

Change the paradigm of complex adhesive cementation: A mission impossible?

Scientific evidence supports consideration of 3M™ RelyX™ Ultimate Adhesive Resin Cement for adhesive cementation

Background

Nowadays, esthetic restoratives like glass ceramics and hybrid materials are enjoying great popularity. In the eyes of many dental practitioners, however, they have some drawbacks: they are lower strength, brittle or even fragile and these restorations require the use of an extra strong adhesive resin cementation procedure. When using classical multi-step adhesives and the corresponding resin cements, this procedure can be inherently complex, technique-sensitive and time consuming. Recognizing this challenge, 3M developed a solution designed to streamline the dentist's cementation workflow.

Materials



The 3M system consists of only two components, 3M™ RelyX™ Ultimate Adhesive Resin Cement with 3M™ Scotchbond™ Universal Adhesive and offers industry-leading bond strength. Scotchbond Universal Adhesive can be used for bonding on the tooth and also as a primer for different restoration surfaces as it contains zirconia primers, metal primers, and a silane for glass ceramics. In addition, it is moisture tolerant and can be used in three different etching modes allowing for utmost flexibility in dental practice.



Adhesive procedure: Pre-treatment of a glass ceramic inlay with hydrofluoric acid, use of 3M™ Scotchbond™ Universal Adhesive as a restoration primer, application of 3M™ RelyX™ Ultimate Adhesive Resin Cement into the cavity (treated with adhesive), and removal of the excess material with a sponge pellet after restoration placement.

Not only has this system simplified the traditional adhesive resin cementation process by reducing the number of components needed, its outstanding bond strength performance has helped clinicians achieve clinical success worldwide. So how does this simplified adhesive resin cement system compare to traditional adhesive resin cement systems? Let's take a closer look at the evidence.

Establish a strong bond to glass ceramics

The 3M™ RelyX™ Ultimate Adhesive Resin Cement system establishes a strong bond to glass ceramics, as shown in an in-vitro study conducted at the University of Washington.¹ The performance of three different luting systems bonding lithium disilicate crowns was tested. Two of the cementation systems tested require a separate restoration primer (NX3 Nexus™, Kerr and Multilink® Automix cementation system, Ivoclar Vivadent), and in the other, the adhesive functions as a primer (Scotchbond Universal Adhesive and RelyX Ultimate Cement). The crowns were pre-treated and cemented on extracted and prepared human molars (12 per cement) according to the material manufacturers' instructions, followed by six months of thermocycling (5,000 cycles per month). In order to measure the bond strength, the crowns were pulled off axially and the removal forces and stresses recorded. The systems from 3M and Ivoclar Vivadent performed equally well. Lower removal forces and stresses were recorded for the NX3 Nexus group.

The authors summarize that the values obtained seem to be clinically acceptable for crown cementation under the conditions described in the study design. However, they also state that, in situations with a less favorable preparation design (e.g. short crown or excessively tapered axial wall), the RelyX Ultimate Cement or Multilink Automix systems should be preferred, the first one being most straightforward to use.

Achieve reliability without added complexity

The RelyX Ultimate Cement system offers the same reliability as systems with multi-step adhesives when cementing glass and hybrid ceramic materials, according to laboratory testing and an in-vivo study.²⁻⁴ One in-vitro study was carried out at the University of Trieste.² The results show that comparably high bond strengths are obtained with the simplified luting system from 3M and with the Variolink II cementation system (Ivoclar Vivadent) on feldspathic ceramic and resin nano ceramic materials. The second laboratory investigation focuses on the bonding of hybrid materials and shows similar results.³

A clinical study initiated at the University of Michigan confirms these findings after three years⁴ (see table below). Eighty six patients were enrolled and received a total of 60 leucite-reinforced glass ceramic onlays and 60 resin nano ceramic onlays. Half of the restorations of each material group were placed with the RelyX Ultimate Cement system using the self-etch technique, while the other half were cemented with a multi-step adhesive system and resin cement (Variolink system, Ivoclar Vivadent) using the total-etch approach. At the three-year recall, each of the 117 available onlays were evaluated using the USPHS criteria. The survival rate was 98 percent after three years. Comparable results were obtained for the different adhesive systems and techniques as well as restorative materials placed. Not a single incidence of debonding was reported.

% Alpha Rating — 3 Year Recall				
Onlay Material	3M™ Lava™ Ultimate Restorative		IPS Empress CAD	
Adhesive Cement	Variolink®	3M™ RelyX™ Ultimate Cement	Variolink®	3M™ RelyX™ Ultimate Cement
Color Match	100	100	100	100
Margin Discoloration	96	97	97	96
Surface Finish	100	100	100	100
Anatomic Form	100	100	100	100
Tooth/Cusp Fracture	93	100	100	100
Onlay Fracture	96	97	100	96
Caries	100	100	100	100
Margin Adaption	100	100	100	100
Surface Gloss	100	100	100	100

Three-year results of the clinical study carried out by Dr. Fasbinder et.al at the University of Michigan.⁴ The table presents the percent Alpha scores for each USPHS criteria evaluated at each recall. For any scores less than 100%, the remainder are percent Bravo unless noted.

Reliable and versatile bonding options

3M™ Scotchbond™ Universal Adhesive is designed to work with and without the use of phosphoric acid etching. The fact that it continues to perform reliably after 18 months in clinical service was confirmed in an in-vivo study of the University of Regensburg.⁵ Fifty patients received three partial crowns made of feldspathic porcelain. Two of the three restorations in each patient were cemented with Scotchbond Universal Adhesive and 3M™ RelyX™ Ultimate Adhesive Resin Cement, one using the self-etch technique, the other using selective enamel etching. The third crown was placed with a different cement. The result of the clinical evaluations carried out after 18 months was that the restorations placed with the universal adhesive and adhesive resin cement performed very well, independent of the adhesive technique used.

Proven long-term clinical results

In March 2017, the five-year results of a practice-based clinical evaluation were published in THE DENTAL ADVISOR.⁶ A huge number of crowns, bridges, inlays, onlays and veneers (2,126) made of different restorative materials was placed with the innovative adhesive cementation system. Of the 1,532 restorations available for evaluation at five years, 99 percent received the highest possible rating for resistance to marginal discoloration, and the retention rate was 98 percent. Only 17 out of 26 bond failures were related to the cement. This resulted in a 99 percent clinical performance rating.

Conclusion

Some dentists are hesitant to adopt new products and systems as soon as they are introduced due to the lack of clinical evidence. Now, the desired evidence base is available for RelyX Ultimate Cement. It shows that the system is reliable in both the laboratory as well as the clinical environment. These recent external endorsements provide the type of proof that clinicians demand when considering a new adhesive resin cement.

NOTE: 3M™ RelyX™ Ultimate Adhesive Resin Cement offers natural fluorescence and is available in various shade options. RelyX Ultimate Cement is fully compatible with 3M™ RelyX™ Try-In Pastes, which come in matching shades.

References

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