Are Zirconia Crowns as Reliable as PFMs?

Reliability of Metalloceramic and Zirconia-Based Ceramic Crowns.
Silva NRFA, Bonfante EA, et al:

J Dent Res 2010; 89 (10): 1051-1056

PFM crowns were more durable than zirconia crowns in this laboratory study.

**Objective:** To test the hypothesis that metal-ceramic restorations are more reliable than 2 yttria-tetragonal zirconia polycrystals (Y-TZP) all-ceramic crown systems under in vitro mouth-motion fatigue conditions.

**Methods:** A 3-D mandibular molar crown preparation prototype was modeled using CAD software, with 1.5-mm reduction of axial walls and 2.0-mm reduction of the occlusal surface. The CAD file was imported into a milling machine that generated plastic models with those dimensions. These were placed into a dental articulator. From impressions of the "teeth," crowns were made with the following materials as cores: LAVA zirconia, CERCON zirconia, or Pd-Ag alloy. All of the copings were veneered with hand-layered porcelain using manufacturer-recommend materials and instructions. Thickness of the veneering porcelain was standardized. The crowns were cemented to composite dies using RelyX Unicem self-adhesive resin cement under a standard applied load. Three crowns of each group were subjected to single load to fracture tests using an Instron universal testing machine. The remaining specimens were subjected to a fatigue testing protocol based on the original failure loads and using an electrodynamic fatigue testing machine. Specimens were observed microscopically at the completion of each fatigue step to evaluate for crack initiation or progression. Failure criteria included veneer fracture with or without core exposure and bulk fracture.

**Results:** The single load-to-failure mean value was 2002 N for the metal control group, 1220 N for LAVA, and 1140 N for CERCON. A Weibull statistical analysis showed that the fatigue reliability of the control group was greater than that of the 2 zirconia groups. Failures (chipping or fractures at the indentation site) in the zirconia groups were confined to the veneering porcelain. Failures in the control group involved exposure of the metal coping.

**Conclusions:** Metal-based ceramic crowns were more reliable than zirconia-core crowns in this laboratory fatigue study.

**Reviewer's Comments:** Failures in this study were very similar to those observed clinically, which provides some evidence for its clinical relevance. Zirconia crowns are becoming more and more popular, but this study and clinical experience suggest that porcelain fused to metal (PFM) crowns still have, and deserve, an important role in restorative dentistry. (Reviewer-Edward J. Swift, Jr, DMD, MS).

Keywords: Zirconia, Fatigue, Crowns, Metal-Ceramic

Print Tag: Refer to original journal article
Self-Etching Adhesive Clearfil SE Shows Long-Term Success

Eight-Year Clinical Evaluation of a 2-Step Self-Etch Adhesive With and Without Selective Enamel Etching.

Peumans M, De Munck J, et al:

Dent Mater 2010; 26 (December): 1176-1184

Selective enamel etching may slightly improve marginal integrity of composite restorations placed with Clearfil SE adhesive.

Background: The self-etching, no-rinse adhesives have gained significant popularity, in part due to their simplified application protocol. Among these materials, Clearfil SE (Kuraray) is considered the gold standard relative to its dentin bond. This 2-step "mild" self-etch system has performed well in many studies. One of the concerns regarding these materials is their less robust etching of enamel. Some have suggested adding the step of selective etching of enamel with phosphoric acid prior to using these materials.

Objective: To evaluate the long-term performance of the self-etching adhesive, Clearfil SE, in non-carious cervical lesions with and without prior selective enamel etching.

Design: Randomized, clinical trial.

Participants/Methods: 29 patients with 2 or 4 non-carious cervical lesions were enrolled in the study. The 100 lesions in this study were restored randomly with either application of Clearfil SE according to manufacturer’s instructions or with selective acid-etching of the enamel margins with 40% phosphoric acid before adhesive application. All lesions were restored with resin composite, Clearfil AP-X (Kuraray). The restorations were examined after 8 years of clinical service relative to restoration retention, marginal integrity, marginal discoloration, secondary caries, tooth vitality, and postoperative sensitivity. The evaluators were blinded to the adhesive used. A restoration was deemed a clinical failure if the restoration was lost, had severe marginal defect, or had discoloration that necessitated replacement or repair.

Results: The recall rate was 76% due to reasons other than restoration problems. The clinical success rate was 97% in both groups, with one restoration from each group replaced due to loss of retention (one at 5 years, one at 8 years). Marginal discoloration was significantly higher at the enamel margin in the nonetch group. In addition, the incidence of small marginal defects was greater in the nonetch group. Otherwise, there were no statistically different findings in the other parameters.

Conclusions: Clearfil SE demonstrated 97% retention and clinical success after 8 years of service. A small improvement in small marginal defects and marginal discoloration was observed in the group that was subjected to selective enamel etching before the adhesive application.

Reviewer’s Comments: This study investigated only one adhesive agent; therefore, the results cannot be applied to others in this class. At the very least, this study demonstrates the clinical effectiveness of Clearfil SE, with or without selective etching of the enamel. The noncarious lesion may not be the best model for evaluating enamel bond longevity as it has very small enamel margins and is primarily a dentin cavity. The class V restoration is also not subject to direct occlusal load that may stress the enamel margins. That being said, selectively etching the enamel had some positive effect on the marginal discoloration and fewer small marginal defects. (Reviewer-Daniel E. Wilson, DDS).

Keywords: Self-Etching Adhesive, Selective Enamel Etching, Longevity

Print Tag: Refer to original journal article
The new Spectra system uses fluorescence of the lesions for diagnosis.

**Background:** For more than a decade, sensitive, noninvasive caries detection devices and methods have been available to identify caries lesions. Emission spectra of carious lesions are shifted toward longer wavelengths (red shift) compared to the spectra of sound enamel that fluoresces green. The red shift is highest for dark brown spot lesions and lowest for white spot lesions. Using this effect allows determination of affected tooth structure to be made for both pits and fissures and smooth surfaces. The detection of caries at restoration margins with current technology (DIAGNOdent by Kavo) requires penetration of a laser into the tooth structure to detect demineralization. Currently, this is not effective in the early stages. The new Spectra system (Air Techniques) uses the fluorescence of porphyrins associated with caries to enable detection of marginal caries. **Description of Technique:** Spectra uses a color visual system with software analysis to provide visual representation of deteriorating tooth structure. Its LEDs project high-energy blue light with a wavelength that stimulates bacteria to fluoresce red and healthy enamel to fluoresce green. Porphyrins that grow in bacterial concentration areas are responsible for this phenomenon. Spectra is similar in appearance to an intra-oral camera but has 6 LEDs emitting 405 nm of blue-violet light. It has a USB connection to a computer and a disposable sleeve for sterility. The system is self-calibrating. Plaque and tartar interfere with accuracy, so they must be removed before the reading. The camera spacer is placed in contact with the tooth to be analyzed. The image is frozen on the screen and then analyzed. Either the Visix proprietary software supplied with the system or a twain driver allowing direct acquisition into other practice management software can be used. The result reveals caries in a graphic representation. The denser the bacterial colonization, the more intense the red fluorescence. The software estimates both the extent and depth of the caries. Changes in depth and extent of the lesion can be monitored at recalls because the image can be stored for future reference. Effectiveness of remineralization efforts can be calculated. Identification of remaining caries during restorative procedures is possible. Spectra can also be used effectively for patient education. A series of photographs demonstrate the use of Spectra.

