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CASE REPORT

ABUTMENT SCREW FRACTURE & MANAGEMENT: A CASE REPORT

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ABSTRACT:

Screw loosening and its fracture is one of the most common mechanical complication of implant treatment. Retrieval of the fractured fragment is challenging when the fracture occurs below the head of implant or when there is damage to its internal threads. The purpose of this article is to describe a technique to remove the abutment screw fragments without damaging the implant body or its screw threads.

Key words: Abutment, Screw

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INTRODUCTION

Dental implantation is a reliable and predictable treatment for partially and completely edentulous patients and is gaining tremendous popularity and interest amongst patients and dentists alike. With proper diagnosis and treatment planning, appropriate placement, adequate prosthetic design, and proper maintenance, dental implants can achieve a success rate of 97% to 99%^{1,2}. However, mechanical complications, such as abutment screw loosening or fracture, have been reported³⁻⁷. The occurrence rate of abutment screw fracture was reported to be up to 8%⁴. Factors that may cause abutment screw fracture include occlusal overload, parafunctional habits, design of implant abutment connection, abutment screw design, material properties, and the lack or loss of adequate preload^{4,5,8,9}.

The ease of removing the fractured screw depends on the level of the fracture. Abutment screw fractures frequently occur at the junction of the screw head and the shank or at the junction where the threaded section begins^{9,10}. While attempting to remove the remaining fragment, extra caution should be taken to avoid damage to the threads inside the screw access channel

of the implant⁷. The purpose of this article is to describe an accessory method to remove a fractured abutment screw with simple armamentarium.

CASE REPORT

A 45-year-old female presented for treatment, reporting the detachment of an implant-supported crown in the region of the lower right first molar. The patient stated that the implant and crown had been placed 3 years earlier. Clinical examination of the patient revealed a missing tooth at the location of lower right first molar with no sign of an implant(**figure 1**). The patient brought the abutment with cemented crown(**figure 2**). Radiographic examination of the area showed the presence of a root-form cylindrical implant, consistent in appearance with an 11 mm long, 3.3 mm diameter abutment with an internal hex. The radiographic examination did not indicate any damage to the implant body(**figure 3**). The apical part of the abutment screw remained threaded into the implant (**figure 4**), but had fractured below the level of the hexagonal lock. The implant was osseointegrated and

no radiographic signs of peri-implantitis were seen. After anesthetizing the area, using the tissue punch, the implant was exposed. Using a ¼ round bur in a high-speed hand piece, a 1 mm deep pit was made across the most occlusal portion of the broken screw fragment. The hand piece is held with both hands to avoid having the bur inadvertently jump into the implant body. Using ultrasonic scaler with no. 3 tip placed in the pit prepared moving in anticlockwise direction slowly the broken abutment screw was retrieved (figure 5 & 6) and radiographically verified after removal of abutment screw (figure 7 & 8). Using close tray transfer impression was made and the model with implant analog and the abutment was sent to the lab for prosthesis preparation. Metal ceramic prosthesis was cemented to the abutment in position which was tightened to the implant body with screw which was torque to 30 N.

Figure 1 Missing tooth at right mandibular region



Figure 2 Abutment with cemented crown with screw fracture



Figure 3: IOPAR of fractured screw below the collar of the implant

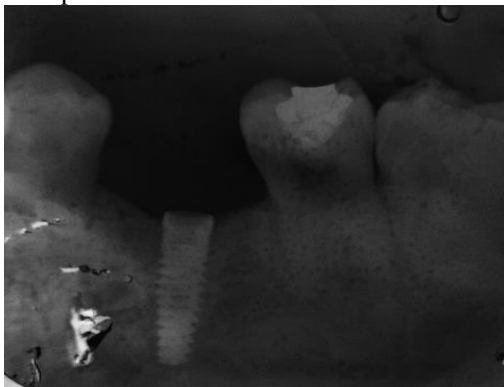


Figure 4: Intraoral view fractured abutment screw



Figure 5: Retrieving fractured screw with ultrasonic scaler tip



Figure 6: Retrieved fractured screw



DISCUSSION

The presented clinical situation illustrates one of the most common complications a dentist deals with an implant prosthesis. Screw fracture and screw loosening are closely linked. Screw loosening has been suggested as the first stage of screw fracture¹³. Thus, fracture of screw can be ascribed to screw loosening occurring due to non-axial movements during functional loading of the prosthesis. Abutment screw produces a clamping effect called the preload because of torquing which in turn holds the abutment to the implant. In external hex design, this clamping effect is integral in implant abutment joint¹⁴. In

internal hex designs, protection against the bending force is inadequate because of absence of form and friction. Screw loosening and undetected micro movements of the abutment under functional loading may lead to the fracture of implant abutment or implant screw. Implants with internal taper/cone-joint anti-rotational components enhance the strength of the system as compared to those with the butt joint and external hex connection of the abutment^{11,12}.

Figure 7: IOPAR of retrieved fractured screw



Figure 8: IOPAR with new abutment and screw



Fractures of screw can be prevented by avoiding occlusion overload, having adequate number of implants to bear the stress, avoid excessive angulation of implants, applying recommended screw tightening torque, replacing loosened screws instead of retightening them and periodic maintenance and scheduling immediate dental visit if patient detects loosening of the prosthesis.

The methods employed to grasp the broken fragments or screw are determined according to the location of the fracture abutment above or below the head of the implant. If an abutment screw fractures above the head of the implant, an explorer, a straight probe or hemostats might be successful¹⁵. The tip of the instrument is moved carefully in a counter-clockwise direction over the surface of the screw segment until it loosens. If the screw fracture occurs below the head of the implant, other methods are required. Several

dental manufacturers provide special kits to manage screw separation; examples include a fork-shaped instrument (Fragment Fork; Dentsply Sirona), screw removal kit (Abutment Screw Retrieval Kit; Nobel Biocare), and implant maintenance kit (Service Kit; Straumann USA).

The technique described in this article involves the use of inexpensive instruments commonly found in dental offices. The force required to remove the broken screw is minimal provided that the screw threads have not been damaged previously. However, a high degree of manual dexterity is required to prevent damage to the implant itself; thus, this may not be the procedure of choice for inexperienced practitioners. Some clinicians may choose to use one of the manufacturer's screw retrieval systems that utilizes a drill guide to orient the drill along the long axis of the implant.

CONCLUSION

Careful treatment planning, correct occlusal scheme, recommended torque and proper patient instructions will definitely minimize post-operative complications. Various treatment modalities are available to deal with such situations. One has to bear in mind that no method is universal to all situations. The technique described here is very simple, requires no elaborate treatment and is very cost effective.

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