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A Technique for Repairing a Loosening Abutment Screw for a Cement-Retained Implant Prosthesis

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Abstract

Prostheses may be attached to implants or implant abutments using screw retention or cementation. With the increased use of cement-retained, implant-supported restorations for the replacement of missing teeth, clinicians may choose to use a definitive cement to lute the definitive restoration. Loosening of an abutment screw is a challenging complication of cement-retained, implant-supported prosthetic restorations. Often, the abutment screw becomes loose from the implant body, whereas the crown remains cemented to the abutment. In such situations, separating the cemented crown from the underlying abutment or locating the abutment-screw access for removal of the restoration is a difficult task. The purpose of this report is to describe a simple technique for locating the abutment-screw access in the event of its loosening. The advantage of this technique is that it can facilitate easy location of the abutment screw, thus minimizing damage to the existing restoration and allowing it to be reused.

Prostheses may be attached to implants or implant abutments by screw retention or cementation. Some authors suggest that the screw-retained prosthesis, established by Brånemark, offers reversibility and more stability and security at the implant/abutment interface.[1–5] Others emphasize the advantages of the cement-retained prosthesis, including more versatile esthetics, passive placement, and the simplicity of the technique.[6–8] Orsini et al demonstrated that fluids and bacteria may leak into the screw-retained implant through the abutment/implant interface.[9] They reported finding a permanent, inflammatory fluid presence around screw-retained implants, even in individuals with good hygiene and peri-implant health. The use of definitive or provisional cements for the cementation of implant-supported restorations is an acceptable alternative to screw-retained, implant-supported crowns.[10] Overall, such restorations have proved to be reliable, with encouraging long-term success.[11] Abutment-screw loosening is a challenging prosthetic complication in cement-retained, implant-supported restorations and may damage the patient's trust, cause masticatory discomfort, and result in screw fracture.[12] Factors affecting this connection have been identified and include component misfit, inadequate tightening, excessive loading, settling of the screws, and inadequate screw design.[13,14] Most often, the abutment screw comes loose from the implant body, whereas the crown remains cemented to the abutment. In such situations, crown removal without damage to the implant body becomes difficult. Several authors have described techniques for retrieving cement-retained, implant-supported restorations with minimal damage.[15–22] The purpose of this report is to describe a dependable procedure that facilitates removal of a cement-retained, implant-supported crown with a loose abutment screw without requiring replacement of the existing restoration.

Procedure

(1) A prosthetic restoration cemented on the implant abutment has become mobile because of abutment-screw loosening. Examine the prosthesis and take an intraoral periapical (IOPA) radiograph to confirm the abutment-screw loosening.
(2) Mark a straight line along the long axis (and in the center) of the implant body on the IOPA and extend it to the occlusal surface (forming points "A" and "B," Fig 1). Using this radiographic guideline, correlate an entry point on the occlusal surface from which a straight line access can be drilled to unscrew the abutment screw.
(3) Prepare an access opening (approximately 2–3 mm in diameter) through the porcelain using a round coarse diamond bur (5805–023; Brasseler USA, Savannah, GA) and then through the metal using a round carbide bur (H34; Brasseler USA), starting at the predetermined entry point on the occlusal surface of the crown (Fig 2).
(4) Locate and remove any filling material that might have been used to close the screw access opening of the abutment before cementation.

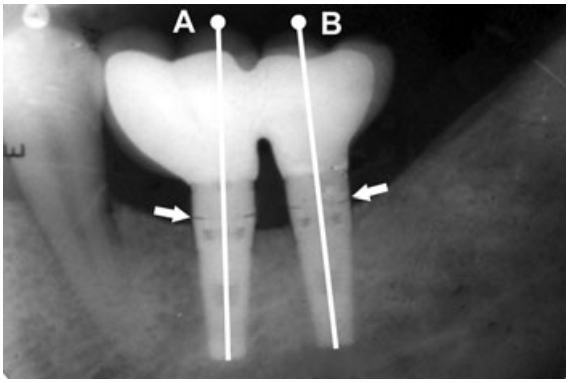

Figure 1 Intraoral periapical (IOPA) radiograph of an implant-retained left mandibular first and second molar prosthesis: Note the white vertical lines indicating the long axes of the implant bodies, and points A and B indicating the site of entry for the access-opening preparation. Arrows indicate the gaps developed at the implant body and abutment junction due to abutment-screw loosening.

