



# LITERATURE REVIEW



by  
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## Miscellaneous Topics of Interest in the Literature

### HAVING TROUBLE WITH UNSET IMPRESSION MATERIAL?

1. Kimoto K, Tanaka K, Toyoda M, Ochiai KT. Indirect latex glove contamination and its inhibitory effect on vinyl polysiloxane polymerization. *J Prosthet Dent* 93:433-8, 2005.

Vinyl polysiloxane (VPS) or addition reaction silicone impression materials are very popular because of their accuracy and stability. Incomplete polymerization is a problem. Sulfur containing zinc diethyl dithiocarbamate is used during latex glove fabrication as a preservative and vulcanizing accelerator. Sulfur has been suggested as the major contributor to inhibiting VPS polymerization. The aims of this study were to show if this sulfur contamination can be transferred to other surfaces by direct contact and to study the feasibility of contaminant removal using several cleansing procedures commonly used in clinical practice.

In the first part of the study, sulfur-free vinyl gloves and retraction cord, with and without a five-second contact with latex gloves, were examined with a scanning electron microscope and an electron probe analysis for traces of sulfur.

In the second part of the study, the latex-contaminated vinyl gloves were either brushed with tap water, brushed with soap and towel dried, or cleansed with alcohol-soaked gauze. PVS impression material was then placed over the experimental surface and contained by a circular mold. Surfaces were then subjectively examined by six experienced dentists for degree of polymerization.

**RESULTS:** In the first part of the study, no sulfur was found on the clean vinyl gloves or retraction cord. However, sulfur particulate elements were identified on the surfaces of both the vinyl gloves and retraction cord after contact with the latex gloves.

In the second part of the study, none of the cleaning methods resulted in complete PVS polymerization. All of the samples had unset surfaces and some recognizable surface distortion.

**CONCLUSIONS:**

- Transfer of sulfur and sulfur-chloride compounds are transferred after brief contact with latex gloves.
- These contaminants were not readily removable.
- Polymerization inhibition appears directly related to the transfer of these sulfur compounds.

**DISCUSSION:** The author reviewed this article because of a persistent problem he has had with the many PVS materials he has evaluated and used over the past several years (it is most apparent when doing multiple-unit impressions where glove contamination is unavoidable). The only apparent solution is to switch to vinyl when using PVS. The other solution may be to use a non-PVS impression material. It has also been observed that some PVS materials are more sensitive than others. Readers' comments on this topic are welcomed (drcrispin@estheticprofessionals.com) and will be shared in the next Literature Review.

**USE AN ARTICULATOR FOR COMPLEX CASES AND SET THE ARTICULATOR FOR EACH PATIENT.**

**2. Chang WS, Romberg E, Driscoll CF, Tabacco M.J. An in vitro evaluation of the reliability and validity of an electronic pantograph by testing with five different articulators. *J Prosthet Dent* 92:83-9, 2004.**

The routine use of articulators, on average, has been inhibited by the complexity of accurately programming the instrument. Complex restorative cases that involve occlusal modification can be done more accurately when using a programmed articulator. Traditional pantographic tracings are difficult to master. Even lateral check bites are time-consuming and provide minimal information. However, the development of a new generation of electronic jaw recording devices has simplified the process, which can be completed in a minimal amount of time.

The purpose of this in vitro study was to test the reliability and validity of the Cadiax Compact (Waterpik Technologies; Ft. Collins, CO) in calculating condylar settings for five different articulators: Denar D5A (Waterpik), Denar Mark II (Waterpik), Whip Mix 8500 (Whip-Mix Corp.; Louisville, KY), Hanau Modular (Waterpik), and Panadent PCH (Panadent Corp.; Grand Terrace, CA).

The Cadiax Compact was attached to each articulator at the terminal hinge axis using special mounting devices, and a series of recordings were made at different articulator settings. Recordings were taken at 3 mm, 5 mm, and 10 mm of condylar movement.

**RESULTS:** For horizontal condylar inclination (condylar guidance angle) the least amount of deviation was at 10 mm, followed by 5 mm,

with 3 mm having the greatest deviation. For progressive mandibular lateral translation, 10 mm and 5 mm were smaller than 3 mm. For immediate mandibular translation, there were no significant differences at the three recording distances.

**CONCLUSIONS:** Within the limits of this study, the Cadiax Compact is both reliable and valid for the articulators tested, as the values of standard deviations for assessing reliability and mean deviations for assessing validity were relatively small, especially at the 10-mm condylotrack distance.

**DISCUSSION:** The Cadiax Compact was most accurate when the amount of condylar movement increased. Thus, the 10-mm distance data is probably the best one to use when setting the articulator, even though accuracy closest to centric relation is more critical clinically in anterior guidance cases.

The author introduced this technology into his teaching programs three years ago and the average dentist can complete the data recordings and articulator programming in approximately 30 minutes. This technology can be used by the average dentist to program an articulator more accurately and in less time than with other alternatives.

**THE VITAL PULP TREATMENT CONTROVERSY CONTINUES. DOES ANYONE REALLY KNOW FOR SURE?**

**3. Accorinte ML, Loguericio AD, Reis A, Muench A, Araujo VC. Response of human pulp capped with a bonding agent after bleeding Control and hemostatic agents. *Op Dent* 30(2):147-55, 2005.**

The best way to treat a vital pulpal exposure continues to be a controversial topic and worthy of another look. Hemorrhage and moisture control appear to be critical factors in maintaining a seal, by minimizing microleakage and potential failure. The purpose of this study was to evaluate the response of human pulps capped with a bonding agent after hemorrhage control with different hemostatic agents.

