# Screw-Retained Prosthesis for Straumann Implant Sites with Limited Interocclusal Clearance

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**This article reports a technique that addresses the problem of the restricted interocclusal distance when screw-retained prostheses are selected.**

***J Prosthodont 2006;15:198-201. Copyright © 2006 by The American College of Prosthodontists.***

**INDEX WORDS: implants, screw retention, prostheses, interocclusal clearance**

RESTORATION OF DENTAL implants requires the involvement of both the restoring dentist and the dental technician to achieve a functionally and aesthetically pleasing result. Provided the placement of the implant follows accepted norms, subsequent restoration should be uneventful. There are, however, a number of clinical considerations that may affect the outcome of the treatment.

At present, there appear to be two schools of thought regarding anchorage of the prosthetic crown to the implant. Some advocate cementation of crowns to the abutment, while others suggest that screw retention is preferable.[1] An approach many clinicians adopt is to use a temporary (provisional) luting agent for crown retention, the advantage being that the prosthesis can be removed without damage to the abutment. Further, any excess cement extruding from the prosthesis/abutment interface at placement that is not removed mechanically may be expected to dissolve within a relatively short period of time; however, cements do not always dissolve rapidly, particularly when the cement mass is located subgingivally and, in this case, the retained material can cause inflammation, infection, and periodontal complications. In addition, there are cases where crown retrieval necessitates sectioning, which usually destroys it.[2] The problems associated with retained excess or subgingival cement are exacerbated when permanent cements, such as glass ionomers, hybrids, and resin cements are used.

A further consideration with cemented restorations arises when the interfacial gap between abutment and crown is narrow. In this situation, extrusion of excess cement (even when a die spacer is used) is dependent upon the seating force, the viscosity of the cement, and the gap dimensions. It has been shown that cement films can reach significant thicknesses with well-fabricated and clinically acceptable crowns,[3,4] and consequently, crown seating may be compromised when the cement film thickness is appreciable at the occlusal surface or even along the marginal walls. Another concern is that seating a cemented crown under normal forces may not overcome peri-implant mucosal resistance, which likewise leads to poor seating of the restoration. As a result, many clinicians prefer to use screw-retained prostheses despite the obvious convenience of cement retention.

There are several advantages to the screw-retained prosthesis. One is that as the crown is

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*Accepted March 4, 2005.*

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*1059-941X/06*

*doi: 10.1111/j.1532-849X.2006.00101.x*

slowly seated, the adjacent gingival tissues are contoured atraumatically by the advancing prosthesis. Further, the prosthesis/implant retention is maximal, since it is determined by the screw–fixture interlock.[5] An additional advantage of a screw-retained prosthesis is that it can be readily removed for try-in, post-fabrication adjustment, and custom staining.

The Straumann system (Straumann Inc., Waltham, MA) is a popular implant system that offers a number of clinical advantages. It incorporates an abutment, such as the synOcta abutment 2.5, which requires a minimum interocclusal height of 5.6 mm for the abutment/retaining screw/coping complex.[6] Unfortunately, in many clinical situations, the interocclusal distance may not reach this level[7] and restoration of the screw-retained implant crown with those components is not feasible. One solution to this problem is the use of a shorter abutment such as the synOcta 1.5 abutment system (abutment: 048.602, cylinder: 048.633, screw: 048.350), which has a minimum height requirement of 4.25 mm; however, it is not uncommon for the interocclusal clearance to be less than 4.25 mm. This article reports a technique that addresses the problem of the restricted interocclusal distance when screw-retained prostheses are selected.

## Technique

The protocol for this technique follows the traditional impression procedure at the fixture level, followed by fabrication of a soft tissue model. If, following articulation and height assessment for restoration, it is found that the interocclusal clearance is less than 4.0 mm, then a modified technique must be followed to fabricate a screw-retained prosthesis.

In this case, an abutment for cemented crowns (Straumann synOcta abutment #048.605 and Plastic Coping #048.663, Straumann AG, Switzerland) was selected to construct a screw-retained prosthesis. This abutment/coping complex requires a total height of 5.5 mm; however, the titanium abutment and plastic coping can be shortened to reduce the height. In this instance, the interocclusal clearance was 4.0 mm; therefore, the abutment required shortening to compensate for this limited clearance. The technique steps are as follows:

1. Implants placed in tooth positions #4, #5, and #12 required restorations. The interocclusal clearance was severely compromised with the angulation of the implant replacing tooth #5 excessively positioned toward the buccal wall. Accordingly, a telescopic design was chosen.
2. The fabrication of the crown on tooth #5 used a customized titanium abutment (#048.605). The areas that needed to be added to the titanium abutment were waxed using a plastic cylinder (#048.663) and cast in titanium. The cast titanium extension was laser-welded to the titanium abutment to create the desired final shape.
3. The implant long axes were perpendicular to the occlusal plane for teeth #4 and #12; the prostheses for these teeth were designed to be screw-retained. Teeth #4 and #5 were splinted to provide an increased stability for the restoration, and to allow the splinted complex to be screw-retained.
4. A plastic coping (#048.663) was cut down to achieve the requisite interocclusal separation for teeth #4 and #12. The titanium abutment (#048.605) and plastic coping (#048.662) were used for the bridge fabrication.
5. The titanium abutments were placed in the master cast (Fig 1).
6. The prosthesis for tooth #5 was waxed, following the procedure for a conventional crown, while that for tooth #4 required the use of a plastic cylinder (#048.662).
7. A 2 mm diameter hole was cut in the occlusal surface of the crowns on teeth #4 and #12 to permit screw access. The wax patterns

**Figure 1.** Insertion of cemented abutment into fixture on the model.

**Figure 2.** Try-in of final restoration.

were cast with noble alloy (45% Au, Pluss, Cendres Metaux, Switzerland). Clean seating of the crown was assured by using a reamer (#046.243) on the interior of the crown.

8. After finishing of the cast, porcelain was applied and fired.
9. The abutment and crown were tried in the patient's mouth (Fig 2).
10. After satisfactory esthetics and fit were assured, the crowns were glazed and polished. The interior of the coping and the abutment were air-abraded to optimize retention. This abutment/coping complex was then cemented with high strength resin-based cement (Nimetic Cem, ESPE Inc, St. Paul, MN) (Fig 3). Excess cement was removed from the margin and the occlusal access hole.
11. The retaining screw was inserted through the access hole and the abutment/crown complex rigidly fixed to the implant (Fig 4).
12. The lateral and frontal views of the restored teeth are shown in Figures 5 and 6.

**Figure 3.** Cementation of final restoration.

**Figure 4.** Occlusal view of final screw-retained restorations.

**Figure 5.** Lateral view of restorations.

## Summary

This clinical technique has several advantages for the clinician. It addresses the problem of restricted interocclusal clearance in a practical and simple way. This technique enables screw-retained prostheses to be used in a greater variety of clinical situations. In a situation where adjacent teeth are to be restored, this technique allows the clinician to splint the teeth and retain the bridge

**Figure 6.** Fontal view of restorations.

with a single screw, while the adjacent abutment is passively seated.

**Authors' note:** Straumann now offers the Regular Neck synOcta gold abutment (048.642) for direct cast-on procedures. It is intended for use exclusively in fabrication of screw-retained single-crown restorations or as a customized abutment for cement-retained crowns, and can be used in situations of restricted vertical clearance. The technique described herein remains suitable for fabrication of crowns on Wide Neck implants in situations of limited occlusal clearance.

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