**Conclusions:** Spectra shows patients the presence of bacteria and their corresponding oral hygiene status to provide motivation. This tool aids in diagnosis and patient communication, especially related to pit and fissure caries.

**Reviewer’s Comments:** This system works differently than does the DIAGNOdent system that has been in use for more than a decade. It appears to have several advantages over other methods of caries identification, such as caries detection dyes and the DIAGNOdent we have been using. More research is needed to determine exactly how accurate it really is. (Reviewer-Thomas G. Berry, DDS, MA).

Keywords: Caries Detection, Fluorescent Technology

Print Tag: Refer to original journal article
Objective: To compare the long-term clinical performance of large Class II amalgam and composite restorations in relation to the caries risk of individual patients.

Design: A practice-based retrospective study.

Methods: Patient records were gathered from a Dutch general practice owned by the lead author of the study. This study involved regular patients who attended recall appointments during a 6-month period in 2008 and who had been attending recalls for at least 5 years. At the latest recall, the dentist assessed the caries risk status of the patient based on the occurrence of new lesions over the entire period. Those who developed new lesions were considered "high risk." All other patients were classified as "low risk." From the patient records, data were collected on all composite and amalgam Class II restorations involving ≥3 surfaces and placed over a 20-year period. Composite restorations (including a glass ionomer liner) were excluded from the study. Restorations were considered failures when they were repaired, replaced, or scheduled for replacement or when a tooth was extracted. It should be noted that almost all large restorations placed in roughly the first half of the time period were done in amalgam; later on, no amalgam was used in the practice. A Kaplan-Meier statistical analysis was used to estimate survival probabilities.

Results: The authors evaluated 1949 large Class II restorations placed over a 20-year period in 273 patients. Approximately 1200 of these restorations were amalgams, and the rest were composite, with similar distributions between premolars and molars for each material. Roughly 80% of patients were classified as high risk and 20% as low risk. Dispersalloy (Dentsply) was the only amalgam used, and all of the composite restorations were placed using a 3-step etch-and-rinse adhesive system. Restorations placed in the high-risk group had a significantly higher failure rate than those in the low-risk group. For the combined population and the low-risk patients, composite had a higher survival rate than amalgam. For 3-surface restorations (but not those involving 4 or 5 surfaces) in the high-risk group, amalgam had better results.

Conclusions: The caries risk of the patient plays a significant role in the survival of restorations.

Reviewer's Comments: It is always difficult to extrapolate results obtained by a single clinician, but, with that said, this study tends to support the use of composite even for larger posterior restorations. (Reviewer-Edward J. Swift, Jr, DMD, MS).

Keywords: Posterior Composites, Performance, Amalgam

Print Tag: Refer to original journal article
Debonding is the main cause of failure of fiber dowels.

Objective: To review the clinical failures of dowel/core/crown restorations luted with resin cements.

Methods: PubMed was searched, as were references from the selected articles. Studies with follow-up of >2 years, with documented mode of restoration failure, and with at least one group with >50 restorations placed were included. Teeth restored with resin crowns were not included.

Results: 15 articles fulfilled the inclusion criteria. Of these, 6 studies tested glass fiber dowels, 6 tested carbon fiber dowels, 3 tested quartz fiber dowels, 1 tested zirconium dowels, and another tested polyethylene fiber dowels. There was no report on metal dowels cemented with resin cements. Failures Rates: Overall failure rates ranged from 0% to 30%. A mean failure rate of 6% was obtained when the studies were pooled. The 2 most reported failure modes were debonding of the dowel and endodontic lesions. Effect of Dowel: Debonding was the most common failure for glass fiber dowels (49%), and endodontic lesions were the most common failure for carbon (29%) and quartz (26%) fiber dowels. Dowel Debonding: Debonding of the dowel accounted for 37% of the failures reported. Based on the results, there was a 2.3% chance that a given restoration would fail due to debonding. Endodontic Lesions: 69 failures due to endodontic lesions were recorded in 2770 teeth in 11 studies (2.5%). However, the criteria to define endodontic lesion failures were not standardized among the studies. Some studies counted asymptomatic periapical lesions as failures, while others excluded them. Crown Dislodgement: This failure mode accounted for 11% of the total failures. The majority of these failures (19 of 20) occurred in 2 studies of the same research group. These failures seem to have occurred (as the authors of those studies reported) along with partial or total fracture of the abutments and in teeth with little remaining tooth structure and heavy occlusion. Dowel Breakage: Breakage was the main failure in a study that tested Ribbond dowels. Otherwise, it accounted for 1% of the total failures. Root Fracture: Fractures were reported in 3 studies for a total of 3% of the reported failures.

Conclusions: Loss of retention and endodontic problems are the major reasons for failure of fiber dowels luted with resin cements.

Reviewer’s Comments: Prospective long-term studies are needed to determine the real advantage of using fiber dowels cemented with resin cements in place of conventional cast metal dowels cemented with zinc phosphate. Aside from laboratory studies that favor fiber dowels, limited valuable clinical information is available. (Reviewer-Ricardo Walter, DDS, MS).

Keywords: Dowel Debonding, Endodontic Lesions, Post Debonding, Post Failure, Dowel Failure

Print Tag: Refer to original journal article
Nano-hybrids may not be better esthetically than micro-hybrids.

**Background:** Fluorescence of teeth and dental materials depends on the duration of ultraviolet light exposure occurring under natural daylight or artificial light. Fluorescence of composites is achieved by incorporation of luminescent elements such as europium, cerium, and ytterbium (rare earths).

**Objective:** To compare optical integration, including fluorescence of the natural tooth, to 3 resin-based materials.

**Methods:** 10 freshly extracted and intact teeth were cleaned, polished with pumice, and stored in distilled water. A reflectance spectrophotometer was used for color measurements. Color matching was also performed using Vita Classic shade guides. Specimens were photographed for comparisons. Mesioincisal preparations simulating fracture were made with a mini-chamfer on the facial surface. Restorative materials used were Grandio and Amaris (bis-GMA/TEGDMA matrix) and an experimental ormocer (ORM; an alkoxysilane-based matrix). Grandio used 1 or 2 shaded materials while Amaris consisted of dentin, enamel, and effect materials that were interposed between enamel and dentin layers. Materials were placed without bonding so each restoration could be removed without damage to the tooth. A layering technique was used to place each restoration. A thin layer of low-viscosity glazing resin (Easy Glaze, VOCO) was placed over the surface. Specimens were then stored in distilled water. After 2 weeks, color measurements with a spectrophotometer were again made against white and black backgrounds. Ten evaluators compared restorations using digital photographs.

