ISSN: 2309-5288 (Print)
ISSN: 2309-6152 (Online)
CODEN: JCLMC4

Journal of Coastal Life Medicine

The Use of Ultrasonic Scaler Tip as A Non-Invasive Aid in Retrieving Fractured Implant Abutment Screw: A Clinical Case Report

Received: 13 February 2023, **Revised:** 18 March 2023, **Accepted:** 22 April 2023

[1]Dr. Preetika Bansal, [2]Dr. Pardeep Bansal, [3]Dr. Rithika Elsa George, [4]Dr. Prabjeet Kaur, [5]Dr. Kannupriya Aggarwal

1Professor, Department of Periodontics, Dasmesh Institute of Research and Dental Sciences, Faridkot, Punjab, India
2Professor and Head, 3,4,5Post-Graduate, Department of Prosthodontics, Dasmesh Institute of Research and Dental Sciences, Faridkot, Punjab, India

Corresponding Author: Dr. Pardeep Bansal,

Professor and Head, Department of Prosthodontics, Dasmesh Institute of Research and Dental Sciences, Faridkot, Punjab, India Email: drpardeepbansal77@gmail.com

Keywords:

implant abutment screw, screw fracture, screw loosening, abutment screw retrieval, ultrasonic scaler tip.

Abstract

Dental implants are increasingly being used to rehabilitate patients with prosthodontic treatment requirements. However, fracture of the implant abutment screw is one of the many complications associated with this treatment modality. Several techniques have been used to retrieve the fractured abutment when the fracture occurs within the body of the implant. But, most of these techniques are complicated or require additional expensive equipment. The novel technique used in the present clinical case report advocates the usage of an ultrasonic scaler tip to take out the fractured segment and is simple to perform and cost effective. Following the retrieval of the fractured segment, prosthodontic rehabilitation was carried out.

1. Introduction

Dental Implants are a treatment modality which enhances the durability and life of the prosthodontic treatment for partially and completely edentulous patients.[1]This however is accompanied with various biological and technical problems. Peri-implantitis and periapicallesionswith loss of osseointegration are the commonly encountered biological complications. The technical complications include loss of retention, screw loosening, screw fracture and fracture of porcelain or the framework.[2]This mayoccur as a result ofmalfunction, cyclic/overloading,harmful superstructure, screw loosening due to metal fatigue, bruxism, misfit of the components,and premature occlusalcontacts. A fractured abutment screw must be taken out of the implant body without causing any damage so as toreplace it with a new abutment while maintaining the implant's ability to retain the previous prosthesis.[3] Abutment screw fracture is a rarely occurring event (less than 0.5%).[4] This can occur due to tensile and bending forces due toa slight sway of the abutments during functional loads.In order to manage a case of a fractured abutment screw, various techniques including cemented cast post and core fabrication, implant removal and retreatment, and screw fragment retrieval are employed.[5]

Fracture of implant components is more habituallyseen in the posterior region and in partially dentulous patients as related to the completely edentulous patients. The implant abutments are often seen to failwhen the lateral forces are beyond 370N and 530N in abutments, with joint depths of approximately2.1 mm and 5.5 mm, respectively.[6] Thus, it is of utmost importance that implants be adequately strong to endure masticatory forces. Screw loosening and undetected micro-movements of the abutment during functional loading was seen to fracture of the implant abutment or the abutment screw.[7]Higher complication rates are found in implant systems without any anti-rotational features. The fractured screw segment must be removed from the inside of the implant once an abutment fracture has occurred. The existing prosthodontic restoration is not suitable thereafter for use as the implant loses its

ISSN: 2309-5288 (Print)
ISSN: 2309-6152 (Online)
CODEN: JCLMC4
Journal of Coastal Life Medicine

ability to retain the prosthesis but may remain osseointegrated.[8]Manyauthors in the past have recommended a novel technique for the recovery of unwarranted torque induced fracture of the implant abutment screws. The use of an ultrasonic scaler tip to loosen a fractured screw successfully was proposed.[9]A similar non-invasive technique has been discussed in the present clinical case report.

2. Clinical Report

A 65 year old male patient presented to the department of Prpsthodonticswith a loose maxillary complete denture. On examination, it was revealed that the patient had undergone treatment with two implant retained overdenture in relation to the maxillary arch five years back. The patient disclosed that the upper denture started to feel loose 2 weeks back but he did not report to any dental clinician. Intraoral examination was done and it was noted that the ball abutment (Norris Medical, Ball Abutment H2.0, Ti) was fractured in the 14 region and the ball abutment was stuck in the nylon cap housing in the maxillary overdenture's intaglio surface. The access of theimplant platform was blocked with the remaining fractured screw component of the ball abutment. It was assumed that the ball abutment must have gotten loose and due to continuous lateral/torque forces, the ball abutment fractured. A straight probe was used to check the mobility (if any) of the fractured screw component. It was firmly lodged in the implant body. Instead of trying the commercially available screw retrieval kits, it was decided to use a conservative measure of trying a scaler tip to check if it could be retrieved. A thin sickle shaped scaler was taken and the activated tip was brought in contact with the broken screw and it was made to run in a counter-clockwise manner (Figure 1). This was repeated a few times. In between, the probe was used to check if the rotation of the scaler tip loosened the screw or not. This procedure was repeated a few more times and then eventually the broken fragment got loosened and it was retrieved. The retrieved segments were then measured and examined extraorally against a stainless steel measuring scale so as to check if any part was left behind intraorally (Figure 2). Female attachment from the intaglio surface of denture in that area was retrieved and attached onto new ball abutment (Figure 3). Chair side pick-up with repair resin (DPI RR Cold Cure Acrylic Repair Material) was done. Finishing and polishing was done (Figure 4). The overdenture was the again placed intraorally to assess its fit and retentive quality (Figure 5). It was found to be satisfactory.

