Full mouth prosthetic case applying magnetic attachments

in various shapes

R. Kanbara, Y. Nakamura, K. Shoji, K. Yoshihara, H. Konno, Y. Takada¹, Yu. Ohno, Y. Tanaka

Department of Removable Prosthodontics, School of Dentistry, Aichi-Gakuin University ¹Division of Biomaterials, Tohoku University Graduate School of Dentistry

Introduction

The patient was a 83-year-old female who lost her bilateral molar occlusion due to the bilateral upper free-end and multiple tooth loss. A X-ray image showed alveolar bone resorption due to advanced periodontal disease, malalignment, and the collapse of the occlusal plane. Stress-bearing ability and preservability of the upper and lower remaining teeth were examined, followed by a thorough consultation with a patient regarding the esthetic recovery based on the diagnostic wax-up. Provisional restoration was placed in the upper jaw to correct the occlusal plane and tooth alignment. The crowns of the lower remaining teeth were truncated, and treatment overdenture was placed. The patient was followed for several months, and final restoration was placed after confirming that there are no functional and esthetic problems. For the design of the final restoration, radicular attachments using magnetic attachment and MT crowns were chosen in the lower jaw, and porcelain-fused-to-metal crown and extracoronal magnetic attachment were chosen in the upper jaw.

The patient is satisfied with functional and esthetic results. Postoperative prognosis at 3 years and a half after the placement of new dentures is satisfactory.

Initial Situation

Fig. 1 shows the intraoral image at first visit. The patient was not using the lower denture due to poor fitting of a denture. Bilateral occlusal support was lost, and malalignment of anterior teeth due to advanced periodontal disease and the collapse of the occlusal plane were observed.



Fig. 1 the intraoral image at first visit

Fig. 2 shows a panoramic X-ray at first visit. Problems were extracted from the oral examination and X-ray image. Problems included mandibular alveolar bone resorption, the collapse of the upper and lower occlusal plane, poor prosthesis, poor root canal filling and remaining teeth.



Fig. 2 a panoramic X-ray at first visit

Treatment Procedure

1. Exploration

1) Mandibular

Fig. 3 shows a dental X-ray of the lower remaining teeth. Severe alveolar resorption in the anterior area, poor prosthesis in the right molar area, and the remaining teeth in the left molar area were observed in the mandible (Fig. 3). Treatment plans in the mandible were root canal treatment in the remaining teeth, followed by an overdenture for all the remaining teeth to improve the crown-root ratio.

2) Maxilla

Fig. 4 shows the frontal and occlusal views of the maxillary arch. The dental axis collapse and space were observed in the arch, and disharmony of the dental arch was observed in the occlusal view (Fig. 4). Treatment plans in the maxilla were prosthetic restoration of the remaining teeth for esthetic and functional recovery, and denture in the bilateral missing molar areas.

3) WAX-UP for exploration

A study model was mounted on an articulator using a face bow transfer (Fig. 5). For the maxillary dental arch, ideal dental arch and shape were fabricated using dental wax to use as a guide of final restoration for esthetic recovery. For the mandibular dental arch, prosthetic restoration of the lower right first and second molars and overdenture were simulated. Lower teeth were aligned to harmonize with upper teeth. The diagnostic wax-up is performed to examine if the present occlusal height is proper for the prosthetic treatment, and is used as an explanatory material.



Fig. 3 a dental X-ray of the lower remaining teeth



Fig. 4 the frontal and occlusal views of the maxillary arch



Fig. 5 WAX-UP for exploration

2. The Designs of Final Restoration

The designs of upper and lower restorations were determined based on the oral examination, X-ray image, and diagnostic wax-up. The designs of the mandibular restorations included radicular-type magnetic attachments in the lower anterior area between the right lateral incisor and the left canine, and attachment denture using MT crowns in the well-preserved lower right second molar (Fig. 6).

The upper prosthesis was also designed based on the oral examination, X-ray image, and diagnostic wax-up. The condition of the upper remaining teeth was fair without mobility. An extracoronal magnetic attachment was placed on the bilateral upper second premolars, and esthetic attachment denture without a clasp was placed on the bilateral molars. Three abutment teeth up to the canine were joined using porcelain-fused-to-metal crown (Fig. 7).



Fig. 6 the designs of lower restorations



Fig. 7 the designs of upper restorations

3. Treatment Process (maxilla)

1) Temporary restoration

A temporary crown was placed to secure masticatory function, pronunciation, and esthetics (Fig. 8), and to facilitate initial periodontal and root canal treatment.



