Selecting Ideal Materials for Full-Mouth Rehabilitation

Authored by Mike Malone, DDS

Upon successful completion of this CE activity, 2 CE credit hours may be awarded

Opinions expressed by CE authors are their own and may not reflect those of Dentistry Today. Mention of specific product names does not infer endorsement by Dentistry Today. Information contained in CE articles and courses is not a substitute for sound clinical judgment and accepted standards of care. Participants are urged to contact their state dental boards for continuing education requirements.
INTRODUCTION

Patients may require full-mouth rehabilitation to correct a variety of conditions and problems, including excessive wear on the occlusal surfaces of natural teeth, full or partial edentulism, and decay. An in vivo study determined that natural enamel wears, on average, approximately 30 μm/year, or about 0.3 mm in 10 years. This natural wear, combined with additional causes of erosion and abrasion, can lead to such problems as pulpal pathology, occlusal disharmony, impaired function, and aesthetic disfigurement. Decreased occlusal vertical dimension can result from incisal and occlusal wear when opposing teeth move against one another in a vertical direction. Reduced maximum bite force from malocclusion or other problems can inhibit masticatory performance, reducing the patient’s quality of life. Full-mouth rehabilitation, therefore, may correct the effects of extensive damage and wear, restoring function, occlusion, and aesthetics.

Full-mouth rehabilitation treatment, however, can present a variety of challenges. Extensive treatment planning, possible surgery, provisionalization, and placement of the final restorations can span several months. Due to the lengthy time frame often required, patient compliance can become problematic. Discrepancies between expectations and outcomes (aesthetics) can lengthen the provisionalization process.

Aesthetics, strength, placement, and preparation all influence material selection for each restoration. Due to the variety of problems and conditions that necessitate full-mouth rehabilitation, most treatments require the use of multiple materials for fabricating all of the final restorations. Because posterior restorations have different requirements than anterior veneers, treatment plans should address individual restorative needs. Maximizing the benefits and indications of different materials can help to achieve oral health, as well as
durable and long-lasting restorations.

Treatment planning full-mouth rehabilitation begins with a comprehensive assessment, photographs, and impressions, among other diagnostic tools. Provisional restorations then provide further insight into full-mouth treatment requirements and remain a critical element in the restorative process. Typically worn for between 6 to 12 weeks, provisional restorations enable the dentist and patient to evaluate biological, aesthetic, and mechanical aspects of a proposed treatment. Any necessary adjustments can then be made prior to final restoration fabrication.

In addition to providing a template for the final restorations, provisional restorations protect prepared teeth by enclosing exposed dentinal tubules and preventing microleakage contamination of endodontically treated teeth. Provisional restorations also preserve marginal integrity and help ensure the health of the surrounding gingival tissues.

Considerations for Selecting Materials

Full-mouth rehabilitation requirements differ depending on the condition of the patient’s teeth. A combination of materials and adhesives ensures that full-mouth rehabilitation is customized and designed to treat the patient’s conditions, creating a comfortable, functional, and highly aesthetic smile.

First introduced for medical use in the 1960s, zirconium dioxide (ZRO₂) (also commonly called zirconia) is a white crystalline powder originating from the naturally occurring metal zirconium. It wasn’t until the 1990s that zirconia was first used in dentistry as a core material for endodontic posts. The high flexural strength of zirconia has been greatly researched and established. An acceptable alternative to PFM restorations, zirconia has demonstrated success as a framework material for posterior bridges.

Since the 1990s, zirconia-based ceramic materials have become more widely used throughout dentistry, partially
Selecting Ideal Materials for Full-Mouth Rehabilitation

Due to zirconia's toughening capabilities, as CAD/CAM technology developed, it became possible to fabricate large and complex zirconia restorations with high dimensional accuracy. The CAD/CAM-generated zirconia bridges have also been shown to be an acceptable alternative to PFM restorations.

Recent material developments (such as IPS e.max ZirCAD [Ivoclar Vivadent]) combine the strength of zirconia and the aesthetics of accurate and detailed fabrication for greater aesthetic control and full-mouth rehabilitation options. These zirconia CAD blocks are typically yttrium-stabilized, to ensure a tetragonal structure at room temperature, and to improve the toughening effect. Suitable for indications requiring high strength and longevity, zirconia-based frameworks can be used for long-span bridges in both posterior and anterior regions.

