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Bonding strengths of reline resin to new flexible partial denture base material

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결합강도에 관한 연구

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이 논문을 치의학 석사학위신청 논문으로 제출함

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국문 초록

새로운 탄성 국소의치상 레진과 이장 레진간의 결합강도에 관한 연구

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현재 국소의치 무치악부에 사용되는 의치상의 재료는 PMMA 성분을 주로 하는 아크릴 레진이다. 강도 및 심미성에 있어 우수하고 파절 및 변형에 대한 수리와 첨상이 용이하다는 점에서 현재까지 많이 사용되고 있다. 하지만 금속 구조물(metal framework)과 함께 제작이 되어야 함으로써 보철물의 부피가 커지고 클래스프로 인한 비심미적인 문제가 야기되었다. 이러한 문제점을 보완하기 위하여 열가소성 레진을 이용한 탄성국소의치가 제작되어 사용되고 있다. 하지만 기존의 탄성 국소의치는 첨상이 어려운 점, 탄성의 상실 시 유지가 급격히 감소될 수 있는 점, 변색 등의 문제점이 발생되므로 사용에 제한이 있다.

본 연구는 새로운 탄성 국소의치에 사용되는 Acrytone의 물리적 성질을 통상적인 국소의치에서 사용되는 열중합형 PMMA 레진(Paladent 20)과 기존의 탄성 국소의치에 사용되는 나일론 성분의 열가소성레진(Biotone)과 비교함으로써 Acrytone의 유용성을 알아보고자 하였다.

3가지 의치상 재료(Paladent 20, Biotone, Acrytone)와 2가지 이장레진(Tokuyama Rebase II, Mild Rebaron LC)간의 각각의 결합강도를 측정하기 위하여 인장결합강도 시험과 3점 굽힘 시험을 시행하였다. 의치상 시편은 제조사의 지시에 따라 각 실험군당 9개씩 총 108개를 제작하였다. 측정된 결합강도는 이원분산분석을 이용

하여 비교 분석하였고 사후 검증으로 Tukey HSD를 시행하였다. 결합면의 실패 양상 또한 관찰하였다.

연구 결과 인장결합강도 시험 및 3점 굽힘 시험 모두에서 다음과 같은 결과를 보였다.

1. Acrytone은 자가중합 및 광중합 이장 레진에 대하여 열중합 PMMA 레진인 Paladent 20과 비슷한 인장 및 굽힘 결합 강도를 보였다.
2. Paladent 20 과 Acrytone 군에서 광중합형 이장 레진(Mild Rebaron LC)이 자가중합형 이장레진(Tokuyama Rebase II)보다 더 높은 결합강도를 보였다.
3. Biotone은 모든 이장 레진에 대하여 가장 낮은 인장 및 굽힘 결합강도를 보였다.

본 연구를 통하여 기존의 탄성 국소의치에 사용되는 나일론 성분의 열가소성 레진은 첨상이 불가능한 반면, Acrytone은 광중합 및 자가중합용 이장 레진을 이용한 첨상이 가능함을 알 수 있었다. Acrytone을 이용한 국소의치의 제작은 기존의 탄성 국소의치와 같은 flexible한 장점을 가짐으로써 금속의치상을 생략할 수 있고, 첨상이 가능하며 또한 기존의 금속의치상에 병용, 사용 가능함으로써 임상에서 다양하게 적용될 수 있을 것으로 사료된다.

I. Introduction

Denture base resins are generally classified into heat-polymerized PMMA, autopolymerizing PMMA, and thermoplastic resin. Recently, light-polymerized and microwave-polymerized resins are also introduced and clinically used as denture base material. Acrylic resin, the main component polymethyl methacrylate (PMMA) is the predominant denture base material in use because of its exceptional physical and clinical properties.[1] Some of the characteristics include good color and dimensional stability, tissue compatibility, and strength.[2] Another favorable property of PMMA resin has been its ability to bond to new resin, even after complete polymerization. The resin-bonding reline or repair procedure involves grinding away some of the surface denture base material to expose fresh underlying resin. Cross-linkage of the surface molecules between the parent acrylic resin and the new reline or repair material, although not as complete as the initial polymerization process, is clinically acceptable.[2-4]

