

Flowable composites: Aesthetics for tots and teens

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Introduction

Parents are concerned about aesthetics for their children. Aesthetic dentistry can provide a beautiful smile that parents and their children desire. Self image is very important for our young patients so that they can look good and feel good about themselves. We have all experienced that wonderful spontaneous patient smile when we have turned the "ugly duckling" into a "beautiful swan." We are fortunate to have dental materials and devices that provide us the opportunity to perform aesthetic dentistry. Some of the techniques and materials we have available for our young patients' smile creations include: porcelain veneers, microabrasion, bleaching, orthodontics (including clear braces and aligners), direct and indirect composite restorations, implants, and all-ceramic crowns.

This article will describe and illustrate various uses of flowable composites that aid in providing aesthetic restorations for children and teens. The advantages of the beauty and functionality will also be elicited.

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Table 1. Indications for Flowable Composites

- Preventive resin restorations
- Bonding orthodontic brackets
- Minimally invasive Class I or II restorations
- Class II restorations as a base or liner under composite restorations
- Minimally invasive Class III restorations
- Class V restorations
- Splinting fractured and mobile teeth (post-trauma or periodontal involvement)
- Repairing small direct and indirect restorations
- Class VI restorations in nonstress bearing areas
- Fissure sealant

Indications for flowable composite in young patients

There are many indications for the use of flowable composites in young patients (Table 1). Let's look in more detail at a few of these.



Figure 1a. Permanent molar with incipient caries. (Courtesy of Giovanni Olivi)



Figure 1b. Preventive resin restoration. (Courtesy of Giovanni Olivi)



Figure 2a. Permanent molar with caries adjacent to failed sealant. (Courtesy of Giovanni Olivi)

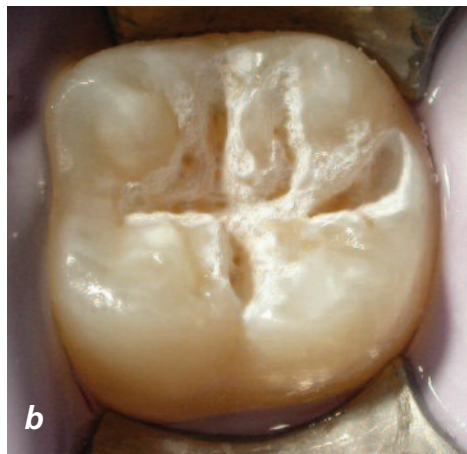


Figure 2b. Erbium laser preparation of molar for preventive resin restoration. (Courtesy of Giovanni Olivi)

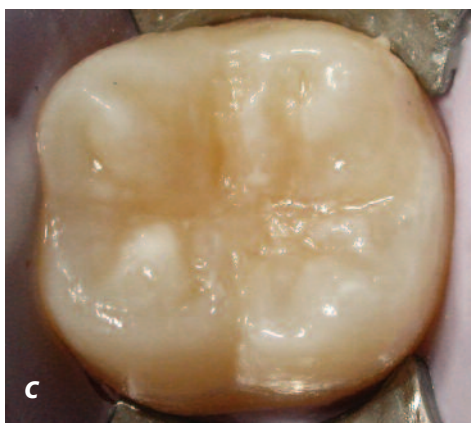


Figure 2c. Preventive resin restoration. (Courtesy of Giovanni Olivi)



Figure 3. Bonded orthodontic brackets.

Preventive Resin Restorations

Simonsen¹ has recommended that, for the type 2 preventive resin restorations (PRR) in which the preparation involves both the enamel and dentin, a flowable composite could be utilized to replace the carious tooth structure after excavation of the incipient caries. In a

recent article by Savage, et al² it was reported that flowable composite was the most widely used restorative material for the PRR among those pediatric dentists surveyed in this study. More than 30% of the pediatric dentists always use a flowable composite or a combination of flowable composite and "packable" composite/

flowable composite combination (Figures 1a and 1b).² The author has found flowable composite to also be useful when a sealant has failed and incipient caries has been detected at a recall visit (Figures 2a to 2c). The Venus Diamond Flow (Heraeus Kulzer) flowable composites offer low shrinkage and high flexural strength.

