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Use of a Magnetic Attachment to Retain an Obturator Prosthesis for an Osseous Defect

Shin-ichiro Kawamoto, DDS, PhD,[1] Syunichi Hamamura, DT,[2] Hideki Kawahara, DDS,[3] Yasuhiro Nishi, DDS, PhD,[1] & Eiichi Nagaoka, DDS, PhD[1]

[1] Department of Oral Maxillofacial Prosthodontics, Kagoshima University Graduate School of Medical and Dental Sciences, Kagoshima, Japan
[2] Kagoshima University Hospital Medical Support Group, Kagoshima, Japan
[3] Private Practice, Kagoshima, Japan

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Correspondence
Shin-ichiro Kawamoto, Oral Maxillofacial Prosthodontics, Kagoshima University Graduate School of Medical and Dental Sciences, Kagoshima 8908544, Japan.
E-mail: kwmt-s@dentb.hal.kagoshima-u.ac.jp

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Abstract

Tooth loss accompanied by a massive defect of the alveolar bone can cause serious problems such as food deposit and esthetic impairment. This report describes procedures for the fabrication of an osseous defect obturator prosthesis connected to a fixed partial denture by a magnetic attachment along with the clinical outcome.

History

A 53-year-old man with a periapical lesion at the maxillary left canine was referred to the Department of Oral Surgery, Kagoshima University Hospital (Fig 1). The lesion was histopathologically diagnosed as a granular cyst. After informed consent was obtained, simultaneous surgical removal of the lesion and extraction of the canine were performed under general anesthesia. The surgery resulted in partial edentulism, classified by the American College of Prosthodontists (ACP) Prosthodontic Diagnostic Index (PDI) as Partially Edentulous Classification IV,[1] and concavity of the alveolar bone at the labial surface (Fig 2). Though the patient was advised to have treatment to recover the defect because of predictable problems such as food deposit and esthetic impairment, he declined further surgical treatment. It was then agreed that the alveolar bone defect would be restored with an obturator prosthesis.

Treatment sequence

Fabrication of FPD

After epithelization of the defect, prosthetic treatments were initiated. A fixed partial denture (FPD) connected to an obturator prosthesis by a commercially available magnetic attachment was designed and fabricated in the Department of Denture Prosthodontic Restoration.

1. Removal of preexisting crowns, preparation for clinical crowns, impression with a custom tray and an elastometric material (Exafine injection type, GC Corp., Tokyo, Japan), and maxillomandibular relationship recording were routinely processed.
2. The design placed a Magfit EX600 (GC Corp.) keeper component in the bottom of the #23 pontic to retain an obturator prosthesis equipped with a magnetic assembly. The wax pattern of the FPD, including a keeper component, was formed and cast into silver-palladium alloy (Castwell M.C. 12% Gold, GC Corp.). After intraoral insertion of the metal framework for checking the fit and occlusion, the FPD was completed in the usual manner (Fig 3).

Fabrication of obturator

1. For the fabrication of an obturator prosthesis, a preliminary impression of the maxilla with the FPD was made with an irreversible hydrocolloid. A definitive impression with an elastometric material was made using the pick-up technique to obtain an impression of the region underneath the pontic and the osseous defect. After filling the

Figure 1 Presurgical lateral view.

