

The Relining Method of Removable Denture with Magnetic Attachments

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Abstract

In a magnetic attachment denture, relining material is interposed between a keeper and magnetic assembly. It creates air gap, which results in a decrease in attachment force of a denture. The purpose of the present study was to investigate the proper relining method of a magnetic attachment denture.

Three relining methods were performed: Direct relining methods were performed by removing and not removing a magnetic assembly. In the indirect method, a functional impression was taken using the denture base as a tray. The denture was relieved and relined in the dental laboratory.

Selection criteria of direct and indirect relining method were different between resin-bonded and cement-bonded magnetic assemblies in the denture base. The level of difficulty in relining was different depending on the fitting condition and a size of a denture base, and the shape of keeper coping and metal denture base.

Further investigation is needed on the selection criteria for relining method of a magnetic attachment denture.

Introduction

If you use a denture for a long time, the denture will observe changes such as disharmonious occlusal relationships by attrition of artificial teeth, coloring and degradation of the denture base^{1,2)}. In addition, incompatibility of the denture base is caused by changes in the jawbone through absorption of under floor mucosa, over time. The Japan Prosthodontic Society guidelines have been created for relining and rebase. With regards to these issues, we often encounter opportunities to treat relining based on the diagnosis of denture incompatibility at the clinical practice. The guidelines recommend the direct relining methods for mild denture nonconformity and the indirect method for more non-conforming cases. However, in a magnetic attachment denture, relining material is interposed between a keeper and magnetic assembly. It creates air gap, which results in a decrease in attachment force of a denture³⁾. The purpose of the present study was to investigate the proper relining method of a magnetic attachment denture.

Relining method

Three relining methods were performed for three different cases. In the first case, direct relining method was performed without removing a magnetic assembly. In the second case, a magnetic assembly was removed before direct relining, and was returned after relining. In the third case, indirect relining method was performed.

1. Direct relining method (without removing a magnetic assembly)

a. Case report

A patient was a 76-year-old female who presented to a clinic with a chief complaint of a discomfort in the upper left area. She was diagnosed with mastication disorder due to rampant caries and marginal periodontitis. The upper left canine and second premolar were extracted due to dental root fracture. Although secondary caries and bone resorption were observed in the upper left first molar, a root cap with a keeper was placed. An immediate overdenture was fabricated in the missing area. Fig. 1 shows the denture design.

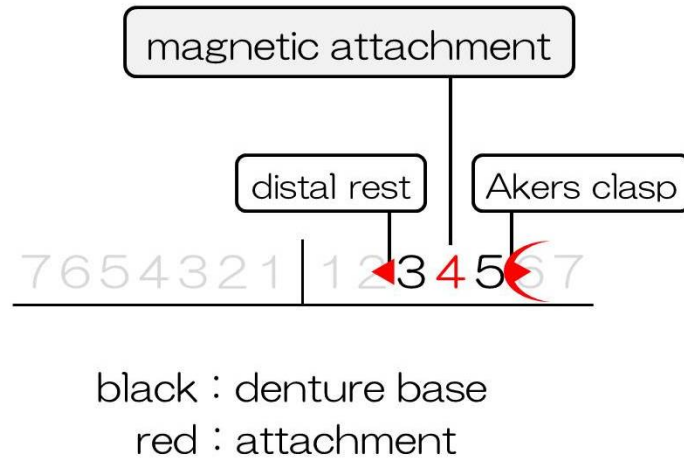


Fig. 1 the denture design

The upper left canine and second premolar were extracted, and an immediate denture was placed on the same day. Figures. 2-a and b show an intraoral image 7 months after the extraction and immediate denture placement. Figures. 2- c and d show the results of fitting test of the denture base using Fit Checker (GC, Japan).

