Synergy in Dentistry

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70-2009-3564-4

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Dear Readers:

Computer-assisted design and computer-assisted manufacturing (CAD/CAM) is one of the fastest expanding technologies in the dental profession. While CAD/CAM technology has been used in industrial applications for a number of years, it is only in the past few years that the dental profession has realized the possible advantages of using it in the context of patient care. As will become evident in the articles presented in this issue, there are economic advantages, patient benefits, and increased efficacy with certain restorative procedures when CAD/CAM technology is used. Using 3M ESPE’s Lava™ All-Ceramic System, a zirconium-oxide ceramic material that is milled, sintered, and then veneered with an esthetic nonwearing ceramic, a metal-free high-strength restoration can be fabricated. Applications include single-unit and multiple-unit fixed bridges.

Dr. Trinkner provides a historical review of available options for ceramic esthetic applications and introduces advantages to using technology such as the Lava™ CAD/CAM system. He presents a clinical case with detailed step-by-step guidelines on how to achieve optimum results with this system.

Dr. Radz provides insights on how to create biologically acceptable and esthetic provisional restorations using a new high-strength polymer-based material. Often viewed as an adjunct procedure to restorative dentistry, Dr. Radz outlines essential elements with a case study that results in a healthy provisional restoration that is more active than passive in function.

Dr. Levin, of the Levin Group, discusses the aspects of incorporating new technologies, such as the Lava™ System, into a modern dental practice. He focuses on four principal factors that are involved in assessing a new technology: quality, efficiency, speed, and return on investment. His analysis results in fundamental outcomes that are focused on both improved practice parameters and improving oral health care to the public.

This issue of Synergy in Dentistry makes evident the clinical and practice-management benefits of using the Lava™ System. Dental Learning Systems would like to thank 3M ESPE for sponsoring this clinical series.

Sincerely,

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Placement of an All-Ceramic, Three-Unit Posterior Bridge Fabricated with Esthetic and Durable Zirconium-Oxide Connectors

ABSTRACT
Relatively recent advances in all-ceramic dental materials have enabled laboratory technicians to fabricate and clinicians to place single- and multiple-unit metal-free restorations in both the anterior and posterior segments. Today, all-ceramic materials are available that meet the demands for enhanced esthetic properties, as well as superior strength, function, and durability. This article discusses the evolution of all-ceramic restorations, discusses a zirconium-oxide ceramic (Lava™), and presents the clinical and laboratory protocol associated with prescribing, fabricating, and placing this metal-free restorative alternative.

Learning Objectives
After reading this article, the reader should be able to:
• discuss the effects of connector design on restoration longevity and esthetics.
• describe the clinical protocol associated with prescribing and placing zirconium-oxide ceramic bridges.
• discuss the CAD/CAM and layering techniques used in fabricating zirconium-oxide ceramic bridge restorations.

Dental patients have achieved a level of esthetic awareness and sophistication that make it essential for today’s clinicians to deliver a variety of restorations that satisfy specific indications, enhance the appearance of a patient’s smile, and fulfill functional and biocompatibility requirements. Among the clinician’s armamentarium of indirect restorations are all-ceramic fixed prostheses, which have become an increasingly important part of modern esthetic dentistry.

In fact, since the first successful attempts to seat a porcelain restoration in the 17th century,1 this material has been an integral component of overall dental care, particularly when combined with metal to produce exceptionally durable porcelain-fused-to-metal (PFM) crowns and multiple-unit bridges that can withstand the masticatory forces and stresses inherent in the posterior region. In recent decades, however, clinicians have been unable to identify and prescribe a consistently strong and esthetic, metal-free, all-ceramic material suitable for replacing missing molars.2

