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CASE REPORT

Management of Fractured Abutment Screw in Osseointegrated Implant: A Clinical Case Report

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ABSTRACT

The degree of osseointegration is the primary determinant of dental implant success. Technical issues can contribute to the failure of dental implants, in addition to physiological factors such as poor osseointegration or the existence of peri-implantitis. When an implant abutment screw fractures, it can be hazardous because the broken component that stays within the implant may stop the implant from acting as an anchor for tooth replacement as intended. However, the majority of the methods that are described in the literature are difficult or need extra costly equipment. The innovative method employed in this clinical case study recommends using an ultrasonic scaler tip to remove the fragmented section; it is inexpensive, easy to use, and simple to execute. Prosthodontic rehabilitation was performed after the broken portion was extracted.

Keywords: Dental Implant, Abutment screw fracture, Ultrasonic scaler tip, Osseo integration, Biologic complications.

INTRODUCTION

Oral implant technology has advanced rapidly since the turn of the century, ushering in a new age in prosthodontics. The development of implant technology has dramatically improved the functional and aesthetic outcomes of definitive restorations as compared to conventional restorations, consequently enhancing the patient's quality of life. Additionally, it has given both patients and healthcare providers better solutions**.**

The degree of Osseointegration is the primary determinant of dental implant success. Nevertheless, peri-implantitis or implant-supported restorations may also be linked to dental implant failure.

Technical issues are the cause of implant-supported restoration failures, which are classified into two categories: prosthesis-related and implant component-related. Fractures of the

abutment screw are among the technical issues associated with implant parts. A growing number of this issue has been documented. Undiscovered screw loosening, which can be brought on by bruxism, an unfavorable superstructure, overloading, or malfunction, is the main cause of screw breakage.

When functional stresses are applied, the abutment wobbles a little bit. Tensile and bending forces applied to the abutment screw may result in a fatigue fracture. Usually, the crown will get dislodged and the screw's apical end will stay in the fixture. Abutment screw fracture is rare (occurring between 0.5% and 8%) but technically isa difficult issue with implant-supported restorations. When lateral stresses surpass 370 N for abutments with a joint depth of at least 2.1 mm and 530 N for abutments with a joint depth of at least 5.5 mm, implant abutments fail. As documented by Wie H In 25% of patients, loose screws were discovered during normal follow-up.

The strength of the system can be increased by implant systems that have antirotational elements, such as an internal hexagon, and those in which the abutment engages deeply into the implant body. Implant systems that are not secured against rotation, frequently have greater rates of complications.

To replace a broken abutment screw with a new one and keep the implant's ability to hold the prosthesis, it must be removed from the implant body without causing any harm. Many methods for retrieving screw fragments have been documented such as with the help of hemostats, tip of explorer or probe, implant removal and retreatment, fabrication of a cemented cast post and core, and many others. The non-invasive technique of using an ultrasonic scaler tip to loosen a fractured screw is discussed in the given clinical report.

CASE REPORT

A 25-year-old patient reported to the Department of Prosthodontics with a dislodged porcelain fused to metal implant-supported crown along with the fractured screw abutment from the maxillary right lateral incisor. (Figure 1)

Figure 1

The crown/abutment/coronal screw fragment was one piece. (Figure 2)

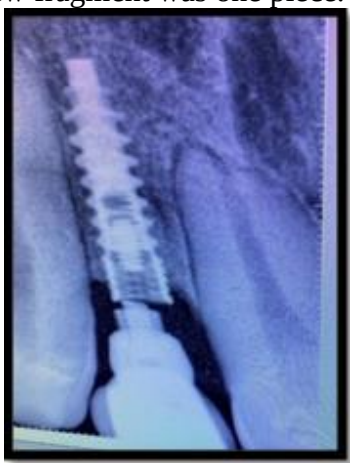

Figure 2

The patient disclosed that the prosthesis started to feel loose 2 months back but he did not report to the clinics. The implant placement was done 2 years back (BioLine D=2.90 L=13.00).
Intraoral examination revealed `that the maxillary lateral incisor region was covered with mucosa.
A radiographic evaluation revealed that the apical part of the abutment screw was lodged in the implant surface.
A localised excisional gingivectomy was done to expose the implant site (Fig3)

Figure 3

Mobility of the retained apical portion of the abutment screw was checked with the help of a probe. The abutment screw was completely lodged in the implant body(Fig4)

Figure 4

The Conservative method of using an ultrasonic scaler was decided in contrast to the screw-retrieval kits.The broken screw was placed in contact with the active point of a narrow sickle-shaped scaler, which was then turned anticlockwiseThis was done several times. In between, the probe was used to see if the screw had been loosened by the scaler tip's rotation or not.
After a few more iterations of this process, the shattered piece was ultimately freed and recovered.
After the segment was removed, it was measured and checked extraorally using a stainless steel measuring scale to see if any intraoral fragments had been left behind (Fig 6)