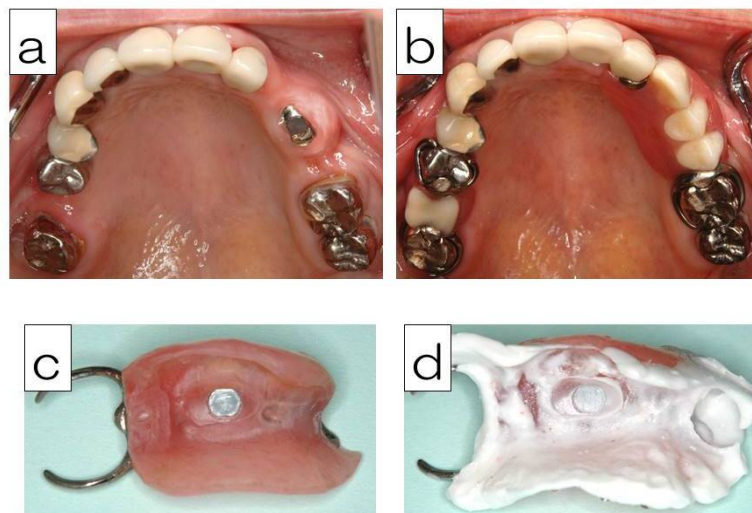


Fig. 2 the intraoral image and fitting test

There was an ill-fitting area in the denture base of the upper left canine and second premolar area. There was no problem in occlusal relationship.

In the present case, the denture base was small, and it was considered that appropriate relining material thickness could be obtained by supporting effect of a root cap and a rest. Therefore, direct relining method was performed without removing a magnetic assembly.

b. Treatment and Prognosis

Spillways were made in two locations around a magnetic assembly as a pretreatment (Fig. 3-a). The mucosal surface of the denture was slightly ground to create space for relining material (Fig. 3-b). Relining process was performed using an easy-to-handle light-cured denture base relining material (MILD REBARON LC., GC, Japan) (Figures. 3-c and d).

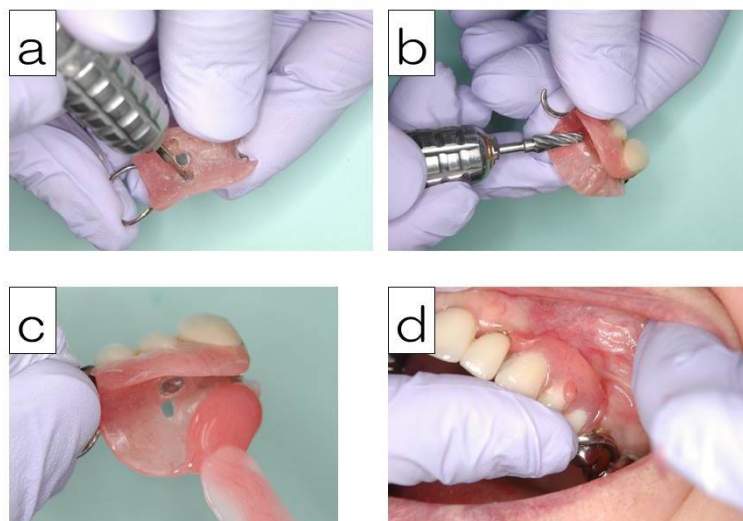


Fig. 3 processes of relining a denture material

It was confirmed that the denture was restored to the original place, and that relining material was pushed out from the spillways. Then, morphology modification and polishing of the denture were performed. Fig. 4 shows post-treatment denture and fitting test result. The fit of a denture was improved without changing retention force, and prognosis was uneventful.

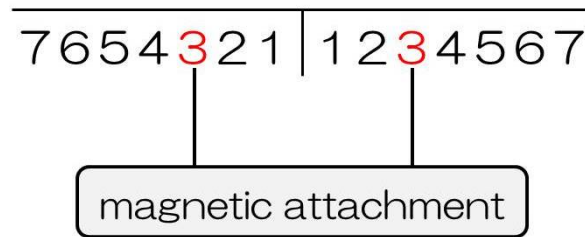


Fig. 4 end of relining a denture material

2. Direct method (removing a magnetic assembly)

a. Case report

A patient was a 69-year-old female who has been using a lower magnetic attachment denture for approximately 6 years. A denture was a complete magnetic overdenture. Keepers were fixed in the root caps of the lower bilateral canines. Fig. 5 shows the denture design.



black : denture base
 red : attachment

Fig. 5 the denture design

Regular check-ups had been conducted since the placement of a denture, and prognosis had been uneventful. However, the patient complained of food impaction on the mucosal surface of the denture at the regular check-up 6 years after the denture placement. Fitting test of the denture base showed ill-fitting area in the left molar area. There was no problem in occlusal relationship. Figures. 6-a and b show an intraoral image. Figures. 6-c and d show the result of fitting test of the denture base using Fit Checker.