Twenty-five vital human bicuspid scheduled for extraction were prepared for Class II restorations. In four groups of five teeth each, the pulps were exposed and four agents were used to control bleeding: saline solution; ferric sulfate (Astringent, Ultradent; South Jordan, UT); 2.5% sodium hypochlorite; and calcium hydroxide powder in distilled water. Following hemostasis, the teeth were etched with 35% phosphoric acid, rinsed, excess moisture removed, one coat of primer applied (Scotchbond Multi Purpose Plus, 3M ESPE; St. Paul, MN) followed by a bonding resin, and light-cured. The cavities were restored with Z-100 (3M ESPE).

In the fifth group, saline was used to control bleeding, and powdered calcium hydroxide was condensed over the pulp exposure, followed by application of Dycal (Dentsply Caulk, Milford, DE).

After 60 days the teeth were extracted, decalcified, sectioned, and scored for the following: inflammatory cell response (1 = no response to 4 = complete necrosis), soft tissue organization (1 = normal tissue to 4 = necrosis of at least one-third of the pulp), and dentin bridge formation (1 = new barrier tissue to 3 = no evidence of any tissue). In addition, postoperative pain was noted.

#### RESULTS:

- None of the bonded teeth had any evidence of dentin bridge formation.
- All of the teeth in the fifth group had dentin bridge formation.
- The saline group had 20% 1 scores and 80% 2 scores for inflammatory cell response and soft tissue organization, respectively.
- The ferric sulfate group had 100% 2 scores in each category.
- The sodium hypochlorite group had 60% 2 scores and 40% 4 scores in each category.
- The calcium hydroxide solution group had 80% 2 scores and 20% 4 scores in each category.
- The calcium hydroxide powder/Dycal group had 100% 1 scores in each category.

**CONCLUSIONS:** Calcium hydroxide should be used as the material of choice for vital pulp capping. The total-etch technique using bonding agents, even after hemostasis, is contraindicated.

Pain was noted in 60% of the ferric sulfate group, 20% in the saline and calcium solution/bonded group, and in none of the other groups.

**DISCUSSION:** This study had an excellent discussion of key issues, including the following:

Hemorrhage control did not improve pulp response, as was stated in a previous study.

The ferric sulfate group caused a severe pulpal retraction so the bonding agent was not in contact with pulpal tissue. This may be why there was a lack of necrosis but a high amount of postoperative pain.

The authors felt that the lack of pulp healing after adhesive capping was due to application of cytotoxic components over the pulp. It was noted that studies that showed an acceptable biocompatibility of adhesive agents over exposed pulps were conducted in monkeys and rats and may not be reproducible in humans.

Etching causes an increased dentin permeability, increasing the outward flow of dentinal fluids due to the enlargement of the dentinal tubules. This large amount of fluid may interfere with polymerization of the primer and/or adhesive resin, reducing bond strengths. It may also cause phase separation of the hydrophilic and hydrophobic moieties and water dilution, decreasing conversion of the monomers.

Another factor to consider is when cavosurface margins are placed in dentine or cementum. Microleakage is difficult to avoid; therefore, having an antibacterial agent such as calcium hydroxide with its high PH may be a good idea.

This controversy is not over yet. It appears that in areas where microleakage may occur, postoperative pain is to be avoided, and you want a dentin bridge under the vital pulp cap, calcium hydroxide powder and Dycal may be a good choice. (Note that this not the technique of just placing Dycal alone, which is, in this author's opinion, the "normal" technique used in the U.S.)

#### WATER LINE DISINFECTANTS— WHAT ABOUT BOND STRENGTH?

4. Betke H, Ziebolz D, Rein C, Blunck U, Attin T. Influence of disinfectants on dentin bond strength of different adhesive systems. *Op Dent* 30:250-56, 2005.

Just put a few drops of solution "X" into water and solve your bio-film problem? It's not that simple. How do these solutions affect bonding agents? The purpose of this study was to test whether the use of water line disinfectants has an influence on dentin adhesion of adhesive systems with different mechanisms of adhesion.

The disinfectant groups were as follows: water control; Alpron Neutral (Alpro Dental Produkte GmbH; St. Georgen, Germany); Alpron Mint (Alpro Dental); and Dentosept P (Sirona Dental Systems GmbH; Bensheim, Germany).

The bonding agent-restorative combinations were: Syntac Classic/Tetric Ceram (Ivoclar Vivadent; Amherst, NY); Clearfil Liner Bond 2V/Luxicore (Kuraray; New York, NY); OptiBond FL/Prodigy (Kerr; Orange, CA); and Prime & Bond NT/Spectrum (Dentsply Caulk).

Standardized cavity preparations were prepared in human dentin and a punch test was used to measure bond strengths. The groups were further divided into subgroups that were stored for 24 hours at 37° centigrade and a second group stored for 180 days and thermocycled. Ten samples were in each water line disinfectant bonding/restorative and storage combination.

**RESULTS:** Prime & Bond NT/Spectrum was the only group that had decreased bond strengths when using disinfectants in the water supply.

**DISCUSSION:** While it appears from this study that most adhesive/restoratives may not be affected, it certainly validates the concern that some are. Without testing every combination, however, it is only speculative as to whether there may be others. If restorative bonds are observed as less than optimal in your practice, this may be the problem. *AB*



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