New materials for a classic indication

Cementation of all-ceramic restorations using Variolink Esthetic

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Metal-based single crowns are normally sealed using a zinc phosphate cement. Glass-ceramic materials have led to a change in the luting material being used for this indication. Zinc phosphate cements are seen as classic luting materials for the cementation of metal-ceramic crowns. Along with all-ceramic materials, glass-ionomer cements (GIC) and resin-modified glass-ionomer cements (RMGIC) were introduced. Generally, luting cements are expected to meet certain requirements. They should provide an optimum bond to the tooth structure and restoration material. They must not be soluble in water. They should be suitable for application in thin coatings and they should offer long-term stability. This is in contrast to the properties of classic cements, which are water soluble and do not establish an adhesive bond to the enamel or dentin (zinc phosphate cements) or establish only a minimally adhesive bond and only to the dentin (GICs and RMGICs). Nonetheless, these cements show reasonable survival rates if used for the appropriate indication even if they involve certain limitations.

Problem I: opacity

The opacity of the luting material is a critical issue in all-ceramic crowns as well as ceramic inlays and onlays. Almost any colour can theoretically be reproduced with ceramics by exploiting their natural translucent properties. Using an opaque luting material appears to be counterproductive in achieving this. Further critical issues are the limitations involved in the anterior region and the location of the cement line in the visible area in inlays and onlays. For instance, if a tooth is restored with a veneer, the basic shade of the tooth is maintained. Only the enamel is replaced, usually by using a translucent ceramic that covers the natural dentine. In such a case, it is essential to use a translucent luting material to achieve a favourable result.

Problem II: adhesion

The comparatively low bond strength of conventional cements is also problematic. Classic preparations around the tooth create a high degree of friction and retention. However, the retention is significantly reduced in partial crowns, veneers or onlays. It is therefore advisable to use a luting material that is capable of providing a strong adhesive bond. Both problems led to the widespread use of composite luting materials. Perhaps their only disadvantage is the removal of excess material. These luting materials are not water-soluble, hard and solid and they have a high adhesive strength, which makes excess removal difficult. Early luting composites were equipped with a self-cure mechanism. Users had to wait a few minutes until the composite was almost fully set before they could remove the excess material. This period of time was risky because of the moisture in the mouth. Blood or saliva could come into contact with the non-polymerized composite and cause damage.

Dual-curing luting composites

These issues led to the rise of dual-curing composites for the cementation of all-ceramic crowns. Dual-curing luting composites are usually delivered in double-push syringes with a mixing tip. During extrusion, the base and catalyst are automatically mixed. The material can be applied directly. The main advantage is that the curing process can be accelerated with light and excess material can be easily removed. At the same time, the self-cure mechanism ensures a reliable cure, even with relatively thick or opaque ceramic layers. Nonetheless, there are some situations in which excess material cannot be removed at all easily because the setting reaction takes place too quickly or the material does not cure down to the depth of the composite layer. After one second of light curing, the surface is set and excess can be broken off, but the material is still pasty-like at the interface to the crown or tooth. State of the art luting composites such as Variolink Esthetic contain the newly developed initiator ivoir. This photoinitiator needs fewer photons to initiate the setting reaction. Excess can be polymerized by means of light and excess material is easily removed due to the new technology based on the calcium-phosphorus bond.

Clinical case

A 45-year-old male patient presented to the practice with a restoration on tooth 46. The tooth had been endodontically treated and was temporized with a filling (Fig. 1). The temporary was removed, the tooth built up with Tetric N-Ceram Bulk Fill and then prepared for the crown restoration (Fig. 2). An impression was taken with a one-step two-phase impression technique using putty and light-body silicone. After scanning the model, the crown was designed in the software suite (InLab, Dental Systems). In addition, the shade spectrum ranges from an opaque white tone (Light+) to an opaque yellow brown shade (Warm+). In between lie shades such as a coconut water white and a neutral tone (very translucent) and a warm tone (comparable to A3). In addition, the luting composite is available in an LC (light-curing) and a DC (dual-curing) version. The DC version is designed for relatively thin restorations such as inlays, onlays and veneers. The DC version is suitable for more extensive and opaque restorations. The luting composite is used in conjunction with the light-curing single-component Tetric N-Bond Universal.