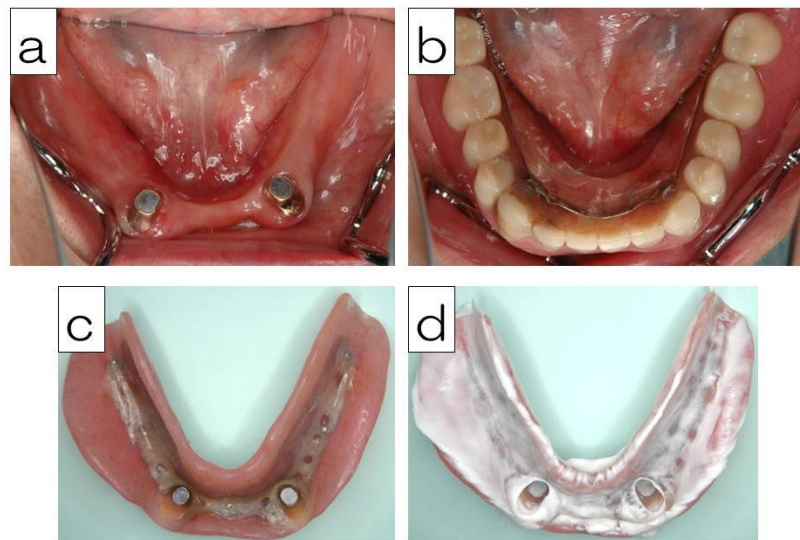


Fig. 6 the intraoral image and fitting test

A magnetic assembly was attached using autopolymer resin, and was removable. Therefore, a magnetic assembly was removed, and direct relining was performed.

b. Treatment and Prognosis

Figures. 7-a and b show the process of removing resin around a magnetic assembly as pretreatment to remove magnetic assembly. Careful attention was paid to minimize the grinding amount and not to damage a magnetic assembly. Figures. 7-c and d show the process of grinding a mucosal surface of a denture base and forming spillways.

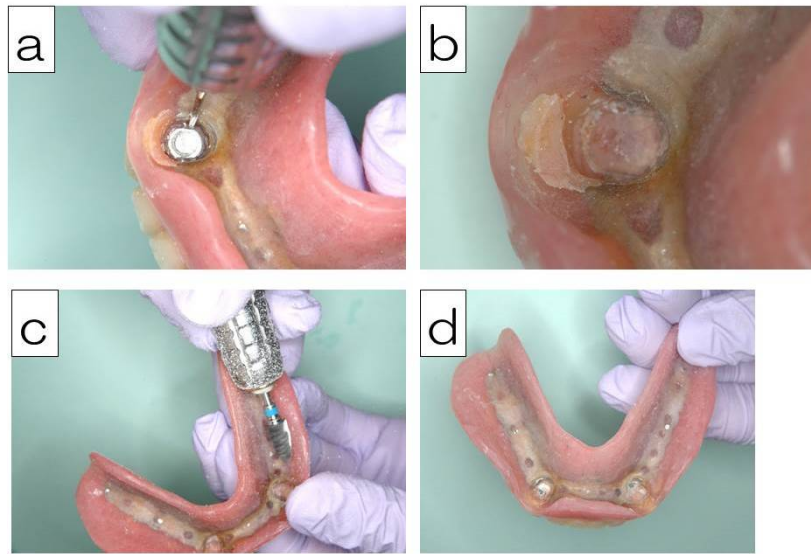


Fig. 7 processes of relining a denture material

Silicone impression material (EXAFINE, regular, GC, Japan) was used for impression taking, and the impression was trimmed. Relining was performed using a autopolymer denture base hard relining material (REBASE II, Tokuyama Dental) according to the manufacturer's instruction (Figures. 8-a, b, c, and d).