A fluorapatite glass-ceramic ingot (such as IPS e.max ZirPress [Ivoclar Vivadent]) can be processed and pressed onto a zirconium oxide core (such as IPS e.max ZirCAD). The fluorapatite crystals, available in various sizes, enable the realization of desired translucency, opalescence, and brightness. This material's ability to mask the less translucent zirconium oxide framework contributes to a highly detailed and aesthetic ceramic restoration. The press-over technique for applying the aesthetic veneering ceramic to the zirconia substructures increases accuracy of fit, and combined with CAD/CAM technology, represents the optimal processing of zirconium oxide-supported restoration. In this way, the high-strength zirconia substructure becomes a strong foundation for an enhanced and more natural-looking restoration. Indicated for single-tooth restorations, bridges in the anterior and posterior regions, implant superstructures, inlay-retained bridges, and gingiva portions, the zirconia press-over technique is quick, easy, efficient, and offers high strength and aesthetics.

However, alternatives to zirconia-based materials are necessary for areas that require higher aesthetics along with adequate and proven strength. Lithium disilicate (IPS
Selecting Ideal Materials for Full-Mouth Rehabilitation

**CASE REPORT**

**Diagnosis and Treatment Planning**

A female patient presented with compromised aesthetics, tooth decay, failed PFM crowns, gaps, and spacing (Figures 1 to 3). The patient's chief complaint was her unattractive smile due to broken and decayed front teeth. Her periodontal health was acceptable. A treatment plan was developed for full-mouth rehabilitation to restore function and aesthetics. It encompassed restoration of the maxillary arch with layered zirconia full crowns (IPS e.max ZirPress fluorapatite glass-ceramic pressed over IPS e.max ZirCAD zirconia copings). Restoration of the mandibular arch included layered zirconia crown and bridge restorations (again, using IPS e.max ZirPress and IPS e.max ZirCAD) on the posterior teeth, and lithium disilicate veneer restorations (IPS e.max) on anterior teeth Nos. 21 to 27. The patient agreed to return after the initial evaluation and provisionalization for adjustments and final restorations.

**Clinical Protocol**

All teeth were prepared and built up for the planned zirconia restorations (Figures 4 and 5). Tooth No. 19 was not restorable, so it was extracted. The provisional restorative material (Radica [Dentsply Sirona Ceramco]) was selected based on its durable nature, high wear-resistance, and lifelike aesthetics. The Radica provisional restorations were fabricated indirectly and finished on the Snapstone models (Whip Mix) (Figures 6 and 7). The provisional restorations were then tried in the patient's mouth, removed, glazed with Radica Glaze (Dentsply Sirona Ceramco), and cemented with spot-etched resin cement (Insure [Cosmedent]) (Figures 8 and 9). The occlusion was verified, and any necessary adjustments were made (Figure 10). Although the patient approved the provisional, due to personal matters, she did not return to complete the treatment for a long time. After 5 years, the patient returned for the final restorations. She presented with several missing provisional and excessive decay (Figure 11). All of the decay was removed, and the teeth were re-prepared and re-impressed without complications (Figure 12). The restoration material shade was selected (HTBL3 [Ivoclar Vivadent]), and the restorations were ordered for laboratory fabrication.

**Layered Zirconia Crowns and Bridges**

The patient returned, the provisional were removed, and the preparations were cleaned. The final layered zirconia crowns and bridges were tried in to ensure proper fit, comfort, and occlusion. After the restorations were removed, they were rinsed with water and air-dried. The entire bonding surface was then covered with a cleaning paste (Ivoclean [Ivoclar Vivadent])
Selecting Ideal Materials for Full-Mouth Rehabilitation

using a microbrush. The paste was allowed to react for 20 seconds, and then simply rinsed and air-dried.

A universal primer (Monobond Plus [Ivoclar Vivadent]) was applied to the surface of the restorations, allowed to react for 60 seconds, and then air dried. An adhesive primer (Multilink Primer A/B [Ivoclar Vivadent]) was then mixed in a 1:1 ratio and applied to the entire bonding surface using a microbrush and scrubbed for 30 seconds (Figure 13). Any excess was dispersed with blown air.