**Results:** Amaris demonstrated the highest optical integration and fluorescence, followed by Grandio, although no significant differences were noted in color among the 3 restorative materials. ORM had the worst optical integration and fluorescence. The use of Easy Glaze may have influenced fluorescence. All 3 materials demonstrated greater fluorescence than tooth structure. Amaris displayed fluorescence more similar to tooth structure than did Grandio and ORM.

**Conclusions:** Various lighting conditions and direct comparison with remaining enamel/dentin revealed significant differences among materials. Micro-filled hybrid resulted in better optical integration and fluorescence than the nano-filled hybrid composite. Alkoxysilane-based matrix ormocer achieved the worst optical integration. Further investigations of the influence of resin matrix and filler composition on resin-based materials are needed.

**Reviewer's Comments:** Restorative material's ability to fluoresce is integral to its ability to resemble the tooth structure. Although the nano-hybrids have many very desirable characteristics, they may not prove to be superior esthetically. It will be interesting to see what future studies tell us about the characteristics of newer materials. It could greatly influence our choice of tooth-colored restorative materials. (Reviewer-Thomas G. Berry, DDS, MA).

**Keywords:** Fluorescence, Composite Resins, Spectrophotometric Analysis
Objective: To measure in vivo temperature changes during a typical restorative sequence when placing a light-activated posterior composite restoration.

Methods: A single adult male patient who needed multiple posterior restorations was treated in 3 separate visits. At each visit, one posterior tooth requiring a Class I or Class II restoration was prepared. Pulpal floor depth was approximately 2 mm in each case. A custom temperature measuring probe was designed and fabricated to simultaneously measure temperature at the top composite surface and the pulpal floor. A hybrid composite was used to restore the preparations and was used at room temperature or was pre-heated in a Calset composite warmer. The device was set to 60°C, but previous work has shown that the composite typically reached a temperature of only 55°C. At each patient visit, temperature readings were made at the pulpal floor following tooth preparation, after etching and rinsing, after placement and curing of OptiBond FL, and during placement of either room temperature or heated composite. For the latter, the top surface temperature was also measured. This composite was not cured. Rather, it was removed, the preparation was extended to final form, and the restoration was inserted.

Results: Pulpal floor temperatures after preparation and etching were <30°C and increased slightly after curing of the adhesive. With the room temperature composite, the pulpal floor temperature remained constant at approximately 30°C. Using the pre-heated composite, the pulpal floor temperature and the composite temperature both approached 40°C.

Conclusions: In vivo placement of pre-heated composite resin increased temperatures within a preparation by 6°C to 8°C over room temperature.

Reviewer's Comments: This is an interesting study if, for no other reason, than its unique experimental design using a live patient. Personally, I would like to see the effects of light-curing under similar conditions, but, unfortunately, that was not part of this particular study. Regardless, this study provides some good information for clinicians who use the Calset composite warmer to pre-heat composite. Pre-heating decreases the viscosity of a composite, making it easier to flow into a preparation. For anyone who was concerned about the potential for the heated composite to harm the pulp, this study's findings are reassuring – the tooth temperature increased only slightly. (Reviewer-Erwood J. Swift, Jr, DMD, MS).

Keywords: Composite Heating, Restorations

Print Tag: Refer to original journal article
All dentists should take responsibility towards reducing hospital-based emergency department charges in the United States.

**Background:** Pulpal-related diseases are known to be the most common cause of hospital-based emergency visits among nontraumatic pediatric patients. Complications originating from this condition include cellulitis and can lead to mortality. Previous studies suggest that providing emergency dental care in a dental office is less expensive, more appropriate, and favored by patients.

**Objective:** To assess the prevalence of hospital-based emergency visits and to estimate the associated hospital charges. Characteristics of the patients were also identified.

**Methods:** The 2006 database of the Nationwide Emergency Department Sample (NEDS) was used. The NEDS is the largest all-payer ED database. Therefore, samples from NEDS can be used to calculate national estimates of hospital-based ED visits in the United States. Among the variables included were age, gender, diagnosis code, procedure performed, insurance status, and household income.

**Results:** 403,149 hospital-based ED visits were credited to pulp and periapical disease in the United States in 2006. The average patient age was 33 years. Patients were primarily (68%) from geographic areas, had an annual median household income of less than $47,000, and were uninsured (40%). The majority of visits (65%) were during weekdays. Periapical abscess without sinus involvement was the most common diagnosis (80%). While most of the ED patients (94%) were discharged after routine treatment, >5000 (1.4%) were admitted into the same hospital for inpatient care. The mean hospital charge was $480, totaling almost $164 million in hospital-based ED charges in the United States in 2006. An additional $80 million was spent for inpatient care (mean charge, $14,251).

**Conclusions:** More than $240 million was spent in pulpal-related emergencies dealt with in emergency hospital settings in the United States in 2006.

**Reviewer's Comments:** As stated by the authors in their discussion, early prevention or intervention in a dental office setting could result in lower costs than the ones presented in this study. For instance, social interventions have been shown to significantly reduce the number of nonemergency hospital-based ED visits. Social interventions should aim to educate patients to differentiate between routine dental problems and urgent situations, as well as to encourage patients to resolve their problems in a dental office setting rather than in a hospital-based ED. (Reviewer-Ricardo Walter, DDS, MS).

Keywords: Access to Care, Epidemiology, Hospitalizations, Pulpal Lesions

Print Tag: Refer to original journal article
Background: The newest class of cement suitable for use with fixed partial dentures is the self-adhesive resin cement. These cements etch, prime, and bond in one step. One issue that presents with any new cement is the potential for postoperative sensitivity; this question has not been addressed in the literature to date.

Objective: This clinical trial examined the postoperative sensitivity of 2 self-adhesive resin cements as well as an etch-and-rinse resin cement.

Participants/Methods: 20 patients were recruited with a need for a posterior fixed partial denture (FPD) replacing one missing tooth. FPD abutments were chosen in order to work with nonrestored teeth. Inclusion criteria were normal occlusal relationships, vital abutment teeth, and asymptomatic abutment teeth. Subjects were excluded if they were currently taking pain medication, had malposed abutment teeth requiring excessive reduction, had recent periodontal surgery, or were pregnant. All subjects were females between 30 and 40 years of age. Preoperative radiographs were obtained, and preoperative sensitivity levels to cold and biting were measured by a visual analog scale. The abutment teeth were prepared with 1.5 mm of occlusal reduction and 1.2 mm of axial reduction. Porcelain-fused-to-metal prostheses were fabricated with ceramic occlusal surfaces. The type of cement was randomly assigned to the subjects, and the prostheses were cemented according to the manufacturers’ instructions. The cements studied were Breeze Self-Adhesive Resin Cement (Pentron Clinical Technologies) and RelyX Unicem Self-Adhesive Universal Resin Cement (3M ESPE), and the etch-and-rinse resin cement, RelyX ARC (3M ESPE). Sensitivity to cold water, air blast, and biting was evaluated at 24 hours, 2 weeks, 6 weeks, and 12 weeks after cementation. At 12 weeks, periapical radiographs were taken and evaluated.