Figure 1: Ultrasonic Scaling Unit with sickle shaped scaler tip was used to retrieve the fractured segment

ISSN: 2309-5288 (Print)
ISSN: 2309-6152 (Online)
CODEN: JCLMC4
Journal of Coastal Life Medicine

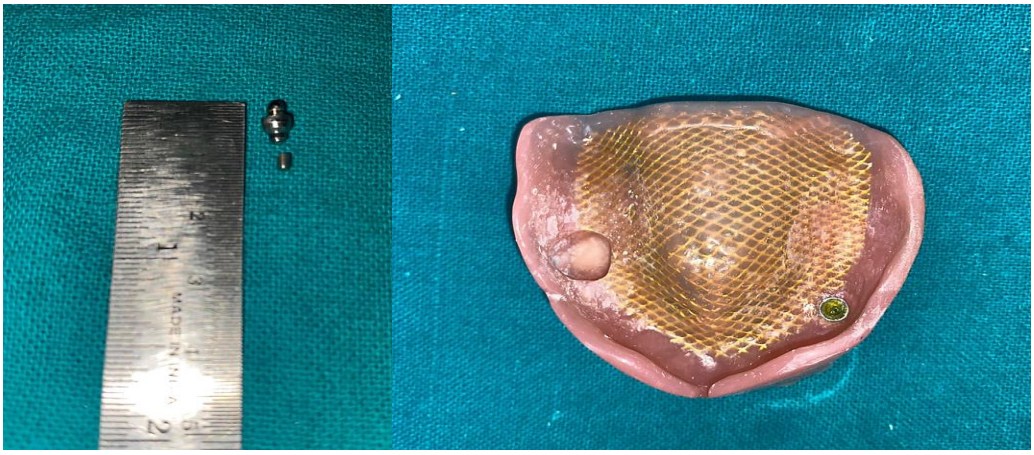

Figure 2: The retrieved segment was inspected and checked against a scale following which a space was made in the maxillary denture after removal of metal housing and plastic cap

Figure 3: The female attachment was retrieved from the intaglio surface of the denture and attached onto the new abutment intraorally

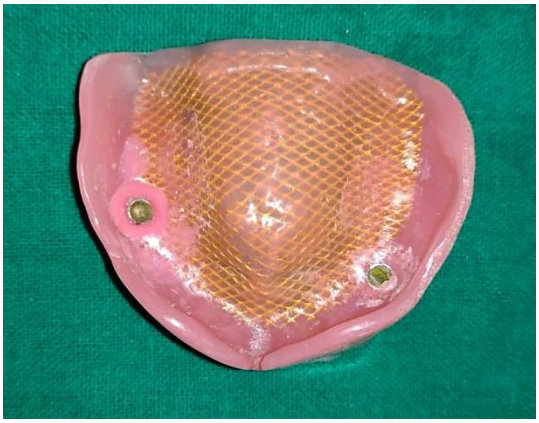

Figure 4: Chair side pick-up done using repair resin followed by finishing and polishing

ISSN: 2309-5288 (Print)
ISSN: 2309-6152 (Online)
CODEN: JCLMC4
Journal of Coastal Life Medicine

Figure 5: Intraoral assessment of the overdenture

3. Discussion

In recent times, replacement of missing teeth with implant-supported removable or fixed prosthesis is seen to be one of the most commonly used treatment modalities. Nevertheless, abutment screw loosening and screw fracture are amongstsome of the complications that are frequently encountered. [10]The design of the implant-abutment connection is a contributory factor to the abutment screw fracture,as is a poorly fitting framework,undue occlusal forces,decreased clamping force and screw joint movement, bone remodelling and pretension releasein the screw joint, and screw loosening due to metal fatigue.[11]A 5-year follow-up has shown that the loosening potential has reached 12.7% in case of single implants with a crown as compared to implant supported fixed bridges (5.6%) when both clinical situations have a similar superstructure retention mode.[12]This could be because the stresses from the external forces are evenly distributed in cases of fixed implant-supported bridges. They tend to act as a single unit and aid in providing anti-rotational features. On the other hand, stressesaccumulateon the abutment screw (at the implant-abutment junction) in case of a single implant supported crown.[13]This leads to an increased prevalence of screw loosening. Fractures are often seen to occur at the screw head-shank junction orat the screw shank-thread jumction.[14]A sharp probe can be used to remove the fractured screw fragments if they are loosely attached and not locked into the implant. The retrieval of the fractured abutment fragment becomes cumbersome if it is engaged tightly with the implant threads. Likewise, due to a lack of screw loosening in case of undue torque, retrieving a retained fractured abutment screw becomes challenging. The retained fractured fragmentis seen to be firmly embedded within the internal threading of the implant. In literature, various methods have been described for the retrieval of screw fragments from within the implant. However, irreversible damage to the implants occur when a low-speed rotary instruments is used to remove the fractured segment.[15]Many clinicians choose removal and replacement of the implant. Some choose to leave it behind unconnected to the superstructure when a fractured screw fragment removal becomes unmanageable or when a problematic retrieval could damage the internal threading of the implant.[16]

