Report of a hands-on seminar on magnetic attachment skills

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Introduction

Unlike conventional mechanical force-application mechanisms, magnetic attachments use magnetic force and have many advantages, such as their small size, simple shape, and their use of a less harmful lateral force. For clinical success with magnetic attachments, accurate positioning of the magnetic assembly on the keeper and its connection are very important, as inadequate attachment causes a gap between the contact surface and a significant reduction in retentive force. In order to acquire the needed skills, a hands-on seminar titled "Learning Magnetic Attachments—Laboratory and Clinical Procedures" was held at the 131st Annual Meeting of the Japanese Society of Prosthetic Dentistry in cooperation with the Japan Society of Magnetic Applications in Dentistry. In this paper, we will report on this seminar.

Objective

In the seminar, a 40-minute lecture on the characteristics of magnetic attachments and how to proceed with treatment, their application, design, treatment procedures, and possible problems was given. After the lecture, 50 minutes was provided to practice using a simulation model and overdenture and to train in the clinical procedure of fixing the magnetic assembly to the denture base using autopolymerized resin.

Lecture

1. Explanation of points to note when placing magnetic attachments

(1) Causes of significant decrease in retention

Failures in the attachment procedures include misalignment of the magnetic assembly, namely, air gaps due to the intrusion of the resin onto the keeper surface or polymerization shrinkage.

As for the misalignment of the magnetic assembly and the keeper, it has been reported that the attractive force decreased by about 1/3 when an air gap of 0.1 mm was vertically created and by about 2/3 when the magnetic assembly was horizontally displaced by 0.5 mm (Figs. 1, 2)[1] .

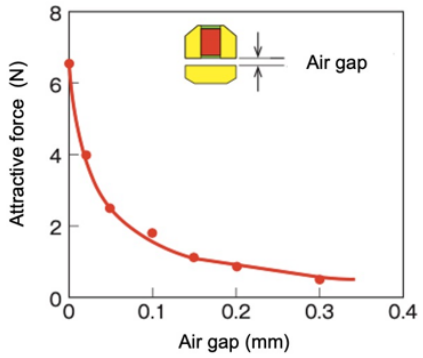

Fig. 1 Effect of vertical gaps between the magnetic assembly and the keeper on attraction force[1]

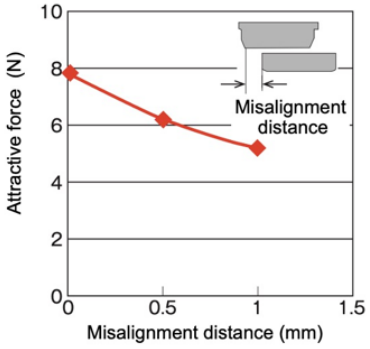

Fig. 2 Effect of horizontal deisplacement of the magnetic assembly on the keeper on the attractive force[1]

(2) Polymerization shrinkage of autopolymerized resins

(i) As the amount of autopolymerized resin used when fixing the magnetic assembly was increased, shrinkage of the autopolymerized resins also increased, and the air gap grew.

(ii) The brush-on technique showed lower polymerization shrinkage and better dimensional accuracy as compared to the mixing technique (Fig. 3)[2].
(iii) The brush-on technique can control the amount of resin on the inner surface of the denture base by the placement of a spillway. The results include the prevention of misfitting dentures and dentures that are difficult to remove due to resin that has penetrated into the undercut around the keeper coping (Fig. 4).
(iv) Holding the denture until the resin is polymerized and the timing of denture removal are also important.

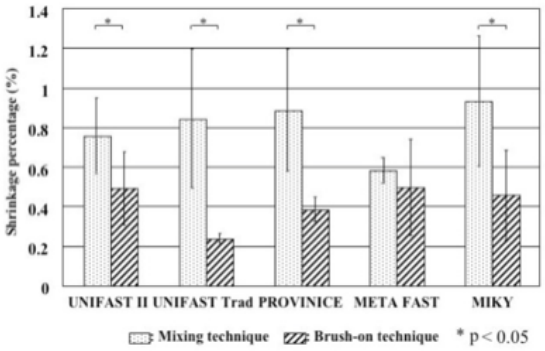

Fig. 3 Polymerization shrinkage of autopolymerized resin using the brush-on and mixing techniques[2]

Fig. 4 Spillway provided to the denture base

(3) Placement of the magnetic assmbly
The magnetic assmbly should be placed after the denture is settled, considering the minimum shrinkage of the autopolymerized resin.

