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CLINICAL REPORT

Management of a Malpositioned Implant using Custom Abutment and Screw-Retained Fixed Dental Prosthesis

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ABSTRACT

A 32-year-old woman with missing permanent mandibular right molars and left first molar presented for treatment. One of the implants were misaligned during the placement due to sudden mouth closure of the patient. All implants successfully osseointegrated. However, the misaligned implant resulted in substantial mechanical and esthetic restorative challenges. The prosthodontic treatment included a custom abutment and a screw-retained fixed dental prosthesis on the right side. The patient did not report any problems with the implants and restorations during the first year of service. The treatment presented in this clinical report may be an alternative option to restore malpositioned implants.

Keywords: Implant, Malposition, Surgery, Abutment, Screw, Prosthesis.

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INTRODUCTION

Dental implants have enhanced quality of life for millions of patients over the last 40 years.[1-3] Therefore, the use of dental implants has increased exponentially in the past four decades.[2,4] As the treatment became more predictable, the benefits of therapy became evident. The tremendous demand for implants has fueled a rapid expansion of the market. Although many studies regarding dental implants have indicated predictable outcomes,[5,6] some complications challenging both patients and clinicians have been reported.[7,8]

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Implant placement should be prosthodontically driven according to the design of the definitive restoration.[7,9] However, the position and angulation of dental implants may not always be ideal due to operator-related and patient-related factors such as inexperienced operator, limited mouth opening and poor bone quality.[10,11] Although this problem is seen less frequently with the use of advanced imaging techniques such as cone-beam computerized tomography, and surgical guides, especially stereolithographic surgical guides, malpositon may still occur.[10,11]

In general, angled stock abutments can be used to correct the angulation of implants up to 20°.[12,13] However, more severe implant angulations may make conventional prosthetic reconstructions very challenging and require custom abutment fabrication in order to correct the misangulation.[7,13]

This clinical report describes the clinical and laboratory steps of a patient treatment where the fabrication of screw-retained FDP with custom abutment, which corrected the misalignment of the implant.

CASE REPORT

A 32-year-old woman with missing molars in the mandible presented to our implant clinic. The patient's chief complaint was 'I can not grind my food well anymore'. She stated that she wanted to have implants and crowns in order to replace her missing teeth. She lost her mandibular left first molar and right molars. Her medical history was unremarkable, except amelogenesis imperfecta.

Radiographic and clinical evaluation of the patient revealed a mandibular residual ridge that would benefit from dental implants. The patient accepted the proposed treatment plan which included three implants and implant-supported metal ceramic crowns.

The patient had a cone-beam computerized tomography (CBCT) scan (Ewoo Master 3D CBCT machine, Vatic, Bora-Dong, Giheung-Gu, Yongin-Si, Geeing-Do, Republic of Korea), and the positions of 3 mandibular implants were determined using 3-D implant planning software (NobelClinician, Nobel Biocare USA, Yorba Linda, CA) (Fig. 1). After administrating local anesthesia, full-thickness soft tissue flaps were elevated using a scalpel and periosteal elevator. Alveolar bone was exposed and then three implant

