

Esthetics, caries control and gingival health with a versatile giomer composite system

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- Fig. 1**_Patient concerned with swollen gums and holes in teeth.
- Fig. 2**_He had braces removed the previous year and said he never smiled.
- Fig. 3**_He had generalized sensitivity to sweets and cold. Composites were to be done on 23 teeth over three appointments.
- Fig. 4**_He did not brush "very often" and really liked soda and energy drinks. He seemed committed to improving things in his mouth.
- Fig. 5**_Diode laser gingivoplasty was done after local anesthetic using low wattage and brush strokes.
- Fig. 6**_Preparations were done as conservatively as possible with a 330 bur, finish diamond and slow-speed round bur. Caries indicator was used to verify decay removal.

There are many direct composite materials that have the strength to be used in the posterior and a level of esthetics acceptable in the anterior dentition.¹ Direct anterior composites must meet the minimum cosmetic demands of the patient while posterior restorations must provide resistance to mechanical forces.²⁻⁵

In patients with questionable hygiene, dietary habits and a history of caries, we must also choose materials that have properties such as fluoride release and high polishability to decrease the effects of a less than ideal oral environment.⁶

A composite system has been developed with a surface pre-reacted glass ionomer (S-PRG) that has shown to have high esthetic properties as well as significant release of fluoride ions into the dentin and re-chargeability.^{7,8}

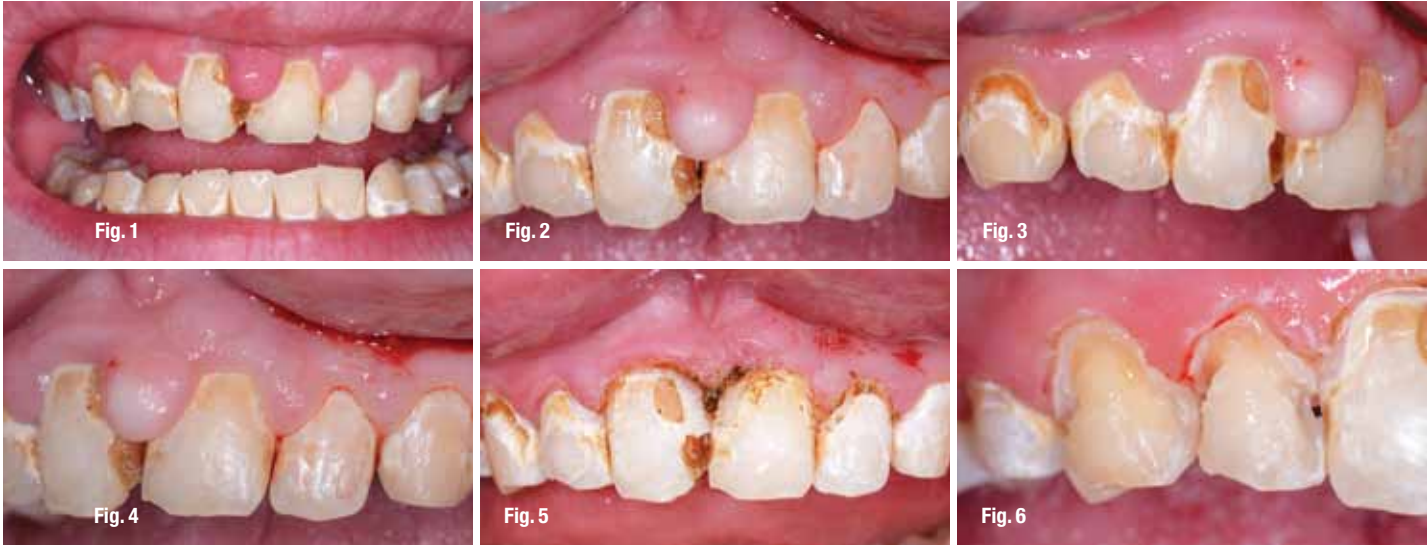
"Beautiful II and Beautiful Flow Plus (Shofu, San Marcos, Calif.) are universal nano-hybrid composites with the durability and esthetics to satisfy the demands of the profession while also providing long-

term tissue health by sustained fluoride release from the S-PRG filler particles."⁹ A potential reduction of secondary caries and maintenance of surface luster has been shown long-term with this material.^{10,11}

The small nano-sized filler has a mean particle size of just 0.8 µm, along with a filler load by weight of 83 percent, making it suitable for almost any clinical situation, including incisal edge replacement and posterior restorations in occlusion.¹²

The versatility of these products, coupled with the giomer technology, make them unique in the dental marketplace and a strong choice in almost any clinical situation.