Luting composite (Multilink Automix [Ivoclar Vivadent]) was dispensed into the restorations, after which they were seated in the patient’s mouth (Figure 14). Each quarter surface was light-cured for one to 2 seconds, and any excess cement was removed. The buccal and lingual margins were then light-cured for 20 seconds each.

**Lithium Disilicate Veneers**

The anterior lithium disilicate (e.max) veneer restorations were tried in to confirm fit and aesthetics. The anterior teeth were then isolated using the rubber dam technique, rinsed with water, and dried with oil-free air. The surfaces of the veneers were also rinsed with water and then air-dried.

A phosphoric acid-etching solution (Total Etch [Ivoclar Vivadent]) was applied to the preparations to condition the enamel and dentin surfaces. It was allowed to react for 15 to 30 seconds on the enamel and 10 to 15 seconds on the dentin (Figure 15). The preparations were thoroughly rinsed with copious amounts of water for at least 5 seconds. Excess water was then removed, leaving the dentin surface slightly but visibly moist for wet bonding. A thick layer of dual-cure adhesive (ExciTE F [Ivoclar Vivadent]) (designed to be used with a total-etch technique) was then applied to the enamel and dentin, and gently scrubbed in for at least 10 seconds. Excess was blown to a thin film with a weak stream of air. The adhesive was then light-cured for 10 seconds at a light intensity of more than 500 mW/cm².

Luting composite (Variolink Veneer [Ivoclar Vivadent]) was placed directly on the inner surfaces of the veneer restorations using a brush. The restorations were seated and held with light and constant pressure. While still maintaining pressure, the restorations were light-cured in a small area for 5 seconds, after which excess cement was removed using a scaler.

The restorations’ margins were then covered with glycerin gel (Liquid-Strip [Ivoclar Vivadent]) to avoid oxygen inhibition. The restorations were light-cured for 30 seconds.

The excess cement was removed, and finishing and polishing strips were applied to the proximal regions. The occlusion was verified and adjusted as necessary (Figures 17 and 18). Patient and clinician were pleased with the full-mouth rehabilitation and final results (Figures 19 and 20).

**CLOSING COMMENTS**

Although this case took more than 5 years to complete, the full-mouth rehabilitation transformed a decayed, unhealthy, and unaesthetic condition into a healthy, functional, and highly aesthetic smile. Because of the variety of problems associated with patients who need full-mouth rehabilitation, understanding the various materials and their indications allows clinicians to provide restorations with high aesthetics and strength.

As this case report demonstrates, the various conditions and situations involved in full-mouth rehabilitation demand a variety of materials and adhesives to customize the design and function. An understanding for condition requirements and materials as well as common problems associated with full-mouth rehabilitation ensures the likelihood of a successful full-mouth treatment.
Selecting Ideal Materials for Full-Mouth Rehabilitation

Acknowledgment

The restorations shown in the case presented were fabricated by Gail Vanderwall with Trinident Laboratory in Metarie, La.

References

Selecting Ideal Materials for Full-Mouth Rehabilitation

POST EXAMINATION INFORMATION

To receive continuing education credit for participation in this educational activity you must complete the program post examination and receive a score of 70% or better.

Traditional Completion Option:
You may fax or mail your answers with payment to Dentistry Today (see Traditional Completion Information on following page). All information requested must be provided in order to process the program for credit. Be sure to complete your “Payment,” “Personal Certification Information,” “Answers,” and “Evaluation” forms. Your exam will be graded within 72 hours of receipt. Upon successful completion of the post-exam (70% or higher), a letter of completion will be mailed to the address provided.

Online Completion Option:
Use this page to review the questions and mark your answers. Return to dentalcetoday.com and sign in. If you have not previously purchased the program, select it from the “Online Courses” listing and complete the online purchase process. Once purchased, the program will be added to your User History page where a Take Exam link will be provided directly across from the program title. Select the Take Exam link, complete all the program questions and Submit your answers. An immediate grade report will be provided. Upon receiving a passing grade, complete the online evaluation form. Upon submitting the form, your Letter of Completion will be provided immediately for printing.

