



Recovery of Fractured Abutment Screws within a Dental Implant: An Accessible Technique

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Abstract

Dental implants are commonly used to replace missing teeth, however concerns associated with implant and prosthetic components are well-established. Fractures of the screws supporting the implant abutment can generate complicated clinical situations. The aim of this article is to present an accessible and minimally invasive protocol to recover fractured implant abutment screws. This study presents a non-invasive, easy-to-perform technique that uses a hand-held instrument (ear cleaning cotton swab) without the risk of damage the threads and external characteristics of the implant. The cotton swab adheres micromechanically to the fractured fragment of the screw, facilitating gentle extraction by hand without causing damage to the implant threads.

Keywords: Dental Implants, Implant abutment screw fracture, Abutment screw retrieval, Cotton Swab

Introduction

In modern medicine, implants are a common solution for replacing or supporting damaged body parts in various fields, from orthopedics to dentistry [1]. Dental implants have gained popularity due to their ease of use, effectiveness, reliability as treatment options for prosthetics, and alternatives to traditional bridges or artificial dentures. However, implant-related complications have also been reported [2]. Implant-supported restorations can fail due to technical issues associated with implant and prosthetic components. Although dental implants are structurally designed to support masticatory loads, abutment micromovement can result in screw loosening and implant fractures. Fracture of abutment screws is uncommon (0.5-8%), and is mainly caused by screw loosening and excessive torque [3].

Extraction of fractured screw fragments is necessary to maintain implant function; however, this is clinically challenging [4]. Carneiro, et al. proposed special precautions to avoid damaging the dental implant connection and access channel when removing the screw from the fractured abutment [5]. Conservative approach-

es to retrieve fractured abutment screws, such as using commercial retrieval kits have been recommended [3,6]. In particular, the IMZ Twin Plus K 3.3 repair kit (Dentsply Friadent, Mannheim, Germany) is reported to be effective for this purpose [8]. Gooty, et al. suggested dislodging the fractured screw with an ultrasonic scaler; [7] whereas Chen and Cho suggested using a Hu-Friedy TU17/23 double-ended explorer, performing a counterclockwise rotation to retrieve the fragment [8]. Yilmaz and McGlumphy opted for a specifically designed forked end instrument (Astra Tech) to capture the fractured screw fragment [9].

Since there is no consensus on the ideal removal technique, our aim is to present a simple and effective method to retrieve dental implant screws after fracture.

Technique

- Under magnification, clinically examine the location and remaining length of the fractured abutment screw fragment. Should it be necessary, capture a periapical radiograph for verification and measurements.

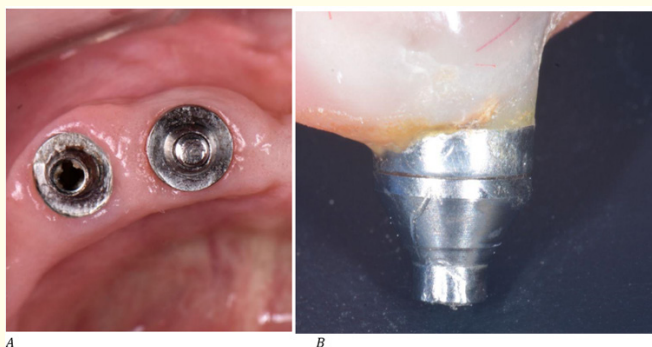


Figure 1: A: Intraoral assessment of abutment fracture, B: Fractured abutment assembly and prosthetic restoration.

