ACTA SCIENTIFIC DENTAL SCIENCES

Volume 9 Issue 2 February 2025

Case Report

Clinical Precision in Managing Fractured Implant Screws: A Case Report

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DOI: 10.31080/ASDS.2025.09.1977

Received: January 15, 2025

Published: January 26, 2025

Abstract

Dental implants are considered to be one of the effective methods for replacing missing teeth, which poses high success rates. However, complications, while infrequent, are inevitable. One notable complication is the fracture of abutment screws, which constitutes significant challenges, particularly when retrieving the fractured screw from the implant fixture. This case report illustrates two clinical scenarios of abutment screw fractures that were successfully treated with a manufacturer-designed implant screw retrieval kit. In both cases, the retrieval process preserved internal threads, ensuring structural integrity of the implant. This report emphasizes the effectiveness of specialized screw retrieval kits as an innovative alternative to traditional methods. These kits safeguard the implant's structural integrity while minimizing patient costs, emphasizing their importance in modern implantology.

Keywords: Dental Implant; Screw Fracture; Screw Retrieval; Screw Retrieval Kit; Abutment Screw

Introduction

The history of dental implants offers a fascinating journey through time, showcasing humanity's ingenuity in addressing tooth loss. From the earliest civilizations, people have sought ways to replace missing teeth, employing various techniques and materials that laid the foundation for modern implantology [1].

Although dental implants are highly successful and predictable, a small percentage of patients may experience implant failure [2]. Technical issues in implant-supported restorations often stem from component or prosthesis problems. Screw loosening, seen in 25% of cases, is a common cause of abutment fractures, with excessive torque also contributing to fractures [3]. Implant abutment screw fractures are uncommon (0.5-8%) [3] but are difficult to manage due to poor visibility of the screw fractured and to retrieve the fragment [3,4].

For fractures above the implant head, tools like explorers or probes can loosen the fragment with counter-clockwise motion. Below the implant platform, rigid instruments are used similarly, with care to prevent breakage. A cotton swab may help remove stuck fragments, and oblique fractures are easier to manage due to natural engagement points. Ultrasonic oscillation with hand instruments can assist when needed, minimizing risks to implant threads and surrounding bone [5].

When removing a fractured screw fragment is impossible or when retrieval damages the implant's internal threading, clinicians may opt to replace the implant or leave the fragment in place, unconnected to the superstructure, necessitating a non-invasive, innovative technique to preserve the implant's integrity [3].

Various implant manufacturers have developed specialized screw retrieval instruments to remove fractured fragments [4,5] which uses reverse torque technique for the removal of the retained screw from the implant body [5]. Therefore the main objective of this case report is to demonstrate the retrieval of a fractured screw from the implant body by using a retrieval kit.

Case Report -1

A 24-year-old male patient visited the department of Periodontology, Narayana Dental College and Hospital, Nellore, with the chief complaint of loosening of his tooth in the lower front tooth region. Clinical examination revealed grade III mobility associated with tooth 41. Radiographic and periodontal evaluation confirmed the need for extraction due to periodontal destruction. The treatment plan included the atraumatic extraction of tooth 41, followed by immediate implant placement. The implant placement procedure was uneventful, and the patient was provided with appropriate postoperative care and instructions. After a healing period of six months, the patient was recalled for the second stage of implant surgery to place the prosthetic restoration. During the placement of the prosthetic abutment, excessive force (iatrogenic) led to the accidental fracture of the abutment screw, leaving it separated within the implant body. A periapical radiograph confirmed the presence of the fractured screw fragment within the implant fixture (Figure 1a). Initial retrieval attempts using conventional techniques, such as spoon excavator, explorer, and an ultrasonic scaler tip, were unsuccessful due to the tight engagement of the fragment within the implant threads. To resolve the issue, a manufacturer-designed implant screw retrieval kit (DIO NAVI SOS KIT) (Figure 2) was employed. This system includes a specialized Internal guide, a reverse cutting drill and a remove bar designed to disengage and atraumatic retrieval of the fractured screws. First, the internal guide was carefully positioned within the implant fixture. Using a reverse cutting drill inserted into the guide and operated at 1200 rpm in a counter-clockwise direction, the screw was loosened from the implant threads. After confirming the screw loosening, the reverse cutting drill was replaced with the remove bar. Drilling was then done at 15 rpm in anti-clockwise direction to a depth of 2 mm. To extract the fragment, an applicator tip was used to place composite onto the fractured screw. After curing, the applicator tip and the screw fragment were removed as a single unit (Figure 3). The procedure was completed without any damage to the internal threads of the implant, preserving its structural integrity. After retrieval, the abutment was securely placed with the new screw. The prosthesis was cemented in place, and a radiograph confirmed proper seating of the components and the absence of residual complications (Figure 4a). Then the patient was provided with detailed oral hygiene instructions and advised to attend regular follow-up appointments to monitor implant health.

