Repair of a Multiple Implant-Supported Fixed Superstructure With a Metal-Ceramic Resin-Bonded Fixed Partial Denture: A Clinical Report

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Even in the case of implant loss, replacement of the implant and refabrication of the superstructure are often sufficient, as long as the bone and soft tissue are in good condition. However, if implant loss accompanied by serious bone resorption occurs with a fixed implant superstructure supported by multiple implants, it is very difficult to treat. This clinical report describes the process by which multiple implant-supported fixed metal ceramic restorations were repaired with a metal ceramic resin-bonded fixed partial denture without complete refabrication after removal of one of the implants due to severe bone resorption. The 3-year follow-up indicated excellent serviceability and a well-satisfied patient.

Key Words: complications, repair, failures, implant-supported fixed partial denture, MC RBFPD

INTRODUCTION

The long-term success of osseointegrated implants is known to depend on the quality and quantity of bone, implant position, and the design of superstructures to equally disperse masticatory and functional loads among the implants.1–4 Long-term studies of failure of fixed implant superstructures report damage to the superstructures from (1) fracture of the abutments or retaining screws,1,5–8 (2) fractures of occlusal material, such as a porcelain and acrylic resin matrix,1,5–7,9 and (3) fracture of the cantilevered area.1,5–7

In general, a complication that is localized to the superstructure is relatively easy to treat; refabrication of the superstructure is a final treatment option. However, in the case of implant loss, the type of treatment varies in accordance with the location of the implant and the type of superstructure. In fact, implant loss after placement of the superstructure (eg, maxillary implant-supported fixed partial denture) is one of the most common implant complications (<10% incidence).1 Even in the case of implant loss, replacement of the implant and refabrication of the superstructure are often sufficient, as long as the bone and soft tissue are in good condition. However, if implant loss accompanied by serious bone resorption occurs with a fixed implant superstructure supported by multiple implants, it is very difficult to treat.

The purpose of this clinical report is to describe the process by which multiple implant-supported fixed metal ceramic restorations were repaired with a metal ceramic resin-bonded fixed partial denture (MC RBFPD) without complete refabrication after removal of one of the implants due to severe bone resorption.

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DOI: 10.1563/AAID-JOI-D-12-00036
CLINICAL REPORT

A 50-year-old Japanese woman had undergone implant and prosthetic treatments 8 years previously at a different dental clinic. Four implants had been placed in the maxillary anterior region (from the right maxillary canine to the left maxillary central incisor). The patient visited the Nihon University School of Dentistry Dental Hospital as there had been swelling, bleeding, and pus discharge from the gums surrounding the right maxillary central incisor for 6 months. There was nothing remarkable about the patient’s dental or medical history, and she was in good health. The superstructures were all metal ceramic restorations; one was a multiple implant restoration from the right maxillary canine to the right central incisor, and the other was a single implant crown located at the left maxillary central incisor. Both superstructures were cement retained (Figure 1). The right maxillary lateral incisor implant was placed high and toward the lip; thus, the crown was very long and the implant partially exposed. There was compromising artificial gingiva, made from gingiva-colored hard resin, where the gingiva had receded (from the right maxillary lateral incisor to the left maxillary central incisor). A panoramic and occlusal X-ray demonstrated severe bone resorption around the right maxillary central incisor implant due to peri-implantitis (Figure 2a and b). The patient agreed to have the implant removed but refused to undergo the recommended refabrication of the entire superstructure.

Reluctantly, it was decided that after the implant was removed an MC RBFPD would be placed using the altered superstructure of the right maxillary lateral incisor and the left maxillary central incisor as abutment teeth. Before removing the implant, the patient was anesthetized with a local anesthesia (xylocaine, Japan AstraZeneca, Tokyo, Japan). The connector between the right maxillary lateral incisor and right central incisor crowns was sliced and the implant and crown were removed as one piece (Figure 3a). Removing the implant was easy because of loss of osseointegration (Figure 3b). An artificial denture tooth (acrylic resin teeth, no. 546, Shofu Inc, Kyoto, Japan) was placed in the vacated site by attaching it to the adjoining metal-ceramic crowns using a resin adhesive (Super bond C&B, Sun Medical Co Ltd, Moriyama, Japan) as a temporary restoration.

