

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.e-jds.com

Correspondence

Removal of fractured implant screw under the microscope and transformation of cemented-type crown into screw-retained crown simultaneously: A clinical report

Mechanical complications such as crown fracture, framework fracture, screw loosening, and screw fracture could occur during implant restoration.^{1,2} Screw loosening is the most common situation in single-tooth implants, which may lead to abutment screw fracture.³ It is a time-consuming and challenging process to remove fractured screw due to poor visibility embedded in the implant. Various implant manufacturers have designed a self-tapping rotary instrument to remove the broken screw. The use of explorer, probe, hemostats, or ultrasonic scaler is the alternative approach to salvaging implant with the fractured screw fragment.⁴ This case report demonstrated the use of piezoelectric ultrasonic instrument to remove the fractured screw with microscopic assistance and then the crown was restored immediately.

This 54-year-old male came to Department of Stomatology, Chung Shan Medical University Hospital and brought the restoration which was detached from the left upper arch about 1 week ago. Intraoral and radiographic examinations revealed a fractured abutment screw embedded in a root-form cylindrical implant (Prima, Keystone, MA, USA) replaced for tooth 25 (Fig. 1A,B). Under the microscope (Leica M 320 F12, Wetzlar, Germany), the piezoelectric ultrasonic machine (P5 Newtron, Satelec Acteon, Merignac, France) was applied with ET20 tip to remove the fractured screw in counterclockwise direction with saline irrigation (Fig. 1C). After 15-min hard-working, the broken abutment screw was retrieved without damage to the threads inside. Then, the high speed was carefully drilling to penetrate from the occlusal surface to take out the fractured segment inside the crown portion (Fig. 1D,E). After ensuring that the threads were still engaging and undamaged, a new abutment screw was inserted and the crown was fabricated as screw-retained type placed in site to achieve immediately

loading (Fig. 1F). Subsequently, the patient was very satisfied with the well-functioning restoration.

The difficulty in retrieval of the fractured screw depends on the location or the depth of fractured screw embedded in the implant. In addition, light is an important influence on the visibility in the oral cavity. With the assistance of a microscope, it can enhance the vision and assess in salvaging the fractured implant screw. The piezoelectric method is one of the ultrasonic producing vibrations that utilize the switch of the electric charge to cause the dimension deformation of piezoceramic disks.⁵ The high efficiency of energy transfer can reduce energy consumption and the linear back and forth motion can produce a more precise vibration.⁵ This instrument has been widely applied in dental field including the removal of the broken screw. Adequate treatment planning and regular recall appointment may minimize implant screw loosening and fracture. It is also important to identify the etiology to eliminate the risk factors. Nowadays, there is still no universally standard procedure for broken screw removal. In this case, the screw was successfully removed by the combination of a microscope and a piezoelectric ultrasonic machine to reduce the risk of damage to screw threads. In addition, the cemented-type crown was transformed into screw-retained crown to achieve occlusal function. Therefore, this new technique may provide a novel solution for fractured screw removal and associated-prosthesis restoration simultaneously.

Declaration of Competing Interest

The authors have no conflicts of interest relevant to this article.

<https://doi.org/10.1016/j.jds.2021.03.007>

1991-7902/© 2021 Association for Dental Sciences of the Republic of China. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

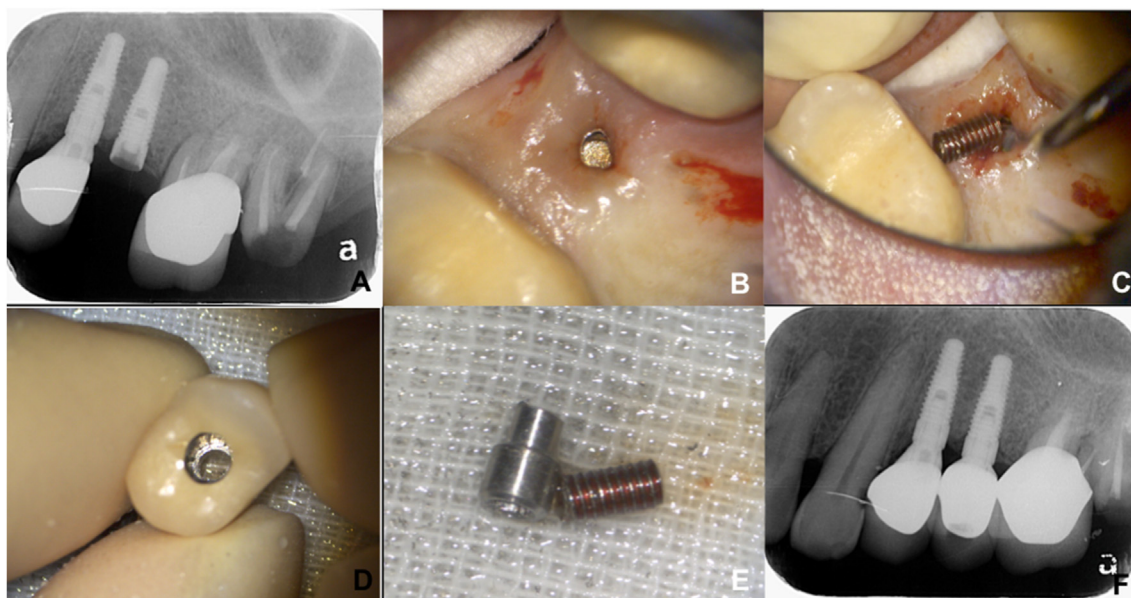


Figure 1 (A) Preoperative radiography revealed a fractured screw remained inside an implant of tooth 25. (B) Intraoral occlusal view of the fractured screw below the hexagon lock. (C) The fractured screw was removed after using ultrasonic tips and explorer under the microscope. (D) The crown occlusal portion was drilled for a pathway to remove the fractured segment. (E) The fractured screw was completely taken out. (F) Original cemented-type crown was modified into screw-retained crown examined by periapical radiography.

References

1. Schwarz MS. Mechanical complications of dental implants. *Clin Oral Implants Res* 2000;11:156–8.
2. Chang CL, Lu HK, Ou KL, Su PY, Chen CM. Fractographic analysis of fractured dental implant components. *J Dent Sci* 2013;8: 8–14.
3. Goodacre CJ, Kan JY, Rungcharassaeng K. Clinical complications of osseointegrated implants. *J Prosthet Dent* 1999;81: 537–52.
4. Mizumoto RM, Jamjoom FZ, Yilmaz B. A risk-based decision making tree for managing fractured abutment and prosthetic screws: a systematic review. *J Prosthet Dent* 2018;119:552–9.
5. Chen YL, Chang HH, Chiang YC, Lin CP. Application and development of ultrasonics in dentistry. *J Formos Med Assoc* 2013; 112:659–65.

Wan-Chen Chen
 Yu-Chao Chang*
 School of Dentistry, Chung Shan Medical University,
 Taichung, Taiwan
 Department of Dentistry, Chung Shan Medical University
 Hospital, Taichung, Taiwan
 *Corresponding author. School of Dentistry, Chung Shan
 Medical University, 110, Sec.1, Chien-Kuo N. Rd., Taichung,
 40201, Taiwan. Fax: +886 424759065.
 E-mail address: cyc@csmu.edu.tw (Y.-C. Chang)

Received 11 March 2021
 Final revision received 14 March 2021
 Available online 27 March 2021