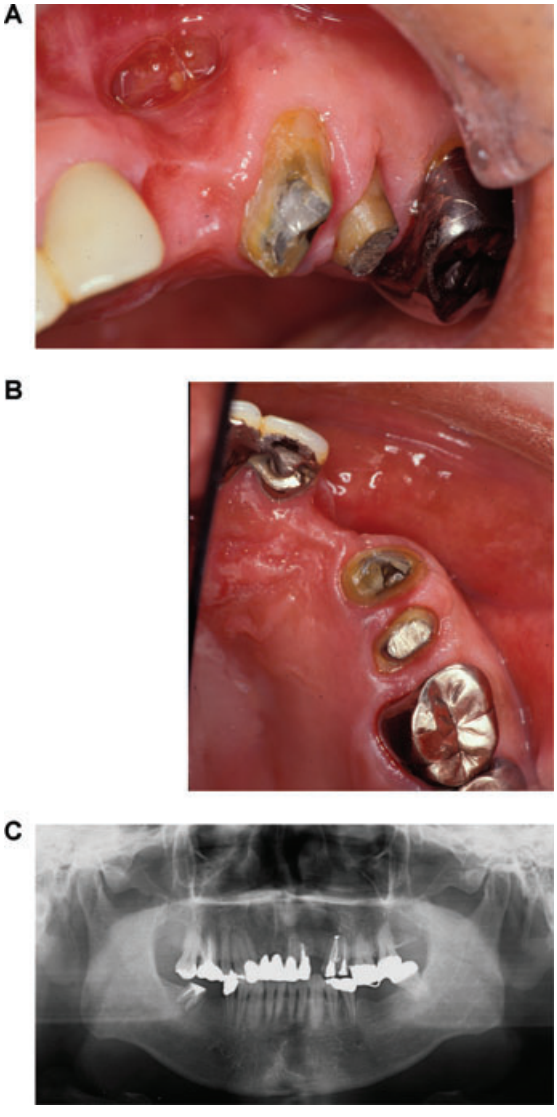

Figure 2 Postsurgical lateral (A) and occlusal (B) views, and panoramic radiograph (C).

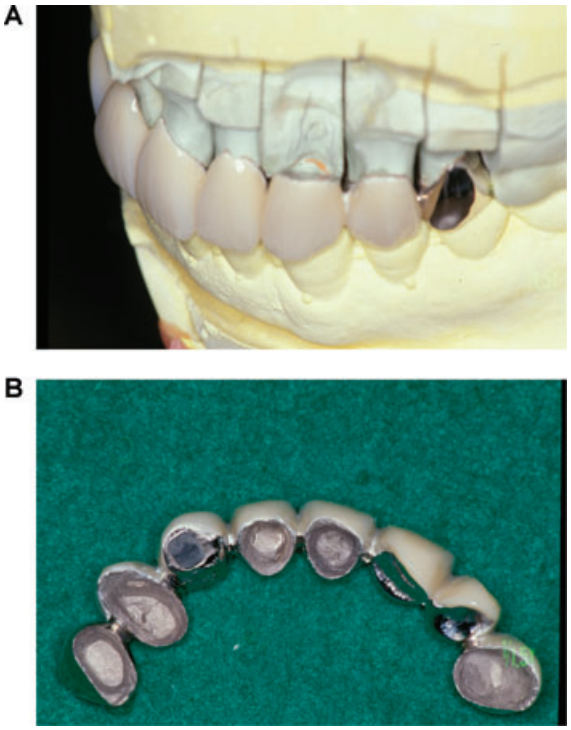

Figure 3 Lateral (A) and bottom (B) views of the fabricated FPD. A keeper component is cast into the intaglio of the left canine pontic of the FPD.

osseous defect with an Exafine injection, an impression of the maxilla was made using a custom tray. After Pattern Resin (GC Corp.) was placed into the crowns of the FPD in the removed impression, the remainder was poured with dental stone (New Plastone, GC) to fabricate the master cast.

2. Subsequently, a duplicate cast was prepared by adding polymerizing silicone (Protesil, Krupp, Germany) and die stone (New Plastone). After blocking out the groove in the concavity of the duplicate cast, an obturator was waxed to restore the defect and to outline the alveolar ridge. The resultant cast was achieved by flasking. The wax pattern

Figure 4 Lateral view of the obturator connected to the FPD.