Results: The etch-and-rinse adhesive demonstrated significantly higher mean sensitivity scores for all 3 tests at all test intervals. The RelyX ARC likewise scored higher sensitivity compared to the pretreatment baseline scores at all time intervals. Both self-adhesive cements had higher sensitivity values than baseline in the cold test initially; however, the sensitivity returned to baseline levels after 2 weeks for RelyX Unicem and after 6 weeks for Breeze. Neither of the self-adhesive cements demonstrated any sensitivity to biting at any of the time intervals.

Conclusions: Both of the self-adhesive resin cements demonstrated significantly less post-cementation sensitivity compared to an etch-and-rinse resin adhesive.

Reviewer's Comments: This study answers one of the concerns with any new adhesive product, namely, the question relative to postoperative sensitivity. The results of this study suggest that self-adhesive resin cements perform very well in this regard, with no real lasting sensitivity issue. This study is somewhat limited in that all of the subjects were in a very narrow age group and were, curiously, all female. These cements should be considered due to their much simpler application protocol, if for no other reason. Certainly, these cements are worthy of consideration. (Reviewer-Daniel E. Wilson, DDS).

Keywords: Self-Adhesive Cements, Postoperative Sensitivity

Print Tag: Refer to original journal article
Artificial aging significantly reduces the hardness of composites, except for some materials that are coated with a surface sealant.

**Objective:** To evaluate the effects of a surface sealant on the roughness and hardness of composite restorative materials.

**Methods:** The composites used in this study included a nanofill (Supreme XT) and 2 microhybrids (Vit-l-escence and one not available in the United States). One hundred disk-shaped specimens (6 mm diameter, 1.5 mm thick) of each composite were made in metal molds. Twenty-four hours after curing, the top surface of the specimens was polished to 1200 grit using an automated polishing machine. Fifty specimens of each composite were etched with 32% phosphoric acid, and Biscover LV surface sealant was applied and light cured. The remaining specimens were not treated. Surface roughness of the composite specimens was evaluated using a profilometer and Knoop microhardness was measured using a hardness tester. After these initial evaluations, specimens from the various groups were subjected to artificial aging (using ultraviolet light, heat, and humidity) or were immersed in a cola soft drink, orange juice, red wine, or distilled water. The immersion period was 28 days, with solutions changed weekly. Roughness and microhardness measurements were then repeated.

**Results:** Application of a surface sealant decreased the Knoop microhardness (KHN) of composite specimens. (I assume that this is because the hardness of the surface sealant, rather than the composite itself, was actually measured.) The 28-day immersion in distilled water had very little effect on hardness. In contrast, the other aging methods significantly reduced KHN values except for sealed specimens of Supreme XT and Vit-l-escence. Sealed materials had significantly lower roughness values than unsealed materials after aging. None of the aging methods significantly affected surface roughness.

**Conclusions:** Artificial aging significantly reduced the hardness of composites, except for some materials coated with a surface sealant; aging had no effect on surface roughness.

**Reviewer's Comments:** When surface sealants were first introduced years ago, research showed that they could reduce the early wear of posterior composite restorations. This effect proved to be transient, as wear rates of sealed and unsealed restorations eventually became similar. However, the present study suggests that surface sealants may still have some value in preserving the hardness of composite materials subjected to aging conditions. (Reviewer-Edward J. Swift, Jr, DMD, MS).

Keywords: Composite, Surface Sealant, Microhardness

Print Tag: Refer to original journal article
A Single Dark Tooth Can Be Esthetically Improved With Conservative Tx

Bleaching the Single Dark Tooth.
Haywood VB, DiAngelis AJ:

Inside Dent 2010; 6 (September): 42-52

Good tray design and patient instruction are the keys to bleaching the single dark tooth.

Whitening the single dark tooth is challenging. Careful diagnosis of the cause of discoloration is critical. It may include loss of vitality, trauma (with pulpal bleeding), internal or external resorption, calcific metamorphosis, decay, or leaking restorations. Endodontically treated teeth may darken. Pulpal obliteration makes teeth appear more yellow because of increased dentin. Bleaching generally offers a conservative approach to whitening teeth. Tray bleaching with 10% carbamide peroxide offers a safe way to bleach a tooth. The target tooth area can be marked on the tray so bleach is applied to that tooth only. Placing a reservoir in the tray to supply extra bleaching agent to the tooth has not proven to be effective. A single-tooth bleaching tray is made with the molds for adjacent teeth removed leaving only the dark tooth mold for the agent. Whitening should be monitored to determine its match to other teeth. The pulp chamber of endodontically treated teeth may need to be cleaned and new access seal placed. If composite restorations are good, external bleaching is advised. In-office bleaching uses high concentration of hydrogen peroxide (35%) applied internally or externally. However, high peroxide concentration could cause external or internal resorption when there is no seal over the gutta percha. "Walking bleach" involves sealing sodium perborate into the tooth. The solution breaks down into an approximately 3% hydrogen peroxide solution. Carbamide peroxide solution of 10% is equally as effective. It breaks down into approximately 3.5% hydrogen peroxide and urea. The urea raises the pH. Carbamide peroxide has a prolonged release time that benefits the whitening process. "Inside-outside" bleaching combines the techniques. The inside bleaching cleans the tooth and tempers final color while outside bleaching is continued until desired whitening is achieved. Access can be left open to allow insertion of carbamide peroxide into the chamber and to be placed into the tray. The access opening is sealed upon completion of the bleaching process. The amount of time required to satisfactorily whiten a dark tooth is difficult to predict.

Conclusions: A single tooth-bleaching tray facilitates external bleaching. For endodontically treated teeth, "walking bleach" using 10% carbamide peroxide internally is the safest approach. It is especially effective used with external bleaching. Bonding procedures should be delayed for 2 weeks post-bleaching to allow shade stabilization and for oxygen to dissipate so bond strengths return to normal. Relapse is possible, so external bleaching may be needed in 1 to 3 years.

Reviewer's Comments: While there is not any real news here, Dr Haywood reminds us how relatively simple and safe whitening the single dark tooth is. It is the most conservative way to improve the tooth's appearance because it does not require any removal of tooth structure. (Reviewer-Thomas G. Berry, DDS, MA).

