Complications of Mandibular Molar Replacement with a Single Implant: A Case Report

(Complications du remplacement d’une molaire inférieure à l’aide d’un implant unitaire : rapport de cas)

- Vicki C. Petropoulos, DMD, MS
- Glenn J. Wolfinger, DMD, FACP
- Thomas J. Balshi, DDS, FACP

Case Report

Patient History
A 57-year-old man in excellent health, with no known allergies or sensitivities to medications, presented to Prosthodontics Intermedica (Fort Washington, Pa.) with the chief complaint “my crown and post came off” (Figs. 1a and 1b). He desired an estimate for an implant. In general, the patient sought dental care only when dental emergencies occurred.

Clinical and Radiographic Examination
Initial clinical evaluation revealed parafunctional habits. Abfraction lesions were present on teeth 13, 14, 15, 24, 25, 34, 35 and 43, and incisor wear patterns were consistent with parafunction. Tooth 36 had a history of endodontic therapy. Its crown was absent, there was extensive decay in the pulp chamber and a periapical radiolucency appeared at the apex of the mesial root. The tooth was determined to be nonrestorable (Fig. 2).

Treatment Options
The patient was presented with the following treatment options for the replacement of the mandibular left first molar.
Complications of Mandibular Molar Replacement with a Single Implant

One option was a 3-unit fixed partial denture using teeth 37 and 35 as abutments. However, an implant restoration for the replacement of the edentulous space at tooth 36 was determined to be a more conservative option. An alternative option was to use 2 Brånemark System implants (Nobel Biocare, USA, Inc., Yorba Linda, Calif.) to support a ceramo-metal crown.

The patient was interested in the implant option; however, for financial reasons, he sought a second opinion regarding a “cheaper solution.” Within a year of his initial visit, another treating dentist had extracted tooth 36 and had restored it with a single standard-diameter implant supporting a screw-retained ceramo-metal crown.

Two years after his initial visit, the patient returned to Prosthodontics Intermedica complaining, “my crown and screw are loose.” He returned to the clinic for several visits because of a loosening of the abutment screw. Eventually, it was recommended that an additional implant be placed and a 2-implant-supported molar crown be constructed to address the chronic screw loosening problem. The patient declined treatment due to cost.

Fifteen months after the patient’s first return visit, he presented to the clinic wearing a 2-unit ceramo-metal fixed partial denture supported by tooth 37 and an implant in the area of tooth 36 (Fig. 4). The retainer of the fixed partial denture was not seated on the implant replacing tooth 36, but was cantilevered off tooth 37. The abutment screw had fractured. The patient was advised of the risk of complications that might arise from such a prosthetic design, including damage to the implant and fracture of the solder joint. Approximately 2 months later, the patient returned with the complaint of a fractured restoration. Further evaluation revealed that the solder joint between tooth 37 and the implant at tooth 36 had fractured (Fig. 5a).

**Treatment**

The abutment screw had fractured because of the biomechanical overload on the prosthesis. After removal of the fractured abutment screw (Fig. 5b), it was observed that the internal threads of the Brånemark System implant were damaged. In addition, the hexagonal portion of the implant was damaged due to friction caused by the ill-fitting splinted
prosthesis (Fig. 6). Thus, it would not be possible to use the
existing implant for the final restoration.

Recommendation was made for the placement of 2 new
implants to support a ceramo-metal screw-retained restoration
replacing the mandibular left first molar, bypassing the previ-
ously placed implant. Consideration was given to trephining
out the existing implant; however, significant bone loss and
bone damage from heat generation along with parasthesia
were of major concern in this patient. Instead, the implant,
which was not fractured, was shortened, using copious
amounts of saline irrigation, to create more room for the
mesial and distal implants while preserving the bone. This was
the least invasive form of treatment for this failed implant.
Informed consent was obtained from the patient after all
options for retreatment were explained.