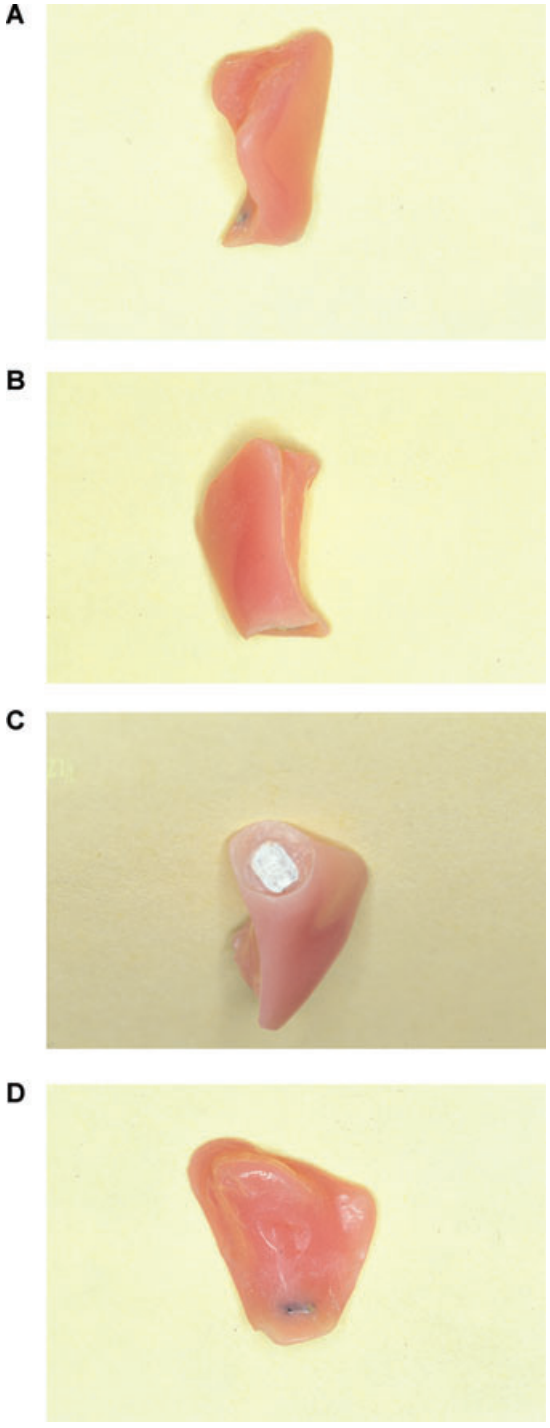

Figure 5 (A to D) Views of the obturator containing a magnetic assembly.

