

Effect of Hard Permanent Chairside Reline Resin on Removable Dental Prostheses: An *in vivo* Study

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ABSTRACT

Objectives: To evaluate the clinical effect of hard permanent chairside relin resin on removable dental prostheses.

Materials and methods: Forty patients with identified post insertion problem of retention of removable dental prosthesis were selected, and their prostheses were subjected to relin procedures using hard permanent chairside relin resin. An objective analysis based on the assessment template was done by a single operator to analyze the effect of chairside relin resin prior to relin procedure, 1 week post relin procedure and 1 month post relining.

Results: One month post relin data showed >95% resistance to vertical pull and horizontal displacement, about 95% improvement in ill-fitting dentures. Negligible (0%) air escapement, sore spots, and post relin complications.

Conclusion: Chairside relin resin system is a quick and effective method of relining removable complete prosthesis.

Keywords: Permanent reliners, Hard reliners, Retention in removable dental prosthesis.

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INTRODUCTION

The function of removable prosthesis is related to fit of its base to denture bearing area.¹ However, due to continuous topographic changing nature of residual ridges, relining is frequently advised. Relining with heat cure denture base resin is time-consuming, and the patient has to remain without dentures within this period.

Recently, some autopolymerizing resins, marketed as hard chairside relin systems with low exothermic

heat, allow the dentists to relin prosthesis directly in the mouth.

There are multiple research references of this material related to its accuracy and strength, but limited evidence is present in regard to its clinical efficiency.²⁻⁸

MATERIALS AND METHODS

Forty patients with identified post insertion problem of retention of removable dental prosthesis were selected, and their prostheses were subjected to relin procedures using hard permanent chairside relin resin (Kooliner, GC America: Product no. 345001) after obtaining ethical clearance from the ethical committee and informed consent from the patient. All the patients had problem in either maxillary or mandibular prosthesis, and none of them had same problem in both the prostheses. An objective analysis based on the assessment template (Graph 1) was done by a single operator to analyze the effect of chairside relin resin prior to relin procedure, 1 week post relin procedure and 1 month post relining. Before relining procedure, the prostheses were subjectively assessed as per the assessment template. Then the borders of the prosthesis were trimmed so that a uniform gap of 2 mm is created between the borders and functional depth for the chairside relin resin material. The borders were coated with a layer of bonding agent provided along with the kit and air dried. The material was mixed as per manufacturers' instructions and placed along the borders of the denture followed by intraoral placement of the prosthesis and muscle trimming. The prosthesis was removed, kept in a water bath at 43°C for 10 minutes followed by removal of excess material using a sharp blade. The patients were called after 1 week and 1 month to evaluate as per the assessment template.

RESULTS

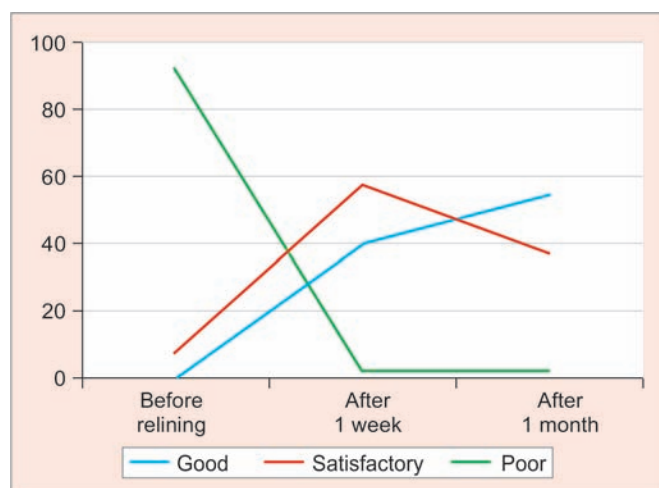
Graphs 1 to 12 show result representation of the objective analysis done at the three time intervals (before relining, 1 week post relining, and 1 month post relining procedure). The number in graph corresponds to the question number the analysis template.