Acrylic resin presents excellent resistance to the oral environment, most solvents and UV radiation. However, there is a risk of toxicity and hypersensitivity to the material due to products of oxidation and other components of the system.[5] Mucosal irritation caused by released methyl-methacrylate have been reported.[6]

Increased awareness of esthetics in dentistry has led to the need for removable partial dentures (RPDs) that reveal little or none of the metal supporting structures or retentive elements. Krol and Finzen's[7] review concerning the rotational path for RPDs insertion pointed to the development of RPD designs that avoid anterior direct retainers. Unfortunately, many clinical situations are not suitable for using these concepts, and conventional metal retainers in the anterior region are often necessary.[5]

To compensate for these problems, non-metal clasp dentures using thermoplastic resins have recently become a treatment option for patients. Thermoplastic resins are polymer resins that becomes a homogenized liquid when heated and hard when cooled. Injection molding technique is a manufacturing process for producing denture from these thermoplastic resins. Several types of non-metal clasp dentures using thermoplastic resins are available, all with the advantages of superior esthetics and the reduced potential for allergic reactions to PMMA or metals.[8] Furthermore, the flexibility of these materials prevents prosthesis fractures and allows lighter and more comfortable prostheses. Flexible resins don 't require teeth preparation as do conventional RPDs, and they reduce the chairtime for construction of the prosthesis.[5] However, it has some limits such as difficulties in reline and repair[9], discoloration[10] and sudden decrease of retention in case of loss of flexibility. Therefore, many denture base materials are still being newly developed. These materials need excellent mechanical properties in oral environment.

Acrytone(HIGH-DENTAL-JAPAN Co., Osaka, Japan) is a new introduced denture base material to maintain the advantages and overcome the shortcomings of PMMA resin and existing thermoplastic resins. Acrytone is thermoplastic resin made by injection molding technique and composed of PMMA. According to manufacturer, it is available for non-clasp denture due to elastic characteristic and relining with reline resin is possible because it is composed of PMMA.[11]

The physical characteristics presented by manufacturer shows that the flexural strength of Acrytone is similar with that of heat polymerized PMMA resin and elastic coefficient value approximately shows between the polyamide resin and heat polymerized PMMA resin. However, the study about adhesion of Acryton to reline resin has not been reported.

The purpose of this study is to evaluate clinical usefulness of Acrytone by comparing the bond strength of Acrytone, heat-polymerized PMMA resin and thermoplastic polyamide resin to reline resins.

II. MATERIALS AND METHODS

A. Materials

The materials used in this study and their chemical composition are presented in table 1.

Table 1. Composition of denture base and reline resins

Material	Material type	Composition Polymer	Monomer	Primer	Manufacturer
Denture base material					
Paladent 20	Heat-polymerized acrylic resin	PMMA	MMA		Heraeus Kulzer., Hanau, Germany
Acrytone	Thermoplastic acrylic resin	PMMA			HIGH-DENTAL-JAPAN., Osaka, Japan
Biotone	Thermoplastic polyamide resin	Polyamide			HIGH-DENTAL-JAPAN., Osaka, Japan
Reline resin					
Tokuyama Rebase II	Autopolymerizing type	PEMA	AAEMA	Ethyl acetate (47%) Acetone(47%)	Tokuyama Dental Corp., Tokyo,J apan
Mild Rebaron LC	Light-activated type	PEMA	EMA	Dichlorometha -ne	GC Corp.,Tokyo, Japan

*PMMA: poly (methyl methacrylate); PEMA: poly (ethyl methacrylate); AAEMA: acetoacetoxyethyl methacrylate

To measure the bond strength of denture base materials: Paladent 20(heat-polymerized PMMA resin), Acrytone(thermoplastic PMMA resin) and Biotone(thermoplastic polyamide resin) to reline resins: Tokuyama Rebase II(autopolymerizing resin) and Mild Rebaron LC(light-polymerized resin), the specimens have been produced according to the manufacturers' recommendations(Table 2).

Two types of reline resins were applied to three types of denture base materials. So total 6 test groups were made(Table 3).

