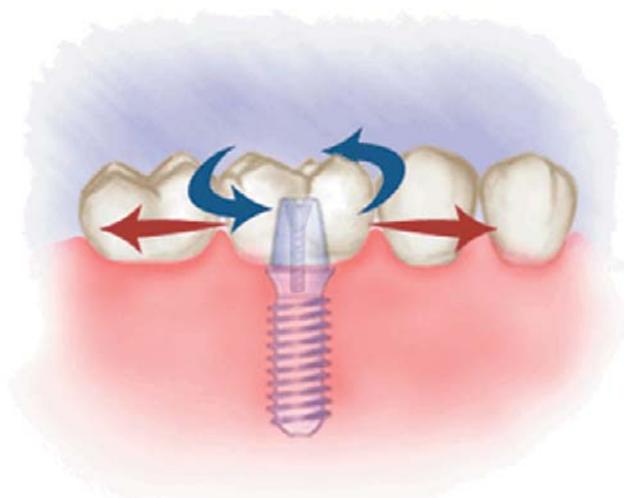


Restoration of a Loose Implant Supported Crown: A Case Report

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Abstract

Cement-retained, single unit implant supported restorations have become a popular method to treat single tooth edentulous spaces. Occasionally, the clinician is faced with the situation in which the restoration demonstrates mobility. This case report describes the treatment rendered to a patient who presented with a chief complaint of a "loose implant" that had been restored with a cemented PFM crown on a screw retained abutment.

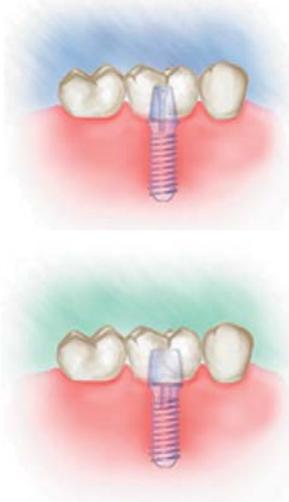
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Introduction

Single crowns supported by root form implants have become an increasingly popular method to treat single tooth edentulous spaces.^{1,2,3} Both screw-retained and cemented restorations have been used in these situations. Screw retained restorations offer the advantage of retrievability should the restoration become loosened.⁴ It is a simple procedure to open the access to either the abutment or the prosthetic gold screw and to either tighten or replace the appropriate screw (s). Additionally, screw retained restorations can be made that do not utilize an intermediate abutment and are attached directly to the fixture reducing the vertical space needed for the restoration.⁵



Disadvantages of screw-retained restorations include lack of esthetics, since the access opening may be visible on the occlusal surface of the crown⁴, and a relatively high incidence of screw loosening. Loose screws were common when titanium abutment screws were widely used. The introduction of gold alloy abutment screws offers a greater preload than titanium screws that has reduced the incidence of screw loosening.⁶ There is a lower incidence of abutment screw loosening when gold abutment screws are used with the proper torque setting.⁶

Cemented restorations offer numerous advantages. Esthetics are improved as there is no access opening that must be obturated.⁴ Cement can also compensate for a slight misfit in the casting.⁴ The cemented restorations main disadvantage is that it is not readily retrievable. Unless the cement seal has failed, the removal of a cemented restoration often requires the destruction of the restoration.⁷

The purpose of this clinical report is to describe the clinical procedures involved in the prosthodontic rehabilitation of a patient who presented with a loose implant supported crown.

Clinical Report

The patient was a 37-year old male who was referred to our clinic with a diagnosis of a “loose implant.” A review of the dental record revealed the patient had a single tooth implant restoration placed on a Branemark wide platform fixture, Ø5.0 x 13 mm (Nobel Biocare, Gotenborg, Sweden), using a screw retained abutment cylinder (CeraOne 1 mm abutment, Nobel Biocare) in the mandibular right first molar area. No mention was made of the torque used to attach the abutment, or of the type of cement used to secure the restoration. A radiograph was made of the fixture (Figure 1), which appeared to be well integrated with the bone level at the second row of threads.

