

BeutiCem SA – All-Round Resin Cement for Easy Adhesive Luting

Dental professional Uwe Diedrichs on an innovation presented by Shofu at the IDS

Minimally invasive and defect-oriented procedures have long since become a must in dental practice, which of course also applies to indirect restorations. Besides, certain clinical factors, e.g. short or conical stump geometries, or the type of restoration as such, may necessitate adhesive cementation. In these cases, the luting material used will have a considerable influence on the success or failure of the restoration. A basic distinction should be made between semi-adhesive luting, e.g. with glass ionomer cements, and enamel/dentin-adhesive luting. Products designed for the latter either need separate conditioning of the tooth and restoration surfaces to be joined or have self-adhesive properties. On the occasion of the 2013 IDS, Shofu Dental now presents BeutiCem SA, a high-performance resin cement of the self-adhesive generation.

BeutiCem SA is an universal, self-adhesive, UDMA-based resin cement, which releases and recharges fluoride thanks to Shofu's proprietary surface-modified S-PRG filler particles. It can be used with all indirect restorative materials and restoration types suitable for adhesive cementation and is available in two shades, "Clear" and "Ivory", on the German market. The addition of phosphonic acid, special carboxylic acids and 2-HEMA eliminates the need to separately condition the tooth structure. Separate conditioning of the restoration surfaces to be cemented is also unnecessary; only restorations made of silicate ceramics should be silanised, e.g. with Porcelain Primer by Shofu Dental.

In this way, BeutiCem SA greatly simplifies highly technique-sensitive steps, and the fact that it is very easy to handle also contributes to its user-friendliness. The cement comes in a dual-chamber syringe with auto-mix tips (Fig. 1), designed to consistently mix it in the correct ratio and without any air inclusions. This direct application system minimises the time required to place a restoration and mixes only the amount of material that is actually needed.

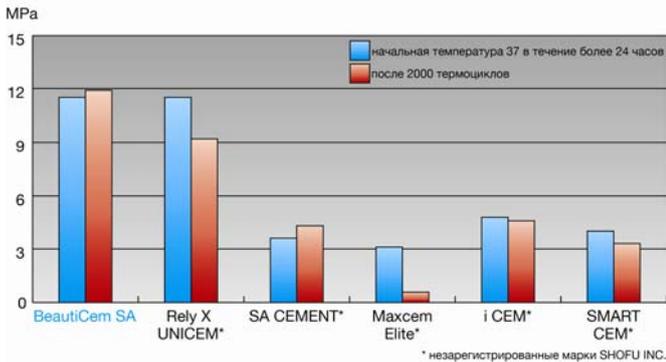


(1)
BeutiCem SA in dual-chamber syringe with auto-mix tip

BeutiCem SA is a dual-cure material. It can be light-cured at wavelengths of 400 to 500 nm for 10 to 20 seconds, depending on the type of curing light used, or allowed to chemically cure in five minutes. Excess cement can easily be removed "in one piece" in a rubber-like consistency after very brief tack-curing or about three minutes of chemical curing.

Bond Strengths

It is remarkable that an all-in-one product like BeautiCem SA shows excellent bond strengths without any separate conditioning. When it comes to bonding to dentin, which is particularly important in its field of application, BeautiCem SA even outperforms similar luting systems with bond strengths of approx. 12 MPa (Fig. 2).



(2)

In-vitro bond strength to dentin after storage in water and thermocycling (internal data, Shofu).

The bond strengths of BeautiCem SA to restoratives are still higher. After 24 h storage in water and 2000 thermocycles, it shows bond strengths of 25 MPa to non-precious alloys, 19 MPa to silicate and oxide ceramics and approx. 12 MPa to precious alloys. All in all, this product combines exceptional ease of use with physical data that absolutely meet the clinical requirements.