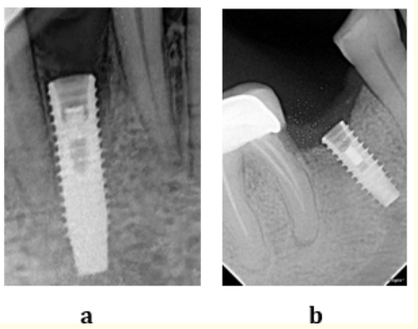

Figure 1: RadioVisioGraphy showing fractured abutment screw.

Figure 2: DIOnavi Dr. SOS+ Kit.

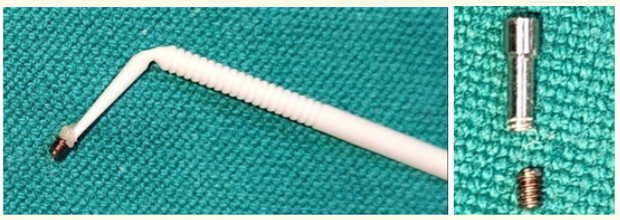

Figure 3: Retrieved Fractured Screw.

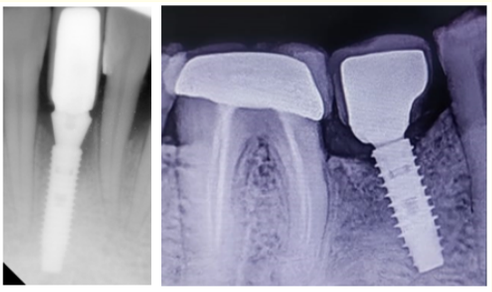

Figure 4: After Prosthesis.

Case Report-2

A 54-year-old male patient presented to the department of Periodontology, Narayana Dental College and Hospital, Nellore, with a chief complaint of the dislodgement of his cap in the lower right back tooth region. The patient reported a history of biting on a hard substance three days prior, which he associated with the onset of the issue. He also provided a history of implant placement in the same region two years ago, followed by restoration with a cement-

retained abutment. The restoration had remained functional and uneventful until the current complaint. Clinical examination revealed dislodgement of the prosthesis in relation to tooth 45, while the implant itself appeared stable. Radiographic evaluation confirmed the presence of a fractured abutment screw within the implant body (Figure 1b). The implant was well osseointegrated, with no signs of peri-implant disease or structural compromise. The treatment plan involved the retrieval of the fractured screw, followed by the replacement with a new screw and recementation of the prosthesis. The procedure, including its steps, was explained to the patient, and informed consent was obtained before scheduling the intervention. At the subsequent appointment, a screw retrieval kit (DIO NAVI SOS KIT) (Figure 2) was utilized to remove the fractured screw fragment. A guide was carefully placed into the implant fixture, and a reverse-cutting drill was used at 1200 rpm in an anti-clockwise direction to disengage the fractured screw followed by replacing it with the remove bar operating at 15 rpm up to the depth of 2mm. The fractured screw was atraumatically retrieved using an adhesive applicator tip, ensuring no damage to the internal threads of the implant, which was confirmed radiographically. Following successful screw retrieval, a new screw was prepared and securely placed and the prosthesis was recemented at the final appointment. Clinical and radiographic evaluations confirmed the proper fit and function of the prosthetic components (Figure 4b). The patient was advised to avoid biting on hard substances to prevent future complications. Detailed oral hygiene instructions were provided, with an emphasis on maintaining meticulous care around the implant. The importance of regular follow-up visits was emphasized to monitor the implant's long-term health and function.

