CASE REPORT

A Simple and Cost Effective Method used for Removal of a Fractured Implant Abutment Screw: A Case Report

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ABSTRACT

The success of dental implants is based primarily on the extent of osseointegration. The failure of dental implants is not only due to biological factors, such as unsuccessful osseointegration or the presence of peri-implantitis, but may also result from technical complications. Fracture of the implant abutment screw can be a serious problem, as the fragment remaining inside the implant may prevent the implant from functioning efficiently as an anchor. A simple and cost effective procedure used for the removal of fractured screw fragments and the successful utilization of the existing prosthesis are described in this clinical report.

Key Words: dental implant, implant abutment, fractured screw.

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Introduction

The use of osseo-integrated implant-supported prostheses in the replacement of missing natural teeth has become an accepted clinical protocol in dentistry. Although the overall success rate of implant dentistry is very high, more than 90 per cent of the treatment modality is not free of complications and dental implants occasionally fail.[1]

Failures of implant-supported restorations result from technical problems and can be divided into two groups: those relating to implant components, and those relating to the prosthesis.[2-3] Technical problems related to implant components include abutment screw fracture[4-5]. Implants with a butt-joint and external hex connection to the abutment are especially prone to screw loosening when compared with internal taper / cone joints with an anti-rotation feature.[6-7]

Implants should be strong enough to withstand masticatory forces[8]. The initial tensile preload generated within the screw on initial tightening provides mechanical resistance against masticatory forces[9-10]. The clamping/tensile force needed to keep the parts tightly together under all static and functional conditions is called preload.[11] Preload is generated by a gold screw when a torquing force is applied to the head of the screw. The amount of preload present at the threads of a prosthetic retaining screw depends on the applied torque,[12] the presence and type of lubricant, the physical properties of the materials in contact, and the settling of the screw after initial torquing.[13] Surface

imperfections lead to increased friction and decreased preload. Removal and retorquing of the screw reduce surface imperfections, and the use of lubricants decreases friction; both result in increased preload.[14]

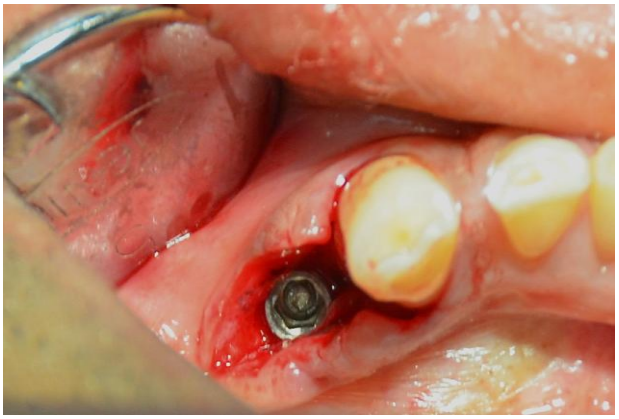

Fig. 1: Clinical picture of Implant region

Once an abutment fracture has occurred, the fractured screw segment inside the implant must be removed. Otherwise, the implant may remain osseointegrated but will lose its ability to retain the prosthesis, so that the existing prosthodontic restoration can no longer be used.

The methods employed to grasp the broken fragments or screw are determined according to the location of the fracture abutment screw 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 haemostats might be successful. The tip of the instrument is moved carefully in a counter-clockwise direction over the surface of the screw segment until it loosens.[1]

If the screw fracture occurs below the head of the implant, other methods are required. There are several available implant repair kits: ITI® Dental Implant System (Institut Straumann AG, Switzerland), consists of drills, two drill guides and six manual tapping instruments. IMZ® TwinPlus Implant System DENTSPLY Friadent, Germany)etc[1].This clinical report presents a situation in which a fractured implant abutment screw was successfully retrieved using an alternative simple method and new abutment was placed to allow the patient to wear the existing prosthesis.

Case Report

A 40 years old partially edentulous male patient consulted the Department of Prosthodontics and Implantlogy, SVS Institute of dental sciences, Mahabubnagar, Andhra Pradesh, India; complaining of a broken implant crown in relation to 34 region (fig 1).An implant of size 4.5X 13mm of unitie company was used for rehabilitation one year ago .On Clinical and radiographic examination of the implant region showed that fractured abutment screw irt 34. The apical part of the screw remained threaded into the implant .The implant was osseointegrated and showed no sign of peri-implantitis.

Two treatment options were considered: attempting to retrieve the fractured screw, or removing the implant and replacing it with a new one. After discussion and consent with the patient it was decided that the fractured screw should be removed and the implant to be restored. So the retrieval of the screw was planned using a spoon excavator instead of using a sophisticated and costly retrieval kit. During the procedure the spoon excavator was modified by cutting working end of the instrument perpendicularly to serve the purpose as shown in the(fig 2).

The abutment screw was broken at the starting point of the threads on the screw, which made the removal

Fig. 2: Retrieved fractured abutment screw and the modified end of the spoon excavator used for the procedure.

more complicated, so a groove was made on the upper end of the broken screw using a airoter without damaging the internal anatomy of the implant to facilitate further use of the same implant. The cut end of the spoon excavator was used to engage in the

prepared groove on the fractured abutment screw which was left in the implant for the removal. The prepared groove provided proper slot for the removal of screw. New abutment screw was then placed and seating confirmed radio-graphically prior to final tightening using a torque driver at 25 Ncm. At subsequent review, the patient was asymptomatic and the prosthesis functionally well.

Discussion

A screw can be thought of as a spring, stretched by preload, with friction forces maintaining the stretch in the threads[13]. In general, the greater the preload, the tighter and more secure the screw joint. The amount of preload present in the joint should not exceed the ultimate tensile strength of the screw. Because preload is of major importance for the stability of the screw joint, it is useful to describe the actual phenomenon of loosening.

Screw fracture and screw looseningare closely linked. It has been suggested that screw loosening is the first stage of screw fracture.[15] When a screw loosens, surface damage occurs at high stress locations, particularly the screw head and the first thread. Consequently, some authors recommend that loose abutment screws should always be replaced as a loose screw could have a fatigue history predisposing it to fracture.[16]

The possible preventive measures are : number, position, dimension and design of implants, as well as the design of the prosthesis are critical factors to be considered during the treatment planning phase.[14] To withstand high bending stresses, implants should be as long and as wide as possible, used in adequate numbers, and be positioned such as to allow axial loading. Implant components are known to fracture more frequently in the posterior region and in partially dentate patients compared to completely edentulous patients.[16]

Retightening an abutment screw ten minutes after the initial torque applications should be routinely performed, and increasing the torque value for abutment screws above 30Newtons can be beneficial for the abutment, implant stability and to decrease the possibility of the screw becoming loose. So, prevent the screw retained prosthesis from loosening

- using the correct fixation screw
- replacing loose screws instead of retightening them
- Immediate investigation; looseness of the prosthesis is detected by the clinician or patient.
- using dimples inside the abutment screw cylinder above the screw.[1]

Conclusion

Using the described technique, fractured implant fragments were successfully removed. Nevertheless, the aim of prosthodontic treatment should be to avoid any fracture of implant abutments and to use the described repair system only in exceptional circumstances. Success in this area is enhanced through correct diagnosis, treatment planning and maintenance; however, complications often occur, which may be significant and compromise the long-term success of the implant abutment and associated prosthesis. The management of such complications has given rise to several techniques to address failings.

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