In particular, a metal-free yet esthetic material that enables the use of smaller, more esthetic, and natural-looking connectors in three-unit posterior bridges has been especially elusive. Fracture of all-ceramic fixed prostheses has characteristically occurred most often in the connector area, primarily as a result of stress concentrations. In fact, a 24% failure rate for molar-pontic fixed partial dentures (FPDs) has been shown, with failures occurring in the connector between the retainer and the pontic.3 When the technology was first introduced, the only way to prevent such fractures was to overcontour the connectors—for example, to a size of approximately 16 mm²—thus limiting the esthetic potential of these restorations.4 Clinical evaluations of lithium disilicate all-ceramics also showed a need to create rather large occlusal–gingival connector heights for premolar-pontic FPDs.5 One recent study, however, has demonstrated that the radius of curvature of the connector design—particularly at the gingival embrasure—could also strongly affect the fracture resistance of multiple-unit all-ceramic restorations.6 The same researchers found that as the radius at the gingival embrasure increased from 0.25 mm to 0.9 mm, the mean failure load increased by 140%, and that the radius of curvature at the occlusal embrasure had only a minor effect on the fracture susceptibility of three-unit FPDs.7

Evolution of All-Ceramic Materials
Historically, developments in all-ceramic materials have focused on improving the previously unacceptable
fracture resistance of the shell ceramics. To this end, manufacturers supplemented the crystalline components of these materials with a variety of fillers, such as leucite (IPS Empress®, a), mica (DICOR®, b), hydroxyapatite, or glass-infiltrated oxides (In-Ceram®, c). Because of this, clinicians have had available many innovative all-ceramic systems from which to choose. Within the past decade, manufacturers have also introduced restorative alternatives consisting primarily of pure polycrystalline-oxide components (ie, Procera®, d), such as alumina.

While many of the ceramic systems resulting from these enhancements have become an increasingly important part of dentistry, they have not presented laboratories with an economic means for their fabrication. As a result, PFM restorations have remained the most reliable modality for FPDs in the posterior segment, demonstrating a minimum survival rate of 85% after 10 years in vivo.  

Unfortunately, glass ceramics and infiltrated ceramics have limited the long-term stability of single- and multiple-unit metal-free restorations in the posterior region. However, recently introduced polycrystalline ceramics, such as zirconium oxide, have demonstrated suitability as a framework material for metal-free posterior prostheses, particularly because the yttria-stabilized zirconia has a characteristic called transformation toughening that contributes to its exceptional strength.

The Lava™ All-Ceramic System

According to the manufacturer (3M ESPE), precise scanning and milling technologies, along with a thorough understanding of zirconium-oxide ceramics, have resulted in the creation of the Lava™ All-Ceramic System®. Based on the machining of presintered zirconia frameworks—which exhibit favorable mechanical properties, biocompatibility, and good esthetics—that are layered with a proprietary veneering ceramic, Lava™ restorations are useful for both anterior and posterior indications. The Lava™ All-Ceramic System also represents a true computer-aided design/computer-aided manufacturing (CAD/CAM) system that allows traditional cementation and fabrication techniques to be used by the dentist and the ceramist, as indicated by the manufacturer.

Case Presentation

A 60-year-old woman presented with a chief complaint of a fractured all-ceramic bridge on teeth Nos. 4 through 6 that resulted from biting a piece of a bone. She also had other all-ceramic restorations in the anterior region. Additionally, the patient requested a modification of the buccal corridor to better match the existing tooth shades on her left side.

Treatment Considerations

After a comprehensive consultation, the decision was made to fabri-
cate an all-ceramic bridge prosthesis to facilitate an esthetic blend with the existing all-ceramic anterior restorations. In addition, and in response to the fracturing of her previous three-unit FPD, the patient agreed to the use of a zirconia-based all-ceramic system (Lava™) that would provide greater strength as well as improved esthetics, a result of the strong yet smaller connector.

Further, to satisfy the patient’s requests relative to the buccal corridor, it was decided that this modification would incorporate a position of the buccal corridor that was different from her remaining natural tooth structure. However, she had tolerated this change extremely well on her left side in terms of function, phonetics, and esthetics.