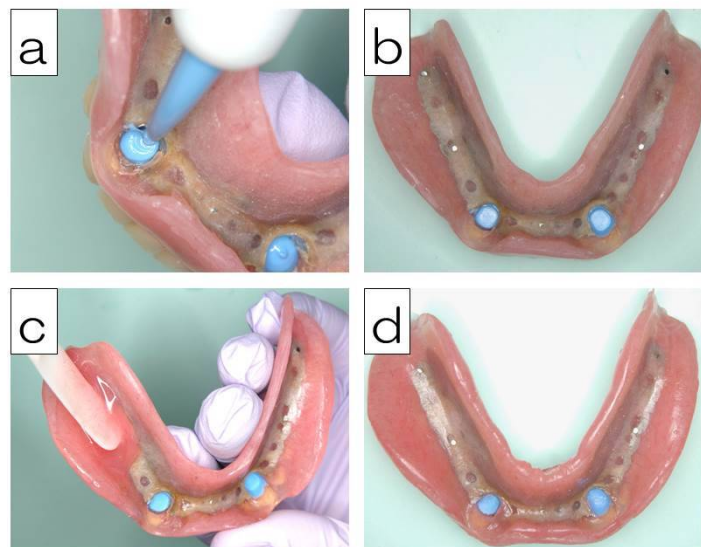


Fig. 8 processes of relining a denture material

A magnetic assembly was reattached. After silicone impression material was removed, a magnetic assembly was sandblasted, and dental metal adhesive (Metal Primer II, GC, Japan) was applied (Figures. 9-a and b). Undercut around a root cap with a keeper was confirmed, and Vaseline was applied. Autopolymer resin (UNIFAST III, GC, Japan) was used to attach a magnetic assembly to the denture according to the conventional method (Figures. 9-c and d).

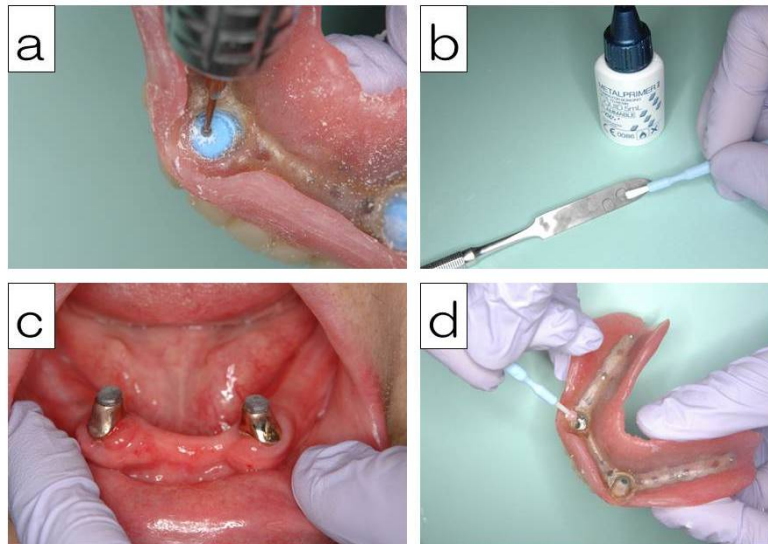


Fig. 9 processes of relining a denture material

Undercut is often observed in the subgingival area around the root cap with a keeper in relining cases. Therefore, careful attention is needed. Morphology modification and polishing of the denture were performed. Fig. 10 shows post-treatment denture and fitting test result. The fit of a denture was improved without changing retention force, and prognosis at 3 months was uneventful.



Fig. 10 end of relining a denture material

3. Indirect method

a. Case report

A patient was a 71-year-old female who has been using an upper magnetic denture for approximately 5 years. A denture was a complete overdenture with magnetic telescopes in the upper right canine and first premolar areas. Fig. 11 shows the denture design.

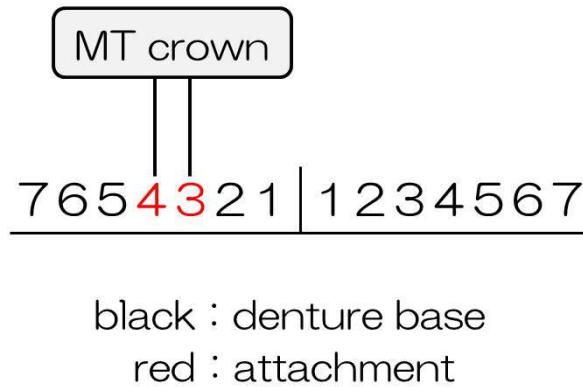


Fig. 11 the denture design

Regular check-ups had been conducted after denture placement, and prognosis had been uneventful. However, the patient complained of loose denture at check-up 5 years after denture placement. Fitting test of the denture base showed an ill-fitting denture base in the right molar area (Figures. 12-a and b). Figures. 12-c and d show the result of denture base fitting test using Fit Checker.