Clinical Application

The following report on a complex prosthetic case serves to illustrate the clinical use of this new cement. A 67-year-old patient presents in my practice for the replacement of an anterior restoration in tooth 12, which he had just lost. The initial situation is characterised by a bilateral posterior bite collapse with a secondary deep overbite and a loss of horizontal and vertical dimensions. This has led to considerable tooth structure defects, especially in the maxillary anterior teeth (Fig. 3a-c). Following clinical and radiographic examination, as well as clinical and minor

instrumental functional analysis, a wax-up and a treatment plan are made, including a Branemark implant in region 36, which has been “dormant” for more than 20 years. The first step is a 10-week functional pre-treatment with the aid of a maxillary bite splint, which is fabricated in the therapeutic jaw relation.



(3 a)



(3 b)



(3 c)

The initial situation is characterised by a loss of horizontal and vertical dimensions: a) frontal aspect, b) left side (mirror image) and c) right side (mirror image).

To produce a temporary restoration, which is best done in the jaw relation established, a duplicate model of the wax-up is made and used to vacuum-form a polyethylene sheet, which then serves as a mould for the temporary (Fig. 4a and b).



(4 a)



(4 b)

Vacuum-formed sheet, made with the aid of the wax-up duplicate model (a), and temporary restoration in therapeutic jaw relation (b)

During preparation, such a vacuum-formed sheet can be used as a kind of model of the final restorations, ideally helping to determine the necessary tooth structure reduction, because it is often hard to say how much occlusal or incisal material has to be removed when the dentition is abraded. The preparation step is completed (Fig. 5) and followed by impression-taking and temporary restoration.



(5)

Completed preparation prior to impression-taking (mirror image)

To avoid an unnecessary increase in the number of alloys present in the patient's mouth (PFM bridge with unknown alloy remaining in the right lower jaw, implant in 036), veneered zirconia restorations are fabricated. This choice is also supported by the fact that only scientifically well-proven indications are treated with these eight single crowns and two three-unit bridges. After separate framework and final try-ins, the completed restorations (Fig. 6 and 7) can be placed.



(6)

Maxillary saw model



(7)
Veneered zirconia restorations on the maxillary model.

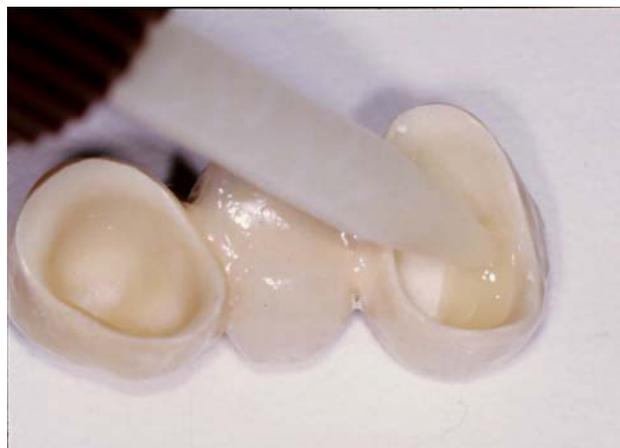
Following the last try-in, the internal surfaces of the frameworks are carefully sandblasted with alumina powder (particle size: 50-100 μm , pressure: 0.2-0.3 MPa) and cleaned with alcohol or acetone swabs; separate conditioning before the use of BeautiCem SA (Fig. 8) is not necessary.



(8)
BeautiCem SA Ivory, ready for restoration placement

Intra-orally, relative isolation is ensured using cotton rolls and/or dry angles, and the prepared tooth surfaces are cleaned using alcohol swabs. The tooth structure does not require any further conditioning, either, thanks to the self-adhesive properties of the BeautiCem SA resin cement. After gentle air-drying of the prepared stumps, BeautiCem SA is directly applied to the restorations with the auto-mix tip (Fig. 9). Then the crowns and bridges are placed on the stumps/abutments

using moderate pressure. This is where the excellent flow behaviour of the cement comes in handy: When under light pressure, it flows and forms a film that may be as thin as 11.5 μm , but when not subject to pressure, it is stackable and does not flow into areas that are hard to reach during excess removal.