Bonding Orthodontic Brackets

Vicente and Bravo³ evaluated the shear bond strength of several flowable composites after debonding of orthodontic brackets compared to a traditional orthodontic resin. The shear bond strength was measured with a universal testing machine and the adhesive remnant after debonding was quantified utilizing image analysis. The results showed that there were no significant differences between the shear bond strengths of the various groups evaluated. The orthodontic resin left significantly more adhesive on the tooth than the 3

flowable composites tested.³ Ryou, et al⁴ in a recent study concluded: "...flowable composites with no intermediate bonding resin could be conveniently applied for orthodontic bonding" (Figure 3).

Class II and V Restorations Utilizing Flowable Composite

Flowable composites are often utilized as a liner under composite restorations. The purpose is to seal the margin, which helps prevent postoperative sensitivity and secondary caries. Sadeghi and Lynch⁵ investigated the effects of a layer of flowable composite and compomer on microleakage of composite restorations that extended apically to the cement-enamel junction. The results of the study showed that when flowable composites were used as a liner, both the packable and the nanofilled composite materials had significantly less microleakage than when flowable liners were not used. There was a



Figure 4a. Class II preparation on a primary molar.



Figure 4b. Flowable composite placed.



Figure 4c. Flowable composite restoration completed.



Figure 5a. Class II preparations of bicuspid and molars.



Figure 5b. Flowable composite as a liner.



Figure 5c. Composite placed over flowable composite.



Figure 6a. Class V preparation on bicuspid.



Figure 6b. Flowable composite restoration.

significant reduction of the microleakage occurring under both types of composite materials at the gingival floors⁵ (Figures 4a to 6b).

Illie and Hickel⁶ investigated the mechanical properties of composites and concluded that flowable composites and compomers showed comparable results. Flowable composites only differed from microfilled composites in diametric tensile strength.

Some of the flowable composites the author uses routinely includes Venus Diamond Flow. The advantages to this particular flowable composite includes the increased strength (versus a sealant), low shrinkage stress, and high flexural strength. It also has the advantage of being an

exact shade match with the Venus Diamond composite system. Other flowable composites that the author uses includes G-aenial Flo and Universal Flo (GC Corporation) and Beautifil Flow Plus (Shofu). The advantage to the later is the release of fluoride. Vertise Flow (Kerr) has the added benefit of being self-etching.

The effects of different light-curing units on the microleakage of flowable composite resins was studied by Yazici, et al.⁷ They found that none of the Class V restorations restored with flowable composites exhibited marginal leakage of the enamel. Also, there was no significant difference exhibited between the flowable composites tested on the dentin margins.⁷



Figure 7. Splint bonded with a flowable composite.



Figure 8a. Fractured permanent central incisor.



Figure 8b. Flowable composite bonded fractured segment to crown.

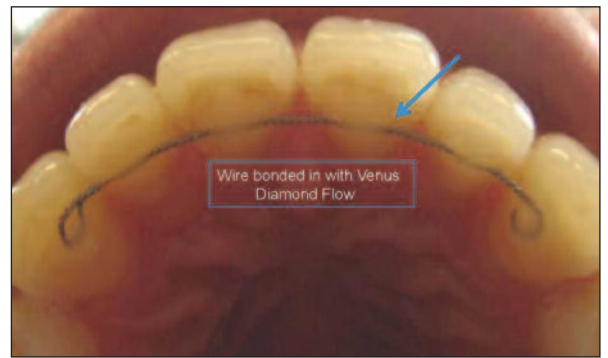


Figure 9. Orthodontic retainer bonded with flowable composite.