In stage I of the procedure, 2 carpules of Marcaine (Cooke-
Waite, Abbott Laboratories, North Chicago, Ill.) 1:200 000
were administered. A crestal incision was made, and 1 (13 mm
by 3.75 mm) Brånemark System implant was placed mesially
and 1 wide-diameter (12 mm by 5 mm) Brånemark System
implant was placed distal to the existing modified implant.
Autogenous bone from the osteotomy sites was used to graft
between the 2 implants. The interdental space was 12 mm.
Two standard-diameter implants (3.75 mm) can successfully
be placed in sites with as little as 10 mm of interproximal space
to support a molar restoration. 6

Eight months after the initial surgery, the abutments were
connected. A 3-mm 17-degree angulated abutment was used
for the distal fixture, and a 1-mm Estheticone abutment
(Nobel Biocare, USA, Inc.) was used for the mesial fixture.
Radiographic verification of the newly fitted abutments was
obtained (Fig. 7). Screw-retained impression copings were
modified for the impression procedure and, for the fabrication
of a conversion prosthesis, a fixed provisional acrylic restoration
was made. 7 The fixed provisional acrylic restoration would
provide for loading during stage II of surgery, and was used as
an interim restoration until the final restoration was fabricated.
Laboratory procedures included the fabrication of the crown, which was made of a porcelain fused to high-gold-content alloy. The 2-implant porcelain–gold restoration was retained by 2 gold prosthetic screws, which were torqued to 10 Ncm to prevent loosening. Delivery of the final restoration included confirmation that proximal contact allowed the patient to perform normal oral hygiene procedures using dental floss between the teeth. The buccal and lingual contours of the 2-implant-supported molar restoration and the contouring of the left second molar restored not only the arch alignment, but also the occlusal plane, function and esthetics. The occlusal scheme for all molars was evaluated to ensure a firm centric contact with no contact in lateral excursions. A postoperative periapical radiograph (Fig. 8) confirmed the seating of the 2-implant-supported molar restoration at the time of delivery. Oral hygiene instructions were reinforced and the importance of periodic recall visits was emphasized.

For the past 6.5 years, the patient has been monitored at recall visits and has been doing well with the prosthesis. Radiographic evaluation has indicated a stable periodontal condition with little or no bone loss associated with the osseointegrated implants (Fig. 9).

Discussion

Previous studies have shown that prosthesis mobility and screw loosening are the most frequent complications associated with single-implant molar restorations. The high incidence of screw loosening may be a warning sign of potentially more serious complications, including fracture of the implant fixture, that may arise over time with these restorations, as observed by Rangert and others.

This case demonstrates the biomechanical advantage of using 2 implants to replace a single molar. At the onset of treatment, the patient was trying to reduce costs by opting for a single fixture, but in the long term this was not cost effective for the patient or for the treating dentist. The use of 2 implants is especially indicated in patients who have been identified as pronounced bruxers or clenchers to overcome the masticatory overload. Dental implants are intended to replace the missing roots of teeth. For a molar, a single implant does not provide the crown-to-root ratio that previously existed and may subject the implant to overload. Even a wide-diameter, wide-platform implant fails to replace the crown-to-root ratio. Furthermore, wide-diameter implants leave cantilevered portions of the restoration that may create biomechanical problems. The use of 2 implants provides more surface area for osseointegration and spreads the occlusal loading forces over a wider area while reducing the potential bending forces that would exist in a single-implant molar restoration. Wide-diameter implants may be indicated in molar areas where space does not permit the placement of 2 implants.

A logical solution to implant overload is the use of 2 implants to replace the roots of a missing molar. Most frequently problems are observed when an implant prosthesis is underengineered. Properly engineered, this design is a more conservative and beneficial approach for both the patient and the treating dentist in the long-term.
La Dre Petropoulos est professeure adjointe de dentisterie restauratrice, Département de dentisterie restauratrice, Faculté de médecine dentaire de l’Université de la Pennsylvanie, et prosthodontiste consultante, Centre médical VA, Philadelphie (Pennsylvanie).

Le Dr Wolfinger exerce dans un cabinet privé, Prosthodontics Intermedica, Institut d’esthétique facial, Fort Washington (Pennsylvanie), et est prosthodontiste de service, Centre médical VA, Philadelphie (Pennsylvanie).

Le Dr Balshi exerce dans un cabinet privé, Prosthodontics Intermedica, Institut d’esthétique facial, Fort Washington (Pennsylvanie).

Écrire à la : Dre Vicki C. Petropoulos, 240 South 40th Street, Suite 201C, Department of Restorative Dentistry, University of Pennsylvania School of Dental Medicine, Philadelphia, PA 19104-6003. Courriel : VPetropoulos@aol.com.

Les auteurs n’ont aucun intérêt financier déclaré dans la ou les sociétés qui fabriquent les produits mentionnés dans cet article.

Références