

Clinical cementation procedures for predictable aesthetic results: tips & tricks

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Acceptable clinical performance of dental cements requires an adequate resistance to dissolution in the oral environment, a strong bond through mechanical interlocking and adhesion, high strength under tension, good manipulation properties, such as acceptable working and setting times, and a biologic acceptability for the substrate.

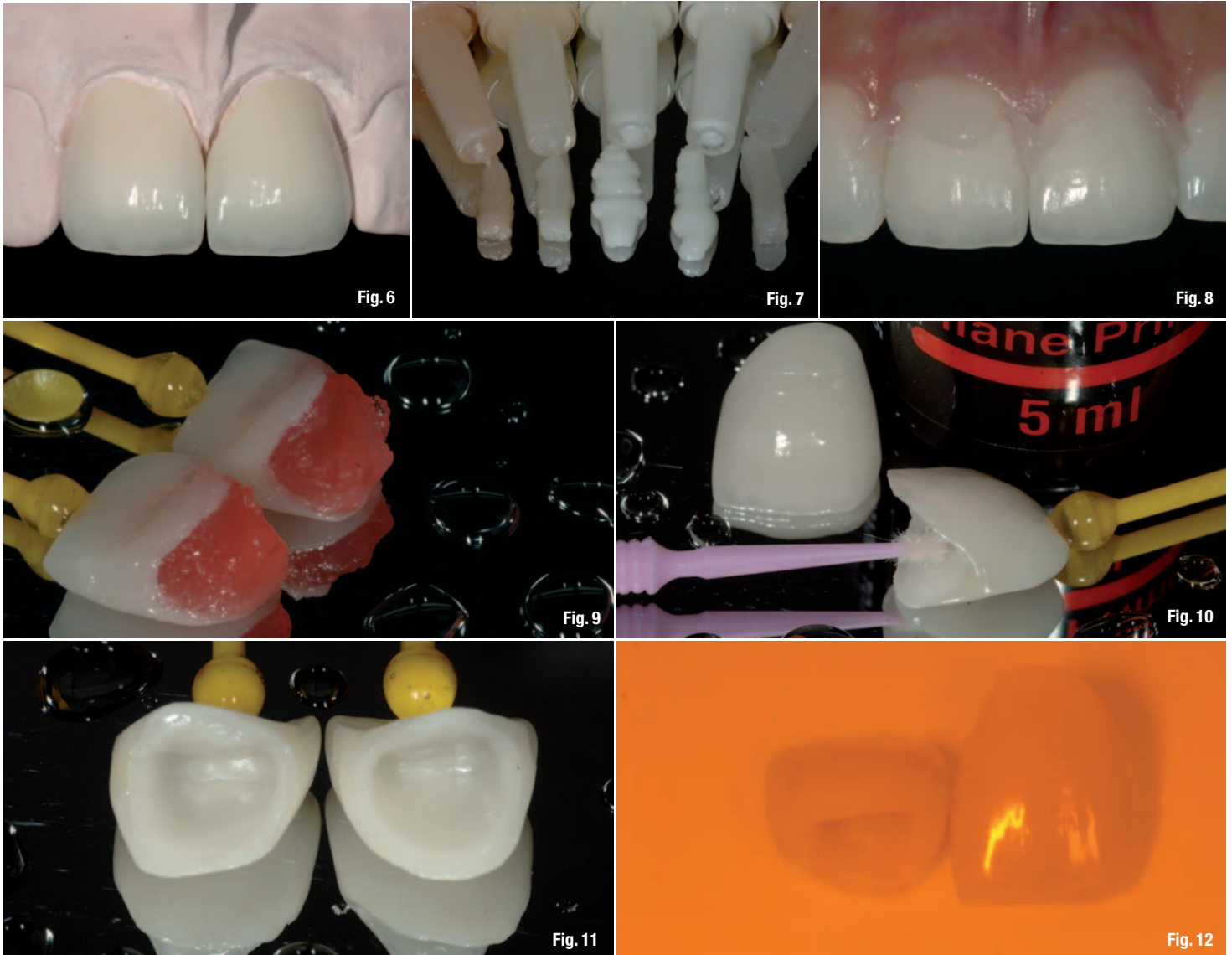
Resin-based cements are generally used for aesthetic restorations (ceramic or resin based) and have become popular because they have addressed the disadvantages of solubility and lack of adhesion noted in previous materials. Restorative dentistry is constantly undergoing change, driven in part by new clinical applications of ex-

isting dental materials and the introduction of new materials.