Keywords: Dark Tooth, Tooth Whitening

Print Tag: Refer to original journal article
Poor primary stabilization, inadequate cortical bone density, and occlusion are big “no-no’s” when immediately temporizing implants.

Objective: To evaluate the long-term outcome of immediately temporized single dental implants.

Participants/Methods: 140 patients (86 females and 54 males) were enrolled in the study. Patients were 15 to 88 years of age (mean age, 45 years) and in need of single-tooth implants. Patients with metabolic bone disease, unstable systemic condition, such as uncontrolled diabetes, untreated hypothyroidism, or a malignancy and in treatment, were not included. Extractions were done atraumatically to prevent damage to the adjacent bone when needed. Saline irrigation was used throughout the procedure. An insertion torque of at least 45 Ncm was applied using the NobelPharma DEC 100 drill machine (Nobel Biocare). Implants in the esthetic zone were placed with the shoulder 4 mm below the crest of the gingiva on the labial aspect. CeraOne abutments (Nobel Biocare) were typically used. Temporary restorations were made using methylmethacrylate custom copings, prefabricated acrylic resin crowns, and acrylic resin. Temporaries were adjusted to eliminate any occlusal contact and cemented using Durelon (3M ESPE). No sutures were placed, as the temporary restoration sealed the socket and maintained the clot subgingivally. Patients were educated to avoid premature function of the implant. Final impressions were sometimes taken at the same appointment. Radiographic follow-up was done on the day of placement, at definitive restoration delivery, and then annually.

Results: 164 implants were placed, with only 1 implant placed to replace molars (authors’ choice). Sixty-four implants were placed in fresh extraction sites, 98 in healed ridges, and 2 were replacements of failed implants. One of 13 machined surface and 6 of 151 oxidized titanium surface (TiUnite, Nobel Biocare) implants failed. Failures were in 4 (of 37) maxillary premolars, 1 (of 18) mandibular premolar, and 2 (of 6) mandibular incisors. The overall survival rate was 95.7%. Complications linked to the failures were various. Three failures were in type III bone, 3 were in type IV bone, and 1 was in type II bone). Nine patients were smokers and received 12 of the implants. However, none of the failures were associated with smoking. One failure was in a diabetic patient.

Conclusions: Temporization of single implants can be successfully accomplished if proper precautions are taken when "loading" the implant.

Reviewer’s Comments: Implants may be successfully immediately temporized as many studies have shown. The present study adds to that knowledge, but some flaws in the design/report could have been avoided. For instance, it cannot be determined from the report if there was any randomization, how long the follow-up time was, and nothing is said about the condition of the remaining dentition. All these are important and significant when evaluating the results. (Reviewer-Ricardo Walter, DDS, MS).

Keywords: Single Tooth Implant, Immediate Provisionalization, Osseointegration

Print Tag: Refer to original journal article
Examine each tooth closely before determining which specific ceramic system to use.

**Objective:** To provide clinical guidelines in treatment planning current ceramic restorations.

**Methods:** The authors offer a rational approach to treatment planning in the use of ceramic restorations. They divide ceramic materials into 4 categories (and key performance factors): Category 1 = feldspathic porcelain (most conservative, most translucent, and weakest); Category 2 = pressed or machined glass ceramics (less conservative requiring a minimum thickness of 0.8 mm, good translucency, stronger than Category 1); Category 3 = high strength crystalline ceramics (much less conservative requiring a minimum thickness of 1.2 mm, stronger); and Category 4 = metal ceramics (much less conservative requiring a minimum thickness 1.5 mm, least translucent, and strongest). The authors suggest that there are 5 important clinical parameters that need to be considered for each tooth to decide which ceramic system and technique is most suitable: (1) Need for color change: 0.2 to 0.3 mm porcelain thickness per color tab change (ie, A2 to A1 or 2M1 to 1M1). (2) Substrate to which ceramic is to be attached: enamel is more predictably bonded to than dentin, healthy dentin is better than sclerotic or decayed dentin, and the type of core material (amalgam, composite resin, etc); (3) Flexural risk of tooth based on signs of cracks, craze lines, tooth and restoration wear, occlusal trauma, recession, and abfraction. The more risk signs, the more the indication for Category 4 ceramics; (4) Shear and tensile risk of tooth based on the presence of deep overbite and the location of the restoration in the mouth. Posterior teeth usually have higher shear and tensile risk than anterior teeth. All ceramics are weak in tensile and shear, and need to be supported by cores that redirect these forces to compression. Metal ceramic systems are best at reinforcing ceramics. Cores should be built out to support marginal ridges and veneering porcelain should not be unsupported by >2 mm thickness; and (5) Assessment of bond and seal maintenance risk: Category 1 ceramics are critically dependent on high quality bonding whereas Categories 3 and 4 ceramics are less dependent.

**Reviewer's Comments:** This article is worth reading in its entirety. It was part of the December theme issue on ceramics. It is freely available at http://www.compendiumlive.com/toc.php?year=2010&month=12. Although this paper is not based on scientific data, it discusses 5 thoughtful and useful guidelines in treatment planning. The guidelines stress examining each tooth and the overall dental condition before choosing the specific ceramic system to use. Ceramic restoration treatment planning is more than just considering which materials are esthetically desirable. When all 5 parameters are optimal, Category 1 materials should be used because they are the most conserving of tooth structure. When all 5 parameters involve high risk, metal ceramics should be used. (Reviewer-Charles B. Hermesch, DMD).

**Keywords:** Ceramic Restorations, Treatment Planning Guidelines, Material Selection

**Print Tag:** Refer to original journal article
Some Beverages Affect Color Stability of Composites

Color Stability of Microfilled, Microhybrid and Nanocomposite Resins—An In Vitro Study.

Nasim I, Neelakantan P, et al:

J Dent 2010; 38 (Supplement 2): e137-e142

Staining liquids affect the color stability of some composites, but all color changes are in the clinically acceptable range.

**Objective:** To evaluate the color stability of different types of composite exposed to beverages.

**Methods:** The composites evaluated in this study were Heliomolar (microfill), Spectrum TPH (microhybrid), and Filtek Z350 (which I believe is Filtek Supreme under a different name; a nanofill). Disk-shaped specimens of each material, 10 mm in diameter and 3 mm thick, were fabricated in molds. They were polished using a series of abrasive disks. Ten specimens of each composite were stored in distilled water as a control. Additional specimens were immersed in either tea or cola for 1 hour per day for 30 days. Otherwise, these were also stored in distilled water. Baseline color measurements were made using a reflectance spectrophotometer with the CIELAB system. Additional color measurements were made at 7 and 30 days. Color differences from baseline (delta-E) were calculated using the standard formula.

**Results:** Mean color differences from baseline ranged from 0.43 to 2.60 delta-E units. Overall, the microhybrid was the most color stable. Although some of the color differences based on type of composite and type of beverage were statistically significant, the differences were so small that none could possibly be clinically significant.