Table 2. Fabrication method of denture base specimens

Material	Molding method	Curing method
Denture base material		
Paladent 20	Compression molding	Heat processed at 80℃/15min, boiling water for 20min
Acrytone	Injection molding	260℃ melting/25min Injection at 0.7MPa Cooling under pressure (30min. in air, 30min. in water)
Biotone	Injection molding	300℃ melting Injection at 0.7MPa Cooling under pressure
Reline resin		
Tokuyama rebase II	Autopolymerizing type	Tokuyama rebase II primer for 30sec ; pour-mixed reline polymer
Mild Rebaron LC	Light-activated type	Mild Rebaron LC primer for 30sec ; pour-mixed reline polymer, 10min light curing

Table 3. Test groups

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Denture base material	PAL 20	ACT	BTN	PAL 20	ACT	BTN
Reline resin	TRII	TRII	TRII	MRB	MRB	MRB

PAL 20: Paladent 20, ACT: Acrytone, BTN: Biotone

TRII: Tokuyama Rebase II, MRB: Mild Rebaron LC

B. Methods

1. Tensile bond strength test

Three different denture base polymers were prepared. Nine specimens for each test group, total 54 specimens were prepared. 2 brass dies with 10mm diameter and 43mm length were used. These dies were invested in silicone rubber. The obtained mold was used for the preparation of the wax blocks, which were used for the production of the denture base polymer blocks. Denture base polymers were polymerized according to the recommendations of the manufacturer(Table 2). The specimens were removed from the flask, and 3 mm of the material was cut off from the midsection using a diamond disc. Surface treatment agent provided by the manufacturer was applied to the sectioned denture base surfaces with a brush and left to dry for 30 seconds. The specimens were then secured back into the silicon molds, and the specimens and reline resins were polymerized. After removal of the specimens from the silicon molds, excess material was removed using a laboratory handpiece and a bur(Fig. 1). The specimens were immersed in distilled water at 37℃ for 50 hours.

Tensile bond strength testing was performed on each specimen until failure.[12] A universal testing machine(AGS-1000D series, SHIMADZU Co., Japan) at a crosshead speed of 5 mm/min was used for this test(Fig.2). The maximum tensile load before failure was recorded for each specimen. Tensile bond strength was calculated as the load at failure divided by the cross-sectional area of the specimen.

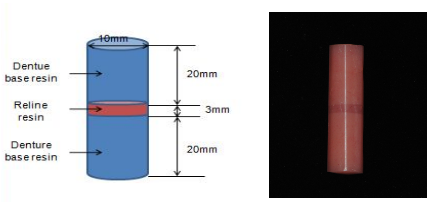


Fig. 1. Specimen preparation for tensile bond strength test.

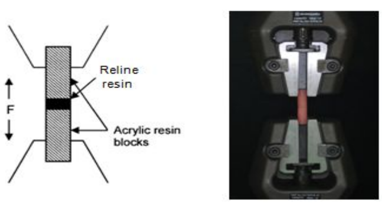
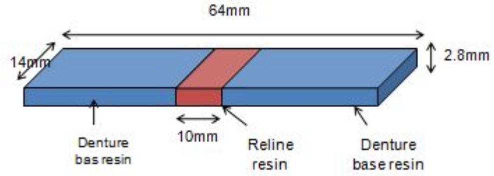


Fig. 2. Testing apparatus for tensile bond strength test.

2. 3 point bending test

Nine specimens for each test group, total 54 specimens were prepared to the dimensions of 64mm x 14 mm x 2.8 mm, according to ADA Specifications 12, 13 and 17 for testing denture base materials in transverse deflection.[4] The specimens were manufactured in the same manner as previously described in the tensile bond strength test. A 10 mm section was removed from the center of each specimen. Surface treatment agent provided by the manufacturer was applied to the sectioned denture base surfaces with a brush and left to dry for 30 seconds. The samples were then replaced in the molds and the missing 10 mm sections were repacked with reline resins. The samples were polymerized according to manufacturers' recommendations. After removal of the specimens from the silicon molds, excess material was removed using a laboratory handpiece and a bur(Fig.3). The specimens were immersed in distilled water at 37℃ for 50 hours.

The transverse bond strength of the specimens was measured using a 3-point bending test in a universal testing machine(AGS-1000D series, SHIMADZU Co., Japan) at a crosshead speed of 5 mm/min(Fig.4). The transverse bond strength of each specimen unit was determined using the formula: $S=3WL/2bd^2$. where W is the flexural load, L is the distance between supports (50.0 mm), b is the specimen width, and d is the specimen thickness.