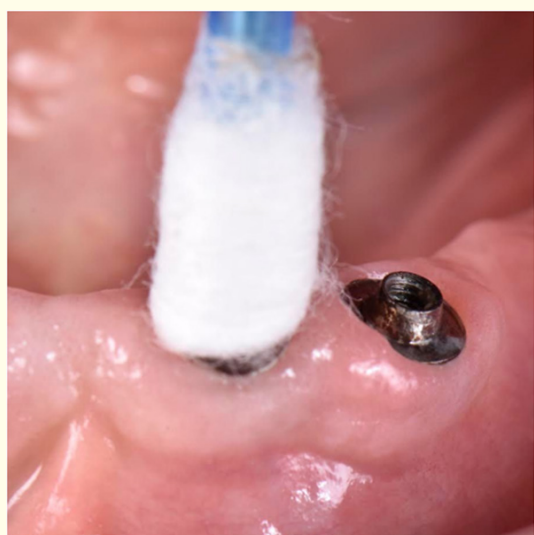


Figure 2: Cotton swab placed vertically and turned counterclockwise.



Figure 3: Fragment of the recovered screw.

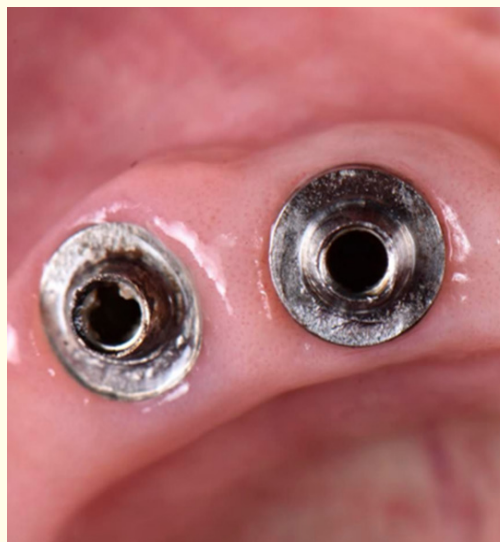


Figure 4: Fragment of the recovered screw.

- Shorten the handle of an ear cleaning cotton swab until it should have a measures aprox of 2 cm to use vertically as a screwdriver. Using heat, the cotton swab can be attached to a prosthetic screwdriver which will act as a handle.
- Dry the screw in the mouth using a filtered air syringe and press the cotton swab on the head of the implant and turn it slowly counterclockwise. Repeat as many times as necessary.
- Examine the recovered screw under magnification to ensure that it is complete and that no other fragments remain in the screw chamber.

Discussion

This article proposes a method for recovering fractured screws from inside dental implants using an ear cleaning cotton swab. The cotton swab adheres micromechanically to the fractured fragment of the screw, facilitating gentle extraction by hand without causing damage to the implant threads. Determining the fracture location of the dental implant screws is essential. Fractures occurring above the implant level are more manageable compared to those occurring more apically. In moderate or high-risk situations, modifications to the screw or implant may be necessary to address and remove the fractured screw fragment.

The risk-based decision tree proposed by Mizumoto., *et al.* [10] aids with clinical decision making regarding repairing broken abutments and screws. Several implant manufacturers have marketed a variety of kits to facilitate the retrieval of broken screw fragments, however these may damage the internal threads of the implant should they be used carelessly. Additionally, most kits are designed

for a specific implant system and more clinically accessible instruments should be tried first as a more economic option.

According to Mizumoto., *et al.* the preferred technique would have a low risk of irreversible damage. Other techniques can damage the implant-for example, there is a risk of damaging the internal threads of the implant when using an ultrasonic scaler to loosen the screw, even should the fractured segment not move while using a hand instrument, this method should only be attempted a few times to ensure that the broken segment is no longer embedded within [11]. In contrast, the method we describe using an ear cleaning cotton swab does not require the fractured fragment to be mobile, making it possible to remove the screw fragment without the risk of affecting the surface properties of the components, whilst preventing any damage to the internal threads of the implant [8].

Conclusion

The fracture of prosthetic screws or abutments in dental implants arises from a various biomechanical issues, such as poor design, excessive occlusal forces or improper positioning. Risk assessment and the decision tree are crucial tools for clinicians to strategically select the most appropriate treatment, that provides the highest benefit to the patient. Most techniques for removing screw fragments are based on trial-and-error. This study presents a non-invasive, easy-to-perform technique that uses a hand-held instrument (ear cleaning cotton swab) without the risk of damage the threads and external characteristics of the implant.

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