Fig. 1: Preoperative situation

Fig. 2: Situation after composite build-up (Tetric N-Ceram Bulk Fill) and preparation

Fig. 3a and b: Crown design in the software suite (InLab) and try-in before crystallization firing (IPS e.max)

Fig. 4: Characterized and glazed crown

Fig. 5: Etching and silanating with Monobond Etch & Prime

Fig. 6: Enamel etching prior to the application of the adhesive

Fig. 7: Applying Variolink Esthetic DC into the crown

Fig. 8: Placing the crown

Fig. 9: Excess removal is easily achieved due to the new technology based on the calcium-phosphorus bond

Fig. 10: Final curing. Excess luting material was removed beforehand (quarter technique)

Fig. 11: Seated crown after excess removal

One material—five shades

Variolink Esthetic is based on the Value Shade concept. The shades are classified according to the effect to be achieved with the cement. Five shades are available: Lights, Light, Neutral, Warm and Warm+. In this way, the shade spectrum ranges from an opaque white tone (Light+) to an opaque yellow brown shade (Warm+). In between lie shades such as a coconut water white and a neutral tone (very translucent) and a warm tone (comparable to A3). In addition, the luting composite is available in an LC (light-curing) and a DC (dual-curing) version. The DC version is designed for relatively thin restorations such as inlays, onlays and veneers. The DC version is suitable for more extensive and opaque restorations. The luting composite is used in conjunction with the light-curing single-component Tetric N-Bond Universal.
ips e.max® ZirCAD
The perfect combination of strength, esthetics and translucency

- Polychromatic MT Multi discs for efficiency and highly esthetic restorations
- High flexural strength and fracture toughness for a broad indication range
- Low wall thicknesses for less invasive preparations
- Three translucency levels (MO, LT, MT) for natural esthetics
The adhesive (Tetric N-Bond Uni-
versal) was applied and dispersed
with a strong stream of air. The dual-
cure (DC) version of the Variolink
Esthetic luting composite was used
for seating due to the thickness of
the crown and the low translucency
of the ceramic material (Fig. 7). The
luting composite was applied into
the crown. Then the restoration was
seated (Fig. 8) and light cured from
each side for two seconds. Excess
composi t e was easy to remove due
to the focometric photoinitiator, which
provides a fast and thorough cure
with a minimum amount of energy
(Fig. 9). For final polymerization, the
restoration was light-cured from
each quarter for 20 seconds (Fig.
10). Figure 11 shows the oral situa-
tion after placement of the crown.

Conclusion
The cementation methods used in
conjunction with all-ceramic mate-
rials have changed for single-crown
restorations. Variolink Esthetic is a
protagonist of the latest generation
of luting composites. Excellent bond
strength values coupled with user-
friendly handling characteristics
and highly esthetic properties make
this material an asset in day-to-day den-
tal restorative care.

VladMiVa—success comes with persistence

By VladMiVa
VladMiVa, a large Russian holding
company that unites a number of
Belgorod-based companies and is
invested in the development and
manufacturing of materials, tools
and equipment for dentistry, cel-
VladMiVa’s activities and products
have not only been recognised na-
tionally and by the Commonwealth
of Independent States (CIS) coun-
tries, but also in the global dental
market, the company is known as
the largest manufacturer of dental
materials and instruments in Russia.
On the night of the anniversary, we
interviewed the founder and gen-
eral manager of VladMiVa, Vladimir
Chuev, who is also a doctor of techni-
cal sciences and a professor and the
head of the Department of Medical
and Technical Systems at Belgorod
State University (BSU).

Prof. Chuev, tell us the story
of how your enterprise began?
Prof. Chuev: The critical moment
when people are “on the edge” is
often a decisive moment. Someone
drops his hands and someone starts
to act despite of their fears, difficul-
ties and an uncertain future. In 1997,
the state funding for the laboratory
that I directed was stopped, but our
development s were of an applied
nature, so we could try to find use for
them. I decided to create a commer-
cial enterprise, invested my own sav-
ings in it and convinced almost all
my colleagues to stay and work with
me. Our first development was very
successful. In the same year, 1997,
we received a silver medal from the
 USSR Exhibition of Achievements of
the National Economy for the tech-
nology we developed to manufac-
ture amalgam fillings. The next im-
portant step was the development of
a technology for the production of
dental cements for the Voronezh-
based enterprise, Raduga-R. Our first
success inspired our small team.

