

Comparative Evaluation Of Different Surface Treatments On The Shear Bond Strength Of Acrylic Teeth To Polyamide Denture Base Material: An Invitro Study

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Abstract: The polyamide flexible denture base requires special modification on the tooth surface for the enhancement of the shear bond strength. Monomer, sand blasting, hydrofluoric acid and silane bonding agent were applied to the 15 samples made and normal injection molding procedure was followed for the fabrication of flexible denture base materials. The resultant shear bond strength was tested in this present study. It was found that Silane coupling agent also increases the bond strength between the denture base and ridge lap area.

I. INTRODUCTION

In the recent years, polyamide based flexible dentures have gained widespread popularity both among the clinicians and patients owing to its flexibility and esthetic advantages it offers to traditional removable partial and complete dentures.

NEED FOR STUDY

The polyamide based resin material does not truly bond with resin teeth and hence utilizes retention slots placed on the resin teeth. Recent studies have been conducted on bond strength of polyamide resin to resin denture teeth after surface treatments, but with no significant increase in the bond strength.

OBJECTIVES OF THE STUDY

To evaluate the shear bond strength of acrylic teeth to polyamide denture base resin after various chemical and mechanical surface treatments.

II. METHODOLOGY

The 15 test specimens were prepared by aligning the long axis of the selected molar acrylic teeth at 45 degree to the base of wax block of size 10mm×10mm×30mm with ridge lap area contacting the base. (Fig-1) These specimens were dewaxed, surface treated (Fig 2 and 3) and categorized again into 5 sub-groups with each sub group having 3 specimens. The sub-groups are named as control, sand blasting, hydro-fluoric acid, monomer and silane bonding agent respectively. The specimens were processed with flexible denture base resins

using teeth with various chemical and mechanical surface treatments. (Fig-4) The final sample was obtained (Fig-5) the samples were tested for the shear bond strength using universal testing machine. Fig 6 shows the schematic representation of application of force to test the shear bond strength.the values were recorded.



Figure 1: Wax Samples



sand blasting, hydro-fluoric acid, monomer and silane bonding agent

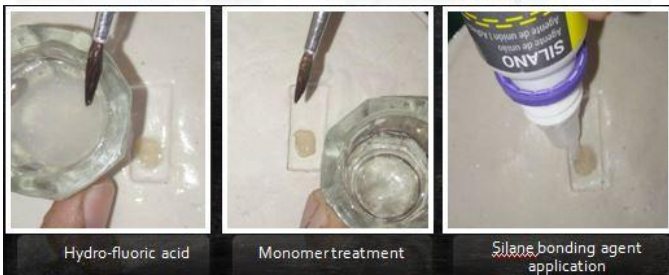
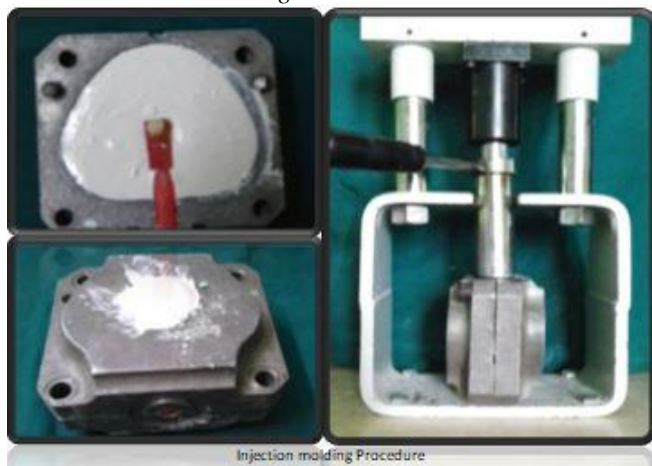


Figure 2 and 3



Injection molding Procedure

Figure 4



Figure 5

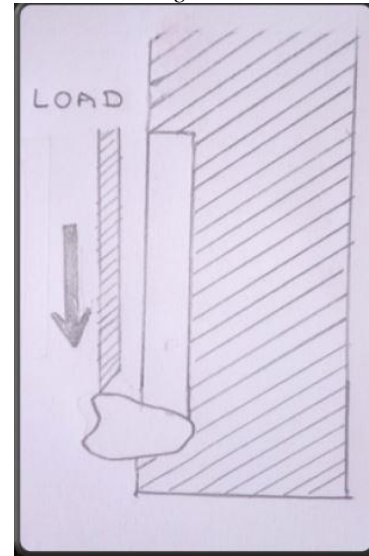


Figure 6

III. RESULTS

The results were tabulated and statistically analyzed using ANOVA. The results were statistically significant ($p < 0.005$)

Surface treatment	Sample 1	Sample 2	Sample 3
Control	118.3 N	121.8 N	116.4 N
Sand blasting	126.8 N	132.7 N	129.9 N
Hydro-fluoric acid	137.6 N	142.9 N	138.7 N
Silane bonding agent	172.8 N	178.7 N	180.9 N
Monomer	145.7 N	148.9 N	143.8 N

Figure 1

IV. FINDINGS

- ✓ There is a lack of bond between untreated acrylic teeth and flexible resin denture base materials.
- ✓ De-bonding may be the result of incompatible surface conditions at the tooth and denture base interference.
- ✓ The shear bond strength of denture teeth bonded to denture base material can be enhanced by the application of suitable bonding agent.
- ✓ The bonding agent increases the wettability of the tooth surface and may have a solvent effect.

- ✓ Silane coupling agent also increases the bond strength between the denture base and ridge lap area

V. DISCUSSION

The flexural properties differences between acrylic teeth and denture base resins cause continuous flexure and incorporate stresses that cause tooth detachment. Maxillary canine and incisors are most commonly separated tooth because of the lesser ridge lap area.

Acrylic teeth generally bond better to heat cure resins because of the heat that diffuses the monomer into the denture teeth. Various methods were employed for the enhancement of shear bond strength in flexible denture bases resins. Mechanical preparation improves bond strength. Application of monomer also increases the bond strength.

VI. CONCLUSION

Within the limitations of the study it can be concluded that

- ✓ Surface treating the acrylic teeth with any surface treatment can increase the effective bond strength
- ✓ Surface treatment done with the silane bonding agent produces most effective bond
- ✓ Order of effectiveness is Sand-blasting < Hydro-fluoric Acid < Monomer < Silane bonding.

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