A TECHNIQUE FOR RETRIEVAL OF CEMENT-RETAINED, IMPLANT-SUPPORTED PROSTHESSES.

ABSTRACT
Cement-retained, implant-supported prostheses offer advantages relative to screw-retained, implant-supported prostheses. However, predictable retrievability of cement-retained prostheses has been a clinical concern. This article presents a technique that describes an implant restoration design that allows for predictable removal of cement-retained, implant-supported prostheses.

KEY WORDS
Cement-retained, screw vs. cement, implant crown, implant retrieval, retrievability, implant complication.

INTRODUCTION
Retrievability of implant-supported dental prostheses is considered an important aspect of patient care due to potential unpredictable biological and/or mechanical complications that may occur. It has been reported that one of the disadvantages of cement-retained, implant-supported prostheses is the lack of predictable retrievability when compared to screw-retained, implant-supported prostheses. However, cement-retained prostheses may offer other clinical advantages compared to screw-retained prostheses such as greater passivity of fit, less incidence of ceramic veneer fracture, improved esthetics, reduced cost and complexity of laboratory procedures, and the ability to create more precise occlusion and compensate for mal-positioned implants. Hence, the incorporation of a feature in the design of cement-retained, implant-supported prostheses that offers predictable retrievability should enable the dental clinician to utilize these potential advantages. Such an attribute should also enhance the clinician’s ability to facilitate maintenance, repair and replacement of these prostheses when necessary.

The proposed technique can be performed with either customized implant abutments or pre-fabricated, machined implant abutments, single or multiple-unit fixed dentures. This procedure calls for a metal alloy abutment-to-prosthesis interface and employs a slot driver to facilitate retrieval of the prosthesis. For customized implant abutments, traditional fabrication techniques are employed with the addition of a customized lingual retrieval slot placed at the abutment/prosthesis interface as follows:

TECHNIQUE
1. A castable, UCLA-type abutment (GoldAdapt 29014, Nobel Biocare Holding AG, Switzerland) is built to ideal tooth preparation dimensions with an auto-polymerizing pattern resin (Pi-Ku-Plast HP36; XPdent Corp., Miami, FL). (Fig. 1) The lingual/palatal shoulder should be approximately 1mm coronal to and follow the contours of the free gingival margin. (Fig 2)

2. A lingual/palatal slot is milled into the abutment mounted on a milling model using a milling bur (H364E; Brasseler USA, Savannah, GA). (Fig.3) The slot should be a minimum of 1 mm in axial depth and wider in mesial-distal width than the functional end of the implant slot driver (RASD6, Biomet 3i Corp, Palm Beach Gardens, FL) that will be utilized for retrieval. (Fig. 4)

3. The customized abutment is invested and cast in a type four high noble alloy metal (JIV, Jensen Dental Inc, North Heaven, CT). Once divested and cleaned, the customized abutment is again milled on a milling model to ideal dimensions and form. The customized abutment is finished and polished.

4. An auto-polymerizing pattern resin substructure (Pi-Ku-Plast HP36) is made over the cast, customized abutment at a minimum thickness of 0.5mm. This substructure does not cover the area of the milled slot. A full-contour wax-up is then applied to the substructure and subsequently cut back to the appropriate dimensions needed for porcelain application. Milling wax (Biotech #510 006 14, XP Dent Corp, Mia, Fl) is
applied to the resin substructure. Dipping wax (Duo Dip, YETI Dentalprodukte GmbH, Enger, Germany) of a lighter color is applied to the area of the slot to help with subsequent identification of its location.

5. The functional end of a slot driver is heated by flame and placed within the confines of lighter color wax along the abutment shoulder and pressed until it hits the axial wall of the milled customized abutment. (Fig.5) This creates an opening (the retrieval slot) at the margin of the crown the approximate dimensions of the slot driver. (Fig.6) The wax pattern is then debrided, invested and cast in a high noble metal porcelain alloy (JP-1, Jensen Dental Inc.), divested, and finished. Porcelain application is performed as usual.

