NEW LUTING COMPOSITE: VARIOLINK ESTHETIC

by Stephanie Huth, DDS

Cementation materials establish a durable bond between the tooth structure and the restorative material and therefore contribute significantly to the long-term success of indirect restorations. Cementation materials are classified into three different types: conventional cements, self-adhesive and adhesive resin cements.

The advantage of conventional cements (e.g. zinc phosphate or glass ionomer cements) lies in the ease of use and more-forgiving properties in adverse clinical conditions like excessive saliva or bleeding. However, these luting cements adhere mechanically to the tooth structure, hence retentive tooth preparation is required. Additionally, they are easily discernible due to an opaque shade.

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The advent of adhesive resin cements has contributed to the rising importance of restorative materials. Adhesive resin cements bond chemically with highly aesthetic all-ceramics restorations—such as IPS e.max Press/CAD, which means they can be used even with non-retentive tooth preparations. It is essential in such cases, however, to select a luting material of an appropriate shade and translucency level in order to obtain excellent aesthetic results. This applies in particular to restorations with a minimal material thickness.

An additional advantage of adhesive luting composites over conventional cements is the enhanced long-term integrity of the restoration margin. The low solubility and high resistance to wear of these luting composites lead to a reduced washing out of the cement gap.

Adhesive resin cements use bonding agents to ensure a reliable bond to the tooth structure. The bonding agent penetrates into the dentin tubuli and forms a hybrid layer by bonding to collagen fibers. Etching of the tooth structure removes the smear layer and exposes the dentin tubuli, resulting in an increased micro-retention. The luting composite forms a chemical bond with the hybrid layer and therefore adheres well to dentin and enamel. Although the pre-treatment time of well-established self-adhesive composite cements is considerably reduced (since no conditioning is required) they demonstrate lower bond-strength values.

The high strength of IPS e.max lithium disilicate allows clinicians to choose conventional, adhesive, or self-adhesive composite cement for cementation. However, due to lower bond strength, it is recommended that self-adhesive and conventional cements be utilized in clinical situations with retentive prep design (less than 8 degree taper and minimum 4mm

height), adequate thickness (greater than 1mm for anterior; and 1.5mm for posteriors) and tight fit. Although adhesive cements are also indicated for these conditions, adhesive cements complement IPS e.max lithium disilicate's high strength in a variety of additional indications, including all types of restorations, any preparation design, and any thickness of restorations.

With no minimum requirements for adhesive cementation, adhesive resin cements provide higher immediate bond strengths and a better marginal seal with IPS e.max restorations.

Optimum aesthetics for a broad range of indications

Variolink Esthetic is a light and dual-curing luting composite for the permanent cementation of ceramic and composite restorations. The light-curing version (Variolink Esthetic LC) is suitable for high-translucent restorations where a longer working time is desired. This allows the dental professional to position, secure and subsequently light-cure all-ceramic veneers without any time constraints. The dual-curing version (Variolink Esthetic DC) is suitable for ceramic and composite restorations for which a complete polymerization with light cannot be ensured due to the material's opacity or strong wall thickness. In such cases, complete polymerization of the luting composite is achieved by the material's combination of light and self-curing properties, resulting in a reliable adhesion of the restoration.

Variolink Esthetic is available in five different shades. Variolink Esthetic Neutral, which features the highest level of translucency, does not affect the brightness value of the restoration and is color neutral. Warm and Warm+ increase the chroma of the restoration and therefore result in a gradual darkening of the overlying ceramic and composite restoration. The shades Light and Light+ have a gradual brightening effect on the restoration. Using the Variolink Esthetic Try-In pastes ensures that the ideal shade is selected to flow seamlessly with the adjacent dentition.

Easy Excess Removal

In the past, the time-consuming removal of excess luting cements before and after polymerization represented a disadvantage of the adhesive cementation technique. Variolink Esthetic has been further developed and sets a new standard for easy removal of excess material, making aesthetic cementation simple. Excess material can be easily removed while still in a gel-like consistency due to the material's optional pre-polymerization feature. For the pre-polymerization, Variolink Esthetic DC is light-cured using the quarter technique, i.e. each quarter surface (mesio-lingual, disto-lingual, mesio-buccal, disto-buccal) is polymerized with light for two seconds. In case of Variolink Esthetic LC, the entire cement gap is pre-polymerized for two seconds (circular technique).

Controlled Viscosity

The consistency of Variolink Esthetic has been optimally adapted to the requirements of dental practitioners. It has a convenient level of flowability and can be effortlessly and precisely extruded from the syringe. Furthermore, excess material smoothly flows from the cement gap, but remains stable at the cementation joint so that it can be readily removed after successful pre-polymerization.