**Conclusions:** The beverages used in this study affected the color stability of the composites evaluated, but the color changes were in the clinically acceptable range.

**Reviewer's Comments:** The topic of composite resin color stability is clinically relevant, but frankly, I am not sure that this study is. I would have preferred to see a much longer or more diverse challenge to the color stability of the tested composites. The authors did immerse their specimens in a couple of very dark liquids, but for a total of only 30 hours. I would not expect any contemporary composite material to have substantial color change under those conditions. Any clinically evident color change would likely occur only after a much longer time or more frequent exposure to staining liquids. I suppose that one could put a positive spin on this paper and say that it proves that contemporary composites are pretty color-stable even when subjected to staining liquids. (Reviewer—Edward J. Swift, Jr, DMD, MS).

Keywords: Composites, Color Stability, Resins

Print Tag: Refer to original journal article
NaOCl removes dentin organic content despite the concentration and exposure time.

**Background:** Sodium hypochlorite (NaOCl) solutions are widely used for irrigation during endodontic procedures. However, no agreement in its optimal concentration exists. Different concentrations and application times have been studied, with some combinations affecting dentin mechanical properties by the degradation of organic components of dentin.

**Objective:** To analyze the effects of different concentrations and exposure times of NaOCl on dentin deproteination.

**Methods:** 30 freshly extracted intact human premolars, selected based on dimensions, morphology, and lack of defects, were used. Crowns were removed at the cementoenamel junction, and the roots were longitudinally sectioned into 2 halves resulting in a total of 60 dentin slabs. Specimens were assigned to 12 groups to be treated with 1 mL of 0.9% NaCl (control), 0.5%, 1%, or 2.25% NaOCl for 1, 5, or 10 minutes. The effects of NaOCl on the organic and inorganic content of dentin were measured using attenuated total reflection Fourier transform infrared spectroscopy.

**Results:** There was a statistically significant effect of NaOCl concentration on the organic content. Exposure time and the interaction concentration and exposure time were not significant. The decrease in organic content for 0.5% NaOCl was lower than for 1% and 2.25% NaOCl, which did not differ between them. With the inorganic content, concentration, exposure time, and their interaction did not influence the inorganic content of dentin.

**Conclusions:** 0.5% NaOCl is recommended as the predominant concentration for routine root canal therapy. Longer exposure times can be used in persistent infections.

**Reviewer’s Comments:** NaOCl removed the organic components, but did not influence the inorganic phase of human dentin, and that did not change as the exposure time increased. One may say that, ideally, organic components should be maintained as they contribute to the bonding of posts to prepared root canals, for instance. Other irrigants such as chlorhexidine may fulfill that requisite and still eliminate bacterial counts in root canals. (Reviewer-Ricardo Walter, DDS, MS).

**Keywords:** Dentin Deproteination, Sodium Hypochlorite, Root Canal Therapy

**Print Tag:** Refer to original journal article
**Objective:** To evaluate the gloss and color changes of a hybrid (Herculite XRV) and a nanohybrid (Premise) composite resin after application of hydrogen peroxide tooth whitening strips and carbamide peroxide bleaching gel.

**Methods:** 24 disk-shaped specimens of each composite (shade A2, 10 mm diameter, 1 mm thick) were formed in molds. They were polished to 1200-grit, stored in water for 1 day, and divided into 3 groups of 8 specimens. In the first group, NiteWhite ACP gel (10% carbamide peroxide) was applied for 3 hours daily for 2 weeks. In the second and third groups, 2 versions of Crest Whitestrips (containing either 6.5% or 14% hydrogen peroxide) were applied for 30 minutes twice daily for 2 weeks. When not being bleached, the specimens were stored in 100% relative humidity. Color measurements were made before bleaching, after 1 day of storage in water, and after 1 and 2 weeks of bleaching. The color measurements were done using a colorimeter and were recorded as CIELAB values. Surface gloss was measured using an infrared gloss meter. Finally, selected specimens from each group were examined using scanning electron microscopy (SEM).

**Results:** For Herculite XRV, the overall color change ranged from 0.75 to 1.03 delta-E units at 1 week and from 0.85 to 1.19 at 2 weeks. For Premise, the values were 1.66 to 1.75 at 1 week and 1.14 to 2.02 at 2 weeks. The difference between the 2 composites was statistically significant, but differences among the bleaching treatments were not. All combinations of composite and bleaching treatment had significant reductions in gloss. Premise had a higher gloss than Herculite at each measurement period. Some roughening of the composite surface was observed with the higher concentration Whitestrips.

**Conclusions:** Exposure to peroxide bleaching agents reduced the gloss of composites resins, but did not have a clinically perceptible effect on color.

**Reviewer’s Comments:** There are no real surprises in this study. We have seen before that bleaching has little or no effect on the color of composite resins. A reduction in surface gloss was detected, but I am not convinced that this is clinically relevant. The study did not include a control group of unbleached composites. For all we know, those might (or might not) have exhibited similar reductions in gloss when stored just in water or saliva. (Reviewer-Edward J. Swift, Jr, DMD, MS).

Keywords: Bleaching, Composites, Color

Print Tag: Refer to original journal article
Auto-transplantation of teeth should be considered when young patients are missing maxillary incisors.

**Objective:** To determine the outcome of auto-transplantation of teeth into the maxillary incisor area and the factors associated with these outcomes.

**Methods:** Auto-transplantation is the intentional removal of a tooth from its socket and the placement of that tooth into another area of the mouth. The researchers retrospectively evaluated the records of 325 patients who had auto-transplantation of 409 teeth in the county of Rogaland, Norway (population 370,000) over a 22-year period (1978 to 1999). A subset of 31 patients had 41 teeth auto-transplanted into the maxillary incisor area. The same oral surgeon followed the subset of patients (mean age at transplantation, 14.8 years; range, 10 to 30 years) clinically and radiographically for a mean of 55 months (range, 1 to 155 months). Sixty-three percent of the auto-transplanted teeth were premolars. The most common reasons for auto-transplantation were maxillary incisor aplasia (42%), dental trauma (37%), and ectopic position/impaction (17%). The most frequent recipient sites were maxillary canines (54%) and central incisors (34%).

**Results/Conclusions:** The overall success rate of auto-transplantation was 80.5%. Success was defined as the auto-transplanted tooth being healthy and acceptable clinically. The primary reason for failure was root resorption in the cervical area of the auto-transplanted tooth. Auto-transplanted teeth with incompletely developed roots were more likely to be successful.