2. Movie explaining the clinical procedure of magnetic attachments (Fig. 5)

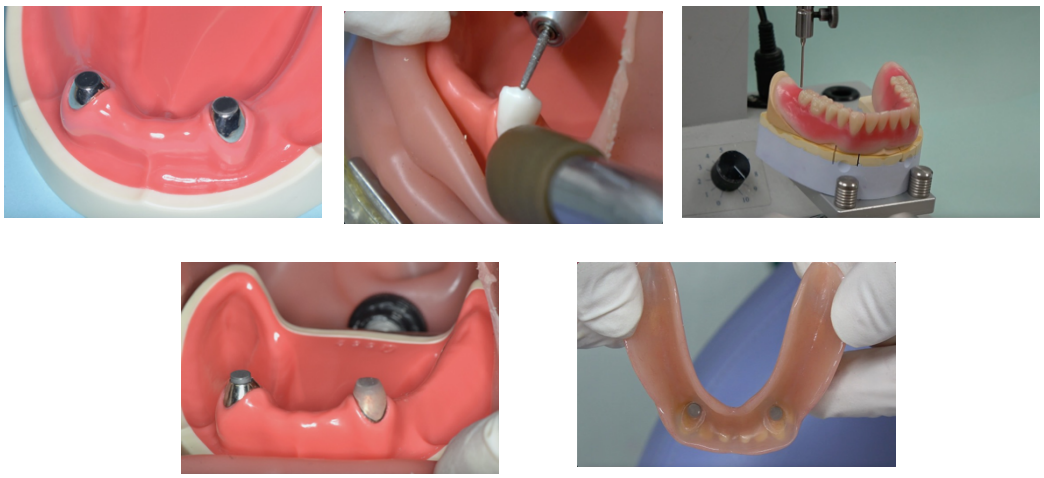

Fig. 5 Clinical procedure for applying a magnetic attachment

Practice

Placement of magnetic attachments (magnetic assembly) (Figs. 6-9)

Fig. 6 Jaw model of a partially edentulous mandible with left and right remaining canines, overdenture, and magnetic attachments (Physio Magnet, Kedika Corporation) used in the seminar.

Fig. 7 A space for magnetic attachments was created on the denture. The denture was placed on the jaw model, and a spillway was provided.

Fig. 8 After applying vaseline to the keeper coping and the residual ridge, the magnetic assembly was placed on the keeper. Using the brush-on technique, the magnetic assembly was fixed with autopolymerized resin using light pressure.

Fig. 9 After the resin was polymerized, the denture was removed and polished.

Results

The seminar was held twice, with a total of 40 participants (23 males and 17 females) divided into two groups of 20. There were 33 university and 7 non-university participants. Difficulties such as the detachment of the magnetic assembly and lack of retentive force were observed during the fixing procedures.

The results of the post-seminar questionnaire are shown in Figs. 10-12.

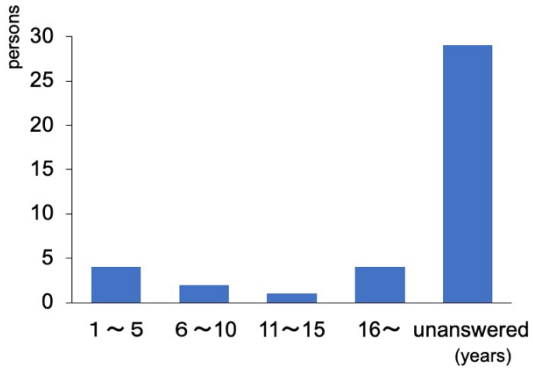

Fig. 10 Work years of participants

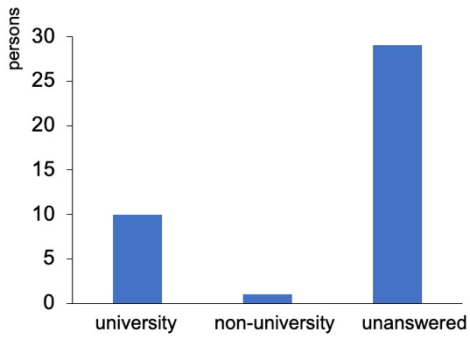

Fig. 11 Work place of participants

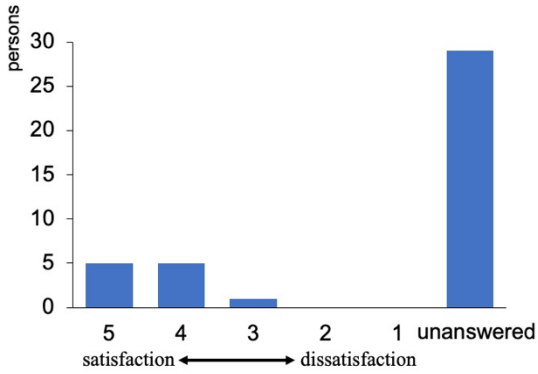

Fig. 12 Evaluation of the seminar

Discussion

Not using metal primers and the premature removal of the denture from the simulation model during the polymerization of the resin were considered to be reasons for the detachment. Insufficient retentive force may be due to misalignment of the magnetic assembly, namely, an air gap caused by the intrusion of the resin onto the keeper surface.

Conclusion

From a post-seminar questionnaire, most of participants learned well the clinical and laboratory procedures for magnetic attachments and were satisfied with the seminar.

References

1) Ai M, Shiau YY. New magnetic applications in clinical dentistry. Quintessence Publishing Company, Tokyo, 2004, 28–50.
2) Hanatani S, Shibuya N, Muraishi E, et al. Dimensional accuracy of autopolymerized resin applied using the brush-on technique. Int Chin J Dent. 2009; 9 (1): 9–13.

Acknowledgments

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