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Effect of Surface Conditioning Method and Chemical Treatment on the Bond Strength of Acrylic Teeth with Different Denture Base Material- An In-Vitro Study

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INTRODUCTION

Artificial acrylic teeth have been used in the fabrication of complete denture since long. They are the most widely used artificial teeth. Loss of adhesion between denture teeth and denture base is a frequently encountered clinical problem. This problem is even more serious with the introduction of highly cross-linked acrylic teeth which has better fracture resistance, abrasion resistance and strain resistance but on the other hand the bonding ability of the teeth to denture base resin was found to be reduced. Dental materials have been evolving with time. Acrylic resins were introduced in 1940's and have been serving dentistry till today. Few materials with superior properties are available in market but simple processing equipment and relatively low cost of the fabrication makes acrylic resin most popular choice.¹

Teeth being the integral part of the prosthesis are subjected to stresses in different direction. With the increased use of implants and hence increased forces applied to prosthetic components, it is probable that tooth debonding will become an even greater clinical problem. Hence good chemical and physical properties are needed for materials used for artificial teeth. In most instances the bond seems satisfactory, still failures can be found in practice. Contributing factors include improper processing, which permit traces of wax to remain on ridge laps of the teeth, and careless application of tin-foil substitutes to the ridge lap area of the teeth, which can prevent chemical bonding.²


Most attempts to improve the bond strength of denture teeth to an acrylic resin denture base have involved chemical or mechanical modification of the ridge lap portion of the denture tooth. Various chemical surface treatments using monomer, non-polymerizable solvents, dissolved Poly methyl methacrylate, combination of above or adhesives are comparatively less time consuming, and they improve bonding to a satisfactory extent. Solvents like ethyl acetate and acetone were used as surface preparation agents to increase the bond strength for denture repair.³ Studies have shown that acetone induces swelling and softening effects to the superficial layer of acrylic teeth thus increasing their

bonding ability to denture base resins.⁴ Mechanical modification as advocated by Lang R et al includes methods such as grinding, surface grooving or sand blasting.⁵ Takahashi et al found that the preparation of a diatoric and application of dichloromethane on the base surface of the teeth significantly improved the bond strength.⁶

Denture teeth generally bond better to heat-cured denture base resin than to autopolymerizing resin. Higher polymerization temperature of heat-cured resins enhances the diffusion of monomers into the denture teeth, thus increasing the bond strength.⁵

Attempts to overcome the problems associated with compression molding have resulted in the development of the continuous injection system. Which was introduced in 1942, this system eliminates the flash of resin between the halves of the flask which compensates for polymerization shrinkage by forcing extra resin into the flask during polymerization. Recent studies have shown a significantly smaller incisal pin opening for complete dentures produced by an injection system compared with dentures produced with the compression molding technique. The injection pressing method that uses the SR-Ivocap system (Ivoclar, Amherst, N.Y.) has reported advantages, including decreased need for a clinical remount. However there is not much literature on the evaluation of the bond strength by using high impact denture base resin material.⁽²¹⁾

So a study was planned to investigate the bond strength of this material in comparison with other denture base materials. The purpose of this study is to determine a particular surface conditioning method and chemical surface treatment method and the effect of such treatment on bond strength between acrylic teeth and different denture base materials.

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