6. After proper fitting, adjusting and finishing, the prosthesis is luted intra-orally with a luting agent (TempBond NE, Kerr Corp., Orange, CA). After removing the excess cement, the retrieval slot is filled with a resilient resin material (Fermit N, Ivoclar Vivadent Inc, Amherst, NY). (Fig. 7)

7. If retrieval is necessary, the unfilled resin within the retrieval slot is carefully removed with a hand instrument such as a scaler or explorer. The slot driver within a torque driver (CATDB, Biomet 3i Corp) is inserted into the retrieval slot, braced with finger pressure and 32 Ncm of torque is applied with a torque controller (CATC3, Biomet 3i Corp). This breaks the cement seal and dislodging the prosthesis.(Fig. 8,9)

DISCUSSION

The presented technique allows for fabrication of a predictably retrievable cement-retained, implant-supported prosthesis. Similar to the technique proposed by Prestipino et al., the proposed retrieval slot mechanism allows a slot driver, upon rotation within the retrieval slot, to simultaneously apply a coronal force to the prosthesis superstructure and an apical force to the supporting abutment great enough to break the cement seal and separate the two components. However, this design creates a lock and key fit between the slot driver and the retrieval slot within the abutment/prosthesis interface decreasing the possibility of the slot driver dislodging during rotation when torque is applied, which can potentially damage the slot and render it less effective. The slot can also be positioned towards the mesio-lingual line angle of posterior restorations in order to allow for improved clinical access and negotiation of interference by the tongue. When fabricating multi-unit fixed dentures this type of retrieval mechanism can be incorporated into multiple abutments in order to successfully retrieve the prosthesis when necessary.

Placement of the lingual/palatal shoulder approximately 1 coronal to contours of the free gingival margin aids in optimizing the health of the supporting tissues, enhances the patient’s ability to perform adequate oral hygiene, facilitates ease of luting agent removal and helps with visual verification of complete seating of the prosthesis. Pre-fabricated abutments, although less costly than custom milled abutments, often to not have ideal margin positioning relative to the free gingival margin creating a potential compromise relative to these aspects of treatment. With regard to proper oral hygiene, sealing the retrieval slot with resilient resin closes what is essentially an open margin. Utilization of a resilient resin, as opposed to a filled hybrid composite resin, allows for the removal of the material with hand instrumentation, such has a periodontal scaler, instead of a rotary instrument. This minimizes the amount of potential damage to the retrieval slot when removing the filling material. Additionally, the use of high noble alloys of greater hardness for both the customized milled abutment and the prosthesis casting aids in preventing significant distortion of the retrieval slot. These alloys are also more corrosion resistant and have less potential for local toxicity affecting the peri-implant tissues.

The advantages of retrievable implant prostheses are widely accepted. Screw-retention allows the clinician to remove prostheses predictability. Although this usually occurs at the expense of, most notably, an intact occlusal table and passivity of prosthesis fit, potentially resulting in related complications thereof. The design feature presented allows the clinician to utilize the previously described advantages of cement-retained,
implant-supported prostheses with the predictable retrieval ability formerly afforded only to screw-retained, implant supported prostheses.

**LEGEND & PHOTOS**

1. Customized UCLA abutment built in auto-polymerizing pattern resin to ideal proportions.
2. Lingual/palatal shoulder of abutment build-up approximately 1mm coronal to the free gingival margin.

3. A lingual/palatal slot being milled into the abutment using a milling bur.
4. The milled slot should be a minimum of 1 mm in axial depth and wider in mesial-distal width than the functional end of the implant slot driver.
5. The functional end of a slot driver placed within the confines of lighter color wax along the abutment shoulder and pressed until it hits the axial wall of the milled customized abutment.
6. Slot created in the wax-up.

7. The retrieval slot of the finished crown filled with a resilient resin material.
8. A slot driver within a torque driver inserted into the retrieval slot.

9. Torque is applied with a torque controller breaking the cement seal and dislodging the prosthesis.