Discussion

Replacement of missing teeth with implant-supported restorations is one of the most widely accepted and successful treatment options in modern dentistry. However, despite the predictable outcomes, complications such as abutment screw loosening and fractures can still occur, albeit infrequently.[6] These issues are quite challenging when they occur during or after the placement of the prosthetic components as it can compromise the longevity and functionality of the implant.

Several methods exist for retrieving fractured implant abutment screws, spanning from conservative techniques to more advanced options. Conservative approaches involve instruments like hemostat, sharp explorers, ultrasonic scalers, endodontic file and modified spoon excavators, which can be used to engage and dislodge the fractured screw fragment [3,5,7]. Satterthwaite., *et al.* [8] utilized an endodontic file to retrieve a fractured implant screw thread whereas Gooty., *et al.* [9] used ultrasonic scaler with no 3-tip moving in counter clockwise direction slowly and the broken abutment screw was retrieved. A more innovative technique was demonstrated by Joshi., *et al.* [10] who used three basic dental instruments: a rotary diamond bur or diamond-coated ultrasonic scaler tip to create a groove on the fractured screw segment, followed by a fine ultrasonic tip (F00359) to loosen the screw, and finally, a Goldman Fox probe to extract the screw from the implant body. Although these techniques have proven successful in other reports, our attempts to retrieve the fractured screw using an explorer, ultrasonic tip, and spoon excavator were unsuccessful.

When conservative methods for retrieving fractured screws prove unsuccessful, some authors recommend the use of specialized commercial retrieval kits [3,5,10]. Cheng., *et al.* [4] described using a counter-torque screw-retrieval device in a counter-clockwise direction to extract a fractured screw. In another clinical case, Turkyilmaz., *et al.* [11] used an initial 1.3 mm diameter twist drill to perforate the screw fragment centrally, followed by gradual manual rotation to extract the fragment whereas Nergiz., *et al.* [12] successfully retrieved the fractured screw with the help of an alternative repair kit without causing any damage to the internal threads of the implant. In the current case report, a manufacturer-designed screw retrieval kit (DIO NAVI SOS KIT) was employed in both cases to disengage and remove the fractured screws. The procedure involved inserting a reverse-cutting drill into a guide, followed by the use of a removal bar which were operated at 1200 and 15 rpm, respectively, in a counter clockwise direction, ensuring the successful retrieval of the screws while maintaining the integrity of the implant threads.

When retrieval attempts compromise the internal threading of an implant, clinicians are often left with two options: the removal and replacement of the affected implant or leaving the fractured screw fragment in situ, unconnected to the prosthetic superstructure [3,13,14]. Both alternatives can negatively impact the overall success and longevity of implant-supported restorations. Therefore, it is imperative to employ meticulous and atraumatic techniques during the retrieval process to preserve the structural integrity of the implant and to reduce the financial burden on the patients. In the present case report, the retrieval procedure was executed with precision, and no damage to the internal threads of the implant was observed, ensuring the integrity and continued functionality of the implant providing an optimal resolution to a challenging complication.

Conclusion

The implant screw fracture is a rare but well documented complication seen in a day-to-day practice. It is strongly emphasized to utilize more invasive methods to retrieve the fractured screws to preserve the structural integrity of the implant to ensure proper fit of the final prosthesis and also to reduce financial burden imposed on the patient. In this case report, employing the manufactured designed screw retrieval kit proved to be atraumatic and more innovative approach in the screw retrieval process, benefiting both the patient and clinician in resolving the complication.

Conflict of Interest

Authors declare that there is no conflict of interest that exists.

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