VladMiVa consists of a group
of companies. What kind
of companies are they and
which idea unites them?
We very quickly realised that focus-
ing only on technological develop-
ment is not very promising business.
Therefore, in 1994, the commercial
deptartment began its work. We start-
ed with direct sales on 2m² of exhibi-
tion space—that seems ridiculous
today—but we managed to find our
customers and see a clear picture of
real consumer demand. In 1998, JSC
“VladIMiVA” EXPERIMENTAL
PLANT was opened.

The idea of “Development—Produc-
tion—Realisation”, upon which we
laid the foundation of the company’s
activities, was soon realised. Between
2001 and 2002, we mastered the
production of dental equipment and
diamond burs and by 2009 we
had produced more than two hun-
dred kinds of products. In 2004, we
opened our own dental centre, which
was not only a place to confirm the
high quality of our materials, but
also a prime example of a world-class
dental centre. The holding company
today also includes Trade House,
our own transport company with
branches across Russia.

VladMiVa also includes a total of
dental restorative care. Today, our
companies employ a total

Do you participate in
programs with state support?
What is the role of science and
education in your work?
The first aid that we received from
the state was a small grant from the
Foundation for Assistance to Small
Innovative Enterprises in Science
and Technology. Since 1997, we
have participated in many programs
of the foundation and are very grateful
to its leadership for their assistance.
Participation, together with the RFU,
in the federal project on govern-
mant’s resolution of the RF No. 218
became an interesting experience
and has led to the emergence of the
first Russian certified nanocompos-
ites, DentLight as well as the creation
of two small innovative enterprises,
MANAPATIT and Keramos-RSU.
We also actively cooperate with lead-
ing scientific centres, such as the
Federal State Institution Central
Research Institute of Dental and Maxil-
lofacial Surgery, Dmitry Mendeleev
University of Chemical Technology
of Russia, Moscow State University
of Medicine and Dentistry, Samara
State University, I.M. Sechenov First
Moscow State Medical University
and Tula State Medical Academy.
By 2010, the employees of VladMiVa
have among them received four PhD
degrees as well as a doctoral thesis.

Furthermore, at the Department of
Medical and Technical Systems at
the RFU, the nominal audience of Vlad-
MiVa was opened and five school-
mates were awarded to the best
students. Our dental centre is also a
clinical base for these students. We
want to realise one more idea, which
is to further educate our young em-
ployees.

What about your employees
today? How do you solve their
social problems?
Today, our companies employ a total

Insert images here.
of 400 people of different professions. Of course, like any other company, we experience a shortage of skilled employees, such as technologists, but this does not diminish the quality of our work. We value each of our employees. Even in the most difficult times of crisis, we do not delay the payment of wages. We also never refuse payments on sick leave or on paid leave. We have developed a corporate program of material assistance to employees who are in difficult socio-economic situations. All our employees also receive dental care on preferential terms. We have also built a new plant with a work environment that meets all the modern requirements of labour protection.

For 25 years, we have formed corporate traditions, such as joint holidays and excursions where the families of our employees participate and we can enjoy children’s performances and competitions. We try to create a comfortable environment for all our people. We have built a chapel, planted flowers and always aim to provide good production and living conditions. We respect our veterans. We also love our city Belgorod and participate in its development.

**VladMiVa products have a high quality. Can they keep up with, or even replace, the imported goods?**

In 2011, our production received a Certificate of Compliance with the requirements of International Standards (ISO9001:2008). Later, we obtained the right to label our products with the mark of European conformity (CE), which means compliance with EU standards. In 2014, JSC «VLADMIVA» became one of the first 25 enterprises that have the right to label their products as “Russian nanotechnological products”, which is a confirmation of the high quality of our products.

Out of our three hundred products, more than 190 are in demand on the foreign market. In Russia, we have to overcome the phenomenon of “Westernism” in dentistry and persuade consumers through systematic participation in exhibitions, conferences and seminars that “Made in Russia” means quality.

We are always pleased to offer to Russian dentists a large selection of dental materials, including prophylactic, restorative or treating materials, as well as materials for paediatric dentistry, biomaterials for the regeneration of bone tissue and various tools, of excellent quality, at a reasonable price.