When subjectively evaluated by a single operator, 92.5% of the patients had poor, 7.5% had satisfactory, and none of the patients (0%) had good retention to

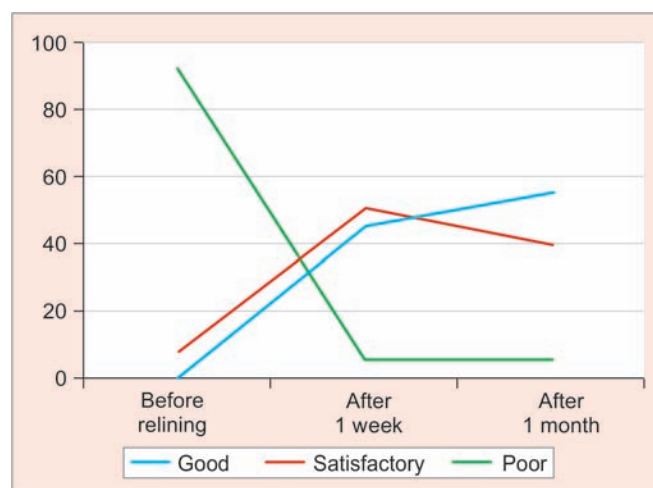
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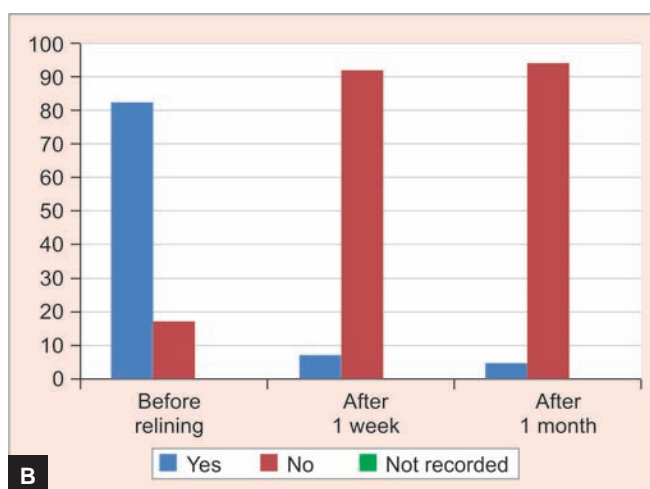
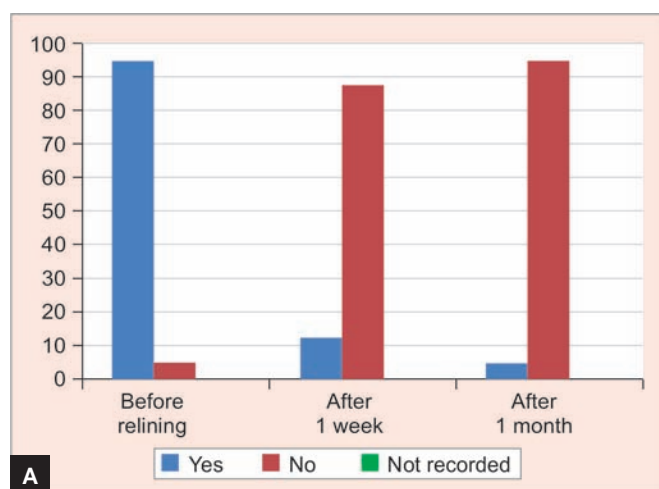
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Graph 1: Responses to resistance offered to vertical pull at different interval of time



Graph 2: Responses to resistance offered to horizontal displacement



Graphs 3A and B: (A) Responses to lifting of mandibular denture, and (B) responses to loose maxillary denture

vertical pull and horizontal displacement (Graphs 1 and 2). One week post relining, it was found good increase of retention to vertical pull as 40%, satisfactory as 57.5%, while remaining 2.5% patients still had poor retention. This further increased to 55% as good at the end of 1 month post reline (Graph 1). The results for resistance to horizontal displacement showed similar trends (Graph 2).