Kerr has recently introduced NX3, a new third generation dual-cure resin cement, with the following features:

- Proprietary amine-free initiator system and optimized resin matrix.
- Simplified delivery: a dual-cure auto-mix syringe eliminates hand mixing.
- Light-cure applications: a cement for veneers and indications requiring unlimited work time.
- Bonds to all substrates: excellent adhesion to dentin, enamel, CAD/CAM blocks, ceramic, porcelain, resin and metal.





- _ Self-etch or total-etch: bonding protocol compatibility. No dual-cure activator required.
- _ Superior color stability: long-term esthetics for both dual-cure and light-cure cements.
- _ Optimal handling: easy clean-up in gel state.

The following article discusses aesthetic adhesive procedure techniques for the new NX3 in luting leucite reinforced glass ceramic restorations with predictable aesthetic results.

An aesthetic resin cementation appointment may be divided into six steps:

- Step 1** _ Try-in and shade control of the laboratory-made restoration
- Step 2** _ Adhesive treatment of the inner surface
- Step 3** _ Adhesive treatment of the tooth surface
- Step 4** _ Adhesive luting
- Step 5** _ Control and adjustment of the occlusion
- Step 6** _ Finishing and polishing

_Case presentation

A 27-year-old male patient was presented with unsightly black gingival shine through resulting from dull PFM crowns in both maxillary central incisors (Figs. 1, 2). After treatment, the newly replaced leucite reinforced glass ceramic restorations (Empress Esthetic) (Fig. 3) cemented with NX3, are harmoniously integrated with the adjacent teeth and the gingival architecture (Figs. 4, 5).

_Step 1: Try-in and shade control of the laboratory-made restoration

Marginal adaptation and proximal contact of the laboratory-made restoration were first checked on the die-cast model. The better the fit, the easier excess luting resin cement can be removed, as there is less danger of tearing the luting composite out of the luting space during excess removal (Fig. 6).



The try-in gels matched both dual- and light-cure cements, a huge advantage when it comes to aesthetic restorations. The intro kit contains three colors—yellow, clear and white—however, other shades are also available. In my practice, clear, white and opaque-white are used the most. Clear try-in was used while closely matching the work piece to the adjacent tooth (Fig. 7).

The fit and shade control was verified by using the try-in gel. This step is quite helpful in determining the final shade aspect of the restoration, luted with the concurrent shade of resin luting. In this case, clear shade try-in paste was used (Fig. 8).

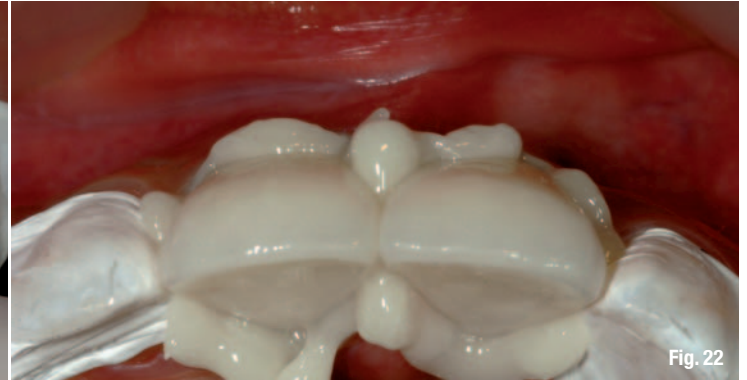
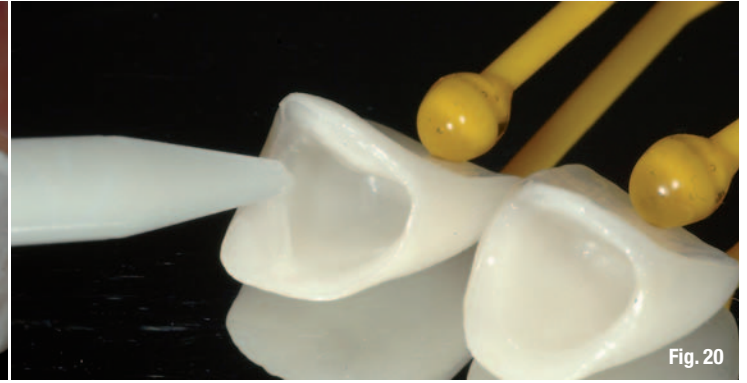
Only minimal adjustments of the workpiece are possible at this moment, otherwise the restoration will have to be sent back to the laboratory for correction and the luting session will have to be postponed.