Preparation, Impression-Making, and Temporization

After removal of the existing abutments of the failed all-ceramic bridge, the preparations were modified to incorporate the design characteristics of the Lava™ material (Figure 1). Specifically, a shoulder or chamfered preparation could have been used, with a circumferential step or chamfer placed at a more than 5-degree angle horizontally. The vertical preparation was 4 degrees or larger, and the inside angle was rounded (Figure 2). The preparations for this restoration were accomplished with minimal tooth structure removal because the framework requires a thin wall thickness of only 0.5 mm.

Dental patients have achieved a level of esthetic awareness and sophistication that make it essential for today’s clinicians to deliver a variety of restorations that satisfy specific indications, enhance the appearance of a patient’s smile, and fulfill functional and biocompatibility requirements.

The underlying core shade was then captured photographically, and occlusal records, facebow, and final impressions were obtained. The provisional restorations—which were modified several times to meet the patient’s esthetic requirements—were fabricated. All relative and necessary patient information and a detailed laboratory prescription were forwarded to the dental laboratory.

Laboratory Fabrication

At the dental laboratory, a working model was created, and sectioned, and then positioned in the Lava™ Scan, a PC-based system for creating Lava™ restorations. Unlike some of the other systems available that require a wax-up of the substructure, the Lava™ All-Ceramic System is a true CAD/CAM system. The bridge dies and edentulous area are scanned with an optical scanning system that allows for the virtual design of the framework by measuring the tooth preparations, antaglio surfaces, and opposing cast. These considerations are displayed on the monitor as a three-dimensional image, and the design of the framework—including the insertion of the pontic and the design or modeling of the connections—is accomplished using the computer keyboard and mouse.

Figure 7—Close-up view of the framework before sintering.
Figure 8—Occlusal view of the anatomical build-up.
Figure 9—Close-up view of the fired restoration.
Figure 10—Final restoration in the laboratory after finishing and firing.
Figure 11—Final restoration on the stone model after being returned from the laboratory.
Figure 12—Alternative view of the Lava™ restoration on the stone model.
When designed, the appropriate zirconia block, which has a plastic holder with a bar code, is selected. The unique design is registered with the bar code, and the block is moved to the separate milling machine.11

When the milling process is complete, the framework is separated from the remaining zirconia block (Figure 3) and colored according to the prescribed shade (Figures 4 through 6). The Lava™ frame zirconia, which is characterized by its outstanding stability and biocompatibility, is available in eight shades because of this proprietary coloring process.

Since the first successful attempts to seat a porcelain restoration in the 17th century, this material has been an integral component of overall dental care. The framework is then fully sintered for approximately 8 hours in a high-temperature oven. To compensate for the 20% shrinkage that occurs during sintering, the virtual bridge dimensions are expanded by 20% in the CAD process. As a result, minimal adjustments to the framework are necessary before applying the veneering porcelain.2

The Lava™ Ceram feldspathic veneering ceramic—which was specifically designed to complement the Lava™ framework—is available in 16 Vita®c shades, with a color range that includes a variety of shoulder, modifying, dentin, incisal, and other special effects materials. This material is artistically applied to the zirconia substructure (Figures 7 and 8)—which is inherently colored for a natural shade—and the restoration is then finished and fired (Figures 9 and 10).

Cementation

The definitive restoration arrived from the laboratory and was tried in during the initial postoperative visit. Modification of the buccal corridor and external shading was required, so the restoration was returned to the laboratory. At the next try-in appointment, the patient was very pleased with the resulting esthetic outcome (Figures 11 through 13). The final restoration was then checked for occlusal considerations, and the follow-up area being restored was isolated for cementation and properly cleansed. In this case, the final three-unit bridge restoration was cemented into place using a self-etching, self-adhering cement (RelyX™ Unicem®). It is important to note that the manufacturer also has indicated traditional cementation procedures with glass ionomer cements can be used for cementing Lava™ zirconia-based restorations, regardless of their indication or location in the mouth. Use of phosphoric cements is contraindicated. In this case, as in others,12 the availability of a zirconium-oxide abutment and connector enabled the esthetic and lifelike reconstruction of the patient’s affected and missing dentition. Factors affecting the aesthetic outcome included the emergence profile of the restoration, as well as its relationship to the buccal corridor. Further, in the visible dental region, this restoration had to meet exacting demands for durability, function, and esthetics (Figures 14 and 15).