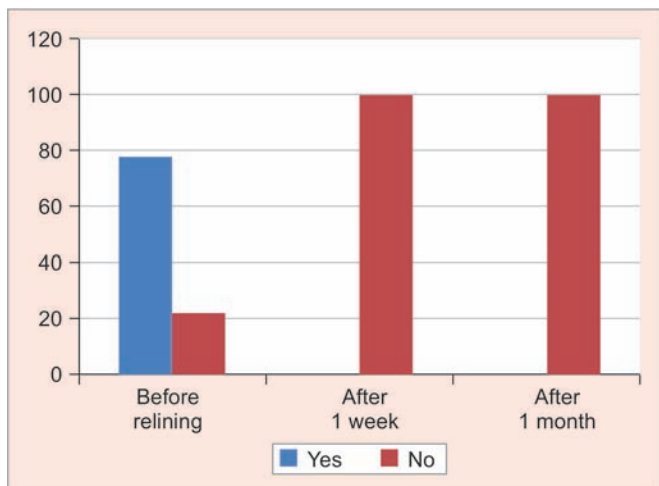
About 92.5% of the patients had ill-fitting mandibular and 82.5% had ill-fitting maxillary prosthesis before relining (Graphs 3A and B). One week post reline, this improved to 12.5 and 7.5% respectively. This further improved to 5% for mandibular prosthesis and remained same for maxillary prosthesis. Before relining, signs of air escapement were found in 77.5% cases mainly in the posterior border of maxillary and mandibular dentures. This improved drastically to none of the patients (0%) after 1 week and 1 month (Graph 4).

Though 17.5% of the prostheses had overextended borders, 57.5% had underextended borders, and 25%

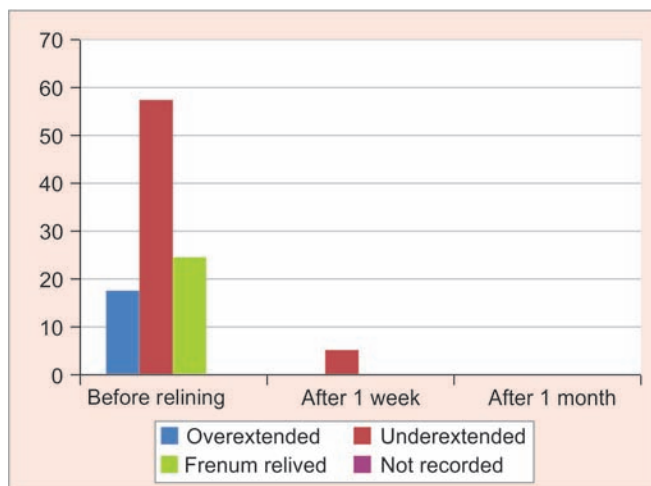
had inadequate frenum relieved, all these problems were minimal at the end of 1 week post reline, and after 1 month they were reduced to negligible (Graph 5). Those prosthesis which were overextended before reline procedure were converted to underextension to facilitate the reline procedure as per manufacturers' instructions.

Only 25% of the prostheses should signs of poor contact between the mucosa and denture base, all of which one week were corrected in reline procedure (Graph 6). Similarly, Occlusion was found to be correct in 95% cases, and there was no improvement in occlusion in the remaining 5% even after relining procedure (Graph 7). Such patients needed occlusal corrections or new prosthesis fabrication, as the case may be.

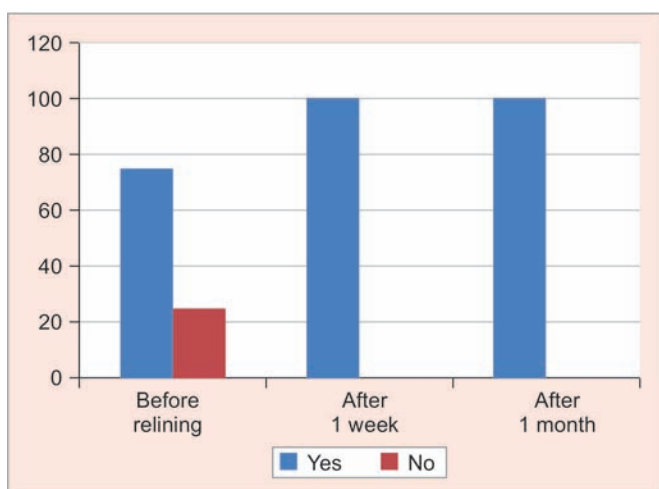
There was no change in condition of the residual ridge (Graph 8) throughout the relining procedure; however, 15% of sore spots and 27.5% of localized pain were reduced to 10 and 17.5% 1 week post reline and to negligible (0%) by the end of 1 month post reline



