

All-ceramic treatment options

By George Freedman, DDS,
and Marc Gottlieb, DDS

■ Dentists see, hear or receive information about all-ceramic crowns and bridges every day. Are the days of porcelain fused to metal over? There is now systematically reviewed data showing that all-ceramic systems are no longer experimental; they are suitable for routine utilization in practice. There are various all-ceramic options available and numerous techniques to place them. Furthermore, there are materials to fix a ceramic chip or fracture.

Crowns and bridges have evolved over time. All-gold restorations, developed a century ago, are still considered by many to be the “gold” standard, functioning successfully for decades. They may not look natural, but they never chip or break. The first esthetic option was to process resin to the labial surface.

Esthetically acceptable when placed, they yellowed and wore over time. Occasionally the veneering resin pops off but can be readily repaired with light-cured bonding materials (Fig. 1).

Porcelain fused to a metal substructure (PFM) was the next major cosmetic advance. A successful PFM mimics the natural tooth. The challenge is to hide the metal under the porcelain with opaque.

As well, the subgingival metal gingival margin becomes exposed with time. The gingival “black line” and to the challenge of masking the metal substructure encouraged the development of all-ceramic restorations.

Patients expect their crowns to look natural and to stand the test of time. Current all-ceramic crowns and bridges can meet and exceed their expectations. Practitioners have choices. Clinical success requires the ability to select the proper material: glass ceramic, particle filled glass, or a tooth-colored poly-crystalline ceramic. There are a few basic concepts to remember: the stronger and harder the material, the more opaque, less translucent.

Every manufacturer provides cementation protocols, the majority require bonding. Glass or particle-filled ceramics must be etched with hydrofluoric acid (HF) to enhance mechanical retention and then silanated. Polycrystalline materials (zirconia or alumina) are primed with an acidic phosphate ester (MDP) or sprayed with silica (Siljet, Danville Materials, San Ramon, Calif.) to improve retention.

The cementation protocol for all-ceramic crowns can be essential for success. Tribochemical treatment (Siljet) of polycrystalline zirconia and non-silica ceramic substantially increases their bond strengths to the resin cement.

This has tremendous implications and applications for dental treatment.



• Fig. 1: (Photos/Dr. Michael Nelson)



• Fig. 2



• Fig. 3



• Fig. 4



• Fig. 5



• Fig. 6

Tribochemical treatment with Siljet is indicated for every non-ceramic surface that is to be bonded. Every intraoral repair is also tribochemically treated to enhance the bond strength.

Case presentations

A patient presented with a porcelain fracture involving the incisal edge of tooth #7 (Fig. 2). A tapered diamond bur feathered the porcelain fracture into the incisal third of the crown.

The roughened surface was then microetched at 40 psi with 50 micron aluminum oxide powder, rinsed and dried. Siljet tribochemical application (Fig. 3) with the microether fine tip at 40 psi was followed by rinsing and silanation of the porcelain surface as directed by the manufacturer. Tooth #7 was then restored using standard bonding and finish-

ing techniques (Fig. 4).

The patient required root canal therapy and the access was through the occlusal surface of a porcelain-fused-to-metal crown (Fig. 5.)

Following the completion of endodontic treatment, the porcelain and metal were treated with Siljet and bonded to seal off the access cavity, providing an excellent and esthetic seal (Fig. 6).

Dentists have been able to predictably bond to glass silica-based ceramic crowns by etching with hydrofluoric acid, silanating and bonding. Predictable bonding to metal and polycrystalline base materials have long been contentious clinical issues. Tribochemical treatment with Siljet solves this problem, offering the practitioner excellent adhesion to Zirconia, Alumina, meta and many other restorative surfaces.

Attend the session

Today from 11:20 a.m. to 12:20 p.m. in aisle 6000, room 3, Dr. George Freedman and Dr. Marc Gottlieb will present “ABC’s of Bonding Ceramic Crowns and Ceramic Repair” as part of the DTSC Symposia. In the session, the clinicians will explain the various all-ceramic options available and numerous techniques to place them. Participants will learn to determine the differences between the types of all-ceramic crowns and bridges and when to use them; understand the steps of bonding to ceramics and metal; and receive exposure to Tribochemical treatment of dental materials.

About the speakers



George Freedman, DDS, is past president of the American Academy of Cosmetic Dentistry and the chairman of the Dental Innovations Forum (Singapore). Freedman is the author or co-author of 11 textbooks, more than 400 dental articles and numerous CDs, video and audiotapes and is a Team Member of REALITY. Freedman is a co-founder of the Canadian Academy for Esthetic Dentistry and a diplomat of the American Board of Aesthetic Dentistry.



Marc Gottlieb, DDS, was born and raised on Long Island, N.Y., and attended Union College in Schenectady, N.Y. as well as the University of Buffalo School of Dentistry. While at Buffalo, he received many academic scholarships, awards and fellowships. After graduation from Dental School, Gottlieb went on to a two-year post-doctoral residency program at Long Island Jewish Medical Center. This unique opportunity provided advanced training in anesthesiology and all the specialties of dentistry. Gottlieb is currently on staff at Stony Brook University Hospital, maintains a full-time private practice, lectures all over the United States and has authored more than a dozen dental articles.