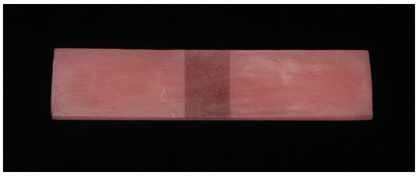


Fig. 3. Specimen preparation for 3 point bending test.

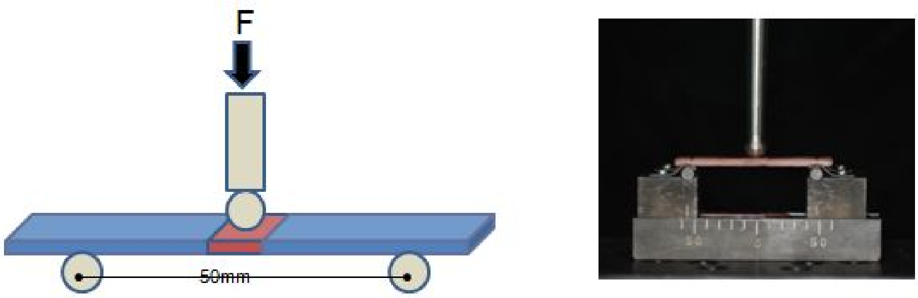


Fig. 4. Testing apparatus for 3 point bending test.

3. SEM analysis of fracture sites

To examine the mode of failure of specimen, the failure sites were examined visually and by means of scanning electron microscopy, SEM(S-4800, HITACHI, Japan). All specimens were gold sputtered with a sputter coater and examined by means of a SEM at 15.0 kV. The SEM photomicrograph were developed with X 40 magnification for visual inspection. The failure mode was recorded as either pure adhesive, cohesive, or mixed adhesive.

(1) Pure Adhesive failure

:if there was no trace of any reline resin on the denture base polymer surface, the failure mode was classified as pure adhesive failure.

(2) Mixed adhesive failure

:if there was thin reline resin residue on denture base polymer surface, it was classified as mixed adhesive failure. The thin reline resin residue on denture base polymer surface means that mixed adhesive failure has the stronger bond strength than pure adhesive failure.

(3) Cohesive failure

: complete bulk(cohesive) failure of reline resin.

4. Statistical analysis

Tensile and transverse bond strength(MPa) values were calculated and compared with each other using 2-way ANOVA and the Tukey HSD tests (α=.05).

III. Results

1. Tensile bond strength test

The mean values of tensile bond strength of specimens are shown in Table 4. For statistical comparison, 2-way ANOVA was performed. Table 5 shows the values for between-subject effects(denture base and reliner) and the interaction term(denture X reliner). The results indicated that significant differences were found as a function of denture base polymer type($P<.001$) and the reline resins($P<.001$), whereas the interaction term was found to be no significant($P=.305$). For this reason, a 1-way ANOVA was performed for both factors using Tukey HSD post hoc comparisons(Table 4). The Tukey HSD post hoc comparison was applied to the denture base polymer/reline resin combinations($\alpha=.05$). The results showed that the tensile bond strengths of group 1(9.30 Mpa) and 2(8.39 Mpa) were significantly higher than that of group 3(1.42 Mpa) ($p<.05$). And group 4(13.48 Mpa) and 5(13.76 Mpa) were significantly higher than that of group 6(3.81 Mpa) ($p<.05$). There were no significant differences between group 1 and 2($p>.05$), and between group 4 and 5($p>.05$). These result revealed

(1) The tensile bond strength of Acrytone to Tokuyama Rebase II and Mild Rebaron LC was similar with Paladent 20.

(2) The tensile bond strength of Biotone to Tokuyama Rebase II and Mild Rebaron LC was lowest.

(3) For all base resins, Mild Rebaron LC showed better bond strength than Tokuyama rebase II.

