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A simple procedure for retrieval of a cement-retained implant-supported crown: A case report

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Retrieval of cement-retained implant prostheses can be more demanding than retrieval of screw-retained prostheses. This case report describes a simple and predictable procedure to locate the abutment screw access openings of cement-retained implant-supported crowns in cases of fractured

ceramic veneer. A conventional periapical radiography image was captured using a digital camera, transferred to a computer, and manipulated using Microsoft Word document software to estimate the location of the abutment screw access. (*Quintessence Int* 201#;##:1–4; doi: ##.###/j.qi.a#####)

Key words: cement-retained, ceramic veneer fracture, implant-supported prosthesis

Implant-supported prostheses can be either screw- or cement-retained,^{1,2} and the choice of retention means depends on the clinician's preference, the available interridge space, esthetics, and cost.² Predictable retrievability of implant-retained restorations is another factor to be considered as a part of patient care,^{2,3} where for maintenance purposes, the prosthesis may need to be retrieved on many occasions. Screw retention allows easier retrievability; however, the range of benefits of cement-retained prostheses includes better seating of the superstructure/framework,⁴ less screw loosening,⁵ fewer problems related to occlusal screw holes,⁶ and fewer problems with ceramic strength issues.⁷ In terms of retrievability, it is more demanding

to retrieve a cement-retained prosthesis without affecting the implant abutment and restoration compared to a screw-retained implant restoration.^{2,8} Unlike in natural abutment teeth, conventional cements do not chemically adhere to metallic abutments. However, the appropriate choice of cement should be made to provide adequate crown retention on the implant abutment and at the same time allow for retrievability.^{8–10} In view of the many reports of abutment screw loosening and ceramic veneer fracture,¹¹ various techniques have been described in the literature to simplify the retrieval of cement-retained implant crown restorations. Some contingency plans to allow the identification of screw access location and hence easy retrieval include incorporating a retrieval slot in the design^{1,3} and staining the occlusal surface of the ceramic restoration to indicate the abutment screw location.¹² Crown sectioning at the midfacial surface to break the cement seal before the sectioned crown is retrieved,¹³ however, involved prolonged chairside time. A more common method is to locate the screw access by drilling and perforating a section of the restoration using a bur.¹⁴ The ability to

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Fig 1 Partial veneer fracture of implant crown replacing the mandibular right second premolar with an exposed metal coping.

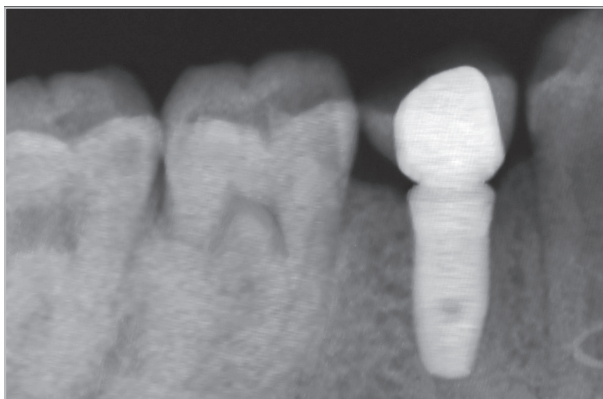


Fig 2 Periapical radiograph of the implant-abutment junction and the cemented metal ceramic-crown before editing.

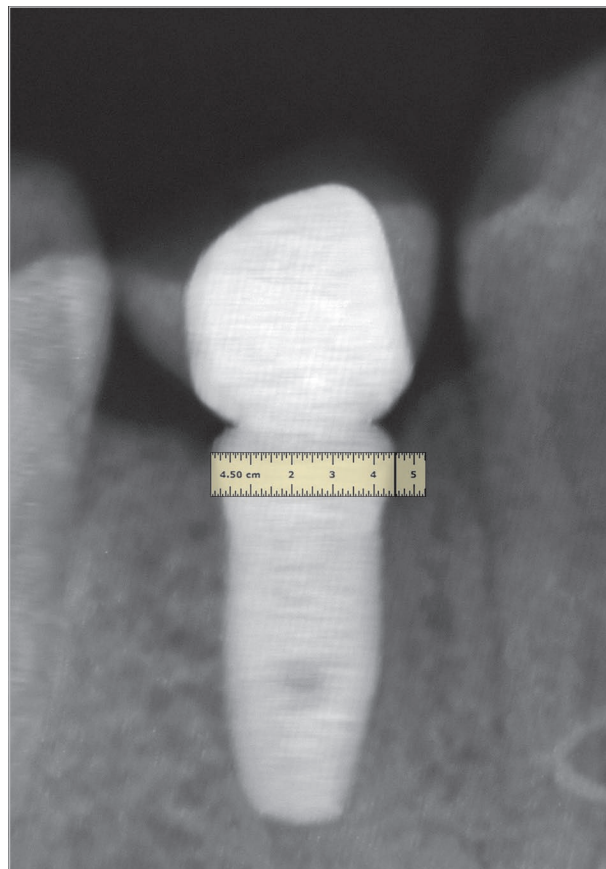


Fig 3 With the help of the ruler, the image was enlarged such that the implant shoulder measured 4.5 cm on the screen.

identify the approximate location of the screw access opening in cement-retained implant-supported crowns may eliminate laborious intraoral crown sectioning.

The purpose of this article is to describe a simple and undemanding procedure making use of readily available conventional periapical radiography to locate the screw access opening of ceramic implant-supported crowns with fractured ceramic veneer. The image was loaded onto a computer, and using readily available software, the abutment screw location was estimated by measuring the mesiodistal dimension of the crown in relation to the adjacent teeth.