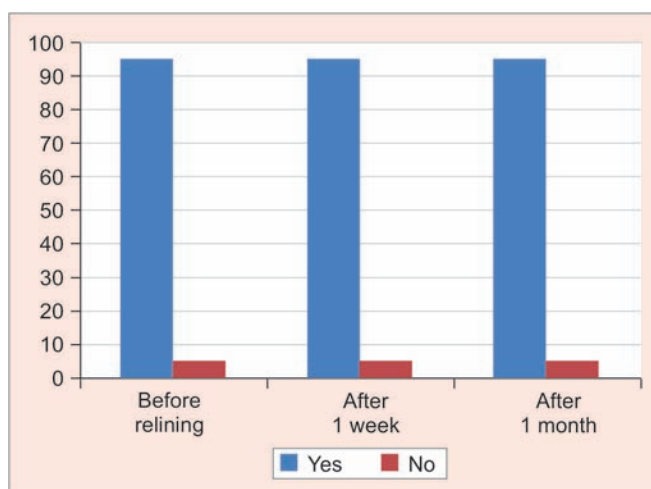
Graph 4: Signs of air escapement from the borders



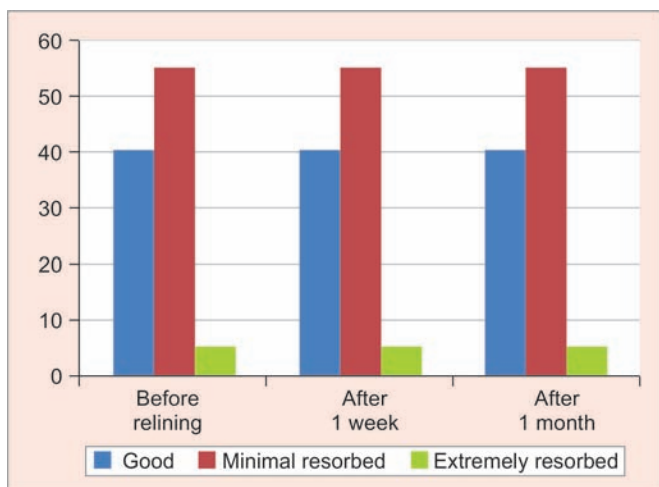
Graph 5: Extension of borders



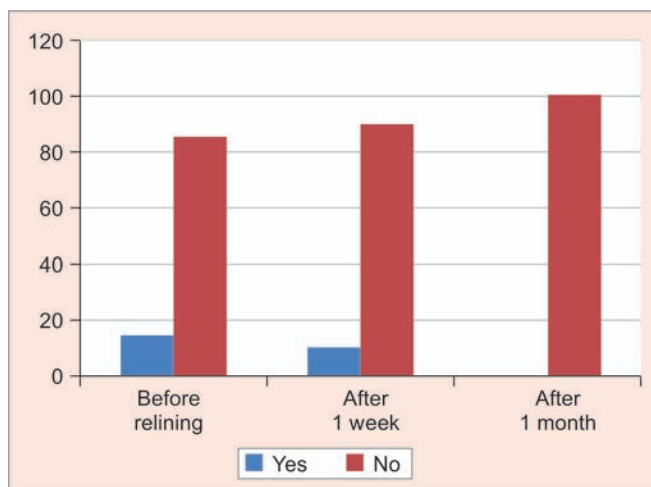
Graph 6: Presence of uniform contact between mucosa and denture base



