

Functional and esthetical full mouth rehabilitation with implant supported prostheses: A case report

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This report describes the prosthetic treatment of a patient with multiple missing teeth. Installation of five fixtures on maxilla with sinus lift and six fixtures on mandible with ramal bone graft were performed. With implant supported all-ceramic with zirconia core using CAD/CAM technology and porcelain-fused-to-gold prosthesis, treatment with positive outcome which satisfies both functional and esthetical aspect was obtained. (*J Korean Acad Prosthodont* 2015;53:81-5)

Key words: Dental implants; CAD-CAM; Full mouth rehabilitation

Introduction

In cases of multiple tooth loss, treatment option can be removable partial denture, complete denture, overdenture, or implant supported prosthesis. Among them, implant supported fixed prosthesis slows down resorption of alveolar ridges and rehabilitates approximately full function of the natural teeth,^{1,2} hence achieving relatively higher satisfaction on patient's behalf, compared to the conventional removable dentures.³ By providing more stable occlusal conditions, implant supported fixed partial denture can be a good alternative, when the patient shows lack of neuromuscular control for removable denture.⁴

The aim of this case report was to show the functionally and esthetically satisfying full mouth rehabilitation with implant supported all-ceramic and porcelain-fused-to-gold prostheses.

Case report

A 56-year-old female patient was referred to the Department of Prosthodontics at Seoul National University Dental Hospital. She complained discomfort derived from the fractured maxillary pro-

theses, and the lower removable partial denture she had been using. She wanted the prosthetic treatment using implant supported fixed partial denture. When presented, #16, 17, 25-27, 31-36, 41-47 (FDI system) were missing and mandibular removable partial denture showed excessive occlusal wear so that the vertical dimension was decreased (Fig. 1).

In clinical and radiological examination after removing all spoiled prostheses, preservation of all the remaining teeth, #13, 15, 23, 24, 37, was planned. In the upper part, after caries treatment, temporary bridges were fabricated from #15 to #24. In the lower, by temporary complete denture, vertical dimension was re-established. During adjusting the prostheses, the patient was satisfied by its function and esthetics.

A CT scan was ordered to evaluate the presence of sufficient bone volume. A radiographic implant CT stent was fabricated by duplicating the temporary denture. Implant position was determined as #12, 16, 22, 25, 26 area in maxilla, and #33, 34, 36, 43, 44, 46 area in mandible. In the upper esthetic zone, from #12 to #22 area, bone grafting was added to treatment plan to compensate bone resorption.

After one month of adjusting period with temporary prostheses, the implant surgery was performed under IV sedation. The whole

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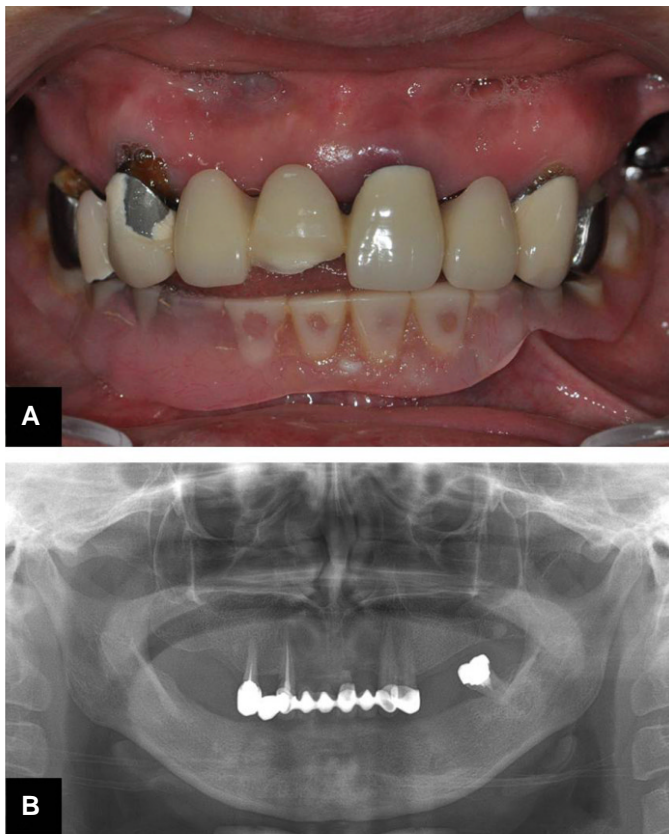