Conclusion

With the introduction of the Lava™ All-Ceramic System, dental professionals now have another tool that enables them to meet patients’ ever-increasing expectations for esthetic restorations. Specifically, natural-looking all-ceramic restorations for the posterior region can now become an increasingly important part of dental care,9 and the introduction of higher-strength, zirconia-based systems allows the use of these restorations for a wider range of applications than previously possible.11

Additionally, the CAD/CAM manufacturing process seems to deliver accurately fitting margins.2 Both the cementation and the porcelain buildup of the material are similar to the techniques used with conventional PFM restorations, so the implementation of the Lava™ system should require a minimum amount of retraining for the dentist and the
ceramist. Further, the availability of a variety of core material colors greatly simplifies the ceramist’s task of creating a natural-looking restoration.

References
owe recently wrote, “A quality provisional restoration is essential for consistent excellence in esthetic and cosmetic restorative dentistry.” When restoring a patient’s anterior teeth, the importance of the provisional restoration cannot be overstated. Not only does the temporary restoration help provide interim function, phonetics, and esthetics to the patient, but the patient’s confidence in the dentist’s skill is often based on satisfaction with the temporary restoration.

Many different techniques have been used to achieve a successful temporary restoration. A number of dentists are using laboratory wax-ups to help design esthetic anterior restorations. These techniques have been very successful and provide excellent esthetic results. The only significant drawbacks are the time that is required to complete the wax-up and the additional expense to the case.

It is often possible to use the patient’s existing dentition—with a few modifications completed chairside—to create an esthetic anterior provisional restoration without incurring the time and cost of involving a laboratory technician.

The following case is a type seen in many general practices. Using in-office techniques and a high-strength esthetic temporary material, it is possible to create a provisional restoration that meets the functional and esthetic demands of both the patient and the dentist.

**Case Study**

A 32-year-old woman presented with cosmetic concerns regarding her maxillary incisors. Diastemas were present distal to teeth Nos. 7 and 10, but the patient was most concerned with the appearance of a 10-year-old porcelain-fused-to-metal (PFM) crown on tooth No. 9. She also was unhappy with the overall color of her teeth.

To achieve the patient’s esthetic goals, the teeth were first whitened with a home-bleaching system (10% Zaris®, a). After completion of the whitening treatment, teeth Nos. 7, 8, and 10 were restored with porcelain veneers and tooth No. 9 was restored with an all-ceramic crown (IPS d.SIGN®). At the restoration appointment, all preoperative photographs were taken. Figure 1 shows the patient’s preoperative condition.

**Figure 1**—Preoperative view after night-guard bleaching. The patient was unhappy with an old PFM crown.

**Figure 2**—Flowable composite was placed on the distal aspects of teeth Nos. 7 and 10.

**Figure 3**—A preoperative impression was made with Position™ Penta™ Quick, a fast-setting VPS impression material.

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**ABSTRACT**

Although it is temporary, a provisional restoration fulfills many requirements for both the patient and the dentist. For the patient, these requirements include interim function, phonetics, and esthetics. For the dentist, the provisional restoration should offer protection of the prepared teeth and allow for the proper healing of the soft tissue during the fabrication of the final restoration. The technique and materials presented in this case study offer dentists a way to provide their patients with provisional restorations that fulfill everyone’s objectives, and instill patient confidence in the skills of the clinician.
after nightguard bleaching. To facilitate the fabrication of temporaries that would simulate the final restorations, flowable composite was added directly to the distal aspects of teeth Nos. 7 and 10 to close the existing diastemas (Figure 2).4

When restoring a patient’s anterior teeth, the importance of the provisional restoration cannot be overstated.

