An integrated approach to cementation

Alessandro Devigus

Abstract

All-ceramic crown restorations are indicated for all situations where maximum aesthetics and biocompatibility are essential. The unacceptable failure rates of certain materials have given rise to a quest for the best possible cementation method. In a few in vitro studies, allceramic crowns produced increased bond strength values if they were placed using an adhesive technique. The adhesive cementation of all-ceramic crowns places high requirements on both the dental practitioner and the adhesive system due to the special preparation design required for adhesive cementation. It should be the goal of new material developments to streamline the clinical procedures and to ensure predictable, reproducible results in everyday clinical practice.

All-ceramic restorations only unfold their full potential in terms of stability, aesthetics and biological integration if they are cemented adhesively. Luting composites create an interface between the conditioned tooth structure and silanized ceramic workpiece, fill the marginal gap and in the process establish a stable adhesive bond between the tooth and restoration. Adhesives are categorized into light-curing, dual-curing and chemically curing materials in accordance with the initiator system built into them.

Many dental practitioners still do not take advantage of the opportunities that adhesive cementation offers to them, because they feel that luting composite systems are too difficult and complicated to handle. True, processing adhesive materials may have its challenges, depending on the clinical situation (position of the preparation margins, isolation of the treatment area, etc). However, if a few basic rules are followed, modern adhesives can be placed successfully without difficulty. Adhesive cementation has a favourable effect on the stability of ceramic restorations. This alone should sufficiently motivate each user to consider adhesive cementation as a real option in their daily practice.

Clinical recommendations

Dual-curing composites can be pre-cured with a polymerization light to facilitate the removal of excess material. However, excess removal may be difficult depending on the location (anterior or posterior region) and position of the preparation margin. The composite may be light-cured at too high a light intensity or for too long. As a result, it may be difficult or even impossible to remove excess luting composite.

To forestall these situations, a new version of the proven Multilink® Automix luting composite has been developed. In this version, the reaction to curing light is delayed. Consequently, practitioners have more time to clean up excess material; the clinical handling is facilitated. The following placement of a crown made of IPS e.max® CAD HT ceramic will be used to present the individual steps to achieve successful adhesive cementation in conjunction with Multilink Auotmix.

Figure 1 shows the crown milled from a ceramic block.

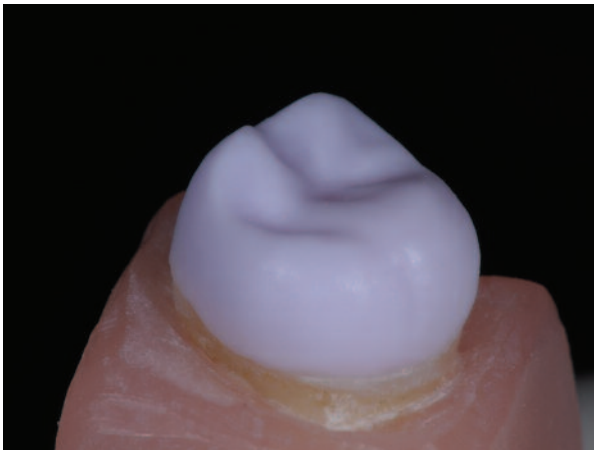

Figure 1: Crown milled from an IPS e.max CAD HT block.

Dr Alessandro Devigus, Bülach/Switzerland

Contact address:
Dr Alessandro Devigus
Gartematt 7, 8180 Bülach, Switzerland
devigus@dentist.ch • www.dentist.ch

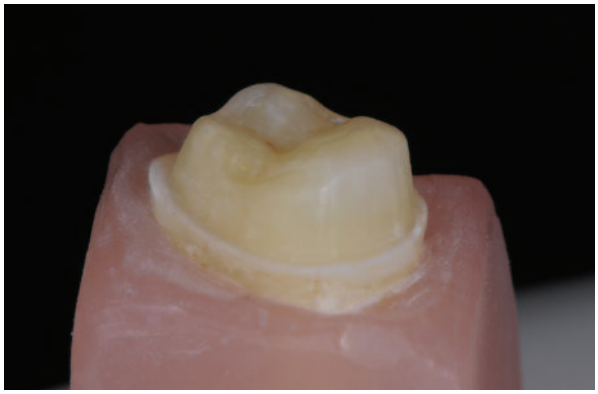

Figure 2: Prepared tooth.

Figure 3: Glazed crown.

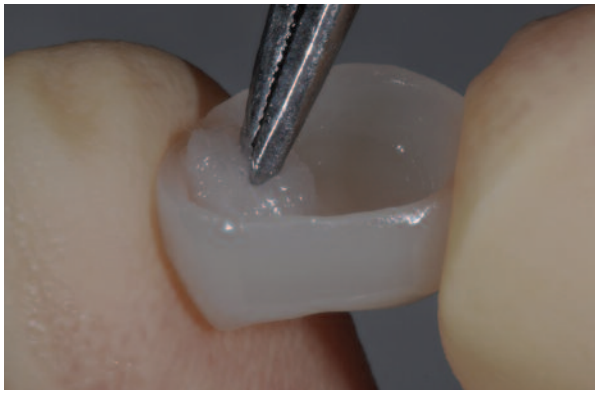

Figure 4: Cleaning the crown.