Fig. 1. (A) Pretreatment intraoral view, (B) Pretreatment panoramic radiograph.

procedure was done during one-day hospitalization in the Department of Oral and Maxillofacial Surgery at Seoul National University Dental Hospital. The radiographic stent was converted to a surgical stent to guide the placement of the implant fixtures. The graft bone for esthetic zone was harvested from mandibular right ramus as a block bone, and sinus elevation was done on maxillary left posterior area. Four Straumann® implants (Institut Straumann AG,

Waldenburg, Switzerland) were placed in the maxilla and 6 Straumann® implants were installed in the mandible. In maxillary right lateral incisor area, implant was inserted 5 months later. The implant diameters and length were summarized in Table 1.

Osseointegration was clinically and radiographically confirmed 6 months later from the surgery. The irreversible hydrocolloid impression material (Aroma Fine Plus; GC Corp., Tokyo, Japan) was used for preliminary impression. Mandibular recording base was fabricated with acrylic resin (Quicky; Nissin Dental Products Inc., Kyoto, Japan) and wax rim was mounted on it. Definitive impression was taken using the pick-up impression copings (Straumann, Waldenburg, Switzerland) on #16i, 25i, 26i, 33i, 34i, 36i, 43i, 44i, 46i with vinyl polysiloxane impression material (Examixfine, GC Corp., Tokyo, Japan). Centric relation record was obtained after determining the vertical dimension by recording base and wax rim. In this process, silicone bite registration material (Exabite II; GC Corp., Tokyo, Japan) was used. Casts were mounted on semi-adjustable articulator arbitrarily.

Abutment selection was performed on the master casts using Straumann prosthetic planning kit. Cement-retained metal ceramic bridge was planned on #33i-43i area, considering the location of screw hole. For #16i, 25i, 26i, 34i-36i, 44-46i area, screw-retained metal ceramic bridges were planned. To fulfill the esthetic and functional requirement, porcelain-fused-to-gold was chosen for this case putting gold occlusal surface on #16i, 25i, 26i, 36i, 46i area, considering the usual Korean dietary habit.

Gold copings were tried-in to ensure passive fitness. Coping for #44i-46i was sectioned and reconnection and soldering procedure was accomplished using duralay resin (Reliance Dental Mfg., Worth, IL, USA). Periapical radiographs confirmed complete adaptation. To obtain accurate centric relation record, bite-registration was done with the coping installed, using duralay resin. After building up veneering porcelain, definitive prostheses were deliv-

Table 1. Implant placement data

Implant location		Type of implant	Implant diameter (mm)	Implant length (mm)
Maxilla	right lateral incisor	Straumann® Bone level NC	3.3	10
	right first molar	Straumann® Tapered Effect RN	4.1	8
	left lateral incisor	Straumann® Bone level NC	3.3	8
	left second premolar	Straumann® Tapered Effect RN	4.1	10
	left first molar	Straumann® Tapered Effect RN	4.1	8
Mandible	right canine	Straumann® Bone level NC	3.3	10
	right first premolar	Straumann® Bone level NC	3.3	8
	right first molar	Straumann® Standard Plus RN	4.1	8
	left canine	Straumann® Bone level NC	3.3	10
	left first premolar	Straumann® Bone level NC	3.3	8
	left first molar	Straumann® Standard Plus RN	4.1	8

NC: Narrow CrossFit®, RN: Regular Neck.

ered. The cement-retained metal ceramic bridge in mandibular anterior was cemented with noneugenol temporary resin cement (Premier Implant Cement; Premier Dental Products Co., Plymouth Meeting, PA, USA).

Three months later after the fixture in maxillary left lateral incisor was implanted, definitive impression taking with vinyl polysiloxane impression material (Examixfine, GC Corp., Tokyo, Japan) was done by placing pick-up copings (Institut Straumann AG, Waldenburg, Switzerland) on #12i, 22i, and using double cord technique on #13, 15, 23, 24. The soft tissue of maxillary anterior area was managed with ovate pontic through the adjusting period, and acrylic resin (Quicky; Nissin Dental Products Inc., Kyoto, Japan) jig was made for duplicating the anterior guidance of temporary prostheses.

All ceramic fixed partial denture with zirconia coping was chosen for #15-24 area to satisfy the patient's esthetic concern. Three-unit porcelain-fused-to-zirconia bridge for #13-15, 4-unit porcelain-

fused-to-zirconia bridge for #12i-22i, and porcelain-fused-to-zirconia single crowns for #23, 24 were planned.