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Shade Comparison							
Variolink Esthetic	Light+	Light		Neutral	Warm		Warm+
Variolink Veneer	HV+3	HV+2	HV+1	MV0	LV-1	LV-2	LV-3
Variolink II	White opaque	Bleach XL		Transparent	White	Yellow	Brown

Combination with Adhese Universal

The adhesive material Adhese Universal ideally complements Variolink Esthetic. The optional etching step with phosphoric acid is part of the selective-etch and etch-and-rinse techniques and results in an enhanced adhesion to enamel and optimized marginal seal. Adhese Universal is applied onto the tooth surface to be treated, starting with the enamel margins, and agitated for at least 20 seconds. Subsequently, the adhesive is dispersed with oil-free and water-free air until a glossy, stable film results. Due to the adhesive's adapted thixotropy, the film thickness is kept to a minimum so that the fit of the restoration is not affected. The material is polymerized with a light intensity of ≥ 500 mW/cm2 for 10 seconds before the placement of the indirect restoration.

Clinical case:

A 25-year-old patient presented to our practice with a compromised resin composite restoration and secondary caries on tooth #19 (Fig. 1). Since the defective area was very large, treatment with an IPS e.max CAD restoration was decided in order to achieve an efficient and aesthetic result. After placement of the core build-up and preparation of the tooth, the tooth was scanned intraorally and a partial crown was designed (Fig. 2). Subsequently, the non-crystallized restoration in blue stage was tried in the patient's mouth to check the contact points and the fit of the restoration. In order to assess the aesthetic appearance and the shade effect, the characterized and fired restoration was again tried in using Variolink Esthetic Try-In Paste Neutral (Fig. 3). During these trial placements, care was taken that the tooth was sufficiently moist to ensure a lifelike shade impression. An anatomically shaped rubber dam (OptraDam Plus) was used for absolute isolation during the final placement of the restoration (Fig. 4).

Variolink Esthetic Advantages
(when compared to Variolink II, Variolink Veneer, and Multilink Automix):

- Balanced, concise effect shade system with only five shades.
- Enhanced shade stability due to its 100 percent amine-free composition.
- Easy, precise, and enhanced excess removal due to pre-polymerization with light.
- Flexible, situational consistency with the optimal combination of flowability and stability.
- Can be freely combined with different adhesive systems.

First, the enamel was etched for 15 seconds (Fig. 5), followed by dentin for another 15 seconds (Fig. 5). Then, Adhese Universal was scrubbed onto the prepared tooth surface for 20 seconds and dispersed with a stream of air (Fig. 6). Special care was taken that no material pools formed at the cavity floor. Subsequently, the restoration was light-cured with a polywave LED curing light (Bluephase Style) for 10 seconds. To obtain an optimum bond, the IPS e.max CAD restoration was etched with hydrofluoric acid (IPS Ceramic Etch Gel) for 20 seconds and conditioned with Monobond Plus 60 seconds followed by air drying. In a next step,

Fig. 1 Preoperative situation: Tooth 19 with failed composite filling

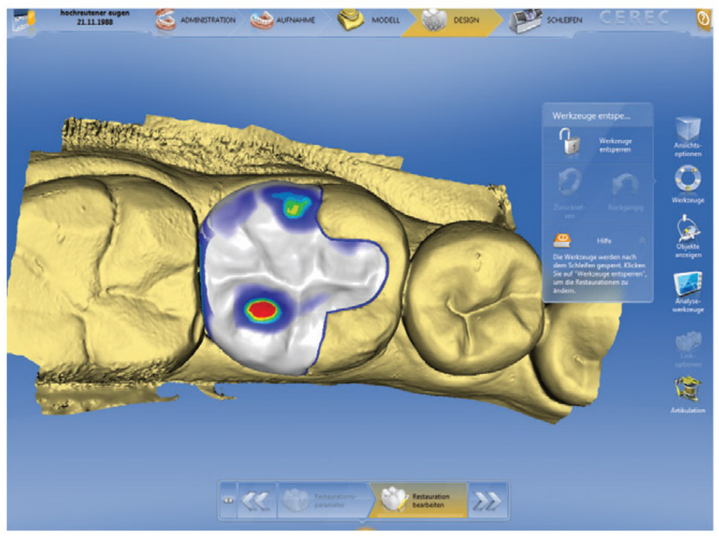

Fig. 2 Proposed design of the e.max CAD restoration

Fig. 3 Try-in of the IPS e.max restoration with Variolink Esthetic Try-In Paste Neutral

Fig. 4 Placement of the anatomically shaped OptraDam rubber dam

Fig. 5 Acid-etching of the prepared tooth surface with 37 percent phosphoric acid (Total Etch)