Graph 7: Occlusion adequacy



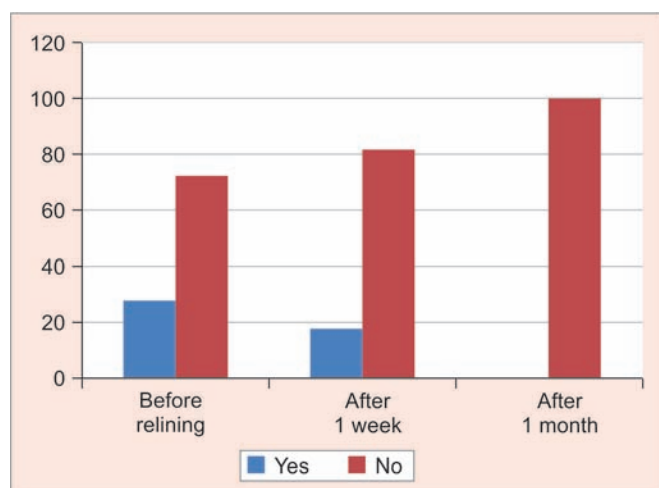
Graph 8: Condition of residual alveolar ridge



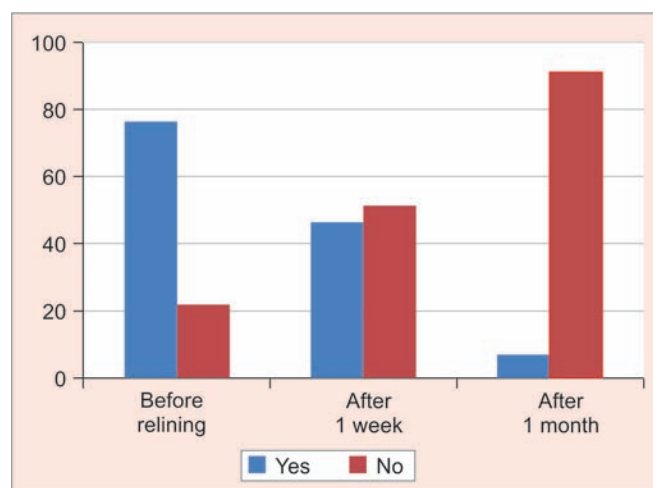
Graph 9: Presence of any sore spots

(Graphs 9 and 10). However, discomfort of 77.5% before reline remained to 47.5% 1 week post reline and to 7.5% 1 month post reline. These cases may require more time for final adjustments or few of them might

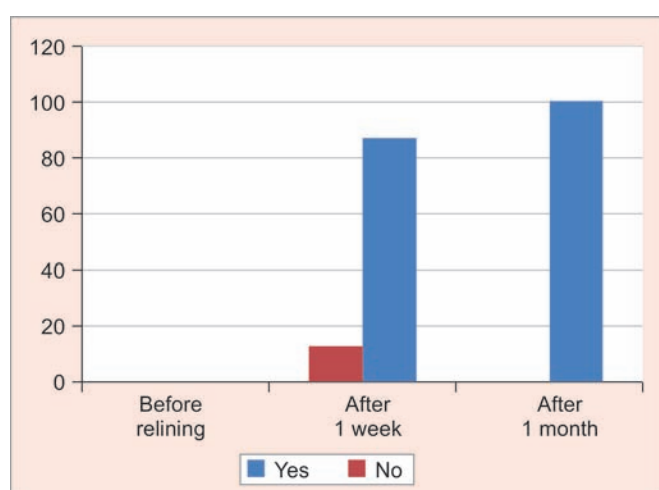
go for fabrication of entirely new prosthesis. Only 12.5% of the cases should post reline complications after 1 week, and it became negligible by the end of 1 month.