Step 2: Adhesive treatment of the inner surface

After the try-in gel was thoroughly washed off and gently dried with oil-free compressed air, the inner side of the silica-based ceramic was conditioned with 5 percent hydrofluoric acid for 60 seconds. This helps to promote optimal morphological change of the surface for the penetration of the silane primer (Fig. 9). For this type of ceramic, silane acts principally as promoter of wettability on the roughened surface and for the successive application of the luting agent (Fig. 10).

The shiny aspect of the inner surface was visible after drying off the silane primer with hot air for two minutes (Fig. 11). After the surface adhesive treatment and before insertion, the restoration had to be protected from light (Fig. 12).





_Step 3: Adhesive treatment of the tooth surface

OptiClean was used for the complete removal of temporary cement and debris. It removes all traces of temporary cement and delivers a perfectly clean cementation surface of the entire tooth preparation. Used on a slow speed handpiece, OptiClean is a single-use instrument with a 1.6 mm diameter tip for excellent interproximal access (Fig. 13).

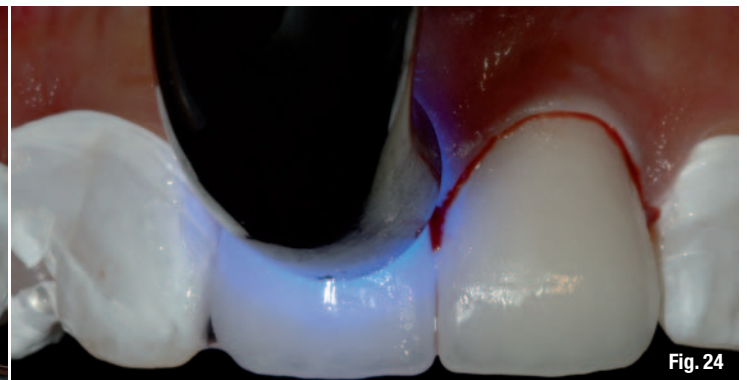
After the total removal of the temporary cement, the operating field and tooth preparation surface was properly prepared with the application of plumber tape to the adjacent teeth. The gingival was retracted with a #00 Ultrapak retraction cord (Fig. 14).

According to the manufacturer, NX3 is compatible with self-etch (OptiBond All-In-One) and total-etch adhesives (OptiBond Solo Plus, OptiBond FL) and ob-

tains high bond strength whether the cement is light-cured or dual-cured. In this case I chose a total-etch adhesive (OptiBond FL).

A total etch of the enamel dentin and resin surface of the composite core was done for 15 seconds with Kerr gel etchant 37.5% phosphoric acid. Afterwards, copious amounts of water were used for rinsing until the etchant was completely removed (Fig. 15).

After rinse off and gentle air drying the etched surface was bonded to a proper moist condition. OptiBond FLPrime was applied on the conditioned surface in a light scrubbing motion for 15 seconds. Another drying session of five seconds got rid of the volatile solvent. At this point the dentin/enamel surface should have a slightly shiny appearance (Figs. 16–19). Light curing is not advisable! The surface was then ready for one adhesive luting of the restoration with NX3 cement dual cure.



