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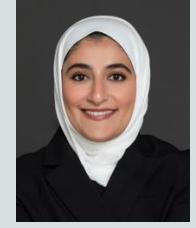
Retrieval of fractured implant screw: A dental technique

Sara Alzamel BMSc[a], DMD, Stephen F. Rosenstiel BDS[b], MSD, Mathew T. Kattadiyil BDS, MDS, MS[c]

[a] Graduate student, Advanced Specialty Education Program in Prosthodontics, Loma Linda University School of Dentistry, Loma Linda, Calif
Scholarship Holder, Department of Restorative Sciences, Faculty of Dentistry, Kuwait University, Kuwait City, Kuwait
[b] Professor Emeritus, Division of Restorative and Prosthetic Dentistry, College of Dentistry, The Ohio State University, Columbus, OH
[c] Professor and Director, Advanced Specialty Education Program in Prosthodontics, Loma Linda University School of Dentistry, Loma Linda, Calif



Abstract

Removing a fractured implant screw, though a relatively rare occurrence, presents a significant challenge for clinicians. Protecting the internal surface of the implant from damage during the retrieval of the fractured fragment is critical to avoid additional complications. A novel, cost-effective, and conservative technique for retrieving fractured implant screws using a small-diameter dental prophylactic brush is described.

Introduction

Implant-supported restorations have become a common treatment option for replacing missing teeth, with a high success rate.[1,2] However, biological and mechanical complications do occur, requiring careful management.[3,4] Biological complications include conditions such as peri-mucositis, peri implantitis, and progressive bone loss around the implant site. On the mechanical side, screw loosening remains the most common complication associated with implant-supported restorations, with a reported incidence rate of approximately 25%.[5] Screw loosening can increase the risk of abutment screw fractures, reported to range be- tween 0.5% and 8%.[6] Screw fractures are particularly concerning as they can compromise the integrity of the restoration and pose significant challenges during retrieval of the retained screw fragment.[7] Effective and minimally invasive techniques that can facilitate the safe and efficient removal of fractured screws are essential. Different methods have been described for retrieval of fractured screw fragments,[8–11] but most of these are complex, time-consuming, or risk damage to the implant. This article introduces a novel, conservative approach for the retrieval of fractured abutment screws.

Technique

A patient presented to the Advanced Specialty Education Program in Prosthodontics, Loma Linda University School of Dentistry clinic for the placement of an abutment (NC Locator Abutment; Institut Straumann AG) for a mandibular implant-supported overdenture. After securing the abutment and tightening it to the manufacturer's recommended torque value of 20 Ncm (Zest Anchors LLC), the abutment became loose, and a fracture was identified at the junction between the shank and the threads of the abutment (Fig. 1) The following steps were then implemented to retrieve the fractured segment.

1. Establish unobstructed access to the fractured screw segment. In situations where soft tissue obstructs visibility, as illustrated in Figure 2, tissue removal might be required to ensure a clear view of the fracture site.
2. Utilize a small-diameter dental prophylactic brush (STARBrush Coronal Brush; Ultradent Products, Inc) attached to a low-speed rotary handpiece and operated at 10,000 RPM in reverse mode (Figs. 3, 4).
3. Gently maneuver the bristles of the brush around the fractured screw segment to engage the fractured screw and use a controlled in-and-out motion.
4. Once the coronal portion of the fragment is loose and is in a more coronal position, use an explorer to rotate the fragment counterclockwise to facilitate complete removal of the screw fragment (Fig. 5).

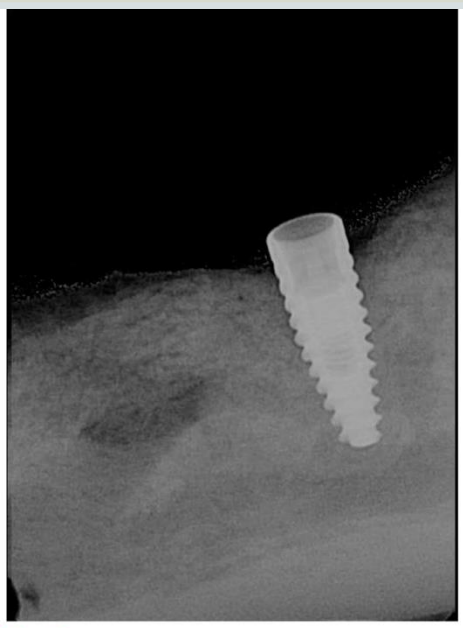


Figure 1. Periapical radiograph of fractured screw.

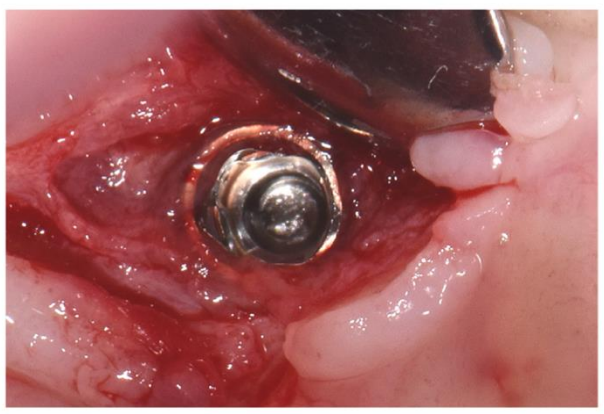


Figure 2. Fractured implant screw fragment.

