

Comparison of Pre-Relining and Post-Relining Retention of Complete Removable Dental Prosthesis Relined Using Hard Permanent Chairside Reliners: An In Vivo Study

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ABSTRACT

Background: Direct relining of complete removable dental prosthesis made with hard chairside reline resins is faster than laboratory- processed reline systems. However, the decision to use these materials must be made with regard to their efficiency in enhancing retention of complete removable dentures.

Materials and Methods: 50 edentulous patients with chief complaint of ill-fitting maxillary dentures with adequate vertical and horizontal relation and teeth arrangement were relined with Hard Permanent Chairside Reline Resin (Kooliner- GC America Inc. IL, U.S.A.) and subjected to vertical pull test at various time intervals (Before relining, Immediate after relining, 24 hours after relining, One month after relining). One-way ANOVA and Scheffe's Post HOC.($p < 0.05$ as significant value considered).

Results: Statistical difference was observed between before relining Vs. Immediate after relining, 24 hours after relining, One month after relining. No statistical differences were observed post relining at various intervals

Conclusion: Hard permanent chairside reliners significantly increases the retention of loose fitting dentures if the case selection is done after proper examination of existing denture, ridges, patient attitude and neuro-muscular co-ordination.

Keywords: Chairside Reliners, Permanent Relining, Hard Reliners, Loose Fitting Dentures.

INTRODUCTION

Every dentist has experienced the problem of dealing patients with loose dentures .It may be due to faulty border molding, excessive trimming of border area during finishing – polishing and/ or due to residual ridge resorption. Direct relining of complete removable dental prosthesis made with hard chairside reline resins is faster than laboratory- processed reline systems and the

patient is not required to be without the prosthesis for the time necessary to perform the laboratory procedures, saving time and appointments. However, the decision to use these materials must be made with regard to their efficiency in enhancing retention of complete removable dentures. It is well established that function of a complete denture is related to the fit of its base to the denture bearing areas and when there is better adaptation of the base, the denture becomes more stable and

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retentive. It is axiomatic that the more dimensionally accurate and stable a material is, the more retentive and stable the denture will be.¹

Due to the inevitable process of alveolar bone resorption, the removable denture may become loose and less retentive, resulting in soreness, loss of vertical dimension of occlusion and poor function. To maintain the prosthesis – tissue relationship, reline or rebase procedures are commonly required to improve retention, stability, oral health, and esthetics of the removable denture.² Reline is the procedures used to resurface the tissue side of the removable dental prosthesis with new base material, thus producing an accurate adaptation to the denture foundation area.³ The primary reason for relining is to re-establish tissue support for denture base, neglecting which can result in increased load over the residual ridge thereby enhancing alveolar bone resorption.⁴

MATERIALS AND METHADODOLOGY

1. 50 edentulous patients (Table 1 & 2) with chief complaint of ill-fitting maxillary dentures with adequate vertical and horizontal relation and teeth arrangement were selected for the study (Table 3).

Table 1: Gender distribution among the study.

		Frequency	Percent
Valid	MALE	38	76.0
	FEMALE	12	24.0
	Total	50	100.0

Table 2: Age distribution among the study.

	N	Minimu m	Maximu m	Mean Age	Std. Deviation
AGE	50	45	73	58.96	7.892

Table 3: Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
Maxillary dentures with satisfactory –	
1. Vertical relation	1. Dentures used more than 5 years
2. Horizontal Relation	2. Worn denture teeth
3. Teeth arrangement	3. Fractured denture base
4. Phonetics	4. Unsatisfactory Jaw Relation
5. Esthetics	5. Phonetic problem
6. Intact Denture base	6. Unaesthetic teeth arrangement

2. After obtaining clearance from departmental protocol committee and university ethical committee and informed consent of patients. Patients were advised for the treatment of ill-fitting denture with chairside hard permanent denture reliners.
3. Stainless steel wire was fixed to the ill-fitting denture with cyanoacrylate between 2nd premolar and 1st molar region on palatal surface (Fig. 1) and the dentures were subjected to vertical pull test by Metro Electronic Hanging Pocket Scale (Accuracy 0.01 Kg) and the readings were notated before relining (Fig. 4).