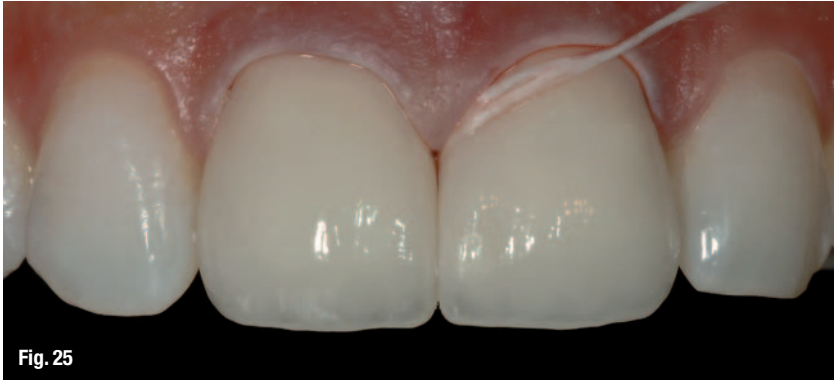


Fig. 25

Fig. 26

Fig. 27

Fig. 28

Fig. 29

Fig. 26 An arrow indicates a small fraction of excess cement that was removed with IPC and Superfloss.
Fig. 27 An X-ray confirmed the complete removal of the excess cement and the adaptability of the restoration to the crown margin. Please note the thin film thickness of NX3.

Step 4: Adhesive luting

NX3 dual-cure resin cement was then easily dispensed on the previously prepared inner surface of the restorations (Fig. 20). The placement of the restorations onto the adhesively prepared tooth surface was done manually by gently pressing at the incisal edge (Figs. 21, 22). This was done immediately after the cement was dispensed. Excess cement in the gel state was easily removed with a sharp interproximal carver (Fig. 23). Direct focus of the operative light on the restoration during placement should be avoided. At this point, more pressure was exerted to ensure that the restoration was fully seated and that the thickness of the cement was as thin as possible.

After all the excess cement and the retraction cords had been removed, all surfaces were light cured for 20 seconds each, using a Hi-power LED

curing device (Figs. 24–27). Even though dual-cure resin cement was used, light curing helped to ensure better polymerization and better bonding to the tooth surface. When using dual-cure cements, clinicians should delay the light-curing procedure to the maximum time clinically possible. That way a maximum degree of conversion of the resin cement may be achieved after light activation, reducing the risk of excessive water uptake.

Step 5: Control and adjustment of the occlusion

The adjustment of the occlusion was safely executed after the restorations were adhesively luted to the teeth. This can be done by checking for a hi-spot in centric and protrusive movement of the jaw. A hi-spot can be corrected with a fine diamond in a hi-speed handpiece (Figs. 28–30a).

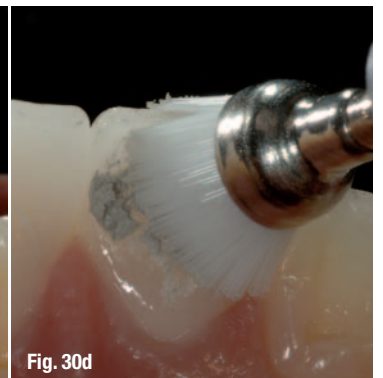
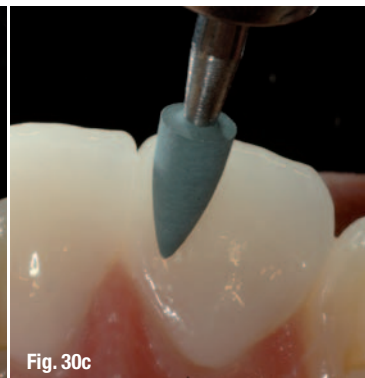
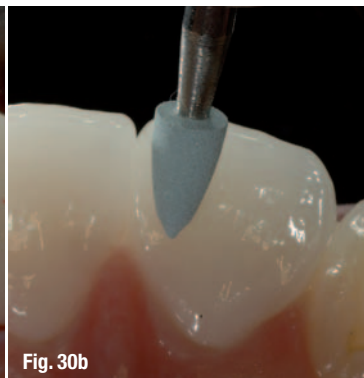
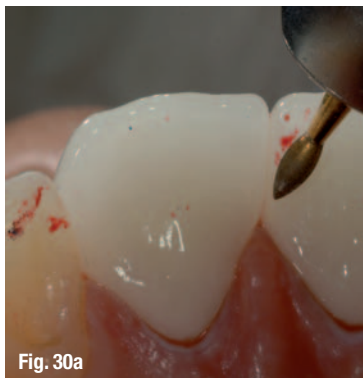