A preoperative impression was then made with a fast-setting vinyl polysiloxane (VPS) impression material (Position™ Penta™ Quick™) to record the existing condition of the maxillary incisors (Figure 3). This preoperative model would serve as the matrix for the patient’s temporary restorations. Using a VPS impression material for the preoperative impression serves a number of purposes. First, it creates an accurate, detailed impression of the preoperative condition. In addition, this impression material has long-term stability. This stability allows the dentist to store the preoperative impression in the event that the patient needs to have a new temporary made.5

The preoperative impression was set aside as the case was prepared. Figure 4 shows the final preparations. After the final impression (with Impregum™ Penta™,a) and the bite registration (using Ramitec™,a) were made, the temporary restoration was fabricated.

A high-strength, esthetic, automix bis-acryl temporary material (Protemp™ 3 Garant™,a) was loaded directly into the preoperative impression (Figure 5). The impression was then placed directly into the patient’s mouth. The temporary material set in approximately 1.5 minutes. Note that the impression must be removed before 2.5 minutes to prevent “lock on.” After the impression set, it was removed from the mouth (Figure 6).

The temporary was removed in one piece from the impression and placed back on the teeth (Figure 7) so it could be evaluated for fit, voids, and thin areas. A companion material, Protemp™ 3 Add-On Material, was used to fill in any voids or thin areas. Figure 8 shows the addition of the companion material to a thin area on the temporary restoration. The companion material was then light-cured for 20 seconds.

Not only does the temporary restoration help provide interim function, phonetics, and esthetics to the patient, but the patient’s confidence in the dentist’s skill is often based on satisfaction with the temporary restoration.

After this cure, the temporary was removed from the mouth. Initial trimming was accomplished with crown-and-bridge scissors (Figure 9). Figure 10 shows the initial trimming of the provisional restoration before it was taken to

![Figure 4](image1)
![Figure 5](image2)
![Figure 6](image3)

![Figure 7](image4)
![Figure 8](image5)
![Figure 9](image6)
the in-office laboratory. In the laboratory, the temporary restoration was finished to the margins using a serrated diamond disc (#946\textsuperscript{c}) (Figure 11) and a series of rubber wheels (Acrylic Temporization kit\textsuperscript{c}) (Figure 12). Figure 13 shows the four-unit temporary restoration ready for provisional cementation.

Conventional temporary cements, such as RelyX\textsuperscript{a}, TempoCem\textsuperscript{b,d}, or Temp-Bond\textsuperscript{e,f}, are excellent for posterior restorations, but in the anterior, these cements can be too opaque and can lead to an unesthetic result. A clear temporary cement is available (Temp-Bond Clear\textsuperscript{e}) that is designed for the cementation of provisional anterior crowns and veneers. Figure 14 shows the temporary restoration cemented into place using a clear, temporary cement. This temporary cement is a dual-cure material.

After the gross excess of cement is removed, the cement is light-cured (using the Elipar\textsuperscript{a} curing light\textsuperscript{a}) for 60 seconds from the facial and lingual.

At this point the restoration can be adjusted using sandpaper discs and carbide burs to create the form and contour necessary to meet esthetic, phonetic, and functional requirements. To create an optimal—and more realistic—esthetic result, light-cured resin stains can be applied. In this case, using a small-tip artist’s brush, a thin layer of light-cured resin stain (Sinfony\textsuperscript{TM} Magic stain #15\textsuperscript{a}) was applied to the appropriate areas to create the illusion of natural tooth structure (Figure 15).

Finally, the temporary material was polished to optimize the esthetic results. Because the temporary material was partially composite resin, composite polishing systems (Sof-Lex\textsuperscript{a}, Jiffy\textsuperscript{®} Polishing System\textsuperscript{f}, PoGo\textsuperscript{TM}g, Fini\textsuperscript{TM}h) could be used to create a high gloss on the restoration. Figure 16 shows the restoration being polished with a composite polishing disc. In Figure 17, note the high luster that can be obtained using a composite finishing brush (Sof-Lex\textsuperscript{TM}). Figure 18 shows the final temporary restoration at the end of the preparation appointment.

**Conclusion**

The proper fabrication of an esthetic temporary restoration offers protection to the prepared teeth, allows for the proper healing and health of the soft tissue, ensures nor-

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**Figure 10**—The temporary restoration, ready to be taken to the in-office laboratory for final finishing.

