

# "Effect of Disinfection of Autopolymerizing Custom Tray Material On The Tensile Bond Strength of An Elastomeric Impression Material Adhesive." :A Study

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## INTRODUCTION:

Effective infection control procedure is a need of the hour by all dentists, dental auxiliaries and dental technicians in the dental office and dental laboratories in order to prevent the transmission of diseases. Blood and saliva may carry high concentrations of potentially infective viruses & bacteria that can produce common cold, herpes, hepatitis, pneumonia and tuberculosis and are the suspected modes of transmission of acquired immuno deficiency syndrome (AIDS). The dental office has primary responsibility for infection control and if disinfection procedures are not practiced, a cycle of cross contamination may occur, thereby exposing personnel and patients to infection.

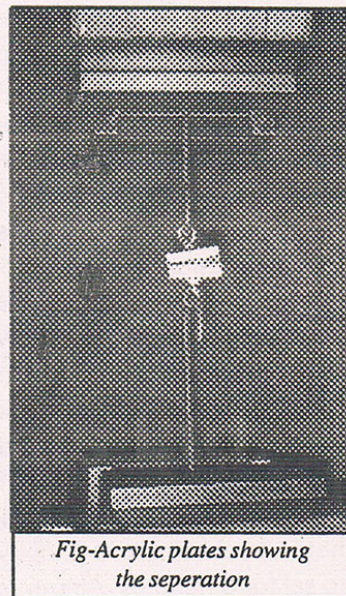
The dental operatory poses two major infection control problems namely, occupational exposure risk and cross contamination. One of the dental procedures that commonly causes contamination between patients and the dental personnel is while making an impression.

It is recommended that dental prosthesis, contaminated dental materials and intra oral devices including impression trays, returning from the laboratories should be cleaned and disinfected before placing in the patient's mouth. Blood and saliva should be thoroughly dispelled from materials that

have been used in the mouth. Several chemical agents are available for this purposes. Chemical disinfectants must be effective in destroying vegetative forms of pathogenic organisms.

After chemical disinfection of custom tray the effect of the tray adhesive may be altered, which in turn could affect the bonding of impression material to the tray and hence the accuracy of impression.

Therefore the aim of this study was to appraise the effects of disinfection of autopolymerizing custom tray material on the tensile bond strength of Polyvinylsiloxane impression material adhesive (methyl chloride). The disinfectants used were 2% glutaraldehyde and 5.25% sodiumhypochlorite.



*Fig-Acrylic plates showing the separation*

## MATERIALS & METHODS:

Thirty pairs of acrylic plates were prepared for this study. The acrylic plates

consisted of male and female parts. The male part consisted of two projections and the female part two slots to ensure a uniform space for the impression material, when the projection of male acrylic plates snugly fitted into the slots of female acrylic plates leaving with 3mm space for the impression material. These plates were divided into three group, Group A, B and C each group containing ten pairs of acrylic plates. Ten pairs of acrylic plates were treated with 2% glutaraldehyde (Group B) and other ten pairs were treated with 5.25% sodium hypochlorite (Group C). The remaining ten pairs of acrylic plates acted as untreated control group (Group A). The acrylic plates were disinfected for 10 minutes, they were rinsed in tap water for 1 minute and dried for 24 hrs. The test surface of each acrylic plate were examined under stereomicroscope at magnification of 160x and 400x. Polyvinylsiloxane impression material with the tray adhesive was used to evaluate any effect on the bond strength between the impression material adhesive and the disinfected custom tray. A thin uniform layer of adhesive was applied on the test surface of each acrylic plate and allowed to air dry for 15 minutes. Polyvinylsiloxane impression material was mixed according to manufacturer's instructions and was placed in between the two acrylic plates. The plates were centered and held under pressure with the help of rubber band & allowed the material to set for 6 minutes. After 6 minutes the specimens were mounted in an universal testing machine (MOHR AND FEDERHAFF, MANNHEIM-GERMANY 60 TONS) and the tensile bond was tested applying required amount of load .

## RESULTS:

Among the test specimens, the highest mean value of tensile bond strength was evinced by group B (2% glutaraldehyde) was

3.33 kg/cm<sup>2</sup>. The mean value of tensile bond strength exhibited by group C (5.25% control group) was 2.88 kg/cm<sup>2</sup>. This showed that acrylic resin disinfected with sodium hypochlorite and the acrylic resin without disinfection showed almost the same tensile bond strength when compared to control group.

Thus, between group A and group B, it showed 15.12% increase in tensile bond strength; between group A and group C showed 2.77% increase in the tensile bond strength.

Group A (control group) and group C (5.25% sodium hypochlorite) did not show much difference in mean tensile bond strength but at the same time group B (2% glutaraldehyde) evinced the highest bond strength furnishing a superior bond between the impression material and the custom tray which was statistically highly significant.

Stereo-microscopic study of all the specimens after 24 hours revealed homogeneity with occasional grooves

across the surface for the Group A (control group), 2% glutaraldehyde (group B) treated specimens showed increased surface roughness and localised definite cavitations and the specimens treated by 5.25% sodium hypochlorite (Group C) also showed the increased surface roughness and increased irregular cavitations. Increased surface

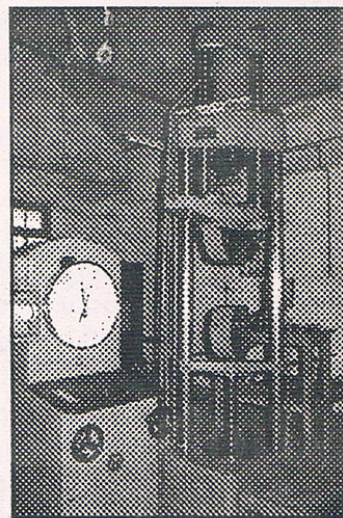


Fig-Universal testing machine

roughness and definite cavitations in case of Group B when compared to that of Group A suggests increased surface area for retention of impression material adhesive and the custom tray material; probably suggesting the resin for the increase in the tensile bond strength. The sample from Group C showed a heavily caivated surface with thin overhangings of the acrylic resin. These overhanging defects suggest the decrease in tensile bond strength in group C as compared to the sample of group B.

In this study glutaraldehyde disinfectant solution showed increase in mean tensile bond strength by 15.12% with that of untreated samples which suggests increase in the surface stiffness may increase the bond strength.

#### CONCLUSION:

Careful selection, appropriate combination of materials and disinfection

procedures should be made to maximize the bond strength of the clinical acceptability. On the basis of the data obtained from this study, the use of the tray material (tray acrylic) disinfected with 2% glutaraldehyde with the Polyvinylsiloxane impression material proved adequate adhesion of the impression material to the custom tray.

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