Fig. 30a

Fig. 30b

Fig. 30c

Fig. 30d

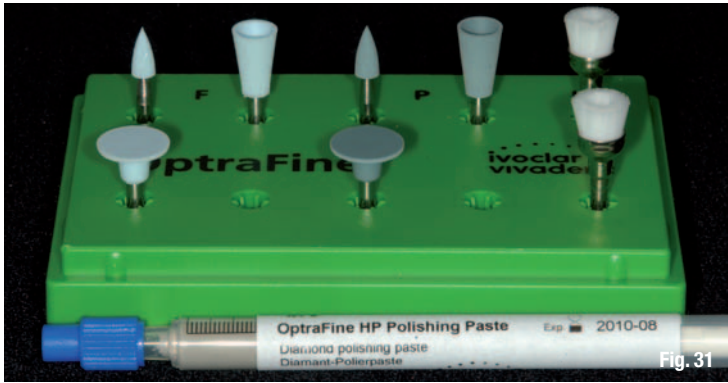


Fig. 31

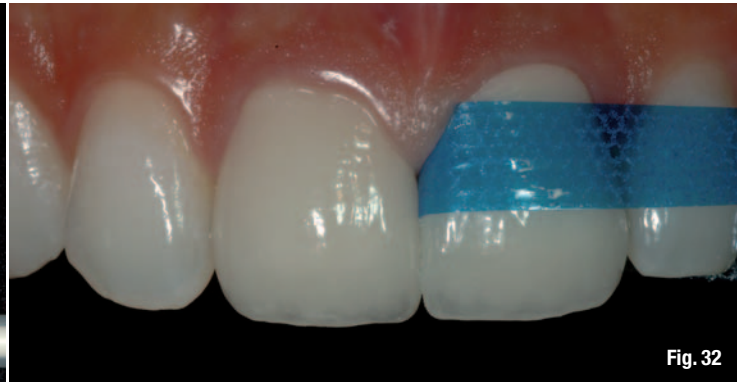


Fig. 32

Step 6: Finishing and polishing

The ceramic surface that was adjusted by grinding was then polished back to high-gloss finish with OptraFine (Ivoclar Vivadent) a new, high-performance diamond polishing system for ceramic materials, which affords a unique combination of highly efficient application and perfect polishing results.

Interproximal ceramic margins under the gum line were finished and polished to a smooth transition with Epitex Strips (GC). These strips are ultra-thin because abrasive particles are not bonded to the strip with adhesive. This also allows easier access in tight contact points and helps minimize gingival damage.

Conclusion

The ideal luting agent should guarantee:

- _ a durable bond between the involved structures and
- _ provide a good marginal adaptation,
- as well as additional attributes like
- _ optimal biomechanical properties,
- _ low solubility in the oral cavity,

- _ radiopacity,
- _ increased working and setting time for easy manipulation,
- _ adequate viscosity for complete seating, and
- _ optimal esthetic properties.

Currently, no commercially available luting cement is ideal for all situations. NX3 was created to meet those aforementioned requirements. Clinicians could work universally with this product in cementing aesthetic crowns, veneers, inlays, onlays, CAD/CAM restorations with efficient and more predictable esthetic results.

The literature list is available from the publisher.

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Fig. 33



Fig. 34