Table 4. Mean tensile bond strength(MPa) between denture base resin and reline resin with 1-way ANOVA using Tukey HSD

	PAL 20		ACT		BTN	
	Mean	SD	Mean	SD	Mean	SD
TR II	9.30[a]	2.53	8.39[a]	1.84	1.42[b]	.33
MRB	13.48[c]	3.92	13.76[c]	3.49	3.81[b]	.52

Group with same superscripted letters not significantly different(P>.05)

Table 5. Effect of denture base polymer type and reline resin type on tensile bond strength compared by 2-way ANOVA

source	Type III Sum of square	df	Mean square	F	Sig.
Denture base	704.257	2	352.129	51.418	.000
Reliner	188.701	1	188.701	27.554	.000
Denture base x Reliner	16.717	2	8.358	1.221	.305
Error	301.327	44	6.848		
Total	5194.541	50			

a. R square = .753 (Corrected R square = .725)

2. 3 point bending test

The mean values of transverse bond strength of specimens are shown in Table 6. The statistical comparison with 2-way ANOVA indicated that significant differences were found as a function of denture base polymer type(P<.001) and the reline resins(P<.001), whereas the interaction term was found to be no significant(P=.056)(table 7). For this reason, a 1-way ANOVA was performed for both factors using Tukey HSD post hoc comparisons(Table 6). The Tukey HSD post hoc comparison was applied to the denture base polymer/reline resin combinations(α=.05). The results showed that the transverse bond strengths of group 1(15.08Mpa) and

2(17.68Mpa) were significantly higher than that of group 3(5.03Mpa) ($p<.05$). And group 4(24.93Mpa) and 5(27.54Mpa) and were significantly higher than that of groups 6(10.42Mpa) ($p<.05$). There were no significant differences between group 1 and 2 ($p>.05$), and between group 4 and 5 ($p>.05$). These result revealed

(1) The transverse bond strength of Acrytone to Tokuyama Rebase II and Mild Rebaron LC was similar with Paladent 20.

(2) The transverse bond strength of Biotone to Tokuyama Rebase II and Mild Rebaron LC was lowest.

(3) For all base resins, Mild Rebaron LC showed better bond strength than Tokuyama rebase II.

Table 6. Mean transverse bond strength(MPa) between denture base resin and reline resin with 1-way ANOVA using Tukey HSD

	PAL 20		ACT		BTN	
	Mean	SD	Mean	SD	Mean	SD
TR II	15.08[a]	2.21	17.68[a]	1.89	5.03[b]	.00
MRB	24.93[c]	2.82	27.54[c]	6.34	10.42[d]	1.40

Group with same superscripted letters not significantly different($P>.05$)

Table 7. Effect of denture base polymer type and reline resin type on transverse bond strength compared by 2-way ANOVA

source	Type III Sum of square	df	Mean square	F	Sig.
Denture base	2274.459	2	1137.230	116.481	.000
Reliner	945.015	1	945.015	96.794	.000
Denture base x Reliner	59.675	2	29.837	3.056	.056
Error	468.633	48	9.763		
Total	3747.782	53			

a. R square = .875 (Corrected R square = .862)

3. SEM analysis of the fracture sites

After testing the tensile bond strength, SEM analysis of the fracture sites were performed to evaluate the failure mode. With regard to failure type, group 1,2,4,5 presented mixed adhesive(77.8%, 88.9%, 100%, 88.9%), pure adhesive (11.1%, 11.1%, 0%, 11.1%) type of failure mode. Group 3 and 6 presented pure adhesive type(100%) of failure mode(Table 8, 9). Group 1,2,4,5 mainly showed mixed adhesive type failure mode which indicated that mixed adhesive type failure has the stronger bond strength than pure adhesive type failure.

SEM photograph showed mixed adhesive type failure mode in group 1, 2, 4, 5(Fig. 5 A, B, D, E). Biotone showed pure adhesive type of failure mode (Fig.5. C. F).

Table 8. Failure mode analysis in tensile bond strength test

Relining material	Denture base	Pure adhesive	Mixed adhesive	Cohesive
TR II	PAL 20	1	7	1
	ACT	1	8	-
	BTN	9	-	-
MRB	PAL 20	-	9	-
	ACT	1	8	-
	BTN	7	-	-

Table 9. Failure mode analysis in 3 point bending test

Relining material	Denture base	Pure adhesive	Mixed adhesive	Cohesive
TR II	PAL 20	3	6	-
	ACT	3	6	-
	BTN	7	-	-
MRB	PAL 20	0	7	2
	ACT	4	4	1
	BTN	7	-	-