(9)
Direct application of BeautiCem SA to the restoration

The restorations can be held in position either by hand or by biting on cotton rolls for five minutes (Fig. 10). This time is definitely sufficient for the chemical curing process of BeautiCem SA to be completed. Excess material should be removed earlier, however, when the cement is not yet fully cured and has a rubber-like consistency. This is the case after about three and a half minutes of chemical curing or two seconds of light-curing. In this state, excess material is easily removed "in one piece" from interproximal spaces and accessible marginal areas with the aid of a probe or a scaler (Fig. 11). During this step, the restorations still have to be securely held in place, especially if excess cement is removed at an early point, after brief tack-curing.



(10)
Restorations held in position after placement, with excess cement.



(11)
Convenient excess removal in rubber-like consistency.

The extremely convenient handling of BeautiCem SA is not least reflected in the fact that the gingiva is not irritated directly after restoration placement (Fig. 12 and 13).



(12)
Maxillary restorations directly after placement.



(13)
Final frontal view in maximum intercuspation.

Discussion

All the practical benefits described should actually support the use of self-etch luting systems. And the dental market has definitely taken this direction in recent years.

However, the scientific data available, referring of course only to the first-generation all-in-one resin cements, which have been on the market for some time, are not very promising. Vrochari et al. [6] reported very low rates of polymerisation, ranging from 10 to 25 per cent for simple chemical curing, and from 26 to 42 per cent for dual curing. This may affect bond strengths and perhaps, through free acids and monomers, also pulpal health in the long term. Other studies showed dentin demineralisation and penetration to be very poor [2, 5], which might explain the decrease in bond strength to the tooth structure after simulated ageing [1]. This is why several investigators concluded that the self-adhesive luting systems available when they conducted their studies could only be an alternative to semi-adhesive luting, but not to classic “adhesive cements” with separate conditioning steps.

The data available on BeautiCem SA are not yet conclusive in this context, especially since a few long-term studies are still going on at universities in Germany and other countries. The results obtained to date show remarkably high initial bond strengths, particularly to dentin, which may encourage clinical use. Concerning the strict indications for the use of adhesive cements (veneers, adhesive bridges/inlays etc.), however, I would still prefer to be cautious in my comments at present and recommend classic, well-proven adhesive cement systems, such as ResiCem [3, 4] by Shofu Dental.

**Uwe Diedrichs, FL-9490 Vaduz,
Liechtenstein**

References

- [1] Abo-Hamar S.E., Hiller K.-A., Jung H., Federlin M., Friedl K.-H., Schmalz G.: Bond strength of a new self-adhesive resin luting cement to dentin and enamel. *Clin Oral Invest* 9, 161 (2005)
- [2] Al-Assaf K., Chakmakchi G., Palaghias A., Karanika-Kouma G.E.: Interfacial characteristics of adhesive luting resins and composites with dentine. *Dent Mater* 23, 829 (2007)
- [3] Diedrichs U.: Eines für alles – und auch noch spezialisiert auf Zirkoniumdioxid. *DZW* 23 (3), 15 (2009)
- [4] Diedrichs U.: Einfache und sichere adhäsive Befestigung ästhetischer Restaurationen aus Silikatkeramik. *DZW* 24 (37), 29 (2010)
- [5] Monticelli F., Osorio R., Mazzitelli C., Ferrari M., Toledano M.: Limited Decalcification of Self-adhesive Cements into Dentin. *J Dent Res* 87, 974 (2008)
- [6] Vrochari A.D., Eliades G., Hellwig E., Wrbas K.-T.: Curing efficiency of four self-etching, self-adhesive resin cements. *Dent Mater* 25, 1104 (2009)

**First published (in German) in: “DZW – Die Zahnarzt Woche”, no. 10/2013, p. 36-37
Zahnärztlicher Fach-Verlag GmbH, Herne, Germany**