Figure 2 Access openings drilled through cemented crowns at predetermined site of entry.

(5) Gain access to the abutment screw with a hex driver and unscrew it completely. In cases involving multiple-unit implant-retained crowns or a fixed dental prosthesis, repeat steps (1) to (4) to loosen remaining abutment screws.
(6) Remove intact cemented crown along with the abutment and abutment screw (Fig 3). Clean and disinfect the abutment and abutment-screw assembly with a 2% glutaraldehyde solution (Sekucid; Paragerm Lab, Carros, France). Examine the peri-implant tissues and irrigate the site with a disinfectant solution (Fig 4).
(7) Tighten the abutment screw (screws in cases involving multiple crowns or a fixed dental prosthesis) according to the manufacturer's recommendations. Alternatively, use a new abutment screw to tighten the restorations (with implant systems in which the abutment screw is separable from the abutment).
(8) Ensure no soft tissue impingement occurs during final tightening of the screw. Take an IOPA to confirm complete seating of the abutment screw on the implant body and verify restoration fit.

Figure 3 Removed intact crowns along with underlying abutments and abutment screws.

Figure 4 Peri-implant tissues after removal of the abutments.

Figure 5 Abutment screws tightened back and access openings closed with the composite resin restorative material.

(9) Fill the screw access opening with cotton pellets and close the access opening with dual-polymerizing composite resin restorative material (MultiCore; Ivoclar Vivadent, Inc., Amherst, NY) (Fig 5). Adjust the occlusion as needed.
(10) Schedule patient for routine recall appointments.
(11) Alternatively, in situations where refabrication of the restoration is mandatory due to fractured restorations or irreparable damage to the abutment or the screw, after

step (6), proceed with a new abutment and abutment screw followed by new crown fabrication.

Discussion

In cases involving abutment-screw loosening, especially when the crown remains cemented to the abutment, separation of the crown from a mobile abutment is a cumbersome procedure. The chances of damaging implant components as well as surrounding periodontal tissues may be increased in the process. Various techniques have been described in the literature to minimize the risk of damage. Chee et al described a technique in which a screw threaded into the implant restoration is used to displace the cemented restoration.[15] Okamoto and Minagi advocated the use of cylindrical guide holes in the lingual aspect of the implant restoration for the removal of cemented superstructures.[16] This technique requires a special instrument called the removing driver, which can be inserted into an access opening prepared on the lingual surface and turned to generate a shear force which raises the superstructure. Both crown displacement techniques are complex and may involve application of undue force to the underlying implant components or to periodontal tissues. In addition, there is a need to refabricate the restoration. Clausen described the use of a secondary lingual locking screw in the restoration for retention and retrievability.[17] Valbao et al[18] described an alternative method for retention and removal of a cement-retained implant prosthesis. Their method requires preparation of a circular cavity on the abutment and an opening on the lingual area of the coping during fabrication of the restoration, making this technique complex to perform.

Various techniques advocating achieving access to the abutment screw in case of screw loosening without the need to refabricate the restoration have been described. Doerr explained an access-gaining technique in which the clinician must preserve the original implant- and abutment-level casts used to fabricate the original restorations.[19] Schwedhelm and Raigrodski[20] described a similar technique for evaluating the landmarks for locating the abutment-screw access. Their technique requires placement of a small ceramic stain on the occlusal surface of the implant-supported restoration during fabrication.

The technique described in this article does not require preservation of casts or placement of any identification marks during restoration fabrication. In addition, the technique is simple to perform and does not require additional material or equipment. With this technique, the clinician can easily retighten the loose abutment without refabricating the restoration. Careful radiographic as well as clinical assessment is mandatory throughout the procedure.

Refabrication of the restoration is mandatory with fractured restorations. Also when the patient continues to use a restoration with a loose abutment screw for a few days, there is the chance of fracture or bending of the abutment screw due to altered masticatory forces. In situations in which the abutment screw cannot be separated from the abutment (inbuilt abutment screws for some implant systems), there is a need to refabricate the restoration. In implant systems in which the abutment screw can be separated from the abutment, the original restoration can be used without refabrication simply by changing an abutment screw.

Conclusion

The technique described in this report provides an approach for the clinician to gain predictable access to an abutment screw, facilitating removal of a restoration without the necessity of referring to earlier records or the placement of identification markings during the original fabrication of the restoration.

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