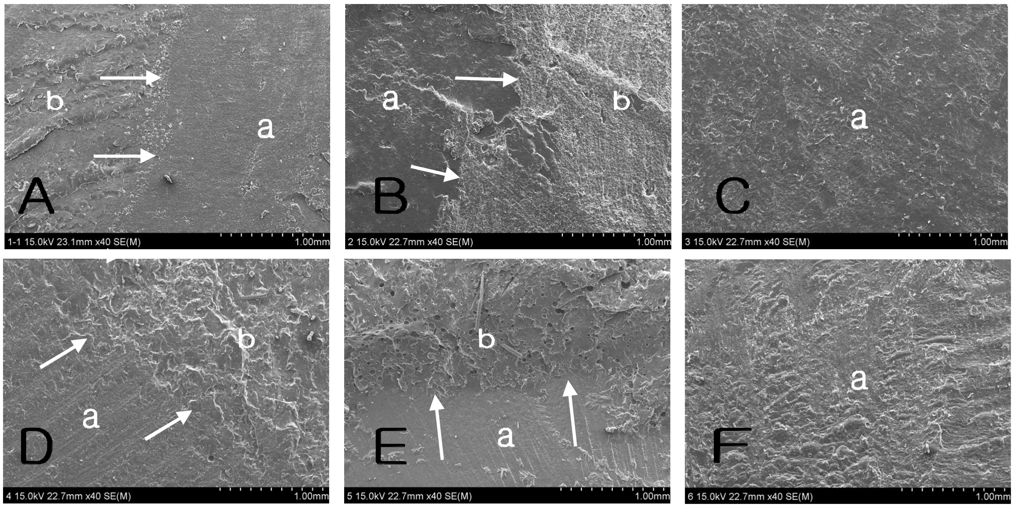


Fig. 5. SEM photograph(X40) of the fracture sites of denture base after tensile bond strength test.

;Arrow indicates the border between denture base and reline resin

A : group 1, B : group 2, C : group 3

D : group 4, E : group 5, F : group 6

a : Denture base, b : Reline resin

VI. Discussion

Existing removable prostheses often require denture base relines to improve the fit against the tissue-bearing mucosa because of gradual changes in edentulous ridge contours and resorption of underlying bone structure. “Chairside” hard resin relines offer an immediate and relatively inexpensive means to directly recondition the intaglio denture base surface of ill-fitting prostheses. One of the most important concerns for chairside relining is the strength of the bond between the reline and denture base materials. A weak bond could harbor bacteria, promote staining, or result in complete delamination of those two materials.[4)]

The bond properties of acrylic resin combinations have been the subject of various investigations. This property has been examined by several investigators using tensile[13-17)], shear[18)], bending[19,20)], and transverse[21-23)] tests. According to the current literature, there is no general agreement about a test method to be used for evaluating the bond strength of hard reline resins.[24)] In the present study, a tensile test and 3 point bending test as described in the ADA no.12 for denture base polymer were used. Tensile test method was preferred because it applies a simple tensile load to the joint, which allows for comparison among different materials[25)], providing a fracture surface that can offer information about the structure of the boundary layers and the location of failure. Measurement of transverse strength is more commonly used for the evaluation of denture plastics as compared to tensile or compressive strengths. This is due to the fact that transverse strength closely represents the type of loading applied to the denture.[26)] In addition, this test evaluates a combination of properties, such as tensile and compressive strength and modulus of elasticity.[27)] Therefore, we are purposed to evaluate the reliability of the result through these two different tests.

Bond strength between the existing denture base resin and the new reline resin is affected by chemical composition of the two resins.[28)]

Paladent 20 used in this study is heat-polymerized PMMA resin of which physical or clinical properties are excellent. Another favorable property of PMMA resin has been its bonding ability with new resin.[12)] The autopolymerizing and light-curing chairside reline systems are based on either PMMA or its copolymer poly(ethylmethacrylate)(PEMA). Because of nearly identical chemistry, the autopolymerizing and light-curing reline resins are considered to actively bond to the PMMA denture base resins.