A clinical exam revealed the restoration was mobile, capable of being rotated about 5 degrees in each direction, as well as being rocked from side-to-side. The patient did not experience any pain or discomfort when the crown was moved. Also of note, the distolingual cusp had fractured off the crown (Figure 2).

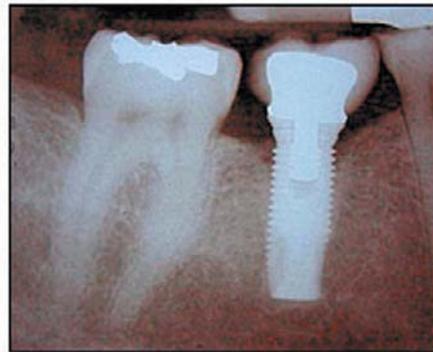


Figure 1. Pre-treatment radiograph.



Figure 2. Clinical view of the defective PFM crown.

According to the patient, this had occurred several months before he began to notice mobility in the restoration. There were no significant periodontal pockets identified upon probing or gingival inflammation associated with the crown.

A tentative diagnosis of a loose abutment screw was made. Impressions were made for diagnostic casts as well as for the fabrication of a custom impression tray. The patient was given an appointment for the following week and was dismissed without any further treatment being rendered. This allowed time to order and receive the necessary components.

Upon his return, the patient reported no change in his symptoms in the intervening week. Since the crown was defective, it was decided to remove it and the abutment as a single unit in order to avoid damage to the internal threads of the fixture, making it unusable for supporting a new abutment or restoration.^{3,7} A high-speed diamond bur with air-water spray was used to reduce the occlusal surface of the crown until the top of the abutment cylinder was exposed (Figure 3). No packing was noted over the abutment screw. The abutment screw was found to be loose. The screw was removed along with the crown-abutment complex. The abutment and crown were firmly affixed to each other, and there was no movement between the two components. The implant fixture was firmly anchored to the bone. The provisional diagnosis of a loose abutment screw was confirmed.

The superior surface of the fixture was evaluated under 3X magnification. Slight rounding of the external hex was noted. This was probably caused by the rotation of the abutment after the abutment screw had come loose. Damage to the external hex has the potential of interfering with the complete seating of a new abutment or with the fit of female internal hex of the abutment (Figure 4).

A new CeraOne wide platform 1 mm abutment was connected to the fixture with a new gold abutment screw. There was no rotary movement of the abutment when the screw was placed with minimal finger torque. A radiograph was made to verify the abutment was fully seated (Figure 5).



Figure 3. The abutment screw is exposed through the occlusal surface of the PFM crown.



Figure 4. Note how the movement of the loose restoration has damaged the external hex of the abutment.

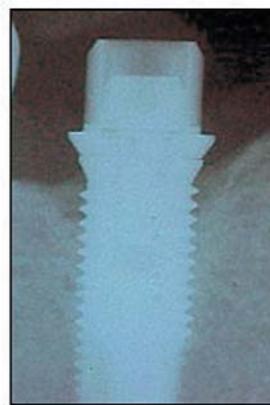


Figure 5. A radiograph is used to verify the complete seating of the abutment prior to applying the final seating torque to the abutment screw.



Figure 6. Interim restoration in place.



Figure 7. Screw access is sealed with rapid-setting vinyl polysiloxane material.

An electronic torque control handpiece (Nobel Biocare) was used to torque the abutment screw to 45 Ncm. A temporary crown was fabricated using a CeraOne temporary cap, methyl methacrylate resin (Jet Acrylic, Lang Dental Manufacturing Co., Wheeling, IL), and a clear plastic stent (Thermo-forming material, Henry Schein, Inc., Melville, NY). The tissue surface of the crown was shaped to place slight pressure on the gingival tissue in order to achieve a more favorable emergence profile (Figure 6). The patient was given oral hygiene instructions and an appointment for final impressions in two weeks.