Zirconia core (ZirPremium, Acucera Inc., Korea) was fabricated using CAD/CAM technology, and tried-in to check for fitness. After building up veneering porcelain, the bridge for #13-15, the crowns for #23, 24 were cemented with resin cement (Rely-X UniCem, 3M ESPE, Seefeld, Germany), and the bridge for #12i-22i was cemented with noneugenol temporary resin cement (Premier Implant Cement; Premier Dental Products Co., Plymouth Meeting, PA, USA) (Fig. 2). The prostheses were designed using mutually protected occlusion concept. The anterior teeth protected the posterior teeth from excursive force and wear, and posterior teeth supported the bite force. Oral hygiene instruction and regular check-up were administered.

During 18 months of follow-up period, clinical and radiological conditions of the osseointegrated implants and prostheses were stable without any signs of inflammation or unexpected bone loss around the implants (Fig. 3).



Fig. 2. Postoperative intraoral view. (A) Frontal view, (B, C) Occlusal view, (D, E) Buccal view.

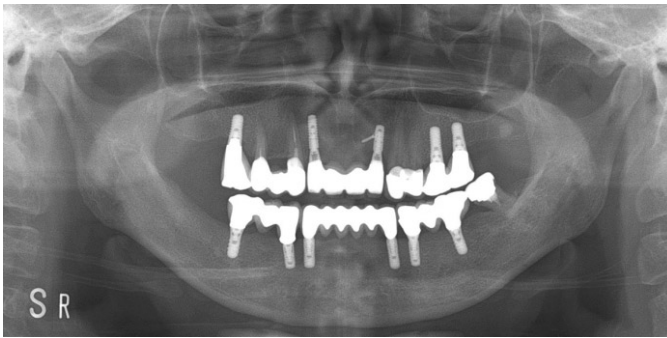


Fig. 3. Panoramic radiograph 18 months after placement of definitive prosthesis.

Discussion

In this case, as all has been acknowledged as a treatment of choice for function and esthetics, implant supported fixed partial denture achieved good satisfaction on patient's behalf, resulting in increased psychological confidence and social activity. With fixed reconstructions, it is particularly important that there is sufficient interocclusal space to ensure rigidity.⁴

For the framework of coping material, high noble alloys, base metals, and zirconia or alumina ceramics can be used. Metal substructures have the advantage of the ability to section and reconnect but their reduced light transmission hinders getting natural appearance. In this case, gold framework made adjusting its fitness by sectioning and reconnecting. Zirconium oxide, also known as zirconia, has gained increasing popularity in contemporary dentistry due to its biocompatibility, high flexural strength, toughness, and esthetic properties.^{5,6} As CAD/CAM technology gets ubiquitous, zirconia is currently being used for the fabrication of all ceramic copings and frameworks for both fixed prosthodontics and implant dentistry.^{5,6}

Several studies have tried to evaluate the feasibility of using different restorative materials in fabrication of implant supported prostheses.⁷⁻⁹ In this case, molar area was restored with gold

occlusal surface to fulfill the usual dietary habit of Koreans, and the rest with porcelain occlusal surface for esthetics. CAD/CAM technology was applied to the esthetic zone and premolar area.

In conclusion, implant supported prostheses satisfied the patient's esthetic, functional desire in the case of multiple tooth loss. For the anterior and premolar area, CAD/CAM technology achieved predictable, successful outcome with the help of proper combination of conventional restorative materials.

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고정성 임플란트 보철물을 이용한 완전구강회복 증례

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본 증례의 환자는 상악 전치부 보철물의 파절 및 기존에 사용하던 하악 의치의 불편감 때문에 임플란트를 이용한 고정성 보철을 원한다는 주소로 내원하였다. 상악동 거상술, 하악지 골이식과 함께 상악에 5개, 하악에 6개의 임플란트를 식립하였다. 전치부와 양쪽 구치부의 세 부분으로 나누어 임플란트 지지형 고정성 보철물을 장착하였다. 이상과 같은 과정을 통해 적절한 심미적, 기능적 결과를 얻었기에 이를 보고하고자 한다. (대한치과보철학회지 2015;53:81-5)

주요단어: 임플란트; CAD-CAM; 완전구강회복술

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