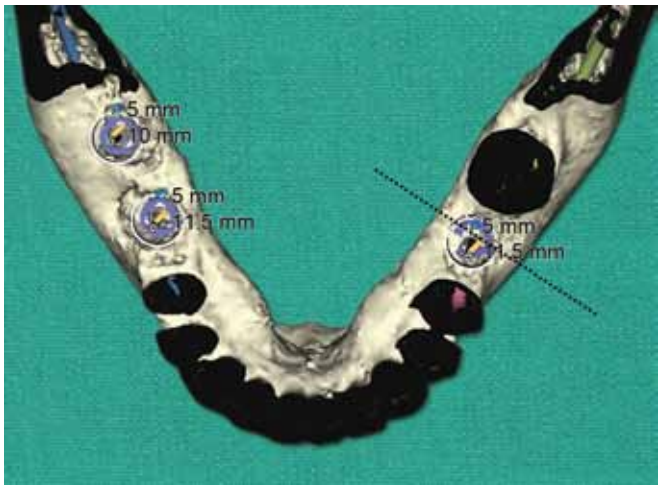

Fig. 1: Proposed implant positions using implant planning software

Fig. 2: Final impression showing misaligned implant

Fig. 3: Tapped custom abutment allowing attachment screw

sockets were prepared according to the manufacturer's guidelines. Two implants, mandibular left first molar and right second molar (NobelReplace Straight Groovy, 5 × 11.5 and 5 × 10 mm, Nobel Biocare USA, Yorba Linda, CA) were placed uneventfully. However, her sudden closure of the mouth changed the insertion path of implant (mandibular right first molar) during placement. Poor bone quality was the other factor that allowed this deviation. The patient was informed about this problem. The implant had a good primary stability, therefore the implant was kept in place. After placing allograft (Oragraft, LifeNet Health, 1864 Concert Drive, Virginia Beach, VA) around this implant, healing abutments were screwed on the implants. Soft tissue flaps were closed using sutures (coated vicryl suture, 4.0, Ethicon Inc., Somerville, NJ). The sutures were removed 10 days after implant placement.

Four months after implant placement, the patient returned to the implant clinic. A maxillary preliminary impression was made using irreversible hydrocolloid impression material (Kromopan 100, Lascod, Des Plaines, Ill), and a mandibular implant-level final impression was made with impression copings (Nobel Biocare USA, Yorba Linda, CA) and polyvinyl siloxane impression material (Aquasil; Dentsply Intl, York, PA). Type IV dental stone (ResinRock; Whip Mix Corp, Louisville, KY) was used to make a definitive cast including implant replicas (Fig. 2). Maxillomandibular relationship record was made with a polyvinyl siloxane occlusal registration material (Blu-Mousse; Parkell, Inc, Edgewood, NY). The both casts were mounted on a semi-adjustable articulator (Whip Mix, Louisville, KY) using a facebow record. A screw-retained metal ceramic crown for the mandibular left first molar was uneventfully fabricated using an abutment with an antirotational component. A screw-retained fixed dental prosthesis (FDP) was planned to restore the implants on the right side, which would allow retrievability. In order to fabricate a custom abutment for the implant replacing the mandibular right first molar, an abutment with antirotational component was used. It was properly shaped using a wax and then cast using high noble metal alloy. This custom abutment was tapped to make a screw-retained FDP (Fig. 3). To make a metal substructure, a wax pattern was made after the both abutments were screwed on the implants and then cast using noble metal alloy (Fig. 4). A hole on the metal substructure was created to insert the attachment screw for the anterior implant. A screw-retained FDP was completed in the laboratory (Fig. 5). The abutments were seated intraorally and torqued with 35 Ncm (Fig. 6). Occlusal adjustments were made to the FDP, and then it was finished and polished (Fig. 7). The screw access holes were covered with cotton pellet and composite restoration material. The patient was recalled 1, 3, 6 and 12 months after the insertion of the restoration (Fig. 8). The patient did not experience any problems with the implants and restorations during the year after completion of the restorations.

Fig. 4: Metal substructure, abutment, screws and drivers

Fig. 5: Screw-retained fixed dental prosthesis

Fig. 6: Custom abutment was screwed on implant

Fig. 7: Screw-retained fixed dental prosthesis was screwed on implant

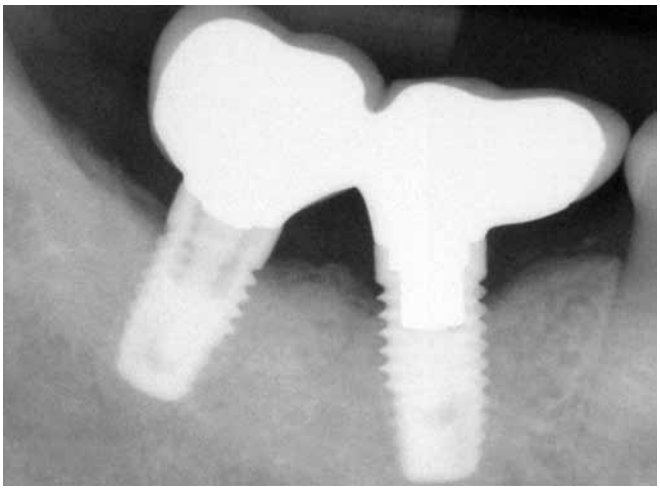

Fig. 8: Periapical radiograph of implants and restoration 1 year after implant placement

SUMMARY

This clinical report described how to manage a challanging patient due to a malpositioned implant. The angulation of the implant was corrected using a custom abutment with tapping procedure, which allowed the attachment screw. By using this custom abutment, additional surgical procedures such as implant removal and bone grafting were avoided. The technique described in this report may be an alternative to efficiently restore malpositioned implants.

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