



FABRICATION OF A CUSTOM ABUTMENT FOR A WIDE-DIAMETER IMPLANT IN A SITUATION WITH LIMITED INTEROCCLUSAL SPACE

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This article illustrates a technique to solve the esthetic and functional challenges of restoring implants in situations with limited interocclusal clearance. As manufactured, some wide implants lack a gold cylinder abutment that attaches directly to the implant. Instead, an intermediate abutment is provided with the system. However, with limited interocclusal space, it is not feasible to restore an intermediate abutment due to the increased restorative space required. This article describes a technique to fabricate a customized abutment that directly connects to a wide-diameter implant, resulting in a functional and esthetic restoration. (*J Prosthet Dent* 2008;100:474-477)

In the restoration of dental implants, several clinical factors must be considered.¹ The position, diameter, and number of implants are determined by prosthetic requirements and anatomic considerations. Prosthetic requirements may dictate implant choice and position, but anatomic limitations in many situations will also affect the final choice, number, and placement of implants.² If the implant in question will replace a molar, one of the prosthetic necessities may include an appropriate mesio-distal width to avoid proximal cantilevers. To reduce the cantilever, a wide-diameter implant may be used.

The first wide-diameter implant was developed by Nobel Biocare (Brånemark System; Nobel Biocare AB, Göteborg, Sweden). This implant was 5 mm in diameter.³ It was designed as a rescue implant for nonintegrated and fractured standard implants, as well as an implant to be placed in compromised situations with limited available bone height and quality.⁴ Currently, it is the implant of choice in molars to avoid proximal cantilevers.

The Straumann system (Straumann USA, Andover, Mass) has demonstrated adequate clinical success

rates.⁵ This system features an internal connection implant with 3 available implant diameters: wide neck (4.8 mm), regular neck (4.1 mm), or narrow neck (3.3 mm). The regular- and narrow-neck implants offer a direct screw-to-implant gold coping, whereas the wide neck uses an intermediate abutment.

The wide-neck diameter is indicated when restoring molars, as it provides a better mesio-distal diameter. Wider implants are also considered to be more suitable in the molar area because of a more favorable emergence profile.⁶ The wide-body implant is indicated when sufficient bone mass (minimum crestal bone width of 7 mm) is available, and for implant placement immediately after extraction of a tooth to provide better implant-to-bone contact.⁷

For single implant restorations there are 2 primary options available: (1) a custom or stock abutment with a cement-retained crown, or (2) a crown which is screw retained directly to the implant. Several advantages and disadvantages are purported for both techniques. However, an advantage observed with screw-retained implant crowns is the possibility they

provide to restore patients who present with limited interocclusal space. Screw-retained implant crowns require less interocclusal space than cement-retained restorations. For cement-retained implant crowns, adequate space should be provided to accommodate the abutment height as well as minimum occlusal thickness for the metal or ceramic coping and the veneering porcelain. In situations of decreased interocclusal space, a screw-retained crown offers increased retention compared to a cemented design.²

A limitation of the implant system described in this article (Straumann Wide Neck; Straumann USA) is the absence of an abutment gold cylinder attached directly to the implant. The system offers the alternative of an intermediate abutment, to which the gold cylinder abutment is then connected. Unfortunately, this requires additional interocclusal space to accommodate both abutment screws and the metal ceramic crown. This article presents a technique developed to eliminate the use of an intermediate abutment when restoring a wide-neck Straumann implant in a situation with limited interocclusal space.

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The method presented here can also be used when patients present with implants from manufacturers that no longer produce the implant parts needed. As long as a screw fits adequately on the implant to be restored, the technique presented can be used for restoration of the implant.

This technique also provides a solution for limited interocclusal space situations when the implant has been placed without a prior discussion between the restorative dentist and the surgeon regarding the preferred implant system. When limited interocclusal space is an issue, a system which provides a gold cylinder attached directly to the implant is recommended.

A limitation of this technique is that the interface obtained is a cast fit, in contrast with the machined fit available with prefabricated parts. This may be contraindicated when restoring multiple implants with a splinted framework, since a machined fit presents a superior adaptation compared to a cast fit, and for a splinted framework design, the abutments may require more refinement during finishing of the prosthesis.⁸ However, with multiple implants with individual abutments and a cement-retained restoration, this technique may be indicated if no machined implant components are available.

