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The alliance between the dentist and lab technician

Synergy in Dentistry

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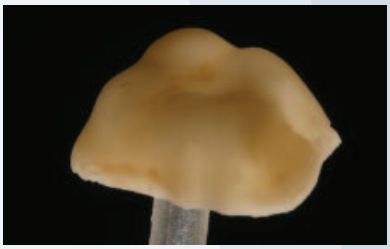




Lab Dialogue

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Introduction

Next to the dentist-patient relationship, the collaboration between dentists and laboratory technicians is perhaps the most important ingredient for clinical and esthetic success in restorative cases. Today, existing restorative products improve and new ones arrive on the market at such a fast pace that it can be difficult to keep abreast of the latest advances. The questions and answers that appear here are a sampling of the most frequently asked-about issues and concerns that confront both dentists and technicians as they treatment plan, fabricate, and seat a successful restorative case. The panel in this issue is comprised of two dentists and two technicians, all of whom are well respected in their fields for their knowledge and expertise in delivering functional, yet highly esthetic, restorations to their clients.

Ed McLaren, DDS
Director, Center for Esthetic Dentistry and School for Esthetic Dental Design
School of Dentistry
University of California at Los Angeles
Los Angeles, California

Matt Roberts
Private Practice
Idaho Falls, Idaho

Gordon Russell, RDT
Owner, Next Level Dental Design
Huntington Beach, California

Bob Winter, DDS
Associate Professor of Clinical Dentistry–Primary Oral Health Care
University of Southern California
Los Angeles, California

Q How is zirconia different and how does it compare to traditional all-ceramics?

Dr. McLaren: Zirconia as it is currently used in dentistry is a solid sintered polycrystalline structure that has no glassy phase. It can be fabricated by one of several CAD/CAM systems. Structurally, it is similar to the densely sintered alumina used in the conventional Procera® technique. Zirconia has a much higher fracture toughness and flexural strength than even Procera® alumina. This is in part because of a unique mechanism in zirconia called "transformation toughening" that other ceramics don't possess. It is a crack "healing" property, in which zirconia grains absorb energy and "transform" from a tetragonal form of crystal to a monoclinic form of crystal. The monoclinic form is slightly larger and can close off small cracks. Zirconia is roughly 2 times tougher and stronger than alumina and 5 to 10 times tougher than glass-based ceramics.

Mr. Roberts: Zirconia gives us a ceramic material that can be very esthetic, yet can be placed with conventional cementation. This allows the use of all-ceramic restorations where margins extend too far subgingivally to allow isolation for bonding, or over metal posts and implant abutments. We can also fabricate all-ceramic bridges in the anterior and posterior with zirconia. I find that the combination of Norataki's pressable ceramic over a zirconia core produces exceptionally nice esthetic results that rival what we can achieve with etched and bonded restorations. In many cases, we are still using conservatively prepared, adhesively placed veneers in the anterior, then preparing more aggressively, and cementing zirconia-based, pressed ceramic restorations in the posterior to finish the case.

Mr. Russell: Dental restorations have been constructed of different materials over the years. Porcelain-fused-to-metal (PFM) restorations have dominated this field for a long time as the mainstay for clinicians. Over the last relatively few years, we have seen all-ceramic systems appear on the market, consisting mainly of lithium disilicate or alumina-based–type systems. Zirconia-based restorations differ from these materials in a number of ways. The obvious difference zirconia has to a metal-based restoration is its color and translucency. The gray color of the metal needs to be masked with a layer of opaque, and there is no light transmission through its core. These drawbacks are overcome by using a zirconia-based structure where light is

allowed to pass through the framework to illuminate the underlying tissue, and the inherently white material can be colored to match the desired shade of the surrounding teeth. The difference to the current all-ceramic systems is mainly an advantage in strength, where zirconia-based systems can be indicated for restoring missing posterior teeth with crowns and bridges on a more routine basis.

Dr. Winter: Lava™[a] zirconia from 3M ESPE is significantly different from traditional all-ceramic materials because of its superior strength, and the fact that the zirconia substructure is available in 8 shades to give more flexibility in achieving the desired esthetic outcome. In addition, the manufacturing process of the framework gives the technician the ability to design a framework that adequately supports the veneer ceramic, eliminating areas of excessive thickness of veneer material. This, in turn, decreases the risk of the veneer ceramic fracturing.

Q Why would I choose to use zirconia vs PFM?

A Dr. McLaren: (1) Patient preference for metal-free; (2) I can use the same veneering porcelain for crowns, bridges, veneers, and glass ceramics; and (3) zirconia is more translucent than metal.

Mr. Roberts: Zirconia allows more light transmission than PFM. This, in turn, makes it easier for me to achieve natural-appearing restorations. Also, some patients are very nervous about putting metal in their mouth.

Mr. Russell: I would choose to use zirconia over PFM in situations where my client desired an all-ceramic restoration that didn't contain metal but where strength in the posterior region was critical. I would also use it for esthetic cases where the translucency of zirconia would be to my advantage. An example today would be when restoring a full-mouth reconstruction, where in the past using different types of materials in different locations could have visible disharmony to the patient.

Dr. Winter: A zirconia restoration would be selected vs a PFM when there is a need to avoid metals, such as in the case of allergies, and in the esthetic zone to achieve a more ideal result.

Q What type of cements should I use for the newer zirconia core-strengthened materials?

A Dr. McLaren: Low-solubility cements, ie, resin cements or resin-reinforced glass ionomers.

Mr. Russell: A variety of different materials may be used; however, studies have shown that the best results can be obtained with a self-curing resin-modified glass ionomer cement, especially if the framework was pretreated with Rocatec™[a].

