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Finding balance in restorative dentistry

One and done. A streamlined dental cementation protocol for low-retention restorations: Clinical case studies

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INDIRECT RESTORATIONS, including porcelain veneers, crowns, and fixed dental prosthetics (FDPs), have endured with great success as one the most prevalent modalities for individuals seeking to correct functional and cosmetic intraoral conditions.[1] Resistance to dislodgment remains a key objective for full-coverage tooth preparations;[2] however, the frequently encountered overreduction of tooth structure when replacing existing dental restorations presents less-than-ideal situations in obtaining maximum retention. Achieving clinical success when presented with limited natural tooth anatomy may be aided by self-adhesive resin cements (SACs). These bonding agents combine the benefits of additional working time with the mechanical properties of light-cure and chemical-cure resin cements.[3] The high bond strength, fracture toughness, low solubility, and simplified application protocols of contemporary SACs makes their utilization in the cementation of compromised indirect restorations an appealing treatment option for clinicians.[4]

The gamut of currently available SACs on the market may pose a daunting decision-making task for the practitioner.[5] To address the practical need for a streamlined material inventory and simplified cementation protocol, a newly developed SAC and accompanying Adhesive Enhancing Primer (G CEM One + AEP, GC America) were developed. The following four case studies demonstrate the variety of day-to-day applications this novel SAC/primer combination possesses for a variety of indirect restorations in wide-ranging clinical scenarios.

CASE NO. 1: EMERGENCY RECEMENTATION OF DEBONDED FELDSPATHIC VENEER

A 67-year-old female presented for emergency care regarding a dislodged feldspathic veneer on tooth no. 27. An intraoral examination revealed that the veneer had fully debonded with no fracture to the restoration, and an aggressively prepared mandibular right canine was devoid of enamel.

In the laboratory, the debonded veneer was subjected to air-particle abrasion with 50µ aluminum oxide (Cobra, Renfert), thoroughly steam-cleaned, and the intaglio surface was etched with 9.5% hydrofluoric acid (HF) for two minutes (Porcelain Etchant, Bisco Canada). Following standardized cleaning protocols, a silane bonding agent (Silane, Ultradent) was applied to the intaglio surface of the veneer for one minute and then allowed to evaporate under a warm hair dryer.[6]

The exposed tooth preparation was coated with an AEP on a microbrush for 10 seconds and then air-dried for five seconds (figure 1). The accompanying SAC was then used to bond the porcelain veneer. An accelerator in the AEP placed on the tooth surface instantly reacts with a chemical initiator in the cement to enhance and expedite the curing capacity of the resin—a process the manufacturer refers to as Touch Cure Technology. The extruded resin cement (figure 2a) was then tack-cured at the margins for one second to allow for easy removal of excess cement and cleanup (figure 2b). Light-curing was continued circumferentially around the tooth for approximately 60 seconds. No occlusal adjustment was necessary; the patient was satisfied with the repair and dismissed without issue.

Figure 1: Adhesive Enhancing Primer (AEP) applied to tooth preparation with a microbrush

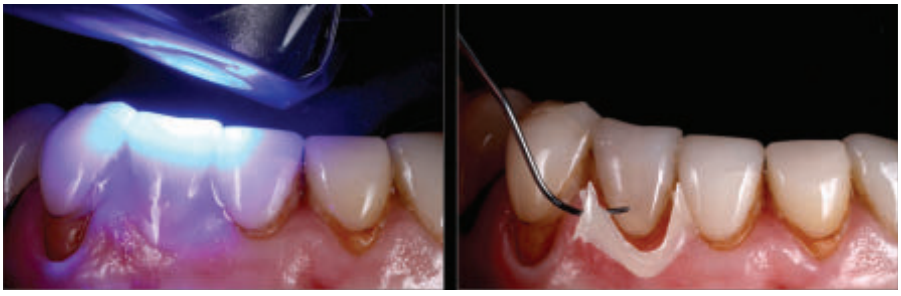

Figure 2: a) Light-curing excess cement to allow for b) removal of excess cement

Figure 3: Fractured feldspathic veneer with limited hard tissue anatomy

Figure 4: Adhesively bonded lithium disilicate restoration (LiSi Press, GC America)

CASE NO 2: FULL-COVERAGE LITHIUM DISILICATE CROWN

A 42-year-old male presented for emergency care with an existing feldspathic veneer on the upper right lateral incisor that fractured unexpectedly. The intraoral examination revealed a short underlying clinical crown with no remaining enamel, and the mesial portion of the ceramic veneer was still attached (figure 3). The treatment plan for the patient involved preparation of the tooth for a full-coverage lithium disilicate crown.