A wide-neck implant (Standard Plus Implant SLA, 6.0 mm, 043.650S; Straumann USA) was selected to restore the first left mandibular molar, due to the amount of mesiodistal space available. The extraction and implant placement were performed in the same day. After implant placement, a healing abutment (WN Healing cap, 048.038; Straumann USA) was positioned, and the implant was left to heal for 4 months.

TECHNIQUE

1. After allowing the proper healing time, make an implant level impression by using an open tray impression

coping (WN synOcta impression cap with integral guide screw, 048.091; Straumann USA) with polyether impression material (Impregum; 3M ESPE, St. Paul, Minn).

2. Securely connect an implant analog (WN synOcta analog, 048.171; Straumann USA) to the open tray impression coping. Pour a soft tissue cast using type IV dental stone (Silky-Rock; Whip Mix Corp, Louisville, Ky).

3. Articulate the soft tissue cast and the opposing maxillary arch. In the presence of limited interocclusal space, select a screw-retained metal ceramic crown as the definitive restoration (Fig. 1).

4. Use the technique described for situations in which a regular-diameter machined gold cylinder (RN synOcta Gold Abutment, 048.642; Straumann USA) does not have the same internal connection and diameter as the wide-

diameter gold cylinder (Fig. 2).

5. Apply an acrylic resin separating agent (Very Special Separator; Dental Ventures of America, Inc, Corona, Calif) to the inside of a wide-neck implant analog (WN synOcta analog, 048.171; Straumann USA).

6. Add acrylic resin (FuturaGen orange acrylic resin; Schütz Dental GmbH, Rosbach, Germany) to a wide-neck (WN) guide screw (WN synOcta impression cap with integral guide screw, 048.091; Straumann USA), using a brush to incrementally add the powder and liquid. Seat the screw with the acrylic resin and screw it onto the implant analog, to capture the internal geometry of the WN analog. Place acrylic resin around the guide screw to capture the internal aspect of the abutment. After confirmation that the guide screw can be removed easily from the analog, al-



1 Left lateral view of first left mandibular molar demonstrating limited interocclusal space.



2 Regular-neck (left) and wide-neck (right) synOcta analogs with regular-neck synOcta gold abutment (center). Note discrepancy in diameter with wide-neck analog.

low the acrylic resin to polymerize for 12 hours before trimming any excess (Fig. 3).

7. Create the remaining anatomy of the metal coping with wax (GEO Wax; Renfert USA, St. Charles, Ill). Confirm that the internal portion of the implant is adequately duplicated. Create a chimney with wax (GEO Wax; Renfert USA) to remain in occlusion, to provide adequate support for porcelain surrounding the screw access hole.

8. Cast the modified wax pattern of the gold cylinder in noble alloy (Jensen JPW 49% ceramic alloy;

Jensen Industries, Inc, North Haven, Conn) (Fig. 4).

9. Ensure proper seating of the casting using an implant analog (WN synOcta analog, 048.171; Straumann USA). Adjust the intaglio surface of the casting with a tapering fluted carbide bur (H282.31.010; Brasseler USA, Savannah, Ga) until adequate seating is obtained, using x25 magnification to verify (Stereo Zoom3 Bausch & Lomb Microscope; Bausch & Lomb, Rochester, NY). Continue with adjustments until a complete passive fit is obtained on the analog, using the microscope to ensure the

absence of open margins.

10. Evaluate the casting intraorally, with clinical and radiographic assessment. After successful seating of the modified gold cylinder, send the casts to the dental laboratory for porcelain application (Fig. 5).

11. Once the definitive metal ceramic implant crown is returned, evaluate it intraorally for esthetics and occlusion. Adjust as necessary (Fig. 6).

12. Torque the implant crown at 35 Ncm, as suggested by the manufacturer, then cover the screw access hole by using a cotton pellet and composite resin (3M Z100 Restorative Dental Composite; 3M ESPE) (Fig. 7).



3 Intaglio surface of wide-neck guide pin modified to copy internal aspect of wide-neck implant.



4 Intaglio surface of custom abutment coping after casting.



5 Periapical radiograph of screw-retained implant crown coping.



6 Occlusal view of definitive screw-retained implant crown.



7 Lateral view of definitive screw-retained implant crown.

SUMMARY

This technique presents a viable solution for the restoration of a single molar implant with limited interocclusal space using a wide-neck implant. It is important that the surgeon confer with the restorative dentist prior to selecting the implant system that will be used. Knowing the restorative advantages and disadvantages of the various implant systems can result in a simpler and more favorable restoration.

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