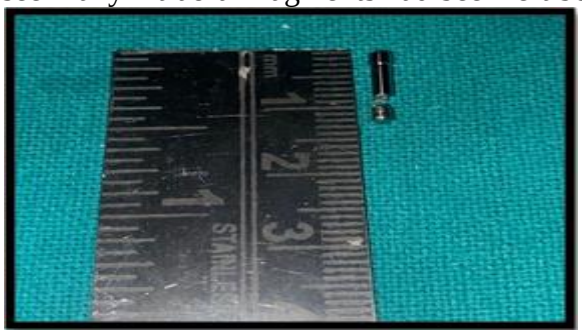

Figure 6

The abutment with the new abutment screw was then seated into the implant (Fig 7)

Figure 7

An abutment-level impression was made with the help of polyvinyl siloxane addition silicone material (Neopure, India), and a master cast was fabricated.A wax pattern was made which was cast in Nickel- Chromium alloy. Metal trial was done. Porcelain firing (Vita VMK) was done and final glazing done .Then crown was cemented over the abutment (Fig 8)

Figure 8

Careful consideration was given to remove any excess cement .

DISCUSSION

For patients who are partly or fully dentulous, dental implants represent an efficient, dependable, and predictable prosthodontic treatment alternative.Even with a high success rate of 97% to 99%, there is a chance of biological and technological challenges.However, among the issues that are commonly seen are abutment screw loosening and screw breakage.

In most implant systems, the abutment screw is a crucial component of the implant-abutment connection. When the screw is tightened, it exhibits elastic deformation and elongation, producing a tensile force known as preload.

Various methods contribute to abutment screw loosening, which include:

A. Type of implant-abutment connection: Internal implant-abutment connection demonstrated better results than external connection.
B. Geometrical morphology of the abutment: Abutments with higher collar heights and angulated abutments are more vulnerable to torque loss
C. Material of the abutment screw: Shinohara et al.'s research indicates that screws manufactured of grade 4 pure titanium loosened considerably more than screws produced of the titanium alloy Ti-6Al-4V.
D. Type of restoration: The implant-supported single crown is more prone to screw loosening than the implant-supported fixed bridge

In cases when the shattered screw fragments are not locked into the implant but are only weakly connected, they can be extracted with a pointed probe[15]. If the shattered abutment piece is securely lodged in the implant threads retrieving it becomes difficult as in this case.
Several techniques have been outlined for extracting screw pieces from inside the implant including the use of low-speed rotary instruments which can result in irreversible damage to implants. Many companies also provide screw-retrieval kits which prove to be a costly treatment option[13].
Some clinicians even choose to leave the fractured screw piece behind and unconnected to the superstructure when there is a chance for damage to the implant, however, it is always recommended to remove the fractured part[9]. Implant naturalization is another technique mentioned in the literature to be used when the implant is damaged and It is not possible to utilise implant parts that are sold commercially[18].This technique utilises custom cast post and core technique.
Removal of the fractured implant with ultrasonic scaler proves to be an effective, easy, and economical treatment option as described in the given article

CONCLUSION

One of the most frequent mechanical issues with restorations supported by implants is screw loosening. In clinical practice, physicians can make better decisions if they are aware of the causes and pertinent circumstances. To avoid causing any harm to the implant structure, it is crucial to collect the fractured component carefully. To stop more loosening or even fracture, physicians must also perform more follow-ups, tighten loosening screws promptly, or replace loosening screws with new ones.

REFERENCES

1. 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.
2. 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.
3. 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*, *15*(1), pp.32-39.
4. 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.
5. 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), pp.264-267.
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. 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.
8. 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
9. Yilmaz, B. and McGlumphy, E., 2011. A technique to retrieve fractured implant screws. Journal of Prosthetic Dentistry, 105(2), pp.137-138

10. 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
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. Bansal P., Bansal P. and Kainth S., 2019. Retrieval Technique for Fractured Implant Abutment Screw: a Case Report. ACTA Dental Sciences, 3(4)
13. Bansal, P., Bansal, P., George, R.E., Kaur, P., and Aggarwal, K., 2023.The Use of Ultrasonic Scaler Tip as A Non-Invasive Aid in Retrieving Fractured Implant Abutment Screw: A Clinical Case Report. Journal of Coastal Life Medicine, *11*(2), 745–749.
14. 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.
15. 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.
16. 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.
17. Flanagan, D., 2016. Management of a fractured implant abutment screw. Journal of Oral Implantology, 42(6), pp.508-511
18. Waguespack, D.E. and Butler, B.C., 2015. Implant naturalization: restoring osseointegrated dental implants with damaged platforms and connections. *Dental Implant Complications: Etiology, Prevention, and Treatment*, pp.145-152.