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Case Report

Is it possible to reuse the previous crown in abutment screw fractures? A clinical case report

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Abstract

Background: This case report presents a novel approach to managing abutment screw fractures in dental implants, emphasizing the reuse of the patient's existing crown with cement retention to reduce both cost and treatment time.

Case Presentation: A 39-year-old woman presented with a fractured abutment screw in an implant at position #19. After multiple failed attempts to remove the fractured screw using hand instruments and ultrasonic devices, we opted for a cement-retained solution. In the standard approach, a new post, core, and crown would typically be fabricated. However, as the existing abutment crown demonstrated a good fit, complete seating, and acceptable aesthetics, we decided to reuse the crown. A custom pin was fabricated to secure the crown to the fixture, thereby reducing the need for additional procedures and lowering the cost for the patient.

Conclusion: Reusing the previous abutment crown with cement retention can be a viable option in cases of abutment screw fracture, offering an effective solution to reduce both cost and treatment time. This method provides an alternative to fabricating a new post, core, and crown.

Keywords: Abutment screw fracture, Screw-retained implant, Crown reuse, Cement-retained implant

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Introduction

Dental implants have become a widely accepted solution for edentulous patients, offering significant benefits in terms of oral function, aesthetics, and overall quality of life.[1] Their high success rate has led to their extensive use in clinical practice. However, despite these advantages, implants are not free from complications. Mechanical issues, particularly abutment screw loosening and fracture, can compromise the stability and longevity of the implant. Abutment fractures are especially challenging as they necessitate complex retrieval methods and, in some cases, additional procedures to restore function.[2]

One of the most frequent complications is abutment screw loosening, with a reported incidence rate of 7% to 11%. When a screw loosening escalates to a fracture, it poses a significant clinical challenge, affecting approximately 0.6% of cases.[3] In these instances, the primary goal is to remove the fractured part without further damage to the implant structure. Chowdhary et al propose a classification system based on fracture location (ASF-1 for fractures at the screw head, ASF-2 for fractures at the shank, and ASF-3 for fractures at the threads) to guide treatment planning.[4]

To address these fractures, clinicians typically begin with techniques that minimize the risk of further implant damage. Hand instruments and ultrasonic devices are often used, and if unsuccessful, auxiliary kits with specialized tools for modification or removal of the fractured screw may be used. In more severe cases, where these methods fail, the options narrow down to implant removal or leaving the implant in situ.[5]

An alternative to these invasive approaches involves converting the implant from screw-retained to cement-retained by modifying the implant body, taking an impression, and fabricating a post, core, and crown. This approach can be particularly advantageous for patients who prefer to avoid additional surgery or those who face financial constraints.[6] However, this process typically requires a new crown, which adds to both the treatment time and overall cost. In our case, we developed an alternative solution that reuses the existing abutment crown, preserving resources and reducing treatment duration.

Case Report

A 39-year-old woman presented to our clinic for the placement of an implant crown at position #19 (ICX regular neck bone level, Medentis Medical GmbH). Due to limited occlusal space, a screw-retained system (UCLA abutment) was selected. Approximately six months after

the implant crown placement, the patient returned with a complaint of implant crown loosening. Upon examination, it was found that the abutment screw had loosened. Consequently, the crown was removed, and a new screw was ordered to prevent a potential fracture of the loosened screw. However, the new screw fractured during torque application at around 15 to 20 Ncm, possibly due to a fabrication fault.

Radiographic examination (Figure 1) revealed that the fracture occurred at the first thread (ASF-3) (Figure 2a). Based on the Chowdhary classification, this case was identified as difficult. Following the proposed stepwise approach, we initially attempted to remove the screw using hand instruments and ultrasonic devices. In all subsequent techniques, the abutment crown was consistently used as a guide to align with the internal walls. After several attempts, due to the unavailability of the ICX kit, we resorted to using the Save Remover kit (Dentis, South Korea). A hole was drilled into the screw, and we tried to remove it by applying counterclockwise force. However, this attempt was unsuccessful, likely due to the deformation of the internal thread walls of the implant.

Before explantation or burial of the implant, we opted for cement retention as a last resort. In the standard approach, a new post, core, and crown would typically be fabricated. However, as the existing abutment crown had a good fit, complete seating, and acceptable aesthetics, we chose to reuse it, thereby reducing the patient's cost and treatment time.

First, the screw-retained crown (Figure 2b) (a one-piece abutment-crown unit) was placed in its position as a guide, and the remaining screw was carefully drilled out using a small round bur under water cooling irrigation to prevent overheating of the implant. A pattern was then fabricated to take an impression of the internal structure using Duralay resin (Reliance, USA) (Figure 2c). Then, a custom pin was cast based on this impression. After trial insertion and final adjustments, the next challenge was choosing the cement. On the one hand, a strong bond between the post and the abutment was required. On the other hand, due to the deep placement of the implant and the difficulty of cleaning excess cement and moisture control, a luting cement with minimal moisture sensitivity and more controllable excess was needed for attachment to the implant body. The process was divided into two parts to meet these criteria. First, to control the amount of cement and ensure maximum bond strength, the post and crown were cemented together outside the mouth using Embrace WetBond resin cement (Pulpdent, USA), which was similar to the cement used in screw-cement systems for bonding the abutment to a PFM crown (Figure 2d). After the final setting, removal of excess cement, and final polishing, the entire assembly was cemented into the implant using Fuji I glass ionomer luting cement (GC, Japan) (Figure 3). A minimal amount of luting cement was applied, and after it had set, the excess was carefully removed. The occlusion was adjusted to ensure light-centric contact, with complete disclusion in eccentric movements. A four-month follow-up demonstrated the success of this approach (Figure 4).