Fig. 6 Application of Adhese Universal

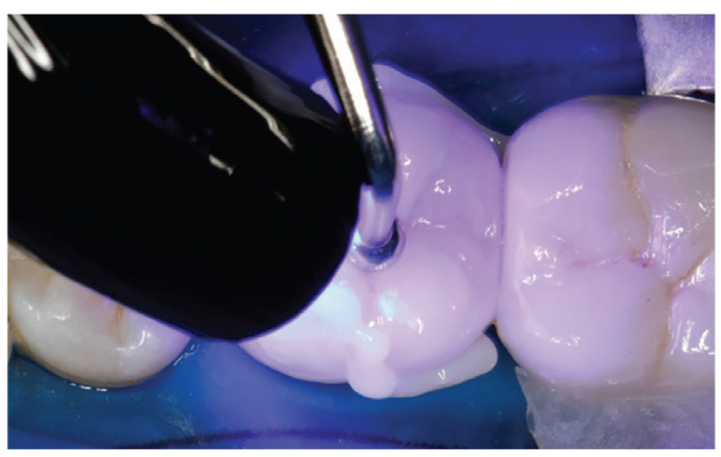

Fig. 7 Pre-polymerization of excess luting cement using the quarter technique, i.e. each quarter surface is light-cured for 2 seconds with the polymerization light held at a maximum distance of 10 mm.

Fig. 8 Removal of gel-like excess luting cement material using a scaler.

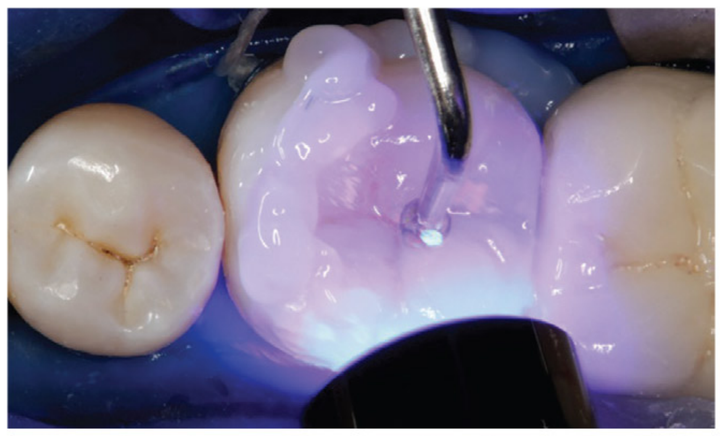

Fig. 9 After the application of a glycerine gel (Liquid Strip), each segment of the restoration is light-cured.

Fig. 10 One-week post-op picture.

Variolink Esthetic DC was applied on the restoration which was subsequently positioned on the tooth. After pre-polymerization of the excess material using the quarter technique (two seconds per quarter surface) (Fig. 7), the gel-like excess material could be easily removed using a scaler (Fig. 8). Glycerine gel (Liquid Strip) was applied to prevent the formation of oxygen inhibition layer. In a final step, each segment of the restoration was light-cured for 10 seconds (Fig. 9), the margins were finished and polished (Astropol) and the occlusion was checked.

Frequently Asked Questions

1. Can veneers be cemented using either Variolink Esthetic materials?

Both Variolink Esthetic DC and Variolink Esthetic LC can be used to cement veneers. Variolink DC is recommended since it defines the time of curing of the composite and not the composite itself.

2. Should a bonding agent be used prior to application?

It is recommended to pre-treat the bonding surface of the restoration with a primer (e.g., Monobond Plus) and utilize a universal adhesive (e.g., Adhese Universal) on tooth surface to ensure a reliable and strong bond between the adhesive and the cement.

3. What aspects need to be considered when determining the optimum shade for cementation when using Variolink Esthetic?

The shade effect of Variolink composite pastes should be simulated *in vivo* with the corresponding Variolink Esthetic Try-In pastes and performed prior to isolation or drying of the tooth structure.

Variolink Esthetic Indications		
	Variolink Esthetic LC	**Variolink Esthetic DC**
Glass-ceramic e.g. IPS Empress Inlays/onlays/partial crowns	X	XX
Veneers	XX	XX
Crowns	—	XX
Lithium disilicate e.g. IPS e.max Occlusal veneers	XX	XX
Thin veneers/veneers	XX	XX
Inlays/onlays/partial crowns	X	XX
Crowns	—	XX
3-unit bridges	—	XX
Oxide-ceramics (zirconia/alumina) e.g. Zenostar, IPS e.max ZirCAD	—	—
Indirect composites, e.g. SR Nexco Inlays/onlays	X	XX
Crowns	—	XX
Root posts	—	—

XX Recommended product information
— Not recommended
X Use Variolink Esthetic LC only for restorations with a low material thickness of < 2mm and with sufficient transparency.

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Author Bio

Dr. Stephanie Huth is a research associate in the internal clinic of Ivoclar Vivadent`s research and development department. She is responsible for clinical studies concerning restorative dentistry and prosthodontics, particularly adhesives and zirconia restorations. She started her career at the Julius-Maximilians-University in Würzburg, Germany (2005-2010), where she passed the examination with distinctions and earned a doctorate in the department for functional materials in medicine and dentistry.