Fig 1: Stainless steel wire was fixed to the ill fitting denture



Fig 2: Kooliner GC America Inc. IL, USA.

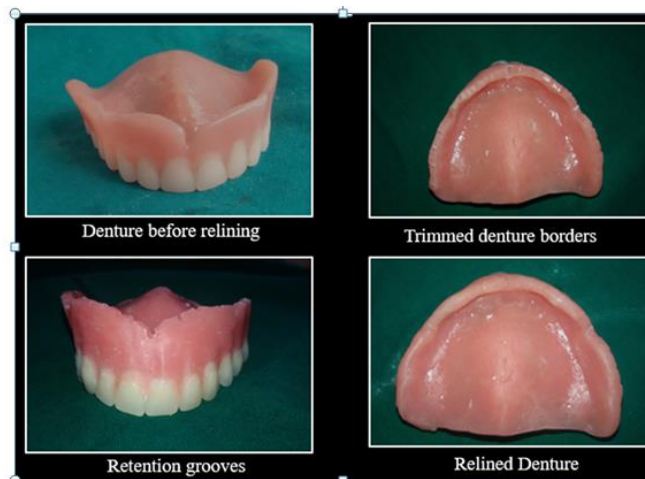


Fig 3: Procedure of relining.



Fig 4: Recording force required for dislodge denture.

4. The borders of the denture to be relined were adjusted properly and overextended borders were trimmed, the remaining

borders were roughened and retention grooves were made and then cleaned and dried thoroughly.

5. Vaseline was applied on artificial teeth, labial and buccal surfaces of the denture with cotton swab except within area of 3mm (1/8 inch) of the peripheral border to protect them from the reline material adhering to the finished surface.
6. The borders of the denture to be relined were coated with bonding agent using the enclosed brush. The solvent was air dried for approximately 10 seconds.
7. Standard consistency was obtained by mixing the ratio as per manufacturer's instructions.
8. Using a plastic spatula, the resin mix was applied evenly onto the borders of the denture and denture inserted into the mouth at approximately 1 minute from start of the mix and the patient was instructed to close lightly into occlusion.⁵ Muscle trimming and functional movements were done as necessary.
9. Excess material was trimmed and denture resealed in the mouth before it began to generate heat and then, placed it in to the warm water approximately 43° for 3 minutes until it was completely cured⁶.
10. The relined dentures were again subjected to vertical pull test to Metro Electronic Hanging Pocket Scale and the readings were recorded (Fig.4).
11. Finishing and polishing were performed after 24 Hours on follow up appointment.
12. The ill-fitting dentures were subjected to a vertical pull test by Metro Electronic Hanging Pocket Scale and the readings were recorded (Fig. 4).

1. Before relining,
2. Immediate after relining,

3. 24 hours after relining
4. One month after relining

RESULTS

TABLE 4 MEAN VALUES OF THE FORCE AT VARIOUS THE INTERVALS

	N	Minimu m	Maximu m	Mean force (Grams)	Std. Deviation
BEFORE RELINING	50	10	50	31.00	9.949
AFTER RELING	50	20	130	96.60	22.279
AFTER 24 HOURS	49	40	120	95.71	17.795
1 Month After Relining	46	40	120	96.74	18.385
Valid N (list wise)	46				

TABLE 5 INTERGROUP COMPARISON BY POST HOC TEST (TUKEY'S POST HOC TEST)

