Peak luting efficiency to modern indirect dental restorative substrates using GC FujiCEM® Evolve

Case report

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Introduction

The cementation of substrates of differing materials to restore compromised tooth structure is a fundamental practice in daily dentistry.

The adhesive bonding of partial-coverage glass ceramics to residual tooth structure is a predictable and strong procedure, but requires absolute isolation from moisture in the forms of exhaled breath, saliva and blood, the triad of which are capable of compromising tensile bond strength.

In the absence of mechanical retention and resistance form, the adhesive bond for non-retentive preparation designs is significantly affected, often leading to functional failure and often loss of the restoration.

Various cements that have been developed with the aim of reducing moisture and technique sensitivity whilst maintaining a stable bond with the cemented substrate, particularly useful for the luting of full coverage indirect restorations, which is one of the most common procedures in restorative dentistry today.

The benefits of Zirconia

Zirconia is a polymorphic crystal of which the yttria-stabilised zirconia 3Y polycrystal is the most commonly used in fracture tough and high flexural strength applications such as that to restore edentulous spaces, and feature typically 2-3% mol of yttria.

The yttria content can be modulated to 4-6% under increasing temperature which increases its corresponding cubic composition which enhances light transmission via a reduction in nonbirefringent properties (refraction in two planes), thus making the once overly-opaque ceramic restoration suitable for high esthetic demand applications in esthetic dentistry.

The fracture toughness of Zr makes it a hygroscopic expansion-resistant restorative material that is suitable for luting using a glass ionomer cement, given that minimal physical preparation ferrule requirements are satisfied. Both resin-modified glass ionomer cements and glass ionomer cements feature the phenomenon of post-setting hygroscopic expansion which increases frictional retention over time given that both tooth substrate and restorative material have adequate innate strength.[1]

Both materials are less sensitive from a moisture isolation perspective than pure resin-based cements and thus can have increased versatility of use in the oral environment.[2]

Building on the legacy GC FujiCEM®, GC FujiCEM® Evolve takes the luting process to the next level!

GC FujiCEM® Evolve offers high bond strength to zirconia, ensuring reliable, long-lasting restorations. It provides high fluoride release and excellent moisture tolerance for enhanced predictable clinical performance.

References

1 Arellano Moncayo AM, Peñate L, Arregui M, Giner-Tarrida L, Cedeño R. State of the Art of Different Zirconia Materials and Their Indications According to Evidence-Based Clinical Performance: A Narrative Review. Dent J (Basel). 2023 Jan 4;11(1):18. doi: 10.3390/dj11010018. PMID: 36661555; PMCID: PMC9857458.