Nevertheless, it is always desirable to remove an abutment screw once it has fractured. Retrieval of the fractured screw with the help of an ultrasonic scaler tip is one of the most economical and easiest ways of screw removal and has been described in the present report.

4. Conclusion

The removal of fractured abutment screws can be accomplished using various techniques, yet clinicians must also try to eliminate any probable cause of fracture.The use of commercial retrieval kits should be avoided in favour of conservative techniques. Yet, it is important to retrieve the broken fragment judiciously in order to prevent any damage to the implant structure.

ISSN: 2309-5288 (Print)
ISSN: 2309-6152 (Online)
CODEN: JCLMC4
Journal of Coastal Life Medicine

References

[1] Flanagan, D., 2016. Management of a fractured implant abutment screw. *Journal of Oral Implantology*, *42*(6), pp.508-511.

[2] Brägger, U., Aeschlimann, S., Bürgin, W., Hämmerle, C.H. and Lang, N.P., 2001. Biological and technical complications and failures with fixed partial dentures (FPD) on implants and teeth after four to five years of function. *Clinical Oral Implants Research*, *12*(1), pp.26-34.

[3] Luterbacher, S., Fourmousis, I., Lang, N.P. and Brägger, U., 2000. Fractured prosthetic abutments in osseointegrated implants: a technical complication to cope with. *Clinical Oral Implants Research: Treatment rationale*, *11*(2), pp.163-170.

[4] Goodacre, C.J., Kan, J.Y. and Rungcharassaeng, K., 1999. Clinical complications of osseointegrated implants. *The Journal of Prosthetic Dentistry*, *81*(5), pp.537-552.

[5] Nergiz, I., Schmage, P. and Shahin, R., 2004. Removal of a fractured implant abutment screw: a clinical report. *The Journal of Prosthetic Dentistry*, *91*(6), pp.513-517.

[6] Möllersten, L., Lockowandt, P. and Lindén, L.Å., 1997. Comparison of strength and failure mode of seven implant systems: an in vitro test. *The Journal of Prosthetic Dentistry*, *78*(6), pp.582-591.

[7] Bakaeen, L.G., Winkler, S. and Neff, P.A., 2001. The effect of implant diameter, restoration design, and occlusal table variations on screw loosening of posterior single-tooth implant restorations. *Journal of Oral Implantology*, *27*(2), pp.63-72.

[8] Gooty, J.R., Palakuru, S.K., Guntakalla, V.R. and Nera, M., 2014. Noninvasive method for retrieval of broken dental implant abutment screw. *Contemporary Clinical Dentistry*, *5*(2), p.264.

[9] Bansal P., Bansal P. and Kainth S., 2019. Retrieval Technique for Fractured Implant Abutment Screw: a Case Report. ACTA Dental Sciences, 3(4)

[10] Bhandari, S., Aggarwal, N. and Bakshi, S., 2013. Ultrasonic oscillations for conservative retrieval of a rare fracture of implant healing abutment. *Journal of Oral Implantology*, *39*(4), pp.475-478.

[11] Chen, J.H. and Cho, S.H., 2018. An accessory technique for the intraoral removal of a fractured implant abutment screw. *The Journal of Prosthetic Dentistry*, *120*(6), pp.812-815.

[12] Chowdhary, R., Sonnahalli, N.K. and Gala, J.N., 2023. Implant abutment screw fracture and techniques of retrieval: a literature review based on a novel abutment screw fracture classification. *Journal of Osseointegration*.

[13] Satwalekar, P., Chander, K.S., Reddy, B.A., Sandeep, N. and Satwalekar, T., 2013. A simple and cost effective method used for removal of a fractured implant abutment screw: a case report. *Journal of International Oral Health: JIOH*, *5*(5), p.120.

[14] Quek, H.C., Tan, K.B. and Nicholls, J.I., 2008. Load fatigue performance of four implant-abutment interface designs: effect of torque level and implant system. *International Journal of Oral and Maxillofacial Implants*, *23*(2), pp.253-262.

[15] Yilmaz, B. and McGlumphy, E., 2011. A technique to retrieve fractured implant screws. *Journal of Prosthetic Dentistry*, *105*(2), pp.137-138.

[16] Canpolat, C., Özkurt-Kayahan, Z. and Kazazoğlu, E., 2014. Management of a fractured implant abutment screw: a clinical report. *Journal of Prosthodontics*, *23*(5), pp.402-405.