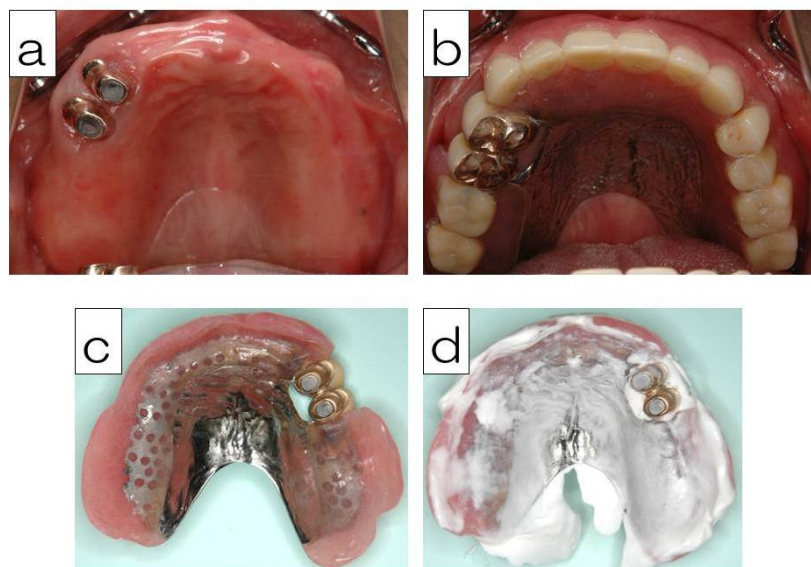


Fig. 12 the intraoral image and fitting test

There was no problem in occlusal relationship.

A magnetic assembly was cemented to the denture in the present case, and was unable to be detached. Therefore, indirect relining was performed. Although the fitting test also showed a slight lack of fit in the metal base, relining was performed only in the resin base considering advantages of metal base would be lost by relining materials.

b. Treatment and Prognosis

Functional impression was performed with wax using a denture as a tray. The mucosal surface and margin of the denture base were ground as a pretreatment (Fig. 13-a). The purposes of the pretreatment were to create the space for impression material and to remove undercuts before model fabrication. Spillways were created in the finish line to clearly identify the border between resin and

metal (Fig. 13-b). Fit Checker was used to check if there is an appropriate space for impression material before impression taking.

Functional impression was performed with wax impression material (KORECTA WAX#4 ORANGE EXTRA SOFT, D-R Miner Dental., Japan). Impression taking with other impression materials such as silicone impression material may cause uplift of a denture due to a leakage of impression material into the metal base. Marginal formation was required since a denture base margin was ground as a pretreatment. Therefore, wax impression material was used in the present study. The process of functional impression taking is shown in Figures. 13-c and d.

After functional impression taking, wax and mucosal surface were settled in the mouth for approximately 10 minutes. The patient was then instructed to hold cold water in the mouth to prevent wax deformation.