**Reviewer's Comments:** This study and others show that auto-transplantation is sufficiently predictable to be an important treatment option for missing or lost maxillary incisor teeth particularly in young people and adolescents where there are few restorative options. Careful extraction techniques to preserve the periodontal ligament cells on the root and regular follow-up are essential to success. If root resorption occurs in the auto-transplanted tooth, endodontic treatment is indicated. If both root resorption and ankylosis occur, failure is inevitable, and extraction is needed. Even if auto-transplanted teeth eventually fail, more alveolar bone will probably have been preserved compared to other treatment options, such as orthodontic space closure or space maintenance. When skeletal growth is still occurring, implants are contraindicated and auto-transplantation should be considered. (Reviewer-Charles B. Hermesch, DMD).

**Keywords:** Auto-Transplantation, Maxillary Incisor Area, Outcomes

**Print Tag:** Refer to original journal article
Simplified self-etch adhesives have a compromised effectiveness in the long term.

**Objective:** To examine the durability of dentin bonds of several mild self-etch adhesives during 6-month water storage and to evaluate potential degradation mechanisms of the aged interfaces.

**Methods:** 5 mildly acidic self-etch adhesives were evaluated in this study. These were the two-step systems Clearfil SE Bond and Clearfil Protect Bond and the all-in-one systems Clearfil S3 Bond, G-Bond, and iBond. Composite was bonded to enamel or dentin of extracted human third molars using each of these adhesives. Rectangular "sticks" of composite and tooth were sectioned from the bonded specimens and either tested following 24 hours or 6 months of storage in water. Bond strengths were evaluated using a microtensile method. In addition, interfaces between the various adhesives and enamel or dentin were evaluated using transmission electron microscopy (TEM).

**Results:** Bond strengths to enamel were relatively stable over time, although they did decline slightly for some of the adhesives stored for 6 months, over those stored for 1 day. This was particularly true of the all-in-one adhesives. For example, the mean dentin bond strength of iBond declined from 28.3 to 11.7 MPa. For comparison, the 1-day and 6-month bond strength of OptiBond FL was 43.4 and 37.7 MPa, respectively. Most failures occurred within the dentin just below the hybrid layer.

**Conclusions:** Simplified self-etch adhesives have a compromised effectiveness in the long term, with dentin bond strengths decreasing dramatically with 6 months of water storage.

**Reviewer's Comments:** Based on their TEM observations, the authors speculate that the reductions in bond strength might be related to insufficient resin encapsulation of the residual smear layer by these mildly acidic materials. The precise mechanism of failure may not be particularly interesting for clinicians, but the study does have some clinical relevance. Specifically, although other studies are indicating that the performance of some newer all-in-one adhesives is improving, this one suggests that they are still the least predictable option for dentin bonding. As an aside, a modified version of Clearfil SE Bond (now marketed as Clearfil SE Protect) had a more stable dentin bond strength than the original Clearfil. (Reviewer-Eduard J. Swift, Jr, DMD, MS).

Keywords: Dentin Bonding, Bond Strengths, Hybrid Layer

Print Tag: Refer to original journal article
Immersion of Fluoride-Releasing Restorative Materials Reduces Their Strength


Moreau JL, Xu HHK:


If fluoride release is critical, then resin-modified glass-ionomer materials offer the best fluoride-release rate.

Background: With the increasing use of esthetic materials, particularly in caries susceptible individuals, those materials that release fluoride become attractive options. Glass ionomers, resin-modified glass ionomers, compomers, and fluoride-releasing composites all have some fluoride-release capability, although they may have compromised esthetics and/or mechanical properties. The pH of the oral environment, as well as fluid immersion, may influence these properties, and studies are sparse regarding this issue.

Design/Objective: This in vitro study investigated the effects of immersion and pH on the fluoride release and mechanical properties of different fluoride-releasing esthetic restorative materials.

Methods: 3 resin-modified glass ionomers (Vitremer-3M ESPE, Fuji II LC-GC, Ketac Nano-3M ESPE), 1 flowable compomer (Dyract Flow-Dentsply), and 1 fluoride-releasing composite (Heliomolar-Ivoclar) were studied. Standard sized specimens were fabricated from each material and allowed to incubate at body temperature for 24 hours. Specimens of each material were then tested for flexural strength and elastic modulus as a baseline. The specimens were then immersed in 3 different pH solutions (4, 5.5, and 7) for a total of 84 days. Fluoride concentration was measured daily for 1 week, then weekly for 11 additional weeks. Samples were then tested for flexural strength and elastic modulus after immersion.

Results: The strengths of the 5 materials were not significantly different prior to immersion. The elastic modulus varied with the Fuji II LC and Vitremer having the highest and Dyract Flow having the lowest. After immersion, Heliomolar had the highest flexural strength followed by Fuji II LC, Dyract, Ketac, and Vitremer. All of the materials exhibited significantly reduced strength after immersion, with the solution pH having no significant effect. The fluoride release rates were highest early after immersion followed by a lower long-term release rate. The initial rate was higher as the pH was lower, but the long-term release rate was not significantly affected by pH. Vitremer, Fuji II, and Ketac Nano demonstrated the highest long-term fluoride release, followed by Dyract Flow. Heliomolar had a much lower long-term fluoride release.

Conclusions: Fuji II LC had both a high fluoride release and relatively high strength; otherwise there was an inverse relationship between strength and fluoride release. The pH had a significant effect on fluoride release and no real effect on mechanical properties. Heliomolar had very low fluoride release.

Reviewer's Comments: The search for the perfect material continues. The material with the best esthetics and mechanical properties, composite resin, demonstrated very low fluoride release. The other materials showed improved fluoride release, particularly at the low pH's where fluoride is needed. We are still faced with the tradeoff between anticariogenic properties and improved esthetics and mechanical properties. Of the materials tested, the Fuji II LC had the best combination of properties. (Reviewer-Daniel E. Wilson, DDS).

Keywords: Fluoride, Restorative Materials, Mechanical Properties, Ion Release

Print Tag: Refer to original journal article
Composite occlusal overlays have greater fatigue resistance than do ceramic overlays.

**Objective:** To evaluate and compare the fatigue resistance of composite resin and ceramic "occlusal veneers" used for posterior teeth.

**Methods:** 30 extracted human maxillary molars were inserted into a special positioning device filled with acrylic resin, embedding the roots to approximately 3 mm below the cemento-enamel junction (CEJ). Standardized preps were made on the teeth. The buccal and lingual margins were approximately 5 mm coronal to the CEJ and 2.3 to 2.6 mm apical to the central groove, maintaining the original cuspal inclines as much as possible. The prepared dentin was treated with OptiBond FL, a three-step etch-and-rinse adhesive, in an immediate dentin sealing technique. Standardized ceramic overlays were fabricated using the CEREC 3 CAD/CAM system. These had a maximum thickness of 1.8 at the cusp tip, and a minimum thickness of 1.2 mm at the central groove. The restorations were milled from leucite-reinforced ceramic, lithium disilicate ceramic, or composite resin blocks. After appropriate treatment of intaglio surfaces, these overlays were bonded to the teeth using OptiBond FL and preheated Z100 composite. The bonded specimens were subjected to masticatory forces simulated by cyclic isometric loading using an MTS testing machine. Specimens were evaluated at baseline and following the loading steps using transillumination and optical microscopy. Failures were defined as the presence of one or more surface cracks at least 2 mm in length.