In preparing the MC RBFPD, the parallel preparation of the proximal surfaces for abutment teeth (metal-ceramic crowns) was done first. Then, crescent-shaped lingual concavity preparation was performed at each adjacent lingual marginal ridge to ensure correct positioning (Figure 4a and b). These reductions were done with a pear-shaped
diamond bur (Diamond Point FG, No. 265R, ISO 015, Shofu Inc). The size of the crescent-shaped lingual concavity preparation was approximately 3.0 mm wide \( \times \) 4.0 mm high \( \times \) 1.0 mm deep. An impression was made with a custom acrylic resin tray (Tray Resin, Shofu Inc) using regular and injection-type silicone impression material (Examix, GC Corp, Tokyo, Japan). The impression was poured using a type IV dental stone (New Fujirock, GC Corp). The tooth shade was selected using a shade guide (Vita classical shade guide, Vident, Brea, Calif). The desired gingiva-colored porcelain was chosen using a shade indicator blade (Vita VM Gingiva; Vident). The MC RBFPD was fabricated using a high noble metal alloy (Casting Bond MC70, GC Corp) with porcelain (Vita VMK13, Vident) fired to the alloy. Lost soft tissue was replaced using gingiva-colored porcelain (Vita VM13 Gingiva, Vident) (Figure 5).

Before cementation, the intaglio surface of the MC RBFPD retainer was airborne-particle abraded (Hi-Blaster-II, Shofu Inc) with 0.05-mm alumina oxide particle under 2.0-bar pressure. The proximal surface porcelain was etched with a 5% hydrofluoric acid gel (GC Corp). Intraoral airborne-particle abrasion was carried out on the entire lingual and proximal porcelain surface of the abutment teeth (the right maxillary lateral incisor and the left maxillary central incisor) with 0.05-mm alumina oxide particle under 0.2-bar pressure. The intaglio surfaces of the wing-type retainers, and the entire lingual metal surfaces of the right maxillary lateral incisor and left maxillary central incisor superstructures, were conditioned with a single liquid primer (Metal Primer II, GC Corp) designed for noble metal alloys. The proximal porcelain surface of the MC RBFPD and the abutment teeth were also conditioned for using a mixed liquid primer (Ceramic Primer, GC Corp) designed for a silane coupling treatment.

The MC BFPD was luted with an adhesive dual-polymerizing resin (Linkmax, GC Corp). The composite resin was incrementally polymerized for 40 seconds using a visible light polymerization unit (Gripilight-II, Shofu Inc). Upon completion of the MC RBFPD, routine maintenance was performed during patient recalls 2 to 3 times each year for 5 years (Figure 6a and b). There was no gingival recession or inflammation in the region of the prosthesis. The patient was satisfied and had no functional or esthetic problems.

**DISCUSSION**

In this present case, it was not possible to avoid cutting and removing part of the superstructures to remove the infected implant. In addition, it was not possible to replace the implant with severe bone resorption; therefore, a prosthetic repair approach
Repair of a Multiple Implant-Supported Fixed Superstructure

This clinical report demonstrated a method of repair with MC RBFPD in a patient with metal ceramic restorations supported by multiple implants, one of which was removed due to severe bone resorption. The 5-year follow-up indicated excellent serviceability and a well-satisfied patient. Further studies are needed to evaluate the long-term usefulness of this type of altered prosthesis.

**SUMMARY**

This clinical report demonstrated a method of repair with MC RBFPD in a patient with metal ceramic restorations supported by multiple implants, one of which was removed due to severe bone resorption. The 5-year follow-up indicated excellent serviceability and a well-satisfied patient. Further studies are needed to evaluate the long-term usefulness of this type of altered prosthesis.

**REFERENCES**