**Figure 11**—A serrated diamond disc was used to open the interproximal spaces.

**Figure 12**—A series of rubber wheels was used to finish the temporary to the margins.

**Figure 13**—The temporary restoration, ready to seat.

**Figure 14**—The temporary restoration was cemented in place using a clear, temporary cement.

**Figure 15**—A light-curable resin stain was added to the temporary restoration to maximize esthetics.
mal speech and function during the fabrication of the final restorations, and, most importantly, provides the patient with natural-looking teeth.

Using the technique and materials described in this article, dentists can quickly provide patients with a strong, esthetic provisional restoration. This will better enable the dentist to create a final restoration that meets the patient’s expectations and builds the patient’s confidence in the dentist’s esthetic abilities.

Disclosure

The author has worked as a paid consultant to numerous manufacturers, including 3M ESPE. 3M ESPE did not compensate the author for this article.

References


In the past 15 years, many new technologies, products, and materials have emerged to provide dentists more options for patient care. When properly implemented into the practice, these innovative technologies allow dentists to increase both practice production and quality of care. Some innovations are designed to be incorporated directly into the practice, and some are for use by external service providers. The technology revolution has led dentists to question how to determine which technologies are worthy of investment and will add true value to the practice.

Technology Factors

Because Levin Group is often asked for an opinion on various technologies, we have standardized our approach to technology evaluation. There are four factors that we consider when evaluating a new technology: quality, efficiency, speed, and return on investment (ROI). A technology that does not meet at least one of these four factors should probably not be added to a dental practice because it will not add true value. Certain technologies may need to qualify in more than one category to ensure a positive ROI for the practice.

Dental practice expenses have increased significantly over the past 10 years, making technology considerations much more financially significant. The expense of adding new technology—combined with insurance controls, lower fee increases, and rising practice costs—necessitate that all ROIs be evaluated carefully to avoid higher overhead and lower practice income. Considering these four factors during technology decision-making will help dentists greatly.

Factor 1—Quality

Any technology that improves the quality of patient care should be considered because it is the first obligation of every dentist. However, there may be a higher investment associated with quality. While adapting the right technology can increase quality, there is often an increase in cost. The key question is: will the increase in quality justify the increase in cost?

Factor 2—Efficiency

Technology that does not increase practice efficiency either will have a negative effect on practice systems or will slow down the overall treatment process. Inefficient technology can also increase overhead and stress.

Be aware that any technology that is referred to as “technique sensitive” should be evaluated carefully; it may not be appropriate for all dental practices. A technique-sensitive technology indicates that there will be a learning curve and some difficulty in the initial stages of providing the new service. Technique-sensitive technologies often do not work well in most practices.

Efficiency is a key factor in any technology decision because it also impacts staff usage, management processes, and practice resource use. The two key questions are: how long will it take to learn to use the new technology, and how will it affect practice systems?

Factor 3—Speed

The faster a dentist or dental team can provide diagnosis or treatment for patients, the better the outcome for the practice. Speed counts in business and dental practices are businesses. Whenever the time for a procedure can be reduced, the associated costs of that procedure are reduced and profit is increased. Speed also allows the practice to increase total production and the number of patient services. Patients like to complete treatment as quickly as possible, so a technology that improves speed will also enhance customer satisfaction. The key question is: how much faster will the technology allow the dentist or dental team to be?

Factor 4—ROI

Technology should not be purchased simply for technology’s sake. The investment can be expensive because it includes installation, maintenance, training, upgrades, insurance factors, scheduling, etc. There are many hidden costs associated with changes in the dental practice. The ROI is a key factor in decision-making.

A technology that does not provide increased ROI should be scrutinized carefully. Why would a practice increase overhead costs to provide services without maintaining a responsible profit margin? If the costs of providing the new service are higher, the practice truly has to question whether it can achieve the right ROI. The key question is: what is the ROI of the investment?