Fig. 8 temporary restoration wearing

2) Change of the designs of maxilla prosthetic appliance

Root fracture of the upper left second premolar was confirmed during root canal treatment during initial treatment using temporary crown. Although the patient was followed for a certain period of time, the tooth extraction was indicated due to the lingering symptoms such as spontaneous pain. The maxillary restoration design was threofore altered to place an extracoronal magnetic attachment on the left first premolar instead of the second premolar. The canine and the first premolar were joined considering the condition of the periodontal tissue (Fig. 9).



Fig. 9 change of the designs of maxilla prosthetic appliance

3) Provisional restoration

A provisional restoration esthetically and functionally improved from a temporary crown was fabricated based on the diagnostic wax-up after the initial periodontal and root canal treatments, and placed.

4. Treatment Process (mandibular)

1) Root canal treatment and Keeper caps and MT-crown inner crown wearing

Fig. 10 shows an intraoral image and panoramic X-ray at the completion of the root canal treatment. A keeper caps and MT inner crown were placed according to the treatment plan and prosthetic design (Fig. 11).



Fig. 10 an intraoral image and panoramic X-ray at the completion of the root canal treatment



Fig. 11 a keeper caps and MT inner crown wearing

5. Final Provisional Restoration and Treatment Denture wearing

Fig. 12 shows an intraoral image with upper final provisional restoration and upper and lower treatment dentures. Final provisional restoration was fabricated by making functional and morphological alterations of the previous provisional restoration. The occlusal plane, upper dental arch, and incisal overjet were improved compared with the initial visit (Fig. 12). The patient was followed for several months with the final provisional restoration. Since there was no problem in occlusal height and temporomandibular joint, final restoration was placed.



Fig. 12 an intraoral image with upper final provisional restoration and upper and lower treatment dentures

6. The Procedure of Final Restoration

1) Bite taking

Fig. 13 shows the bite taking of the final restoration. Bite taking was performed using a bite plate based on the occlusal height of the treatment denture. Occlusal height with upper provisional restoration was taken, followed by bite taking with the upper abutment teeth. For the bite taking between the abutment teeth and the bite plate, occlusal height between the obtained provisional restoration and bite plate was secured by an upper treatment denture, followed by the removal of provisional restorations in anterior teeth area and bite taking (Fig. 14). The upper denture was removed, and bite taking of the molar abutment teeth was performed using the same silicone bite (Fig. 15).

Since the bite plate was used for bite taking, obtained horizontal maxillomandibular relationship should be confirmed. Horizontal occlusal relationship was registered using Gothic arch to obtain horizontal jaw position according to the conventional method (Fig. 16).



Fig. 13 the bite taking of the final restoration



Fig. 14 removing of provisional restorations in anterior teeth area and bite taking



Fig. 15 removing the upper denture and bite taking of the molar abutment teeth



Fig. 16 using Gothic arch to obtain horizontal jaw

$2) \ \, {\rm Try\ fitting}$

Fig. 17 shows the final restorations including upper and lower wax denture, upper porcelain-fused-to-metal crown, extracoronal magnetic attachment, and lower MT outer crown. These final restorations were tried in to verify occlusion and esthetics.

3) Final restoration

Fig. 18 shows upper and lower final dentures. The image on the left shows the occlusal view, and the right shows the mucosal surface of a denture base. The metal used for the metal base was gold platinum alloy.



Fig. 17 try fitting of the final restorations including upper and lower wax denture

Fig. 18 upper and lower final dentures

Discussions

Fig. 19 shows intraoral image of the patient with final restorations. The accurate intraoral position of a denture was determined by magnetic attachments. Magnetic attachments allowed easy placement and removal of a denture, and esthetics and function were markedly improved. The patient was satisfied with the results (Fig. 19).

Fig. 20 shows an intraoral image at 3 years after the placement of final restorations. Although mild redness in the gum around keeper caps and palatal indentation due to a denture were observed, the patient did not complain of pain, and there was no problem in masticatory function and esthetic appearance.

Fig. 21 shows the intraoral dental X-ray image of the first visit and present. Although the lower left second molar was hemisected, there was no clinical symptom in abutment teeth, and the prognosis was satisfactory. The results suggest the mechanical usefulness of magnetic attachments on abutment teeth. Although the designs of upper right second premolar and left first premolar with extracoronal magnetic attachments included cantilever structure, no alveolar resorption related to this design was observed. It is suggested that stress was distributed by the concomitant use of bracing arms and interlocks.

The results of the present study confirmed the effectiveness of magnetic attachments which can be applied in various shapes such as extracoronal attachment, MT crown, and root cap attachment depending on the clinical situations.

Regular follow-up and oral care by specialists will be continued for a favorable prognosis.



Fig. 19 intraoral image of the patient with final restorations



Fig. 20 an intraoral image at 3 years after the placement of final restorations



Fig. 21 the intraoral dental X-ray image of the first visit and present

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