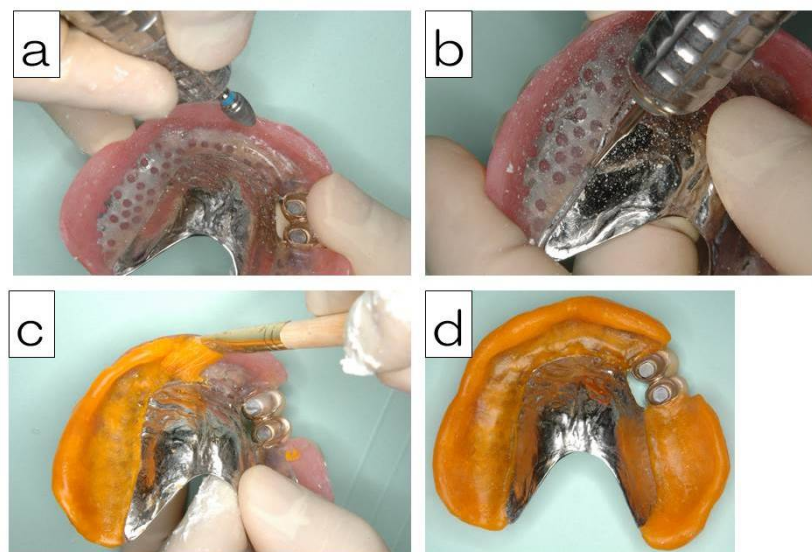


Fig. 13 processes of relining a denture material

Relining was performed in the dental laboratory. The denture was retrieved to fabricate the model in the laboratory. The model was mounted on the articulator to check occlusion before and after relining (Fig. 14-a). Margin was smoothly finished on the model to use pour-type resin, and a wax spruce was placed. Impression was taken using silicone putty (Fig. 14-b). Wax was then removed, and denture base acrylic resin (PROCAST DSP, GC, Japan) was packed. The model was remounted on the articulator, and confirmed that there is no uplift of a denture. The process was shown in Figures. 14-c and d.

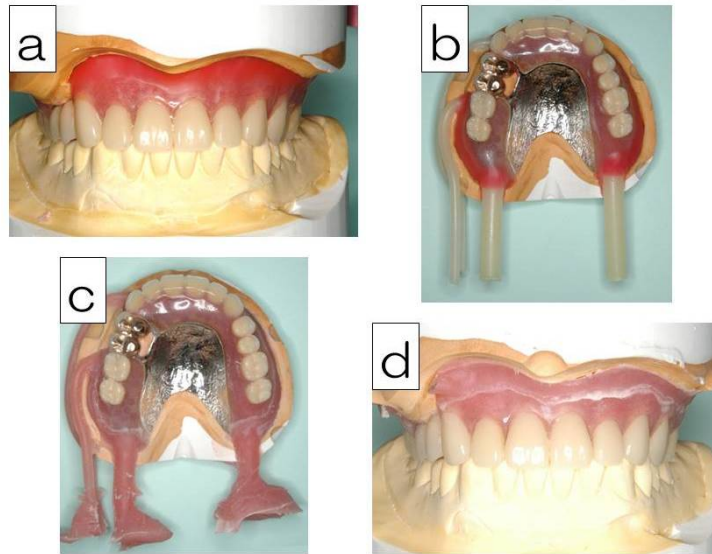


Fig. 14 processes of relining a denture material

Then, morphology modification and polishing of the denture were performed. Fig. 15 shows post-treatment denture and fitting test result.

The fit of a denture was improved without changing retention force, and the prognosis after 3 months was uneventful.



Fig. 15 end of relining a denture material

Conclusion

The present study reported 3 types of relining methods. It is important to choose relining method of the magnetic attachment denture depending on the case. Procedures are significantly different between a denture with a removable magnetic assembly and non-removable magnetic assembly. When a magnetic assembly is attached with resin, it is removable, and, there is a choice between direct and indirect relining methods. In contrast, when a magnetic assembly is cemented, it is not removable, and indirect method is recommended. Not only removability of a magnetic assembly but also a degree of ill-fitting of a denture, denture base material and size, the shape of root cap with a keeper, and the number of magnetic assemblies should be considered.

Further investigation is needed to objectively and quantitatively evaluate a change in retention force of a denture before and after relining, and to set the criteria for relining method selection.

References

1. Y. Tanaka . Dental Magnetic Attachment Q&A, Ishiyaku Publishers Inc, Tokyo, 126-127, 1995.
2. Y. Akagawa, Y. Igarashi, T. Ichikawa, S. Ohkawa, S. Kohno, K. Koyano. et al. Prosthetic Treatment for Edentulous Patients, Ishiyaku Publishers Inc, Tokyo, 236-244, 2004.
3. Y. Nakamura. Stress Analysis of an Overlay Denture and a Magnetic Attachment using Finite Element Method. Journal of Prosthodontics, 1998 ; 42 : 234-245.