CLINICAL CASE

A 21-year-old female patient presented to the Department of Prosthetic Dentistry, 3 months after a metal-

ceramic implant-supported crown was cemented, replacing the mandibular right second premolar. She was concerned with the crown restoration, which was gradually chipping off, and had no other associated symptoms (Fig 1). The patient's dental record indicated that a 4.5-mm diameter (bone level; SuperLine, Implantium) implant had been inserted in the mandibular right second premolar edentulous area. The metal-ceramic crown was cemented using provisional cement (TempBond, Kerr). A straight abutment was used in this case. The most likely cause for the ceramic veneer fracture in the present case was unsupported ceramic as a result of an undercontoured and poorly designed metal coping. The treatment plan included replacement of the damaged crown and recementation of a new metal-ceramic crown on the existing implant abutment (Fig 1).

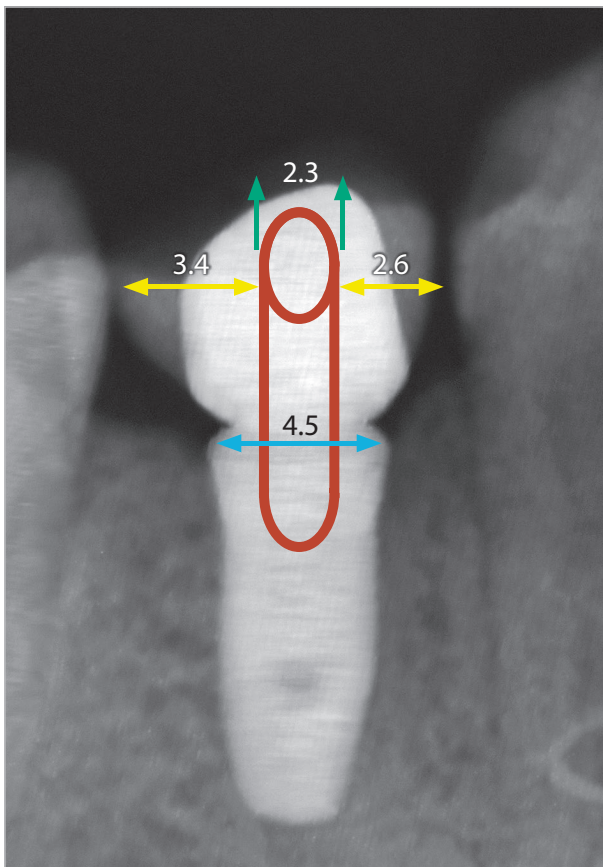


Fig 4 Cylinder shape outline of the estimated mesiodistal abutment screw location.



Fig 5 The abutment screw was exposed.



Fig 6a Retrieved abutment-crown assembly.



Fig 6b Metal coping separated from the abutment.

The location of the abutment screw was estimated using a conventional intraoral periapical radiograph of the implant taken post-cementation. A digital camera (Canon EOS Digital Rebel; Canon) was used to capture the image of the periapical radiograph with flash off/ autofocus settings. The image was loaded onto a computer as a JPEG image and later imported into a Microsoft Word document file. The image was edited and enlarged so that the radiographic image was approximately 4.5 cm wide at the implant shoulder (representing the actual 4.5-mm implant diameter) (Fig 2). On-screen ruler software (Version 2.2, Kummailil J) was used for this purpose (Fig 3).

In the same Word document file, a ready-made cylinder shape was inserted and superimposed on the radiographic image of the abutment screw. A similar enlarging procedure was performed where the mesio-

distal length of the cylinder was enlarged to approximately 2.3 cm, representing the 2.3-mm diameter of the abutment screw according to the manufacturer. Once this length was established, the mesial and distal lengths to the proximal surfaces of the respective anterior and posterior adjacent teeth were established.

The mesiodistal distance between the mesial surface of the cylinder and the proximal surface of the adjacent first premolar measured 2.6 cm, while the distance between the distal surface of the cylinder to the proximal surfaces of the first molar was 3.4 cm (Fig 4).

The estimated position of the screw access opening was marked occlusally using a metal ruler. With a sharp transmetal bur (Dentspy Maillefer), the metal coping was penetrated to expose the sealer over the screw head. A hand driver was used to unscrew the abut-

ment-crown assembly, which was easily separated once out of the mouth (Figs 5 and 6). A new crown restoration was fabricated and cemented in place.

DISCUSSION

One advantage of this radiographic technique over other methods that utilize a photographic image^{15,16} is that the intraoral periapical radiograph can be made available even after cementation. With the technique of Figueras-Alvarez et al,¹⁵ two digital photographs of the definitive cast precementation are required, indicating that the procedure needs to be performed routinely before the prosthesis is cemented. With the technique of Daher and Morgano,¹⁶ taking digital photographs of the patient is time-consuming for both the patient and the dental office staff, and it needs to be performed routinely precementation. The present technique also requires information on the implant system used, which can easily be obtained from the website or product catalogue.

The two-dimensional approach with this technique, however, may provide limited information as to the buccolingual position of the screw access opening. While a three-dimensional radiographic imaging would provide such information, such equipment is not readily available in all dental clinics.

CONCLUSION

A simple and undemanding procedure for locating the abutment screw access to allow abutment retrieval was described using readily available information on the implant system and the postcementation periapical radiograph. The implant abutment radiographic image was captured on a digital camera and the image was manipulated using Word document software to estimate the screw access location on the crown. This technique can be performed by anyone with a computer, without the need for special equipment or software.

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