The flowable comes in two viscosities with a varying degree of flowability, each with similar physical properties strong enough to withstand occlusal forces in posterior restorations.¹³ The zero flow, F00, is a stackable flow with almost no movement or slump when syringing. The low flow, F03, is a great universal flow material with handling similar to other more viscous flowables on the market.





Will these flowable materials replace each of the more viscous composite materials? No. The sculptability and layering potential of conventional composites will always have a place in esthetic dentistry. Another advantage of a non-flowable material is void reduction in posterior composites as uncured flowable is followed by a more viscous material pushing out and displacing the flowable as the viscous composite material is injected.

Patient exam and planning

A 15-year-old male came to the office with an "unpleasant" smile after having orthodontic treatment the previous year (Fig. 1). His primary concern was the hypertrophic tissue around his incisors and his cold and sweet sensitivity (Fig. 2). There was rampant decay, enlarged gingival tissue, poor hygiene and decalcification areas (Figs. 3, 4).

A full series of radiographs and photographic images were taken for treatment planning, marketing and case documentation. These images were studied, along with clinical exam notes, before treatment so that a basic plan was formulated.¹⁴

A treatment plan was made to do 23 direct composite restorations over three appointments after a prophy, oral hygiene education and tray-delivered home topical fluoride delivery. The plan included laser gingivoplasty followed by restorations with Beautiful II because of its esthetics, ease of use, fluoride release and versatility.

After several weeks of maintained oral hygiene improvement, the surface of the anterior teeth would be re-contoured and enhanced at no additional charge.

Soft-tissue enhancement

Lasers have become a critical component of smile rehabilitations, and if done with respect to periodontal tissues and biologic width, results can be a great enhancement to cosmetic treatment.^{15,16} Diode lasers offer excellent control of tissue sculpting with very predictable healing and tissue tolerance as long as sound biologic principles are followed.¹⁷⁻¹⁹ These principles must be understood during treatment in order to prevent possible chronic periodontal inflammation and unwanted gingival responses, such as redness, bleeding and irritation.^{20,21}

On the first restorative appointment, a local anesthetic (Septocaine, Septodont, Lancaster, Pa.) was given and retractors (See More, Discus, Culver City, Calif.) were placed to keep the lips out of the way and to provide some isolation from saliva. An 810 nm diode laser (Odyssey, Ivolar Vivadent, Amherst, N.Y.) was used on a relatively low wattage, 2.0, to sculpt the tissues and remove hyperplastic gingival tissue (Fig. 5).²²

Clean up and removal of the charred tissue was done with a microbrush and hydrogen peroxide. It is expected that the new soft-tissue location would be maintained or even improve with properly contoured restorations, good surface polish and continued plaque control.²³

Giomers composite technique: maxillary

The goal of this one-hour restorative appointment was to provide improved esthetics and an environment to promote tissue recovery on the maxillary anterior. Tooth preparation was done with a 330

Fig. 7_ Contour matrices were placed and a BAC containing 37 percent phosphoric acid etch was placed and rinsed.

Fig. 8_ Several coats of a universal bonding agent were applied and air thinned.

Fig. 9_ Beautiful Flow Plus was applied to cover all dentin and then cured.

Fig. 10_ The contour matrices form a good gingival seal, keeping the crevicular fluids out while giving anatomical form to the material.

Fig. 11_ The remaining cavities were restored with the same flowable material. Notice how the material holds its shape without running, even before curing.

Fig. 12_ Light polymerization was done from facial, lingual and incisal to insure a high level of conversion.

(Images/Provided by Dr. Jack D. Griffin, Jr.)



Fig. 13_Initial shaping was done with a finish diamond on high speed with water, making sure that the width and embrasures were adequate before restoring the adjacent teeth.

Fig. 14_Other teeth were prepared and restored in the same way.

Fig. 15_One-hundred percent of the restorations at this time were done with flowable material that has high fluoride release and re-chargeability.

Fig. 16_At the end of the first appointment, contouring was done but polishing was minimal because of time.

Fig. 17_Impressions were taken and bleach-type trays were given with topical fluoride. The goal was to keep the giomer material recharged for optimal healing.

Fig. 18_At the second appointment, two weeks after initial treatment, the gingiva showed marked improvement.

bur, finish diamond and a #2 slow-speed round bur (Fig. 6). Caries indicator (Sable Seek, Ultradent, South Jordan, Utah) was used to verify complete caries elimination and a long irregular bevel was placed on all enamel margins. Two teeth were done at a time.

