjacent surfaces, and then the dentin and enamel were etched for 15 seconds with 35% phosphoric acid. After washing thoroughly, the preparations were gently air-dried to rid them of excess moisture. Optibond Solo Plus (Kerr) was applied with agitation for 20 seconds to the etched but slightly moist preparations. Treated preparations were cured for 6 seconds from facial and lingual using a PAC light (DMD). Tetric Flow A2 was applied to the dentin surfaces as a liner to ensure excellent adaptation of the restorations to the tooth/resin interface. Point 4 A2 microhybrid composite (Kerr) was condensed into the preparations and sculpted with an IPC instrument (Cosmedent) and the mylar matrix. At this stage, a single “prep shade” composite was chosen that later could be etched and veneered along with the facial and incisal surfaces.

Smile analysis consisted of a careful study of preoperative photos to determine desired incisal edge positions, gingival zeniths, and contact points in harmony with the patient’s lip line. Measurements on the study models suggested that an additional 1.5–2 mm of clinical crown length was desirable. Desired length-to-width ratio of 1.2 would improve the proportions of the patient’s teeth, as the central incisors were nearly as wide as they were long. A longer, tapering ovoid or square tapering tooth form was the goal. With gingival recontouring, 1 mm of additional length could be gained and an additional 1 mm of length added to the incisal edge of the restorations.

The gingival contouring was done on #7–10 using a #15 Bard-Parker scalp, followed by ViscoStat® (Ultradent) for hemostasis (Fig 5). Because the patient’s tissues were still
somewhat edematous, a #1 gingival retraction cord (Ultradent) saturated with aluminum chloride was packed in the sulcus to retract the tissue and prevent seepage of crevicular fluids onto the preparations. I have found that using a new scalpel blade for each tooth, followed by application of ViscoStat® prior to preparation, yields a predictable result with virtually no postoperative discomfort. In combination with an impregnated cord, tissue was managed yielding good visibility and complete moisture control.

Because the midline was determined to be acceptable and tooth width would not be changed, it was decided to prep one tooth at a time. Preparations were accomplished using Brassler course round end diamonds, creating a light chamfer at the gingival margin, interproximally and overlapping the incisal edge. In this case, a chamfer margin was chosen over a long bevel to ensure that all superficial decalcification was removed near the margin. A gingival chamfer also would aid in precise margin placement, which was needed in this case to enhance moisture control. The incisal edge was prepped in such a way as to mimic a basic mamelon pattern and break up any straight line (Fig 6). Due to the extensive facial decay, some areas were prepped into dentin and the preparations appeared much like those for indirect porcelain veneers. Interproximal margin placement extended to a point where the margin would not be obvious if a color demarcation was present between tooth and resin. The preps were polished with a fine chamfer diamond.

Figure 5: Gingivectomies to improve gingival contours and height-to-width ratios.

Figure 6: The incisal edges were prepped to avoid the appearance of a horizontal line.

Figure 7: Mamalon development was sculpted into each direct veneer and cured.

Figure 8: Layers were placed to mimic the natural tooth structure.
BONDING AND SCULPTING

Adjacent teeth were protected with a section of stainless steel matrix while the tooth being bonded was etched with 35% phosphoric acid for 15 seconds. The prepped tooth was washed with copious irrigation for 5 seconds and excess moisture blown away. Due to exposure of significant dentin, Optibond Solo Plus (Kerr) was used to bond the restorations. The adhesive was applied to the slightly moist tooth structure with a micro brush and agitated for 20 seconds. Excess adhesive and solvent were removed with a stream of dry air, leaving a shiny surface. All areas of the preparation were cured for 6 seconds with a PAC light (DMD).

The first layer of composite resin applied was Point 4 A2 (Kerr), to extend the incisal edge to approximately 1 mm short of its final position. This would be my dentin replacement material. It was chosen for its combination of strength and polishability. Point 4 could have been used for the entire restoration, but I prefer using a microfill for the final facial surface. The dentin layer was sculpted with a washed, gloved finger (my favorite sculpting instrument), IPC (Cosmedent), and Thompson #6 to mimic mamalon development and leave room for translucent composite at the incisal edge, between the mamelons and at the incisal-interproximal transition (Fig 7). This layer was fully cured with a PAC light (DMD). Next, a judicious amount of Creative Color A2 opaquer (Cosmedent) was applied with a fine sable brush to highlight the mamelon development and mask the transition from tooth to microhybrid resin. The opaquer layer was cured for 60 seconds with a standard halogen light.

To accentuate the incisal character, Point 4 T2 microhybrid (Kerr) was used to build the incisal edge to full length. The translucent composite was blended to the facial, interproximal, and lingual using a finger and IPC. Care was taken to leave 0.5 mm of room on the facial for the final layer of microfill resin. This layer was cured with a PAC light for 6 seconds from facial and lingual.

Renamel Microfill Resin A2 (Cosmedent) was used to form the gingival third of each tooth. Mylar matrices were placed interproximally and used to pull the microfill into the contact area flush with the margins of the preparations prior to curing. The A2 microfill was beveled to disappear at the junction of the gingival and middle thirds of the tooth. Once shaped, this layer was cured with a halogen light for 60 seconds. The entire facial surface was then veneered with Renamel Microfill A1, again using the mylar matrices to pull the excess into the contact area to seal the interproximal margins. Due to the prior contouring of deeper layers, the A1 final layer had minimal thickness at the gingival to yield a warmer A2 shade. Also, only a thin layer was beveled to the incisal so as not to mask the carefully placed incisal characteristics. This final layer was cured using a halogen light for 60 seconds. The resin layer placement is summarized in Figure 8. The four upper anteriors were sculpted and rough finished during this appointment in an identical fashion. The canines and premolars were done at a subsequent visit and included gingivectomies to improve the appearance of the buccal corridors.

FINISHING

The restorations were shaped with an 8-fluted ET9 finishing bur (Brasseler) and Flexidisks (Cosmedent). A 12 fluted 7408 football-shaped bur (Midwest) was used to shape the lingual slopes. When the final gross contours were achieved, Astropol points were used to define facial developmental lobes and lingual concavities. Gingival areas were finished with Astropol cups. Fine Flexidisks combined with Brasseler diamond interproximal finishing strips were used interproximally, although most of this finishing had been done previously. Careful attention was given to reproducing developmental lobes and avoiding overuse of disks, which tend to flatten the facial surface. At this point, we finished with the fourth appointment, took a series of photographs, and made another appointment to complete the case.

After evaluation of the mid-treatment photos, some minor changes in contour were made and restorations taken to a polish with Astropol fine points and cups. Unfortunately, the patient’s oral hygiene had slipped and final polish and evaluation had to be delayed. Oral hygiene was reinforced using an Oral B 3D (Gillette; Kronberg, Germany) electric toothbrush and dental floss. After several other visits to monitor the progress of her home care, the final polish was
achieved using the finest Flexidisks, Astopol points and cups followed by Enamelize (Cosmedent). Another appointment was made for postoperative photos 1 week later (Figs 9-12).

CONCLUSION

Remarkable esthetic and functional results can be achieved with direct resin veneer restorations. This procedure gave this young lady a second chance after poor oral hygiene during the course of orthodontic treatment ended in horror. Patient satisfaction is incredible for this procedure when taken to a high level of excellence. Additionally, direct resin veneers allow the cosmetic dentist to better understand the process of smile design from start to finish.

REFERENCES