Example Case Analysis

The Lava™ All-Ceramic System by 3M ESPE is an excellent example of an advanced technology making a
significant impact on dental practices. The Lava™ All-Ceramic System is a computer-aided design/computer-aided manufacture (CAD/CAM) system used by dental laboratories to create all-ceramic prostheses, and represents a breakthrough in prosthetic dentistry.

Dental practice expenses have increased significantly over the past 10 years, making technology considerations much more financially significant.

The Lava™ All-Ceramic System focuses on creating all-ceramic crowns and bridges with excellent strength and durability. In the past, dentists were concerned about the long-term fracture levels of ceramic crown-and-bridge restorations. Our research indicates that, perhaps because of this concern, more than 80% of dentists still place porcelain-fused-to-metal (PFM) prostheses when offering crown-and-bridge services. With the technology of the Lava™ All-Ceramic System, the strength of ceramic prostheses can match those of PFM restorations. Not only can dentists have high levels of confidence concerning strength and fit, but it is also an easy process for the dental practice and laboratory.

We can evaluate the Lava™ All-Ceramic System according to the four factors outlined above. Its capability to provide superior strength and esthetics is not in question. What is being analyzed is the feasibility of this technology to meet any or all four of the factors used in technology decision-making.

First, the quality of the restorations is excellent. A breakthrough in science allows dentists to provide excellent shading, strength, and customized esthetics because of the zirconium used in the Lava™ All-Ceramic System. The end result has been considered excellent by leading clinicians and dental researchers, and the quality and esthetic attributes of both the anterior and posterior restorations are well accepted by dentists and patients.

Second, we examine efficiency. Because it is a CAD/CAM system, the Lava™ All-Ceramic System is contained at the dental laboratory. The dentist does not have to purchase any extensive equipment or change any aspect of how prosthetic dentistry is performed. This advance in technology does not have a learning curve or require training of the dentist or dental team. It is not disruptive to the practice because the dentist and dental team continue to perform procedures as they have in the past. The practice will be able to provide a superior esthetic restoration with exceptional fit and strength, capitalizing on its existing efficiencies.

Third, the automated Lava™ All-Ceramic System is more efficient than conventional procedures, which can increase speed. This gain does not impact on tooth-preparation time, but rather on the laboratory time necessary to fabricate frameworks and final restorations. Through this CAD/CAM technology, clinicians are finding that they can receive frameworks back from the laboratory in as little as 5 days. Dentists can also gain time seating final restorations using conventional cementation procedures, rather than bonding.

Fourth, the Lava™ All-Ceramic System offers excellent ROI. While the practice will continue to provide crown-and-bridge services in exactly the same way it has in the past, the Lava™ All-Ceramic System allows the dental laboratory to follow a standard set by the technology itself. With this technology, laboratories will be able to provide a level of quality control that will increase the final quality of the restorations, but also will decrease the need for remakes. The fewer remakes made, the higher practice profitability will be.

In this case, the Lava™ All-Ceramic System becomes the standard. Rather than relying on the skills of each technician, the technician relies on the standardization of the technology. Both the dental practice and the dental laboratory are ensured a higher level of quality control and a faster procedure. The team approach between the practice and the laboratory is important in providing quality patient care.

In addition, there are the fees to consider. All-ceramic dentistry with superior esthetics will have higher fees than more traditional procedures without increasing the time involved. This increases production and profitability, which leads to a positive ROI. In addition, because this new technology is incorporated into an external service provider, the investment for providing superior service is minimal.

Any technology that improves the quality of patient care should be considered because it is the first obligation of every dentist.

Conclusion

Technological advances are often expensive to incorporate into the dental practice in terms of both time and cost. Fortunately, not all of them have significant upfront costs. Adapting new technologies should be based on the value they add to the practice, how they help the team to provide excellent dental care, and their commensurate profitability. To achieve these goals, new technologies need to improve practice efficiency and productivity, and enhance the speed and consistency of care. The Lava™ All-Ceramic System is an excellent example of a technological breakthrough that supports dental excellence and makes great business sense.
Rely X™ Unicem self-adhesive universal resin cement is strong, versatile, easy to use, and has been proven successful by clinical tests. Specifically formulated to be self-adherent and moisture tolerant, the cement eliminates the need for separate etching, priming, and bonding steps. The unidose capsule provides reproducible mixing with direct delivery into the restoration, and is available in two sizes—for single-unit restorations and bridge work up to 3 to 5 units.