**Results:** The leucite-reinforced ceramic overlays (IPS Empress) all failed by the end of the load cycling regimen. In contrast, 30% of the lithium disilicate (eMax) and 100% of the composite restorations survived the entire load-cycling regimen. None of the specimens in any group suffered catastrophic failure, just cracking confined to the restorative material.

**Conclusions:** Occlusal veneers made of machined composite resin had significantly higher fatigue resistance than did ceramic occlusal veneers.

**Reviewer's Comments:** The lead author of this paper is a strong proponent of partial coverage restorations that preserve tooth structure, including the overlay or "occlusal veneer" approach used in this study. The flexural strength of 1 ceramic tested is nearly twice that of the composite, but it had much lower fatigue resistance than the composite. The similarity of the composite's elastic modulus to that of dentin might account for this somewhat surprising result. (Reviewer-Edward J. Swift, Jr, DMD, MS).

Keywords: Occlusal Veneers, Fatigue Resistance

Print Tag: Refer to original journal article
Impression Technique Affects Accuracy of Dies

Comparison of the Three-Dimensional Correctness of Impression Techniques: A Randomized Controlled Trial.

Luthardt RG, Walter MH, et al:
Quintessence Int 2010; 41 (November/December): 845-853

In regard to final restorations, the impression technique used affects the accuracy of the dies.

Background: For final restorations, both 1-stage impression techniques (1 or 2 materials of different viscosity) and 2-stage techniques (2 materials of different viscosity used in stages) are commonly used. While addition-cured silicones and polyether impression materials produce good impressions, there are some differences in the resulting accuracy depending on the technique used. One-stage with addition silicones and polyether materials produces enlarged dies, while two-stage and one-stage high-viscosity putty impressions produce dies smaller than the teeth.

Objective: To determine whether 3-dimensional reproduction of abutment teeth (accuracy) depends on the impression technique used.

Methods: 3 impressions each were made on 48 patients using monophase (MP; Impregum Penta), one-stage (OS; Dimension Penta H Quick/Dimension Garant L), and two-stage (TS; Dimension Penta H Quick/Dimension Garant L Quick) putty-wash. The 3 impressions were made on single crown or short-span fixed partial denture (FPD) preparations for 48 patients. Each patient underwent all 3-impression techniques. Retraction cord soaked in astringent was placed followed by a second non–astringent-soaked cord. The second cord was removed prior to the impression-making, but the first cord was left in place. Second and third impressions were made after a ≥5-minute interval. For OS impressions, light-bodied silicone was injected around the preparations and medium-body silicone in a tray seated over the area. For MP impressions, polyether was injected around the tooth and used in a tray. For TS impressions, an initial impression was made with heavy-body silicone. The set impression was relieved, then filled with light-bodied material and seated over prepared teeth that had been covered with light-bodied material. Master casts were poured 4 hours after impressions were made. Sectioned casts were measured with a high-resolution optical digitization system.

Results: OS impressions were considered superior in accuracy, so they were used as reference. Dies from TS impressions were generally smaller than those of representative impressions made with OS impressions. Dies from MP demonstrated smaller deviations compared to OS impressions. In most cases, major deviations occurred at the margins.

Conclusions: Comparison of MP and TS putty-wash techniques in relation to an OS putty-wash technique demonstrated better reproduction with an OS technique. Mean deviations between TS and OS techniques are of minor clinical relevance. OS putty wash technique with individualized, stock metal trays can be recommended.

Reviewer's Comments: Clinicians usually have their own technique and material choices for impression making. This study does not indicate that one material is better than another, but it does make a point about the accuracy of the technique. It is interesting that OS impressions tend to make dies larger than the preparation, while TS and OS high-viscosity putty impressions tend to produce dies smaller than the preparation. Exactly how significant that is as to the acceptability of the fit of the crown is not stated, but it does give consideration as to what technique to use. (Reviewer-Thomas G. Berry, DDS, MA).

Keywords: Impression Techniques, 3D Correctness, Fixed Partial Dentures

Print Tag: Refer to original journal article
Objective: To evaluate the stability over time of interproximal contacts between implant restorations and natural teeth.

Design/Participants: Case series research study involving a convenience sample of 105 patients (38 men and 67 women; age range, 20 to 78 years) in a private practice in Japan.

Methods: The patients received a total of 353 implants (91 in the maxilla and 262 in the mandible) between 1999 and 2007 and were followed for 1 to 123 months after placement. The implants were restored 3 to 6 months after placement with 146 prostheses, which included single crowns and fixed partial dentures of varying lengths. All implant restorations were restored such that interproximal contacts were established with adjacent natural teeth. Contact was defined as physical resistance to pull through with a 50-micron metal strip. One board certified prosthodontist placed all the restorations. By order of frequency, the implants used were Nobel Biocare, Straumann, Calcitec, and IMZ. Most implants were placed in healed extraction sites. Patients were excluded from the study if any changes occurred in the natural teeth adjacent to the restored implant (ie, a new restoration, a fractured marginal ridge, or loss of the tooth). Approximately every 6 months, the interproximal contacts were assessed with 50-micron metal strips and recorded as present or absent. Various factors were also recorded regarding the patients’ dental health and tested statistically for association with presence or absence of interproximal contact.

Results: During the follow-up period, interproximal contact between the implant restoration and the natural teeth was lost in 43% of all the contacts. With regard to location, 52% of the mesial and 16% of the distal contacts were lost. The loss of contact was progressive over time. Statistical analysis showed that 50% of the interproximal contacts would be found open within 5.5 years.

Conclusions: Regression analysis found that mesial interproximal contact loss was positively associated with age, opposing removable partial denture occlusion, and nonvital, endodontically treated teeth. For distal interproximal contacts, no factors were associated.

Reviewer’s Comments: This is the first report in the scientific literature of the loss of interproximal contact between implant restorations and natural teeth. If collaborated by future research, these findings raise concern for the periodontal health of both the implant and the adjacent teeth. For example, open contacts can lead to food impaction and potential periodontal attachment loss. The authors do not speculate on the etiology of the open contacts. Implants are ankylosed and are in a stable position in the bone. On the other hand, mesial drift of natural teeth, due to interproximal wear and functional forces, could potentially account for a loss of mesial interproximal contacts. Certainly, this study will generate more research. In the interests of their patient’s overall dental health, clinicians should check the status of their implant restoration contacts at recall visits. (Reviewer-Charles B. Hermesch, DMD).

Keywords: Implants, Interproximal Contact, Stability

Print Tag: Refer to original journal article