Splinting Fractured and Mobile Teeth and Orthodontic Retainers

Tabrizi, et al⁸ found that flowable composites provided satisfactory shear bond strength comparable to a standard orthodontic resin and therefore may be used for direct bonding of lingual retainers.⁸ Flowable composites may be used to splint mobile teeth utilizing orthodontic wire or

nylon filament splints (Ribbond). Foek, et al⁹ studied the adhesive properties of bonded orthodontic retainers to enamel, utilizing flowable composite, with both stainless steel wire versus fiber-reinforced composites. They found that the bond strengths between the fiber-reinforced composites and the orthodontic wire when used as retainers did not differ significantly (Figures 7 to 9).⁹



Figure 10. Occlusal restoration with Venus Bulk Flowable.

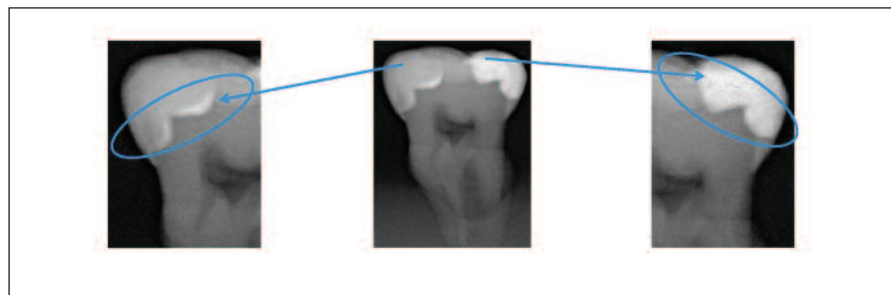


Figure 11. Radiopacity of a flowable composite material.

Repairing Small, Direct, and Indirect Restorations

One of the many advantageous properties of flowable composites is their ability to repair previously placed composite restorations. Papacchini, et al¹⁰ evaluated the effect of various intermediate resin agents on composite-to-composite bond strengths. The flowable

composites showed good interfacial quality to the adhesives. Also, the application of flowable composites resulted in statistically superior tensile strength (Figure 10).¹⁰ The author used Venus Diamond Flow in this instance due to the studies indicating its excellent bond strength, low shrinkage stress, and shade matching quality.

Table 2. The Desirable Properties of Flowable Composite are the following:

- Flowable consistency and modeling (thixotropic)
- Low shrinkage
- Radiopaque
- Shades corresponding to composites; color adaptative qualities
- Polishability and long-lasting shine
- Color stability

Important properties of flowable composites

Flowable composites exhibit many characteristics that make them an excellent choice for indications like the ones highlighted above (Table 2). The following properties are important when treating young patients with this class of composite resin restorative material.

Radiopacity of Flowable Composites

One of the qualities of a flowable composite that is very favorable is that of being radiopaque. Venus Diamond Flow has been shown to be one of the most radiopaque flowables on the market today. Murchison, et al¹¹ in their study, stated the following: "The level of radiopacity of the tested flowable composites was variable; those with low radiodensity should be avoided in Class II restorations, where a clear determination of recurrent caries by the examining clinician could be compromised."¹¹ Sabbagh, et al¹² agreed with a more recent study when they concluded that flowable composites used within intracoronal restorations, clinicians should use materials with high radiopacity (Figure 11).¹²

Polishing Flowable Composites

Polishability of the surface of the restoration is important for aesthetic and functional purposes. The surface should be able to have a smooth lustrous surface and be able to maintain this desired characteristic. Ozel, et al¹³ studied the effect of one-step polishing systems on the surface roughness of various flowable composites. The one- or 2-step polishing systems are a good choice for the polishing of flowing composites.¹³

Conclusion

This article briefly described and demonstrated various indications for aesthetic restorations that can be used successfully for our child and adolescent patients. Modern aesthetic techniques and flowable composite resin materials, used properly for purposes such as those presented herein, will serve to broaden the scope of aesthetic dentistry delivered for children and teens.

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