	GROUPS	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Tukey HSD	BEFORE RELINING Vs AFTER RELINING	-65.60000 ^a	3.53243	<0.001 [*]	-74.7553	-56.4447
	BEFORE RELINING Vs AFETR 24 HOURS	-64.71429 ^a	3.55041	<0.001 [*]	-73.9162	-55.5124
	BEFORE RELINING Vs 1 Month After Relining	-65.73913 ^a	3.60841	<0.001 [*]	-75.0914	-56.3869
	AFTER RELINING Vs AFETR 24 HOURS	.88571	3.55041	>0.005	-8.3162	10.0876
	AFTER RELINING Vs 1 Month After Relining	-.13913	3.60841	>0.005	-9.4914	9.2131
	AFETR 24 HOURS Vs 1 Month After Relining	-1.02484	3.62601	>0.005	-10.4227	8.3730

Table 4 denotes Mean Values after various time intervals. Table 5 denotes there is statistical difference between (i) Before relining and immediately after relining with $p < 0.05$ and mean difference -65.60 (CI 95% = -74.75; -56.44) denotes significant increase in retention. (ii) Before relining and 24 Hours after relining with $p < 0.05$ and mean difference -65.73 (CI 95% = -73.91; -55.51) denotes significant increase in retention. (iii) Before relining and one month after relining with $p < 0.05$ and mean difference -65.60 (CI 95% = -74.75; -56.44) denotes significant increase in retention. (iv) Immediately after relining and 24 Hours after relining with $p > 0.05$ and mean difference 0.89 (CI 95% = -8.32; -10.08) denotes the change in retention is not significant between immediately after relining and 24 Hours after relining. (v) Immediately after relining and one month after relining with mean difference 0.89 (CI 95% = -8.32; -10.08) denotes the change in retention is not significant between immediately after relining and one month after relining. (vi) 24 Hours after relining and one month after relining mean difference -1.02 (CI 95% = -10.42; -8.37) denotes

the change in retention is not significant between 24 Hours after relining and one month after relining.

DISCUSSION

Removable dentures have been used extensively for the rehabilitation of the completely and partially edentulous patients and the success of these restorations greatly depends on retention, support and stability. The major objective in the fabrication of complete denture is to attain a denture base that conforms to the supporting tissues with a high degree of accuracy. With greater accuracy of the base in relation to the underlying tissues, the prosthesis becomes more stable⁷. The relining of complete dentures involves solving all these problems encountered in the dentures, except positioning individual teeth in vertical dimension⁸. Hard direct autopolymerizing relining resins are similar in composition, surface reproduction, and dimensional change to autopolymerizing denture base acrylic resins.⁹ Ill-fitting dentures causes trauma to both underlying hard and soft tissue as well as psychological stress, in this condition patient does not accept treatment plan of fabrication of new denture. Because it requires 4-5 more visits, more money and questionable results. The conventional relining procedure also requires 2-3 visits, and the long lab procedure and poor esthetics. In chairside permanent relining patient gets satisfied due to quick result, single appointment, and esthetic superiority than conventional relining.

Autopolymerizing chairside relining resins are found to be more dimensionally accurate than conventional laboratory heat polymerizing relining resins¹⁰. Wyatt et al. (1986) and Bunch et al. (1987) reported that Kooliner material showed the lowest peak polymerization temperature than the other autopolymerizing acrylic resins tested, being more favorable to perform denture base relining directly in the mouth¹¹. Kooliner exhibited least dimensional change at the end of 2 months and hence was most dimensionally accurate among all the materials under study. In consideration with dimensional accuracy, the chairside autopolymerizing resins are valid alternatives to conventional laboratory heat polymerizing resins.¹⁰ An investigation was conducted by ALM Cucci (1996) to evaluate and

compare the dimensional stability of hard chairside reline resins (Kooliner and Duraliner II,) showed Kooliner was more dimensionally stable than other Hard chairside reliners.¹² The results from study done by CR Leles (2001) indicated that the bond strength of the hard chairside reline resin Kooliner can vary when using different surface treatments of the acrylic denture base material. Treating the surface with Lucitone 550 monomer or chloroform improves the sites for bonding, and promoted the highest transverse bond mean values.¹³ Studies done by J Bunch showed only a small change in color with aging for Perm and Kooliner, there was a moderate shift in the color of Kooliner.⁶ However Microwave disinfection promoted shrinkage of intact denture bases and those relined with New Truliner and Kooliner¹⁴.