General Program Information:
Online users may log in to dentalcetoday.com any time in the future to access previously purchased programs and view or print letters of completion and results.

POST EXAMINATION QUESTIONS

1. An in vivo study determined that natural enamel wears, on average, approximately 30 μm/year, or about 0.3 mm in 10 years.
   a. True   b. False

2. Decreased occlusal vertical dimension can result from incisal and occlusal wear when opposing teeth move against one another in a vertical direction.
   a. True   b. False

3. Although there are a variety of problems and conditions that necessitate full-mouth rehabilitation, very few treatments require the use of multiple materials for fabricating all of the final restorations.
   a. True   b. False

4. In addition to providing a template for the final restorations, provisional restorations protect prepared teeth by enclosing exposed dentinal tubules and preventing microleakage contamination of endodontically treated teeth.
   a. True   b. False

5. An acceptable alternative to PFM restorations, zirconia has demonstrated success in crown fabrication but not as a framework material for posterior bridges.
   a. True   b. False

6. Indirect lithium disilicate veneers require a light-cured adhesive resin cement along with proper application of silane (or a universal primer) to the intaglio surfaces.
   a. True   b. False

7. In the case presented, a universal primer was applied to the surface of the restorations, allowed to react for 60 seconds, and then air-dried; in addition, silane was applied.
   a. True   b. False

8. After all light curing was completed, the restorations’ margins were then covered with glycerin gel to avoid oxygen inhibition.
   a. True   b. False
Selecting Ideal Materials for Full-Mouth Rehabilitation

PROGRAM COMPLETION INFORMATION
If you wish to purchase and complete this activity traditionally (mail or fax) rather than online, you must provide the information requested below. Please be sure to select your answers carefully and complete the evaluation information. To receive credit you must answer at least 6 of the 8 questions correctly.

Complete online at: dentalctoday.com

TRADITIONAL COMPLETION INFORMATION:
Mail or fax this completed form with payment to:
Dentistry Today
Department of Continuing Education
100 Passaic Avenue
Fairfield, NJ 07004
Fax: 973-882-3622

PAYMENT & CREDIT INFORMATION:
Examination Fee: $40.00   Credit Hours: 2
Note: There is a $10 surcharge to process a check drawn on any bank other than a US bank. Should you have additional questions, please contact us at (973) 882-4700.

☐ I have enclosed a check or money order.
☐ I am using a credit card.
My credit card information is provided below.
☐ American Express ☐ Visa ☐ MC ☐ Discover
Please provide the following (please print clearly):

Exact Name on Credit Card

Credit Card #       Expiration Date

Signature

PERSONAL CERTIFICATION INFORMATION:

Last Name (PLEASE PRINT CLEARLY OR TYPE)
First Name
Profession / Credentials License Number
Street Address
Suite or Apartment Number
City State Zip Code
Daytime Telephone Number With Area Code
Fax Number With Area Code
E-mail Address

ANSWER FORM: VOLUME 35 NO. 4 PAGE 110
Please check the correct box for each question below.

1. ☐ a. True. ☐ b. False
2. ☐ a. True. ☐ b. False
3. ☐ a. True. ☐ b. False
4. ☐ a. True. ☐ b. False
5. ☐ a. True. ☐ b. False
6. ☐ a. True. ☐ b. False
7. ☐ a. True. ☐ b. False
8. ☐ a. True. ☐ b. False

PROGRAM EVALUATION FORM
Please complete the following activity evaluation questions.
Rating Scale: Excellent = 5 and Poor = 0
Course objectives were achieved. _________
Content was useful and benefited your clinical practice. _________
Review questions were clear and relevant to the editorial. _________
Illustrations and photographs were clear and relevant. _________
Written presentation was informative and concise. _________
How much time did you spend reading the activity and completing the test? _________
What aspect of this course was most helpful and why? _________

What topics interest you for future Dentistry Today CE courses?

This CE activity was not developed in accordance with AGD PACE or ADA CERP standards. CEUs for this activity will not be accepted by the AGD for MAGD/FAGD credit.