A contoured anatomical matrix (Contour Matrix, Ivoclar Vivadent, Amherst, N.Y.) was placed and wedged loosely. The matrix extends slightly, providing a "sulcular seal" aiding in marginal integrity. These matrices not only increase restoration longevity, but also greatly increase placement efficiency.²⁴

The teeth were etched with 37 percent phosphoric acid (Etch 37, Bisco, Schaumburg, Ill.) for 10 seconds, rinsed thoroughly and left damp (Fig. 7). This etch contains benzalkonium chloride (BAC) for a continued antimicrobial effect. A universal bonding agent (All Bond Universal, Bisco, Schaumburg, Ill.) was applied in several layers, air thinned and cured (Fig. 8).²⁵

Beautiful Flow Plus, low flow, was placed into the preps, covering all dentin, and cured for 15 seconds (Fig. 10). The non-runny nature of this material and the great adaptability make this a great choice for dentin replacement. The remaining preparation was restored with the same material so that the entire restoration was done in this flowable nano-hybrid composite in a single shade of A2 (Fig. 11).²⁶

Curing was then done for 20 seconds from the facial, lingual and incisal to insure complete polymerization (Fig. 12). Initial contouring was done quickly with a finishing diamond (Diatech Direct, Charleston, S.C.) to provide basic anatomical shaping.²⁷

Tooth #8 was prepped, caries removed and restored in a similar fashion (Fig. 14). Because of the size and depth of this restoration, the flowable material was placed and cured in three different increments

(Fig. 15). The remaining anterior teeth were restored and shaped (Fig. 16). Minimal polishing was done at this time because of time constraints.

Alginate impressions were taken and flexible bleach-type trays were made. The high fluoride release and ability to be recharged make this giomer an ideal product in less than ideal oral environments such as this.²⁸

The potential of recurrent decay and the plaque formation that may compromise the gingival recontouring may be lessened by the sustained antimicrobial effect of this material.

The patient was given stannous fluoride at 0.4 percent with instructions to place it in the mouth overnight two to three times per week until all restorative work was completed. At that time, re-charging of the giomer material would continue between prophyl appointments at once a week (Fig. 17).

_Second appointment: mandibular restorations

Two weeks later, a two-hour appointment was made to restore the mandibular teeth. The gingival health on the maxilla was consistent with better hygiene on restored teeth and bacterial control (Figs. 18, 19). The patient claimed to use the fluoride trays two to three times a week and was brushing at least once a day.

The patient's right side was done, first focusing on facial decay initially (Fig. 19). Cavity preparation, caries removal and enamel beveling as described above was completed with various burs. On the right bicuspid, a pinkish blush was noticed after decay removal with no obvious pulpal exposure (Fig. 20).



Fig. 19



Fig. 20



Fig. 21



Fig. 22



Fig. 23



Fig. 24

A bioactive liner (TheraCal, Bisco, Schaumburg, Ill.) was placed in a thin layer to stimulate secondary dentin formation and to seal deep pulpal dentin. This material was light cured and kept 2 mm away from restoration margins (Fig. 21). All facial lesions were restored using selective etching, a universal bonding agent and Beautiful Flow Plus as described above.

The matrices used varied. In the anterior, Mylar strips were used and held in place with a plastic instrument while the flowable material was light cured. Where a strip had trouble going through the contact, a FenderWedge (Garrison Dental, Spring Lake, Mich.) was used (Fig. 22). Shaping was done with a finish diamond and flame-shaped finish bur.

In the posterior, the teeth were isolated with a suction/light/bite-block system (Isolite, Santa Barbara, Calif.). Conservative preparations were done with a 330 bur and sectional matrices placed with a wedge and 3-D ring system (Garrison Dental, Spring Lake, Mich.) to insure tight, broad contacts (Fig. 23).

After etching and bonding, a 0.5 mm layer of the giomer flowable was placed on the pulpal floor and cured, creating a good polymerized layer protecting the pulp. A small amount of flowable was added again, left un-polymerized and the more viscous Beautiful II forced the flowable into all areas of voids leaving a dense fill (Fig. 24).

Shaping was done with a #6 round bur and a football-shaped finish bur, leaving excellent margins and contacts (Fig. 25). All restorations were completed on the right and then the Isolite unit was moved to the left side and restorations done in the same manner (Fig. 26).

Final restorative appointment: maxillary enhancement

Three months after the initial flowable placement on the maxillary teeth, the patient returned still showing soft-tissue and hygiene improvement. This 1.5 hour appointment was completed to enhance the maxillary anterior teeth and complete several posterior maxillary restorations.

Using a finish diamond with water on a high-speed handpiece, the surfaces were roughened in an irregular way to provide depth to the re-surfacing (Fig. 27). All preparation was done about 3 mm away from the gingiva and the surface left wavy (Fig. 28). The materials used on the anterior were a universal bonding agent and etch, and both versions of the giomer material (Fig. 29).

The surfaces were etched with 37 percent phosphoric acid for 10 seconds, rinsed well and dried. This left a roughened, frosty appearance to the Beautiful Flow (Fig. 31).