Biotone used in this study is thermoplastic polymers belonging to the class known as polyamides. Its generic name is a Nylon. These polyamides are produced by the condensation reactions between a diamine and a dibasic acid.[29)] Polyamide resins have a low modulus of elasticity and are easily manipulated, these materials make it possible for larger undercuts to be used for retention compared to acrylic resin.[10)]

Polyamide resins are highly chemical-resistant materials due to its high degree of crystallinity. Therefore, It is hard to react with the monomers and resin primers of reline resins.[30)] In the result of this study, Biotone, which is polyamide resin, showed the lowest bond strength to the autopolymerizing and light-polymerized reline resins.

Acrytone used in this study is thermoplastic PMMA resin, produced by injection molding technique, not by polymerization of polymer and monomer. According to the manufacturer, Acrytone has 82Mpa of flexural strength, 2500Mpa of elastic coefficient. The flexural strength is similar to heat-polymerized PMMA resin and the elastic coefficient is in between polyamide resin and heat-polymerized PMMA resin. The flexibility of Acrytone is better compared to heat-polymerized PMMA resin, but about half of polyamide resin. The impact strength of Acrytone is two times of heat-polymerized PMMA resin. Thermoplastic polyamide resin is sensitive to temperature, so gently curved in hot water as a result of loosening in molecular structure. but Acrytone maintain the existing rigidity. Because molecular structure of Acrytone is changed in more than 70 degrees of heat, crack is likely to be in progress.

In this study, Acrytone showed similar bond strength with paladent 20 to autopolymerizing and light-polymerized reline resin. It is because that it has the same chemical composition with heat polymerized denture base resin.

The mechanisms for adhesion of hard reline resin to PMMA denture base materials are dependent on swelling of the surface by monomer or solvent, diffusion of monomers into the swollen PMMA denture base material, polymerization, and formation of interpenetrating polymer network(IPN).[31)]

Adhesion between denture base and reline resins can be improved by first applying appropriate chemicals to the acrylic resin surfaces. These chemicals etch the surface by changing morphology and chemical properties of the materials. Normally this change is obtained by wetting the surfaces with methyl methacrylate. Organic solvents such as chloroform, acetone, and dichloromethane have also been used for this process. Some investigators have reported that these organic solvents increase the bond strength of a reline resin to the denture base.[32)]

In this study, before chairside reline resins apply to the surfaces of denture base resins, the surfaces of denture base resin were treated with primer provided by the manufacturer. Mild Rebaron LC was used with a dichloromethane-based primer and Tokuyama Rebase II with an ethyl acetate-based primer. The application time for those primers was 30 seconds.

Surface preparation with dichloromethane can cause the surface to swell, permitting the diffusion of the polymerizable material; Such preparation can create surface pores approximately 1mm in acrylic denture base resin.[33-35)] Ethyl acetate also has the ability to swell the surface and permit diffusion of the denture base resin material. *Shimizu et al.*[36)] reported that a 120s application of ethyl acetate was as effective as a

5s application of dichloromethane at preparing the surfaces of a denture base resin. This means that the ability of dichloromethane is better than ethyl acetate.

In this study, the results show that Mild Rebaron LC with a dichloromethane-based primer groups showed higher bond strength than Tokuyama Rebase II with an ethyl acetate-based primer groups in all of three denture base resins.

Another reason for these results are handling difficulties and difficulty of proper wetting due to the viscous character of Tokuyama Rebase II. So air is get in or ununiform relining may be happened during relining.

Ⅶ. Conclusion

In this study, to evaluate the relining property of Acrytone used as denture base resin for new flexible partial dentures, the bond strength between 3 different types of denture base materials(Paladent 20: heat-polymerized PMMA resin, Acrytone: thermoplastic PMMA resin, Biotone: thermoplastic polyamide resin) and 2 types of reline resins(Tokuyama Rebase II: autopolymerizing resin, Mild Rebaron LC: light-polymerized resin) were compared.

The following conclusions were drawn:

1. Acrytone has similar tensile and transverse bond strength with Paladent 20(Heat-polymerized PMMA resin) to autopolymerizing and light- polymerized reline resin.
2. In Paladent 20 group and Acrytone group, Light-polymerized reline resin (Mild Rebaron LC) had higher bond strength than autopolymerizing reline resin(Tokuyama Rebase II).
3. Biotone had the lowest tensile and transverse bond strength to all reline resins.

Within the limitation of this study, it can be concluded that Acrytone can be used for new denture base material because it has flexibility and is available for chairside relining.

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