Graph 10: Presence of pain in any localized area



Graph 11: Presence of any discomfort in the localized area



Graph 12: Presence of any signs of post insertion complications

DISCUSSION

Removable dentures have been used extensively for the rehabilitation of the completely and partially edentulous patients and the success of these restorations greatly depend on retention, support, and stability.⁹

The function of a complete denture mainly depends on the fit of its base to the denture bearing areas, and when there is better adaptation of the base, the denture is more stable and retentive. But, due to the inevitable process of alveolar bone resorption, removable dentures may become loose and less retentive, resulting in soreness, loss of vertical dimension of occlusion, and poor function. Thus removable dentures need frequent relining or rebasing to improve retention, stability, oral health, and esthetics.¹⁰

The fit of the denture base also depends on other factors like method and the material used for its fabrication. The increasing number of different relining materials give more options to choose the most efficient and feasible technique. The different technique for relining are mainly divided into laboratory procedure

and clinical procedures. The laboratory procedures are done by either Articulator method, Jig method, or Flask method. The clinical method includes chairside relining with either long-term or short-term reliners. These reliners generally employ poly(methyl) methacrylate or poly(ethyl) methacrylate, poly(vinyl chloride), and poly(vinyl acetate).

The requirement of the ideal relining material can be listed as:

- It should resist the vertical pull.
- It should resist horizontal displacement.
- It should prevent the lifting of mandibular prosthesis.
- It should prevent the falling of maxillary prosthesis.
- It should prevent signs of air escape from the borders.
- It should cover the desired extension of borders.
- It should maintain uniform contact between mucosa and denture base.
- It should maintain the condition of residual alveolar ridge.
- It should not create any sore spots.
- It should not cause any pain in any localized area.
- It should not cause any discomfort in the localized area.
- It should not cause post insertion complications.

With these requirements in mind, the present study dealt individually with each of these requirements at different time intervals:

- Before relining,
- One week after relining, and
- One month after relining.

In this study, the resistance offered to vertical and horizontal forces before and after relining was checked and recorded and is shown in Graphs 1 and 2. The results for resistance to horizontal displacement showed similar trends (Graph 2). Such a result is expected as previously explained by Tewary² since the chairside reline resins attain their accuracy of fit at least after a period of

1 month. This accuracy is expected to be better after 2 months because of higher degree of polymerization of the resin.

Shrinkage of the bone of the maxilla usually permits the upper denture to move up and back in relation to its original position. However, the occlusion also may force the maxillary denture forward. The lower denture usually moves downward and forward, but it may move down and back relative to the mandible as shrinkage occurs. Concurrently, the mandible moves to a higher position when the teeth are in occlusion than it occupied with the teeth in occlusion before the shrinkage occurred. This movement is rotary around a line approximately through the condyles. This mandibular rotation can elicit severe damage in the denture supporting tissues over a long period of unsupervised denture wear. This study recorded the responses of the displaceability of the dentures before and after relining, and the presence of any sore spots and pain in localized area was also observed and is shown in Graphs 3 and 4 and 10 to 12 respectively. Visual method was used to check for any sore spots, and finger palpitation method was used to locate presence of any localized pain. The present study also observed and recorded signs of air escape and extension of borders which is shown in Graphs 5 and 6 respectively. The vestibular outline was checked for indications of overextensions due to settling and presence of epulides, underextension, and adequacy of frenum relieving.

Dentures with built in gross occlusal errors that create premature contacts, sliding bases, and soreness may not need refitting but fabrication of new prosthesis. The present study recorded the occlusal adequacy before and after relining and is shown in Graph 7. There was no change in condition before and after relining procedure indicating that gross occlusal inadequacy should not be treated by relining procedures alone.

If the denture has proper tissue coverage and acceptable retention and stability but the patient complains of looseness of dentures, tissue may show unilateral inflammation or irritation.

The present study verified and recorded the presence of uniform contact between mucosa and denture base and condition of residual alveolar ridge before and after relining and is shown in Graphs 8 and 9.

CONCLUSION

Almost all patients treated with removable prosthesis have problems related to retention and fit of the prosthesis. Conventional relining procedures are time-consuming, and the patient has to be without prosthesis during the reline period. This is particularly important as it can affect the nutritional status of the old debilitating patients.

Within the limitations of the study, it can be concluded that chairside reline resins are quick and convenient method of relining removable dental prosthesis, proving good postoperative comfort and least post insertion complications, and hence are a valid alternative to conventional relining materials.

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