In present study 50 maxillary dentures of 38 males and 12 females with mean age of 58.6 years (Table 2) were relined. Some of these patients (1 patient after 24 hours and 4 patients after 1month) did not turn up for follow up. Table 4 denotes change in average retention at various time intervals i.e. before relining, immediate after relining, after 24 hours and after 1 month indicates significant difference in retention between before relining Vs after relining. Inter group comparison was done by Tukey's Post HOC test, denotes statistical significance between before relining Vs. immediate after relining, 24 hours after relining and one month after relining. It indicates that use of chairside permanent reliners increases retention significantly. While there is no statistical difference between retention immediately after relining Vs. 24 hours after relining, immediately after relining Vs. one month after relining and 24 hours after relining Vs one month after relining. This indicates that no change takes place in retention as time passes. The procedure is faster than the conventional reline method and does not result in any clinically significant dimensional change or warpage in the denture base¹⁴.

CONCLUSION

Hard permanent chairside reliners (Kooliner- GC America Inc. IL, U.S.A.) significantly increases the retention of loose fitting dentures if the case selection is done after proper examination

of existing denture, ridges, patient attitude and neuro-muscular co-ordination.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Zissis A, Huggett R, Harrison A. Measurement methods used for the determination of dimensional accuracy and stability of denture base materials. *J Dent* 1991;19:199-206.
2. Pow EHN, Chow TW, Clark RKF. Linear dimensional change of heat cured acrylic resin complete dentures after reline and rebase. *J Prosthet Dent* 1998;80:238-45.
3. The Glossary of Prosthodontic Terms - 8. *J Prosthet Dent* 2005;94:10-92.
4. Cucci ALM, Giampaolo ET, Leonardi P, Vergani CE. Unrestricted linear dimensional changes of two hard chairside reline resins and one heat curing acrylic resin. *J Prosthet Dent* 1996;76:414-7.
5. Winkler Sheldon. Essentials of complete Denture Prosthodontics, 2nd edition, U.S.A. JEA, 1996, p 341-51.
6. Barco, Jr MT, Moore BK, Swartz ML, Boone ME, Dykema RW, Phillips RW. The effect of relining on the accuracy and stability of maxillary complete dentures - An in vitro and in vivo study. *J Prosthet Dent* 1979;42:17-22.
7. Boucher CO. The relining of complete dentures. *J Prosthet Dent* 2004;91:303-5.
8. McCabe JF, Wilson HJ. Polymers in dentistry. *J Oral Rehabil* 1974;1:335.
9. Tewary S, Pawashe KG. Evaluation of linear dimensional accuracy of hard chairside and laboratory heat cure reline resins at different time intervals after processing. *Indian J Dent Res* 2014;25:686-91.
10. WYATT, C.C.L., HARROP, T.J. & MACENTEE, M.I. (1986) A comparison of physical characteristics

- of six hard denture reline materials. Journal of Prosthetic Dentistry, 55, 343.
11. Cucci ALM, Giampaolo ET, Leonardi P, Vergani CE. Unrestricted linear dimensional changes of two hard chairside reline resins and one heat-curing acrylic resin. J Prosthet Dent 1996;76:414-7.
 12. Leles CR, Machado AL, Vergani CE, Giampaolo ET, Pavarina AC. Bonding strength between a hard chairside reline resin and a denture base material as influenced by surface treatment. J Oral Rehabil 2001;28:1153-7 7.3]
 13. Seo RS, Vergani CE, Pavarina AC, Compagnoni MA, Machado AL. Influence of microwave disinfection on the dimensional stability of intact and relined acrylic resin denture bases. The Journal of prosthetic dentistry. 2007 Sep 30;98(3):216-23.
 14. Craig RG. Restorative dental materials, cd 7. St. Louis: The CV Mosby Co, 1985: 495.