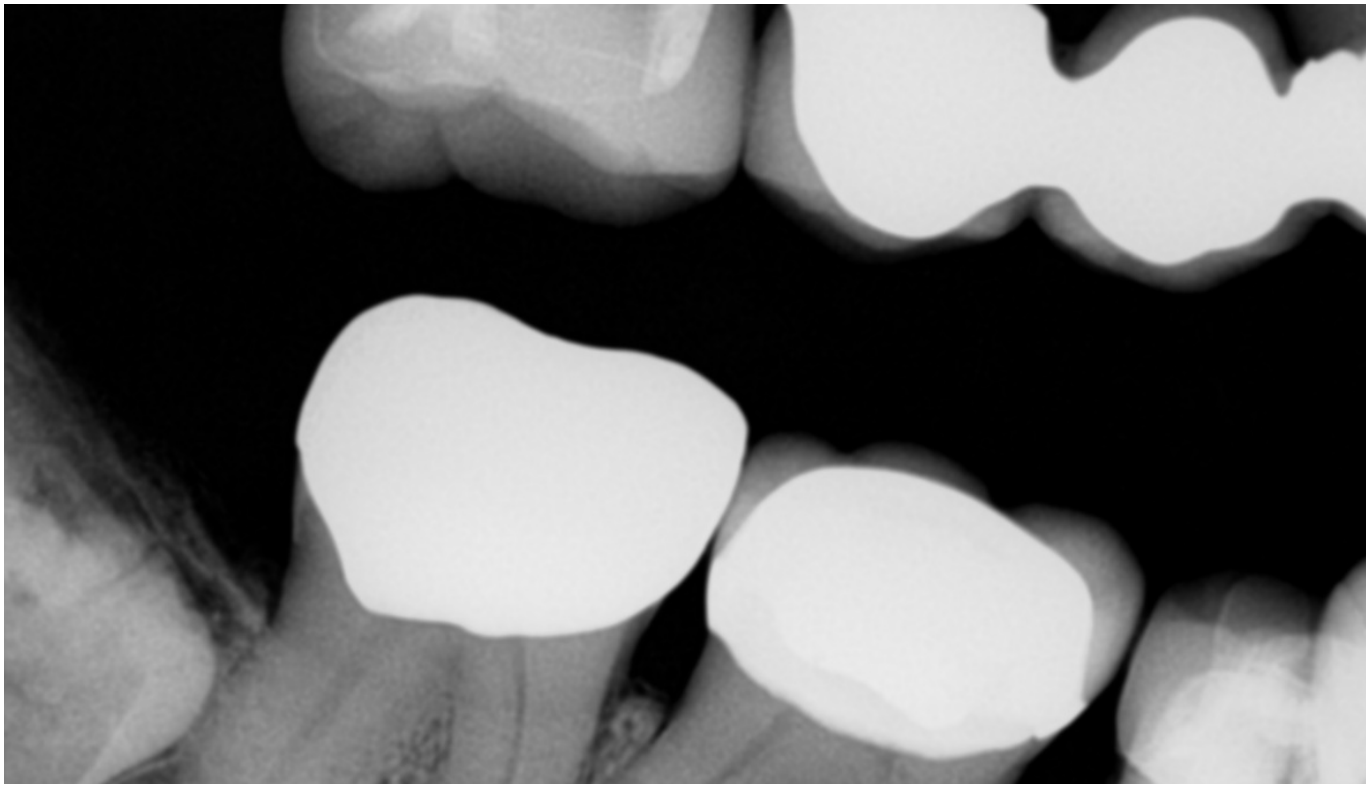
2. Cury AH, Goracci C, de Lima Navarro MF, Carvalho RM, Sadek FT, Tay FR, Ferrari M. Effect of hygroscopic expansion on the push-out resistance of glass ionomer-based cements used for the luting of glass fiber posts. J Endod. 2006 Jun;32(6):537-40. doi: 10.1016/j.joen.2005.10.060. Epub 2006 Apr 4. PMID: 16728245.

Case report

An ASA II well-controlled female presented to the practice on examination with significant marginal defects associated with the crown on tooth 4.7 with previous failed restorative marginal sealing attempts and recurrent caries. She was anesthetised using 1 carpule of 2% Lignocaine with 1:100,000 epinephrine and shade parameters confirmed (Fig. 1). Following rubber dam isolation, the crown was sectioned and caries removed (Fig. 2), along with the old restorative core, which was defective. Caries detector dye was utilised to guide caries removal endpoints prior to adhesive core reconstruction. Adhesive substrate optimisation was utilised featuring air particle abrasion (29 micron aluminum oxide, Aquacare), prior to a total etch adhesive procedure over which microlayers of everX Flow (Dentin shade) (Fig. 3) were utilised prior to a bulk fill core replacement material. everX Flow features an increased fracture toughness characteristic and was utilised to increase this property relative to the residual dentin. The margins were refined, and a light and heavy body impression was captured using a polyvinylsiloxane material prior to provisionalisation (TEMPSMART®, GC Japan). A zirconia crown was fabricated to replace the old crown and was subjected to a dry fit to ascertain precision of margins.

The intaglio surface was subjected to air particle abrasion as described previously prior to the application of an MDP-based primer (G-Multi PRIMER, GC Japan). The tooth surface was subjected to air particle abrasion to remove remnants of the non-eugenol based temporary cement and simply scrubbed with a 2% chlorhexidine solution (Vista) for 30 seconds and blotted dry. The cement (GC FujiCEM® Evolve, GC Japan) (Fig. 4) was dispensed into the crown and the restoration placed with firm finger pressure. A 3-second curing time to each corner of the restoration was applied to generate a gel-phase, which exhibited ease of removal (Fig. 5). After removal of excess cement, the rubber dam was removed, margins verified for precision and a post-operative control radiograph was taken.

All in all, the high efficiency workflow using GC FujiCEM® Evolve represents one which still features firm restorative substrate adhesion, but leverages the hygroscopic expansion of a glass ionomer cement to increase frictional resistance to displacement in candidates that feature sufficient ferrule (Fig. 6). It truly is an evolution in expedited cementation workflows when modern zirconia restorations are considered.



