Expanded Abstract

Compatibility of Hydrogen Peroxide-Based Surface and Immersion Disinfectants with Elastomeric Impression Materials

Introduction

Dental impression materials need to be rinsed in water and disinfected immediately after making using an approved surface disinfectant or immersion disinfectant, to control transfer of infectious materials from saliva and blood to casts and to dental healthcare workers.1, 2, 3, 4

The ADA has recommended that impressions made be decontaminated.5, 6, 7, 8 should make reference to CDC Guidelines for Infection Control in Dental Care Settings 2003, Dental Laboratory section, pages 33 & 34. 16 There are many commonly used disinfectants in dentistry.9 Studies have shown that bacterial and viral contaminants can be effectively controlled by disinfection.10, 11, 12

Disinfection process may sometimes affect material properties of impression materials.13, 14 The Council on Dental Materials and Devices has methods for testing surface detail and dimensional stability of materials, and these test methods with greater samples can be used to study the effects of disinfectants on elastomeric impression materials.15

Purpose

The OPTIM CS, high level disinfectant is not FDA approved for sale in the US. Can we not exclude reference to this part of the reference to the test document and just mention the intermediate level disinfectant OPTIM 33TB? See my recommended amendments in yellow below. The purpose of this study was to evaluate compatibility of hydrogen peroxide-based disinfectant (Surface disinfectant) with commonly used elastomeric dental impression materials and evaluate the effects on surface detail and dimensional stability of the exposed impression materials.

Materials and Methods

Three popular vinyl polysiloxane (VPS) were used in this study [Aquasil® (Caulk-Dentsply); Imprint® (3M); and Take-1® (KERR-Sybron SDS)]. The disinfectants tested in this study were Optim 33 TB - 0.5% Hydrogen Peroxide (SciCan, Canada). ANSI/ADA specification #19 test methods for elastomeric impression materials and ANSI/ADA spec. 18 & 19 dies were used in this evaluation.

Figure 1: Disinfection of contaminated impressions

Legend:
All impressions are contaminated with saliva/blood and must be decontaminated immediately after making. Methods of decontamination include spraying with an approved intermediate-level surface disinfectant or immersion in a high-level disinfectant for the given exposure time (TB Kill Time) followed by a rinse with water before pouring the casts.
Processing the Samples

The light body material was initially applied on the lines followed by the heavy body material. All impressions were made and allowed to polymerize at 35+1°C to replicate the temperature in the mouth (set in water under a 1 Kilogram weight). Treatment samples were rinsed in water and sprayed with the surface disinfectant or immersed in the immersion disinfectant for their respective exposure time, rinsed in running water. Control samples were only exposure to water for the same times as their experimental samples. All treatment and control samples were die matched. The dies were steam cleaned after each impression and a die separator applied.

Surface Detail Reproduction - Both the experimental and control group samples were studied at a magnification of 20X and clarity of the 20 micron line’s reproduction rated from 1-4 (with 1 being the best result and 4 being the worst). Differences in measurements between the groups determined using ‘comparison of group means’ at an alpha of 0.05 to study adverse effects if any due to the use of the disinfectant.

Dimensional Stability - After air-drying both the experimental and control group samples had a stage graticule with micron markings, placed on the impression surface and scanned using an optical image scanner under a very high resolution to capture the impression surface including the measurement grid on the stage graticule. These images were imported into Image Tool Ver.3 Software (UTHSCSA Dental School, San Antonio, USA).

Differences in measurements between the groups in the post 24 hour line lengths were determined using ‘comparison of group means’ at an alpha of 0.05 to study adverse effects if any due to the use of the disinfectant.

Results & Discussion

Surface detail reproduction - Three investigators individually rated the lines (Treatment and Control) of each material for the Surface Disinfectant. A total of 288 lines (N) were rated by 3 raters (n1=96; n2=96; n3=96) from a scale of 1-4 and the overall mean calculated for the three raters for each Disinfectant Protocol. No significant difference was noted in the ratings of the 25 micron line between the Treatment Group and the Control Group for each impression material in the Surface Disinfectant Study with respect to surface detail reproduction (p>0.05).

Dimensional Stability - A total of 96 lines (N) were measured (48 baseline and 48 post exposure and post 24 hours wait) that were exposed to each disinfection protocols. Student’s-t Test was used to compare differences between treatment and control groups for each material and each disinfection protocol. No significant difference noted between the treatment samples and the experimental samples for each of the material in the Surface Disinfectant Study with respect to dimensional stability (p>0.05). Can this section be condensed perhaps referring to the full study document. We only have one page for this Abstract.
In this study, both the Optim 33 TB - 0.5% Hydrogen Peroxide (SciCan, Canada) had no deleterious effect on the tested three popular vinyl polysiloxane impression materials when used per manufacturer's recommendation.

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References:
16. CDC Guidelines for Infection Control in Dental Care Settings, MMWR. 2003; 52. (NOOR-17)