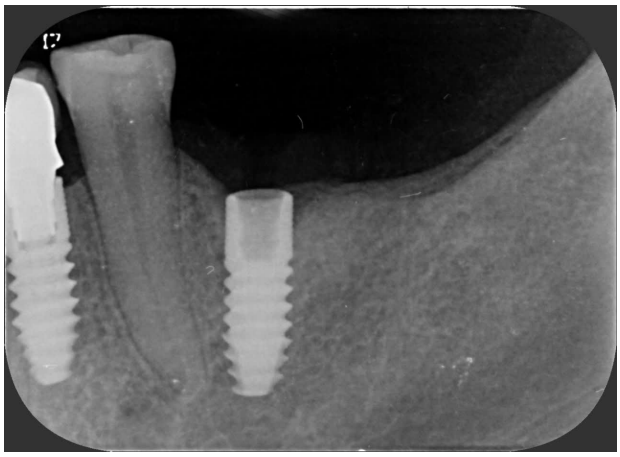

Figure 1. Radiograph showing implant #19 with a fractured abutment screw at the thread level (ASF-3)

Discussion

Controlling the risk factors for screw fracture is much easier than managing subsequent complications. However, if such an incident occurs, the first step would be to attempt screw removal without damaging the internal threads. If that fails, the next step involves reshaping the remaining screw using specialized kits or modified tools. However, when a screw fractures under torque, as in this case, the likelihood of successful removal decreases. The final option is to connect the crown to the implant body using cement. This can involve casting the

Figure 2. Comparison of fractured screw vs. normal screw (a), one-piece abutment and crown (b), resin pattern used for impression (c), and final assembly after cementation of the pin to the abutment-crown unit (d)

Figure 3. Final restoration

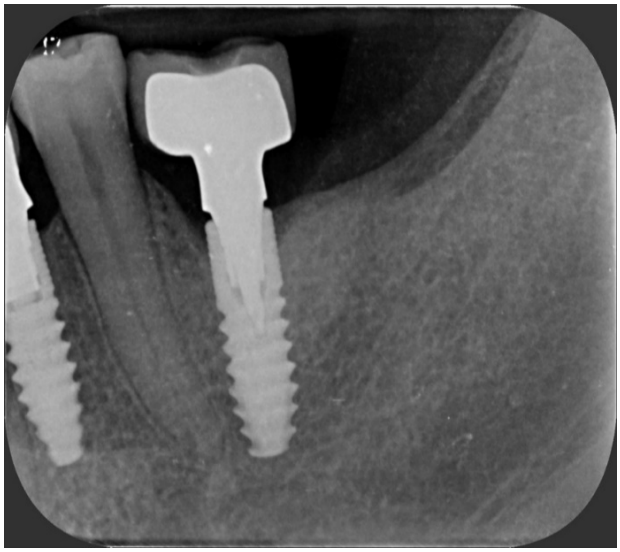

Figure 4. Radiographic follow-up after four months

entire assembly as a single unit, similar to old Richmond crowns,[7] or connecting the upper structure (such as a ball or locator) to the post and core using laser welding.[8] Another method presented here involves the use of the previous crown with a custom pin cemented to the fixture instead of a screw. Resin cement was used to bond the pin to the structure, and luting cement was used to attach the assembly to the fixture body. The long-term success of this method needs to be evaluated in future studies. Despite the benefits mentioned, potential issues such as weakness in the implant neck and a poor connection should be noted. It is recommended that the implant's occlusion be carefully managed. There should be no contact in lateral movements or centric occlusion. Light contact should occur under heavy load.

Strengths and limitations

The primary strength of this approach is the reuse of the patient's existing crown, which provided a cost-effective and time-efficient alternative to conventional management of abutment screw fractures. This method also minimized invasiveness by preserving the original restoration rather than fabricating a completely new post, core, and crown. However, its applicability is limited to cases where the existing crown meets functional and aesthetic requirements. Additionally, further research is needed to evaluate the long-term outcomes of cement-retained restorations following screw fractures.

Conclusion

Managing a fractured screw presents numerous challenges. If removal is unsuccessful and the goal is to reuse the previous crown, fabricating a custom pin and cementing the entire assembly can be an effective solution.

Authors' Contribution

Conceptualization: Ali Banisi, Sina Safari, Mohammad Hossein Banisi.
Data curation: Ali Banisi, Mohammad Hossein Banisi.
Investigation: Ali Banisi, Mohammad Hossein Banisi.
Formal analysis: Ali Banisi, Sina Safari, Mohammad Hossein Banisi.
Methodology: Ali Banisi, Sina Safari.
Project administration: Sina Safari.
Supervision: Sina Safari.
Software: Ali Banisia, Mohammad Hossein Banisi.
Resource: Ali Banisi, Mohammad Hossein Banisi.
Validation: Sina Safari.
Visualization: Ali Banisi, Mohammad Hossein Banisi.
Writing-original draft: Ali Banisi, Mohammad Hossein Banisi.
Writing-review & editing: Ali Banisi, Sina Safari.

Competing Interests

The authors declare no conflict of interest related to this study.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval

This case report was conducted in accordance with the ethical guidelines of the Declaration of Helsinki. The patient provided informed consent for the treatment and the publication of case details and accompanying images.

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