Dr. Winter: Restorations fabricated with zirconia cores can be conventionally cemented with materials such as glass ionomer or resin-modified glass ionomer cements. To achieve the best bond strength, surface-treat the zirconia with the Rocatec System, and then use the RelyX™ Unicem Self-adhesive Resin Cement[a].

Q What type of cement should I use with a porcelain veneer?

A Dr. McLaren: A light-cure resin cement that has minimal to no color shift on polymerization.

Mr. Roberts: Porcelain veneers are dependent on the bond to underlying dentin and enamel for their survival. I have seen a 7-year, 97.5% success rate of several thousand restorations in one practice and 100% failure rate of 135 restorations in another practice during the same time period. The restorations were fabricated from the same ceramic, by the same lab (me); the only difference was the materials and techniques used for placement. My personal preferences are for fourth-generation dentin adhesives used with a total-etch technique, ie, ALL-BOND®2[b] and the two-part OptiBond®[,c] system. I feel that which luting resin is used is less critical than the dentin adhesive, but my clients have good luck with Variolink® II[d]. Finally, I would stress that I am a ceramist, not a dentist, and therefore an armchair quarterback on this one. If you have a system that has given you a high success rate and low sensitivity and microleakage, be very reluctant to change to anything new.

Mr. Russell: Choosing a cement for a veneer may be based on a variety of factors, such as the color of the substrate, the ability to alter the shade for slight color modifications, the ability to bond to dentin, ease of use and cleanup, and sensitivity to the patient. The clients I work with usually have more than one type of veneer cement and use them for different situations, some brands being RelyX and Panavia®[,e].

Dr. Winter: Porcelain veneer restorations should be bonded with resin cements.

[a]3M ESPE, St. Paul, MN 55144; 800-216-9502

[b]BISCO, Inc, Schaumburg, IL 60193; 800-247-3368
[c]Kerr Corporation, Orange, CA 92867; 800-537-7123
[d]Ivoclar Vivadent®, Inc, Amherst, NY 14228; 800-533-6825
[e]Kuraray Dental, New York, NY 10022; 800-879-1676

Q I'm having trouble with tight contacts on my crowns. Could this be related to my provisional material?

A Dr. McLaren: Absolutely. A material that wears easily or leaves open contacts because of shrinkage on polymerization can precipitate tooth migration during the provisional phase.

Mr. Roberts: This may be less of a material issue and more of a technique issue. Whichever provisional material you use, make sure that contacts are properly adjusted to prevent tooth movement. Open contacts on provisionals may allow shifting to close the space; therefore, the contacts on the restorations will be tight. It may also be possible that more care needs to be taken by your technician. Fitting to a solid model rather than a pinned model will greatly reduce contact adjustment.

Mr. Russell: The problem of tight contacts when fitting crowns can be caused by a number of problems, one of them being ill-fitting provisionals. Another cause could be the result of too much expansion in the materials used in the model work. What seems to give the most consistent results is when the impression material used by the dentist and the stone used by the laboratory are matched. The resulting fit is evaluated by the dentist, and adjustments are made by the lab accordingly for future cases. This setup can then be suggested to other clients when issues of fit are encountered.

Dr. Winter: If a dentist is having a problem with tight contacts when trying in a restoration, it is possible that the provisional restoration was fabricated with too light of a contact, and the tooth has moved slightly. The material used to make the provisional should not influence the interproximal contact, unless it is a long-term provisional. In that case, the wear characteristics of the material may be a factor.

Q Do you feel that a good impression is based more on a good technique or a good material?

A Dr. McLaren: 80% technique.
Mr. Roberts: Good technique!

Mr. Russell: I feel that a good impression is more related to good technique rather than the material, because different dentists using the same material can achieve quite different results. Ease of use of the material may contribute to this, as well as good technique in following the manufacturer's directions.

Dr. Winter: A good impression is the result of both. Adequate retraction of the gingival tissue is necessary to reveal the tooth structure apical to the preparation finish line, and there must be no contamination of the surface of the tooth with either debris or moisture. The impression material must be injected into this area without trapping bubbles. Material must flow adequately, be tear resistant, avoid deformation, and be dimensionally stable to create a good impression.

Q What is the most common defect you see in the impressions you receive? What do you recommend to your clients to prevent these defects?

A Dr. McLaren: Inadequate impressioning of marginal detail is the most common defect. I would recommend using the double-cord technique with atraumatic preparation techniques.

Mr. Roberts: Lack of marginal detail because of sulcular fluid or hemorrhage is probably the most common problem. This situation can be improved by avoiding subgingival placements whenever possible as well as being careful with the gingival tissues. The less bleeding that you cause during preparation, the less you have to control during impression taking.

Mr. Russell: The most common defect I see in impressions is lack of sufficient retraction on the preparations. When the impression captures the information below the margin, the technician is able to fabricate a restoration that has a smooth emergence in the transition from the tooth structure to the crown structure. Good cord technique and control of oral fluids in the sulcus can improve this situation greatly as well as by using a more hydrophilic impression material.

Dr. Winter: When I have the opportunity to evaluate impressions in the laboratory or when teaching courses, the two most common defects in impressions I observe are:

- material that has pulled away from the tooth, creating a positive deformity in the die. (The most common cause of this is using materials that are too viscous, or a wet tooth surface.)
- defects in the material at the finish line of a preparation.

The goal of every impression is to capture tooth structure apical to the finish line. Keys for success are adequate retraction, clean and dry teeth, careful injection of the impression material, and the use of impression materials that flow efficiently.