Sheer Bond Strength (MPa) of Cements to Zirconia (Abstract 3241)

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Objective: The study was designed to evaluate the shear bond strength of various cements (in their recommended mode of curing) to zirconia all-ceramic (Lava™ All-Ceramic System from 3M ESPE). Samples were tested at 30 minutes and after 14 days followed by thermocycling.

Results: RelyX™ Unicem Self-Adhesive Universal Resin Cement from 3M ESPE showed high bond strengths to the ceramic substrate. Results were comparable to or higher than other cement systems.

Linear Expansion Study

Results from internal 3M ESPE tests

Objective: The purpose of the study was to determine the amount of linear expansion of cements stored in water after one month. This is important information to have to feel comfortable with using the cements under all-ceramic restorations.

Results: RelyX™ Unicem Self-Adhesive Universal Resin Cement from 3M ESPE showed low linear expansion after being stored in water. The expansion is considerably lower than resin-modified glass ionomer cements and is comparable to other resin cements. RelyX™ Unicem cement will work well under all-ceramic restorations without risk of fracture from expansion.
Dental Learning Systems provides 2 hours of Continuing Education credit for those who wish to document their continuing education endeavors. Participants are urged to contact their state registry boards for special CE requirements. To receive credit, complete the enclosed answer sheet and mail it, along with a check for $20, to Dental Learning Systems, 405 Glenn Drive, Suite 4, Sterling, VA 20164-4432, for processing. You may also phone your answers in to 888-596-4605, or fax them to 703-404-1801. Participants with a score of at least 70% will receive a certificate documenting completion of the course. For more information, call 800-926-7636, ext 180.

Program #: D507

Dr. Trinkner, Mr. Roberts

1. When the technology was first introduced, the only way to prevent fractures in the connector area of all-ceramic fixed prostheses was to overcontour the connectors to a size of approximately:
   a. 8 mm².
   b. 12 mm².
   c. 16 mm².
   d. 20 mm².

4. Which recently introduced ceramics have demonstrated suitability as a framework for posterior metal-free restorations?
   a. polycrystalline ceramic
   b. glass ceramic
   c. infiltrated ceramic
   d. high noble ceramic

5. The framework for a Lava™ restoration requires a wall thickness of:
   a. 0.1 mm.
   b. 0.5 mm.
   c. 1 mm.
   d. 1.3 mm.

6. The bridge dies and edentulous area are scanned with an optical scanning system that allows for the virtual design of the framework by measuring the:
   a. tooth preparations.
   b. antaglio surfaces.
   c. opposing cast.
   d. all of the above

7. The Lava™ frame zirconia is available in how many shades?
   a. 3
   b. 8
   c. 16
   d. 20

8. To compensate for the 20% shrinkage that occurs during sintering, what is done to the virtual bridge dimensions in the CAD process?
   a. They are decreased by 20%.
   b. They are expanded by 20%.
   c. They are decreased by 15%.
   d. They are expanded by 15%.

9. The Lava™ Ceram feldspathic veneering ceramic is available in how many Vita® shades?
   a. 3
   b. 7
   c. 16
   d. 20

10. Use of which type of cement is contraindicated with the Lava™ system?
   a. self-etching
   b. glass ionomer
   c. phosphoric
   d. self-adhering

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I trust 3M ESPE products and use them all the time. When I read about the Lava™ All-Ceramic System, its three-year clinical history, and that it offered eight shades for a truly natural tooth appearance, I was intrigued. My lab said they were getting more and more requests for the Lava All-Ceramic System. So I prescribed it for my next restoration and loved the results. The esthetics were superb. Fit was excellent. The patient was ecstatic. What more could you ask for?

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