At the delivery appointment, the patient's provisional crown was removed, and the tooth preparation was gently scrubbed with a 2% chlorhexidine gluconate pumice (Consepsis, Ultradent) and rinsed. The laboratory and chairside protocols for the etching, cleaning, and silanating of the lithium disilicate crown were identical to the previous case, with the exception of the intaglio surface of the crown being etched for only 20 seconds with HF rather than two minutes. The same AEP, cementation, and light-curing steps were also followed in accordance with the recommended manufacturer's instructions described in the first case. The patient's occlusion was evaluated without need for adjustment. The patient was satisfied with the final esthetic outcome (figure 4) and dismissed without issue.

CASE NO. 3: CAST-GOLD ONLAY

A 55-year-old male presented with a fractured restoration and recurrent decay under tooth no. 13. The patient has a history of bruxism coupled with extrinsic dietary chemical erosion. A treatment plan was made to replace the failing amalgam with a partial-coverage cast-gold onlay, which would aid in the preservation of tooth structure and provide a good long-term prognosis. Metal-ceramic crowns and restorations composed of cast-metal alloys are unable to form a true chemical bond with the underlying tooth structure; therefore, the type of cement used for the retention of metal crowns is critical to ensure clinical success.[7]

All existing restorative material and recurrent decay were removed from tooth no. 13. The axial walls and pulpal floor of no. 13 were then refined with fine diamond burs in a high-speed handpiece to ensure a single path of draw and to maximize retention for the definitive cast-gold restoration (figure 5). To ensure maximum adhesion of the resin cement to the underlying tooth structure, an identical protocol was followed from the previous case studies in which an SAC was used in conjunction with an AEP. Following delivery of the cast-gold restoration, the patient's occlusion was evaluated, and all adjustments were made with rubber polishing points. The patient was satisfied with the fit and function of the final restoration and dismissed without issue.

Figure 5: a) Onlay preparation tooth no. 13 for cast-gold restoration, b) final result of cast-gold onlay tooth no. 13

CASE NO. 4: THREE-UNIT LAYERED ZIRCONIA FDP

A 38-year-old female presented with a dislodged three-unit zirconia FDP. An intraoral examination revealed that the ceramic abutment for tooth no. 6 was not seated on the underlying preparation, and recurrent decay was present on the lingual margin of tooth no. 8 (figure 6). A treatment plan was devised to include sectioning and removal of the existing FDP and replacement with a new three-unit layered zirconia restoration.

Figure 6: Occlusal view of debonded abutment tooth no. 6, and recurrent decay on abutment tooth no. 8

Figure 7: Try-in of layered zirconia FDP demonstrating overprepared tooth structure

Fixed multiunit prosthetics present a different restorative challenge than stand-alone crowns and veneers. Each abutment must have enough taper to allow for a passive, single path of draw of the rigid framework. However, overreduction of the individual teeth is common (figure 7),[8] the retention is compromised,[9] and an exposure of the underlying vital pulp may occur, necessitating endodontic therapy.

The recommended protocol was followed for pretreating zirconia frameworks with air-particle abrasion utilizing aluminum oxide, decontamination with commercial cleansers (ZirClean, Bisco Canada),[10] followed by cementation with an SAC containing MDP.[11] Prior to cementation, an AEP was again applied to each abutment tooth in an identical protocol to each of the previous case studies. Following delivery of the final restoration, the patient's occlusion was evaluated, and no adjustments were necessary. The function and esthetics of the new three-unit FDP were deemed acceptable, and the patient was very satisfied with the final result (figure 8).

CONCLUSION

These four case studies have demonstrated that the use of SACs in combination with a unique AEP can aid in the predictable delivery of many types of indirect restorations with limited tooth structure by providing the following clinical advantages: reduced need for fricative macroretention,[12] avoidance of composite buildups, and elimination of unnecessary endodontic therapy for post and core placement.[13]

Clinicians who choose to utilize SACs in their clinical practice will appreciate the ease of application and cleanup as well as a peace of mind in knowing that a strong, reliable bond with reduced microleakage[14] and high retention has been achieved for their patients.[15] **DE**

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Figure 8: Definitive layered zirconia FDP demonstrating improved overall esthetics

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