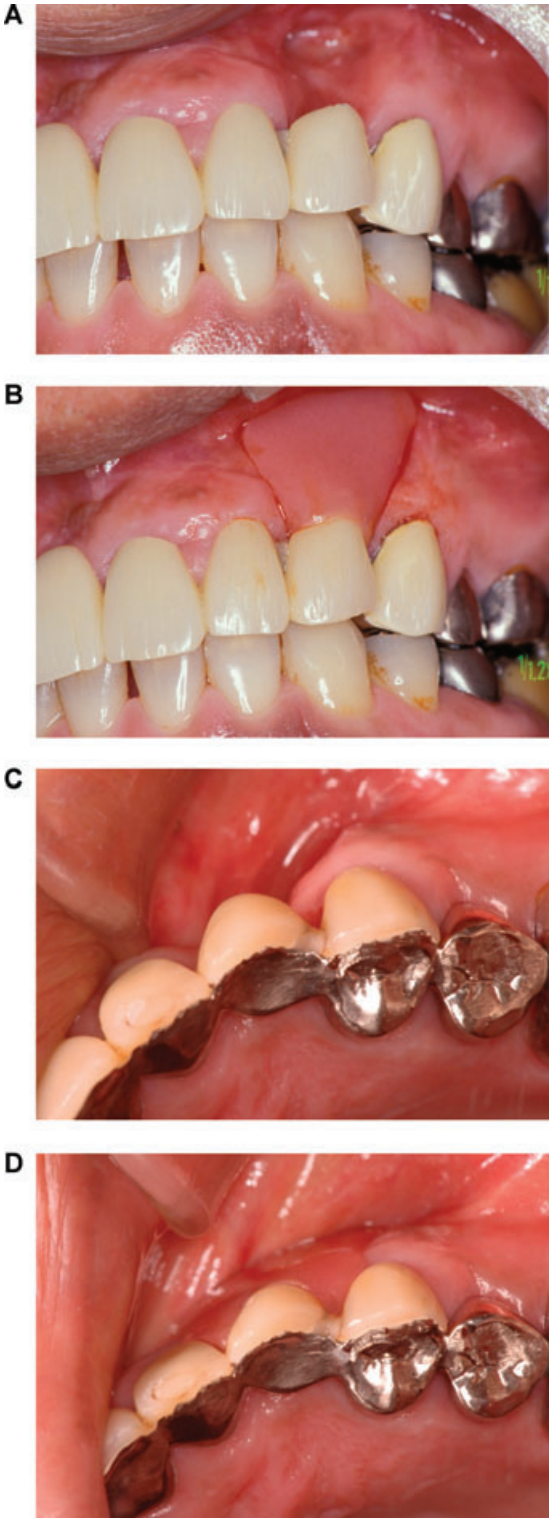

Figure 6 Labial view of the alveolar defect without (A) and with (B) the obturator. An occlusal view without (C) and with the obturator (D).

was then polymerized with heat-polymerized denture-base acrylic resin (Acron, GC Corp.). Trimming and polishing of the obturator was carried out to fit the master cast (Fig 4).

3. After intraoral fitting, the obturator was drilled to install a magnetic assembly. The housing space was filled with autopolymerized acrylic resin (Metafast, GC Corp.), and the obturator was then gently set over the magnet attached to the keeper component at the bottom of the pontic. The

obturator was slipped off after resin polymerization, and was trimmed and polished (Fig 5).

4. The obturator within the magnet was delivered to the patient along with instructions necessary for its use and maintenance. The patient was also informed about the effect of the magnetic attachment on any magnetic resonance imaging. Routine follow-up appointments were scheduled. In the 5.5 years postinsertion, no complaints have been reported regarding either esthetics or leakage of food (Fig 6).

Discussion

For rehabilitation of masticatory function in a patient classified as ACP PDI Class IV and with a missing canine, an FPD having functional rigidity was considered more suitable than a removable partial denture. The prosthesis here was individually designed to restore edentulism and repair an osseous defect.

Etienne and Taddei reported an application of bar-clip attachments to retain an obturator in a patient following total maxillectomy.[2] In this case with a comparatively small defect, an obturator prosthesis was considered necessary for its simplicity rather than for its great retention. Magnetic attachments are increasingly used in prostheses as retainers in partially edentulous cases. In cases with a facial defect, magnets are reported to be useful for retaining an implant-supported prosthesis.[2-6] An obturator that can be attached and detached by patients offers great benefits, especially for sanitation. Plate-type pontics in partial dentures have been applied to cases with alveolar defects. A conventional plate-type pontic, designed to be removable because of poor self-cleaning effects, is usually difficult to manage. Here, an attempt was made to design a prosthesis that could be easily handled.

A rectangular magnetic attachment was used to retain the obturator, and the keeper component was placed into it without changing the shape or size of the bottom of the canine pontic. The attachment force was 610 gf. Although it could easily be removed by hand, there was probably no external force of sufficient magnitude and direction that could remove the obturator in the oral cavity. Additionally, labial pressure favorably affected the stabilization of the obturator.

Since the bottom surface of the pontic was kept slanted to the tooth axis, the obturator had a wedge-like configuration. With some lateral turns it could be attached or detached. When the magnetic assembly was placed into the obturator, resin was used to keep the sides of the pontic configured. This treatment was considered to both retain and stabilize the obturator.

In this case, where it was also necessary to remove a cyst, the possibility of simultaneous bone graft[7] for osseous repair of the defect should have been evaluated prior to surgery. Considering the patient's reluctance to undergo more surgical procedures, filling of the bone defect caused by cyst removal was successfully carried out by fabrication of an FPD and obturator using an integrated design.

Conclusion

An original prosthesis design using an obturator connected to an FPD by a magnetic attachment facilitated restoration and repair of tooth loss and an osseous defect.

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