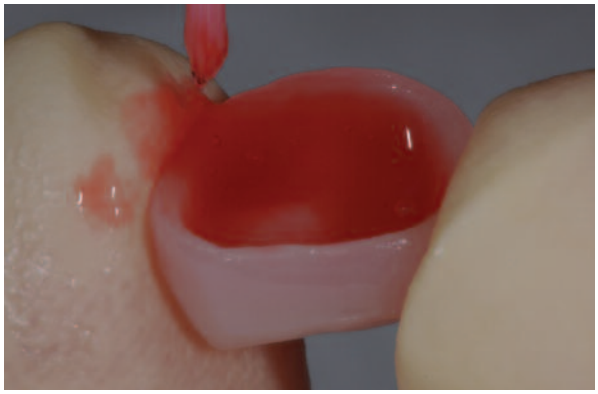

Figure 5: Etching with hydrofluoric acid (IPS Ceramic Etch Gel).

Figure 6: Silanizing with Monobond Plus.

Figure 7: Preparing the tooth preparation with adhesive.

Figure 2 shows the tooth preparation.

Before the combined crystallization/glaze firing is conducted, a few characterizations are applied and the restoration is covered in a thin coating of glaze from a spray can. Subsequently, crystallization and glaze firing are conducted in a single step in a Programat® CS furnace (Figure 3).

After the crystallization process, the restoration is cleaned (Figure 4) and etched for 20 seconds with hydrofluoric acid (< 5%) (Figure 5). Next, the restoration is thoroughly rinsed and dried. Then, the crown is silanized with the all-in-one primer Monobond Plus (Figure 6). This primer is suitable for glass-ceramics, eg lithium disilicate (LS2), and oxide ceramics, e g zirconium dioxide (ZrO2), as well as for metal-supported restorations. Monobond Plus requires a reaction time of 60 seconds in conjunction with all materials.

The tooth preparation is conditioned with an appropriate

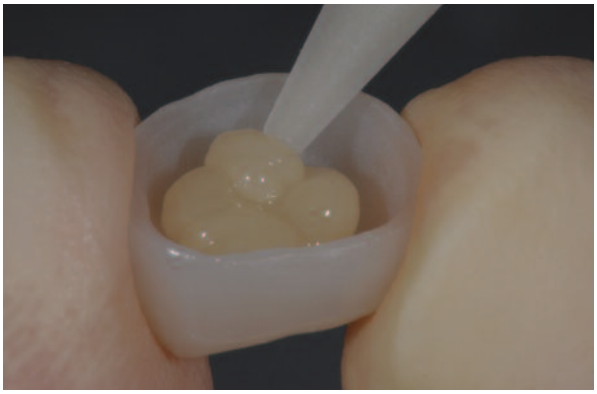

Figure 8: Seating the crown.

Figure 9: Excess composite.

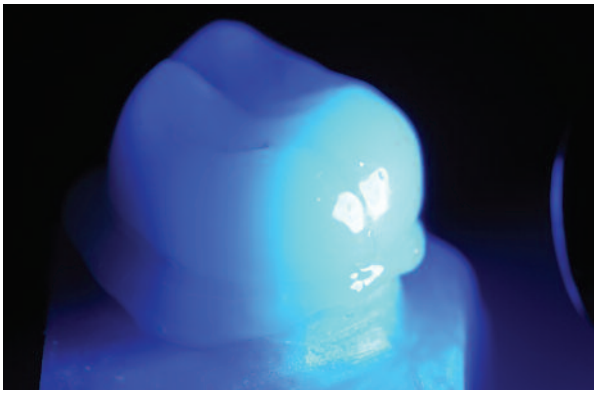

Figure 10: Excess is light-cured ...

Figure 11: ... and easily removed.

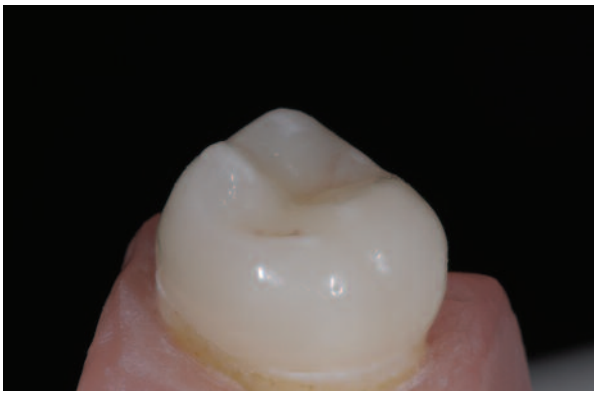

Figure 12: Completed crown.

adhesive (Multilink Primer A and B are used here, Figure 7). The luting composite (Multilink Automix Easy Clean-up) is applied into the crown directly from the automix syringe (Figure 8). Then, the crown is seated on the tooth preparation, applying light pressure. The excess material that has been squeezed out in the process can be clearly seen (Figure 9). This material is lightcured for two to four seconds per quarter surface (at low light intensity, eg using the low-power mode of a bluephase® curing light) (Figure 10). In the process, the material obtains a convenient consistency and can be easily removed, eg with a scaler (Figure 11). After excess removal, the luting composite may be completely lightcured. Alternatively, the material may be allowed to undergo self-curing. Figure 12 shows the crown cemented in place adhesively.

Summary

Effective, easy adhesive cementation plays a decisive role in the clinical long-term success of all-ceramic restorations. Excess removal presents a central issue in the application of adhesive materials. Luting composites that allow targeted light-curing of excess material provide an ideal solution to this conundrum.

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