After two weeks, the patient returned to the clinic for final impressions. The temporary crown was removed, and the abutment was cleaned. The torque of the gold screw was verified with the electronic torque controller, and the access was

sealed with a rapid-setting vinyl polysiloxane material (Blu-mousse, Parkell, Inc., Farmington, NY) (Figure 7).

The fit of the impression coping was verified on the abutment. The temporary crown was then placed back on the abutment to maintain the soft tissue profile while preparing to make the impression. The temporary crown was removed and the impression coping was placed on the tooth immediately prior to making the impression. The final impression was made using an addition reaction silicone (Extrude, Kerr Corp., Romulus, MI) in a light cured acrylic resin custom tray (Triad TruTray, Dentsply International, Inc., York, PA). A facebow transfer and jaw relation records were then secured. The interim restoration was then recemented with an interim cement (Temp-Bond, Kerr Corp).

The final impression, laboratory analog, burnout coping, facebow transfer, and jaw relation records were sent to the laboratory with a laboratory authorization for a porcelain fused-to-metal (PFM) crown. The completed PFM crown fit well on the master cast, having a light centric contact and no contact in lateral excursions (Figure 8).

The crown was found to be about 2 mm high when it was tried in the mouth. Since the patient was leaving the area immediately following the appointment, there was no time available to remake the restoration. Therefore, the crown was adjusted intraorally until only a light contact in maximum intercuspation was achieved. The crown was then adjusted so there was group



Figure 8. New restoration on master cast.



Figure 9. New restoration after occlusal adjustment completed.

function with lateral guidance on the canine and premolars. This occlusal adjustment resulted in the removal of much of the occlusal porcelain and the exposure of some of the metal substructure (Figure 9). The patient was advised of the situation. Since the patient was not concerned with the display of metal on the occlusal surface, the crown was cemented with Temp-Bond™. For restorations with excellent retention/resistance form, Temp-Bond™ has a similar tensile resistance to dislodgement as zinc-phosphate cement.⁸



Figure 10. Rapid-setting vinyl polysiloxane occlusal registration.

Prior to cementing the crown an occlusal registration was made with rapid-setting vinyl polysiloxane material (Blu-mousse, Parkell) (Figure 10). The registration and crown were then placed on the master cast. With the crown firmly imbedded in the registration, there was a 2 mm gap between the seating surfaces of the crown and the labora-

tory analog (Figure 11). There are two possible causes for this error. The most probable cause was the laboratory analog was not fully seated in the impression coping when the master cast was poured. To prevent this type of error the laboratory technician must ensure the lab analog is fully seated in the impression coping (Figure 12).

A second possibility is the laboratory analog vibrated out of the impression coping when the impression was vibrated during the pouring of the cast. This is the less likely scenario as there is significant friction between the parallel surfaces of the impression coping and the laboratory analog. To prevent this from occurring, a small drop of cyanoacrylate cement could be placed on the laboratory analog prior to placing it into the impression coping.

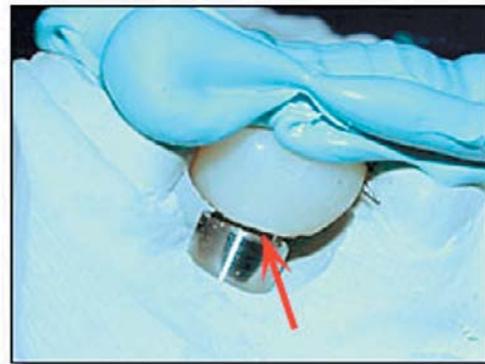


Figure 11. Crown seated on the master cast using the occlusal registration. Note the gap between the abutment and the crown.



Figure 12. Laboratory analog properly placed in the final impression.

Summary

A loose restoration is a possible complication of single tooth implant supported restorations. The clinician needs to ascertain or diagnose why the restoration is mobile. Has the cement seal between the crown and abutment failed? Is either the prosthetic gold screw or the abutment screw

loose? Or, has the fixture failed and is no longer integrated with the bone? After the diagnosis has been made, the appropriate treatment may be undertaken. Attention to detail is required in all phases of treatment, both clinical and laboratory, if a satisfactory restoration is to be placed.

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