

## **Evaluation of Effect of Soft Liner on Shear Bond Strength between Flexible Denture Base Material and Heat Cure Acrylic Resin.**

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### **I. Introduction**

Denture base materials are being modified by various researchers performing types of researches since the time of its evolution. A breakthrough came when flexible denture base material was introduced. The innovation of the nylon derived denture base material in the 1950 paved the way for a new type of dentures.<sup>(1)</sup> A number of efforts are being made to improve properties of flexible denture base material. It is because of its property of being highly esthetic; biocompatibility and flexibility that made it become popular choice among denture bases especially for removable partial denture bases.

Elastomeric resins can be added to resin to create greater flexibility and can be strengthened with glass fibers.<sup>(2,3)</sup> The flexibility present in flexible denture base materials make it good choice for highly resorbed cases, ridges with bony spicules, very thin mucosal lining over the ridge. Its good to use for patients with high esthetic demands, as these materials have excellent esthetics and biocompatibility, so they are good in meeting with demands of esthetics with patient with very specific needs.

Sometimes even the best denture material is not suited in some cases, to compensate the problems caused sometimes by denture base material, resilient liners are used. They help simplify problem of masticatory force distribution over the given area equally, provides relief to the abused tissue and prevents further laceration of underlying mucosa.

Since the introduction in the 1950 these viscoelastic materials have undergone some development and improvement, being used to form all or part of the fit surface of denture and help condition traumatized tissues providing an interim or permanent cushion like effect.<sup>(4)</sup> Use of soft liners has been done widely in complete dentures to provide relief to the underlying abused mucosa. These abuse maybe caused due to bony spicules underlying the ridge, highly resorbed ridges, irregular bony contours, underlying of mucosal lining being very thin, and sometimes even after all prosthetic adjustments the patients still feel discomfort and pain due to low pain threshold. A tissue underneath the lower denture usually receives more masticatory pressure per unit area than the tissue beneath the upper denture.

The study was conducted to assess the bond strength of chair-side silicone based liner with flexible denture base material compared with the bond strength of silicone based liner with heat cure denture base resin.

### **II. Materials & Method**

The study was conducted in the following phases-

Two groups were made, Group 1 samples fabricated from Pyrax heat cure denture base material and Group 2 samples fabricated from Macrodent flexible denture base material, the relining material used in both groups was Mollosil soft liner of DETAX, GmBH, Germany.

Wax patterns were designed with dimensions of (70mm X 12mm X 5mm length, width and thickness respectively) having a stopper of depth 3mm. One part of the sample was placed on the other leaving a space between them of dimensions (12mm X 12mm X 3mm length, width and thickness respectively) to sandwich the relining material.

1) Preparation of Heat Cure resin samples: The samples of Heat cure acrylic resin were prepared according to manufacturers instruction. The curing was done at 74°C for One and half hours and 100°C for half hour.

After curing deflasking was done and the samples were removed then finished and polished except the areas that would be attached to relining material which represent the tissue surface of the denture. After polishing the samples were conditioned in distilled water at 37°C for 48 hours. The samples were ready for relining.

- 2) Preparation of Flexible resin samples: (Fig 1). The flasking techniques used was that for making Flexible Dentures. The procedure started with preheating of the cylinder of the machine to 290°C then the cartridge of the flexible denture base material was inserted inside the cylinder and the flask was placed in its position in the machine, after that thermosens material started to be injected after heating time of 18 minutes and a pressure of 6.5 bar at 290°C according to the manufacturer's instructions. After injecting the thermosens material the program ended with cooling for 1 minute, and then the flask was removed from the machine and allowed for cooling at room temperature. The flask was opened and the samples were removed from it then the sprues were cut and the samples were finished and polished except the areas that will receive the relining material. The samples were conditioned in distilled water at 37°C for 48 hours. Then the samples were ready for relining.



**(Figure. 1)** Thermoject machine

- **Measuring Procedure of Shear bond Strength**
- The samples (fig.3) were subjected to shear load with cross head speed (1mm/min) using load cell capacity (1000N) of the Instron machine. (fig.2)



**(Figure.2)** Instron Testing Machine



**(Figure.3)** Samples of flexible and heat cure denture base material with soft liner

### **III. Result**

- The results were reported and submitted One-way Tukey test, analyses were performed using a statistical analysis program (SPSS 12.0, SPSS Inc, Chicago). Significance level was 0.05
- The result (Table 1) procured showed that the shear bond strength of silicone relining material was higher with heat cure denture base material as compared to shear bond strength of silicone relining material with flexible denture base.

GROUP	BOND STRENGTH	
	MEAN	STANDARD DEVIATION
GROUP I	1.96	0.39
GROUP II	0.55	0.21
STUDENT T TEST	9.891	
P VALUE	0.001(HS)	

TABLE 1. Mean values of shear bond strength

#### IV. Discussion

Resilient soft liners are widely used in prosthetic dentistry as an adjunct to removable prosthesis to restore the health of the inflamed and abused denture supporting tissues. These materials are commonly used for patients with resorbed mandibular alveolar ridge, thin and nonresilient.

Soft lining materials used were distinguished as silicone based type and plasticized based acrylic type. The major advantage of silicone over acrylic-based soft liners is that the former retains its inherent softness whereas the latter tends to lose its resiliency as the plasticizer leaches out of the material. Silicone soft liners are basically dimethylsiloxane polymer and can be of heat- or self-curing type with the latter showing greater tendency to peel away from the denture base. On the other hand, self-curing soft liner allows the clinician to reline the prosthesis directly in the mouth without leaving the patient without the prosthesis during laboratory procedures.<sup>(6)</sup>

Flexible dentures are not the same as a soft reliner for traditional dentures. Flexible dentures are a special flexible resin that prevents them from chafing the gums, allows the wearer to chew properly. It also provides a soft base that prevents the gums from being rubbed raw. Some of the commercially available products are Valplast, Duraflex, Flexite, Proflex, Lucitone, Impak where as valplast and lucitone are monomer free.<sup>(7)</sup>

Even after using flexible denture base material there are certain problems, which still arise no matter how much correction is done, even flexible material may require relining. There are numerous studies investigating bond strength between soft liner and heat cure denture base. No studies have been reported on investigating bond strength between flexible denture base and soft liner. The present study was designed to evaluate the shear bond strength at denture base-relining interface by using the mollosil as relining material and conventional heat cure acrylic and flexible denture base materials. The results determined that the shear bond strength of flexible resin with liner was less as compared to that of heat cure acrylic resin. This may be due to the loss of plasticizer that can alter the bonding surfaces or the viscoelastic properties of resilient materials, which become brittle, changing their bond strength properties.

#### V. Conclusion

- The study revealed that bonding between silicone based liner and flexible resin was less when compared to bonding between liner and heat cure acrylic resin.

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