

SOLVING ADHESION ISSUES IN EVERYDAY CLINICAL PRACTICE INVOLVING ZIRCONIA DENTAL RESTORATIONS

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The area of dental ceramic materials was revolutionized with the introduction of aesthetically more appealing metal-free ceramic materials that can withstand chewing forces and are nowadays designed and fabricated not only in a way that marginal fit is no longer an issue, but also exhibiting biocompatibility. It is somehow accepted that the true modern area of prosthetic dental care started 15 to 20 years ago with the introduction of high strength zirconia ceramics, which nowadays dominates. Not only high strength but also lowered wear of antagonists is another appealing aspect of zirconia.

However, the zirconia's high chemical inertness results in insufficient bonding abilities especially when limited or no mechanical retention is provided as is in the case of zirconia root dental posts, inlays, onlays, occlusal veneers, veneers, partial coverage restorations, inlay – inlay fixed partial dentures, etc. At present airborne particle abrasion and tribochemical silica coating, such as Rocatec system and Cojet system, are methods for roughening the ceramic surface and embedding silica particle onto the cementation surface, respectively. Furthermore, phosphate monomer resin based luting agents are also widely utilized, but still low retentive applications of zirconia remain unsolved.

In this presentation some clinical examples will be provided showing advanced mechanical design and chemical strategies solving zirconia's bonding deficiencies. In case of using zirconia posts with asymmetric coronal part, improved adhesion strength is achieved due to the post shape. By using Vallbond system, a non-invasive surface functionalization technique, new chemical strategy for high improvement of adhesion strength is presented. This technique consists of deposition of an adhesive alumina nanostructured coating, which mimics the process of acid etching of enamel, thereby increasing surface area of zirconia cementation surface, which significantly improves adhesive abilities, opening widely doors for minimally invasive dental procedures using zirconia.