Post-operative radiograph

Figure 1 Shade selection.

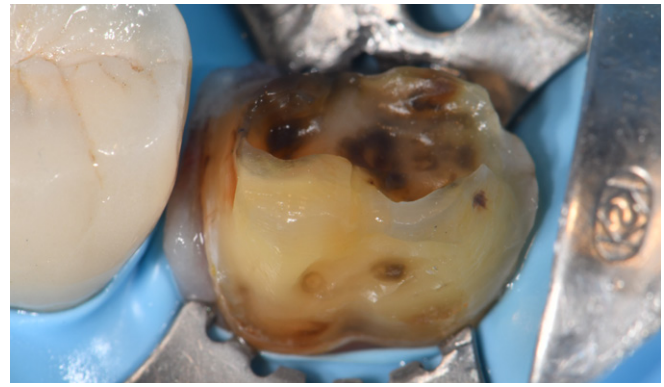


Figure 2 Caries removal.

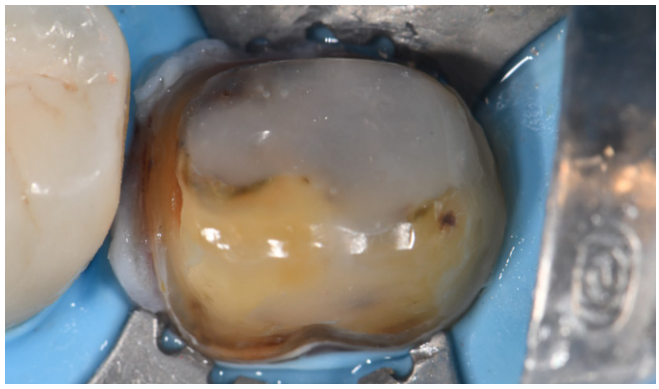


Figure 3 Core replacement.

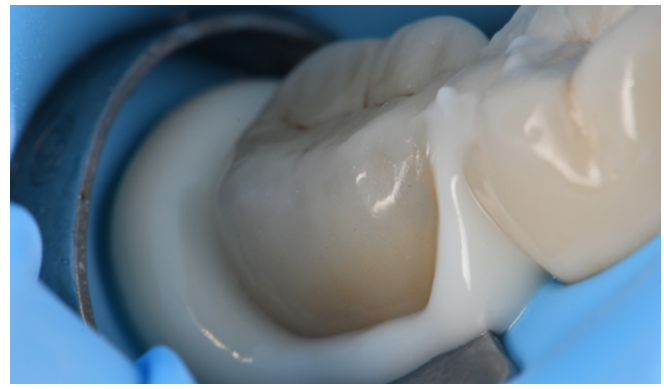


Figure 4 Gel phase.

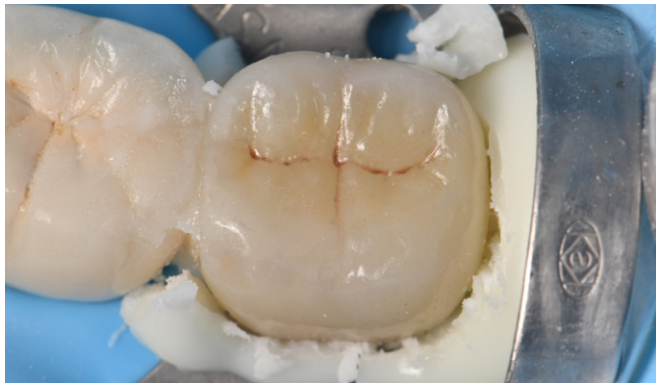


Figure 5 Removal of excess cement.

Figure 6 Final result.

Final result using GC FujiCEM® Evolve

GC FujiCEM® Evolve

The solution is evolution

GC FujiCEM® Evolve syringe (9.2 g / 5.0 ml)

GC FujiCEM® Evolve Single pack:
Syringe (1), Tips Regular (15)

GC FujiCEM® Evolve Triple pack Automix:
Syringe (3), Tips Regular (45)

GC Push and Click Tip Regular (15)

GC Push and Click Tip Endo (15)

Scan to view tip installation video

Find the step-by-step for all luting procedures on the **GC Luting Guide**

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