The All Bond Universal has a high bond strength to polymerized composite without an air-inhibited layer and was applied in several coats and air thinned. (Fig. 32) Mylar strips were placed and the Beautiful Flow Plus low flow was placed in the center of the tooth and left uncured.

This material helps to wet the surface and decrease void as the more viscous material was applied directly over it. A1 Beautiful from a compule was applied to each tooth, sculpted and cured using a free-handed technique.²⁹ Most of the less viscous flowable was wiped away with the plastic instrument. The

Fig. 19 The lower quadrants were done at this appointment, starting with the right side. Facials were done first, followed by interproximal to reduce the chance of bleeding.

Fig. 20 After complete caries removal, pink blush was noticed.

Fig. 21 Before bonding, a hydroxyapatite promoting liner was placed to stimulate dentin bridge formation.

Fig. 22 Various matrices were used, including Mylar strips and a wedge-sectional combination called a FenderWedge where contacts were very tight.

Fig. 23 Isolation in the posterior was done with an Isolite and the teeth were prepped. Sectional matrices were placed along with a 3-D ring.

Fig. 24 Etching, rinsing and flowable liner were completed followed by Beautiful II from a compule.



Fig. 25



Fig. 26



Fig. 27



Fig. 28



Fig. 29



Fig. 30

Fig. 25_ The restorations show excellent margins with broad, deep, tight contacts.

Fig. 26_ Shaping was completed with a finish diamond, finish bur and disks.

Fig. 27_ At the third and final restorative appointment, the maxillary anteriors were enhanced. A finish diamond was used with water to roughen the surface of the Beautiful Flow Plus from the first appointment.

Fig. 28_ The surface was irregular and kept 3 mm from the gingiva.

Fig. 29_ The materials used during this enhancement included 37 percent etch, a universal bonding agent, flowable and more viscous composite.

Fig. 30_ The teeth were isolated with retractors, etched for 10 seconds and rinsed thoroughly.

lighter surface shade brightens the smile while giving vitality to the restorations that were placed over the darker A2 shade from the first restorative appointment. Initial contouring was done with a finish diamond on high speed with water.³⁰⁻³²

Shaping and polishing was completed with a flexible disk system (Super Snap Rainbow, Shofu, San Marcos, Calif.). This system features a sequence of very thin, flexible disks that are very efficient at shaping embrasures, final shaping and high polish without metal in the center that may gouge or scratch the restoration surface (Fig. 34). The giomer material is easily polished and rivals many nano-hybrids on the market today.³³

Results

Obviously, a great improvement was realized for a boy who said he "never smiled until now" (Fig. 37). It would be naïve to think that these restorations will last him his entire life without the need for more definitive porcelain restorations or other cosmetic procedure. However, the improvement in self-esteem, the decrease in sensitivity and the feeling of better oral health may help to stimulate him to be committed to better oral care. After six months, the improvement in soft- and hard-tissue health is undeniable (Fig. 38). The attached tissue stippling and lack of bleeding clearly shows how well the soft tissues tolerate these materials.

The giomer materials have excellent esthetics and strength, which combined with the high long-term fluoride release make these materials a strong consideration in most all direct restorative cases. The patient has continued fluoride treatments at home

on average about every one to two weeks, as often as he can remember. Now, if we can just keep him from losing his trays for the third time.

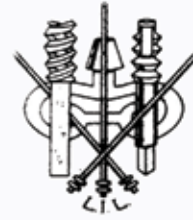
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Fig. 31



Fig. 32



Fig. 33

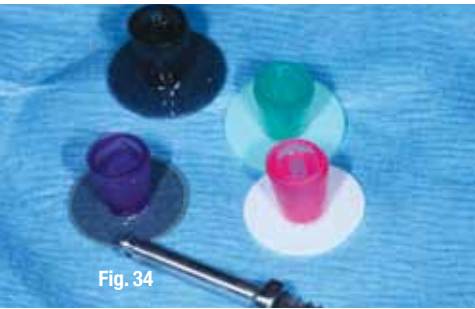


Fig. 34



Fig. 35



Fig. 36



Fig. 37



Fig. 38

Fig. 31—The surface was rough and frosty in appearance.

Fig. 32—The universal bonding agent bonds very well to a previously polymerized composite surface, is clear and has a very low film thickness.

Fig. 33—Mylar strips were placed and the A1 Beautifil II was injected onto uncured flowable on each tooth. Sculpting was done with a plastic instrument and cured.

Fig. 34—Initial contouring was done with a finish diamond, which was followed by Super Snap disks.

Fig. 35—The black disk was used with light pressure to improve form. The embrasures were primarily formed with the purple disk.

Fig. 36—The green and red disks complete the polish.

Fig. 37—Excellent hard- and soft-tissue result with a great improvement in oral health.

Fig. 38—The smile is much improved as the patient continues at home fluoride use and brushing.

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