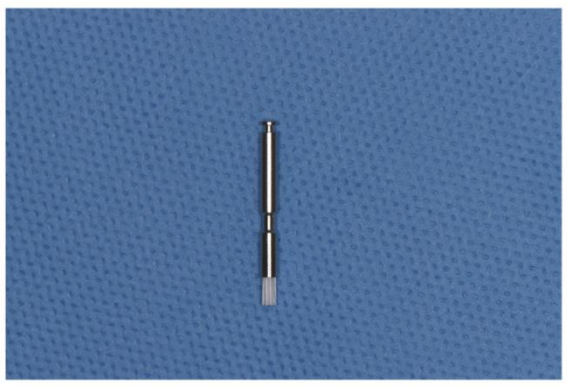


Figure 3. Small-diameter dental prophylactic brush (STARBrush Coronal Brush; Ultradent Products, Inc).

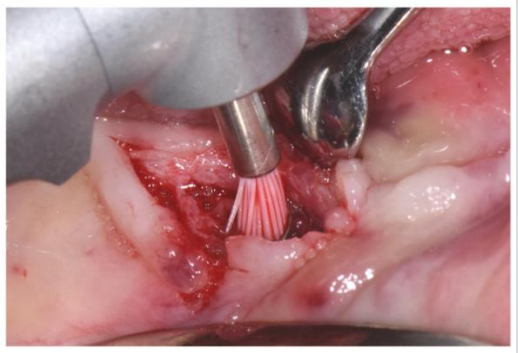


Figure 4. Bristles of brush placed on fractured screw fragment to engage fractured screw using controlled in-and-out motion.

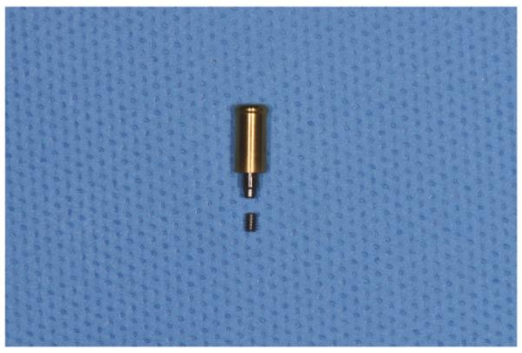


Figure 5. Retrieved fractured abutment screw fragment.

Discussion

Although the incidence of abutment screw fractures is relatively low, the retrieval of the fractured fragments poses a significant challenge for clinicians. It is crucial to ensure that the internal surface of the implant remains undamaged during the retrieval process to preserve its integrity and functionality.

The difficulty of removing fractured screw fragments, based on the location of the fracture has been described[8] Fractures occlusal to the implant body are generally easier to access and can often be retrieved using hemostats. In contrast, fractures that occur more apically, such as within the threads, present a more significant challenge because of limited accessibility. Chowdhary et al[9] classified abutment screw fractures into 3 categories: fractures at the screw head (ASF1), within the shank (ASF2), and within the threads (ASF3). ASF3 fractures are the most difficult to retrieve because of their depth and inaccessibility, which was the type of fracture presented in this paper.

Despite several techniques reported in the literature[8, 9, 10, 11] for the removal of fractured screw fragments, a consensus on the optimal method is lacking. Both conservative approaches and the use of specialized commercial retrieval kits have been advocated, each with advantages and disadvantages.[7] Regardless of the technique employed, the primary focus must always be preventing damage to the internal surface of the implant, with a growing need for minimally invasive and effective techniques that facilitate the safe and efficient removal of these fragments. Bai et al[11] described the use of tungsten carbide burs as a preferred material for retrieving stripped screws from angled screw channel abutments. However, they emphasize the need for caution to avoid causing damage to the titanium abutment and implantduring the procedure. The proposed technique in this paper utilizes the stiffness of the brush, which may be regarded as less abrasive compared with other published methods.

This article introduces a novel, conservative approach to the retrieval of fractured abutment screws, particularly those occurring more apically and are difficult to access. The technique utilizes the STARBrush Coronal Brush (Ultradent Products, Inc) attached to a slow-speed rotary handpiece. The diameter of the bristles matches the shank of a latch rotary instrument and the brush is non-abrasive, cost-effective, and easily available. One of the key benefits of this method is that it does not require any additional specialized tools and can be performed with routine equipment in a dental setting. The brush allows for careful engagement with the fractured screw segment, ensuring minimal damage to surrounding internal threads while maximizing the likelihood of successful retrieval.

Limitation of this technique include that it was devised relatively recently and has only been tested on a few patients, which may not comprehensively evaluate its effectiveness. Moreover, the method may not be effective in situations where the fractured segment is deeply and tightly embedded, with no mobility or evidence of screw loosening.

Conclusions

This technique article introduces a safe and straightforward method to retrieve a fractured abutment screw fragment using a conservative and easily accessible instruments found in most dental offices.

References