

State-of-the-Art Screw-Retained Hybrids and Attached Bar Overdentures: Not your Father's Highwater Bridge!

BY THOMAS WADE, CDT

As a boutique laboratory owner specializing in removables and implant prostheses since 1983, I can't help but get excited when technology delivers new products that greatly advance our ability to provide patients with an improved device. Considering that fixed/detachable, removable implant prosthetics is one of the fastest-growing segments in dentistry today, the advancements as well as the excitement have been abundant over the past few years.

I fabricated my first implant-supported, screw-retained hybrid (SRH) or "highwater bridge" about 25 years ago. The bar was a cast precious alloy, the acrylic was press-packed and heat-processed and the teeth were either Isosit or IPN. Today, I'm fabricating the same prosthesis with greater passivity, strength and success using a CAD/CAM-milled titanium bar from Nobel Biocare Procera, Ivocap injected acrylic and the new Ivoclar ^{SR}Phonares NHC denture teeth.

The Components

Milled Titanium (MT) Bars: Comparing today's milled bars to the cast bars of a few years ago is like comparing the latest Corvette to a Model T: not even close! (See Figures 1 and 2.) Cast bars had varying degrees of distortion and porosity and required sectioning and welding, conditions not conducive to accuracy or strength. MT bars are "reverse engineered" virtually on a 3D screen to properly fit within the contours of the patient approved wax try-in. Then they're milled out of a dense "hockey puck" of medical-grade titanium, which is accurate, strong and lightweight. Thanks to recent advancements in retention and reinforcement designs and the ability to control shapes, taper angles and to tap and thread replaceable attachment heads (Locator, Bredent VKS), today's bars afford tremendous capabilities.

Ivocap Injected Acrylic and Precision Component Stacking: Although Ivocap Injection technology has been around for a long time,

its density, accuracy, strength and ability to compensate for shrinkage during polymerization have never been more appreciated than with its application to MT bar cases.

When marrying denture teeth to a milled bar for a SRH or when combining the teeth, attachments and a cast reinforcement frame for a bar overdenture (see Figures 3 and 4), it's imperative that the small amount of acrylic used to tie and bond the components together be strong.

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With bar overdentures (see Figure 5), it's often a challenge to incorporate all of the necessary components into a mostly acrylic device that then attaches to and sits over a bar, and must withstand the incredible vertical forces generated with implant-supported prostheses. Precision component stacking (see Figure 6) is required to obtain a successful result, especially considering that we are often working within a very limited vertical height parameter. A SRH (see Figures 7, 8 and 9)—including bar, teeth and acrylic—can fit into as little as 11-12 mm of vertical space.

To fabricate a very precise, strategically positioned cast reinforcement substructure for attached bar overdentures, start by screwing the MT bar onto the master soft tissue/analog model (see Figure 10). Then place the Locator attachments and block out underneath the bar as well as the screw access holes. Create a reversible hydrocolloid duplicate model (see Figure 11) that can then be used to make a chrome-cobalt casting to achieve rigidity and strength. This casting also covers the tops of the Locator attachments to prevent the vertical forces from fracturing the acrylic above them (see Figure 12).

Even with direct-attached overdentures with no bar (see Figure 13) and four fixtures, we can remove the palate on maxillary devices and

greatly reduce the overall bulk while increasing strength by combining a precision-cast reinforcement framework with Ivocap injected acrylic.

A light-cured opaque, such as GC Gradia, can be used to effectively block out the metal of the hybrid bars and reinforcement frames and, with the recent addition of an 80% opaque injection acrylic to the Ivocap system, we can further disguise our bars and substructures.

^{SR}Phonares Teeth: I had been aware for some

time that Ivoclar Vivadent was working on a new line of teeth designed for implant prosthetics that presumably would be more wear resistant. However, I never anticipated that instead of just pressing some new formulation of material into the same old molds, they would actually create a whole new tooth design and manufacturing process from the ground up!

The anterior molds are completely new and divided into subcategories: small, medium and large; then soft and bold; and finally, youthful, mature and universal. They tend to be a bit more "European," a little more aggressive, natural perhaps, than some of the more softened, "Hollywood" molds that are prevalent these days.

I'm finding that our doctors and their patients are very satisfied with the ^{SR}Phonares teeth. Some doctors are prescribing the ^{SR}Phonares posteriors for their excellent wear resistance while still using their favorite Ivoclar Vivadent PE or BlueLine anterior molds.

There are several characteristics that give ^{SR}Phonares a decided advantage for fixed/detachable, removable implant prosthetics as well as for conventional removables. Although the facial portion of the tooth tapers in at the neck area as do all denture teeth, the lingual aspect of the neck portion maintains a nearly full width "cylinder," further hiding the metal and

giving the technician more control to optimize the final cervical area shaping with the carving of the gingival wax. Also, Ivoclar Vivadent designed the teeth with an unusually high proximal harmony that provides for a very intimate interface between the mesials and distals; this allows for smaller interproximals and eliminates the larger, dark triangles that are sometimes visible when trying to cover a bar or reinforcement substructure with conventional “bell shaped” denture teeth (see Figure 14).

The teeth have a beautiful surface texture and a very high degree of translucency and fluorescence that can create a slight problem when combining the ^{SR}Phonares posteriors with other types of anteriors. For example, when combining an A-2 BlueLine anterior mold with a ^{SR}Phonares A-2 posterior, I’ve noted that the posteriors appear a bit lighter and brighter so I advance the posteriors to an A-3 to maintain an acceptable shade harmony. Ivoclar has incorporated a nice ridge-lap design on the posteriors so I can set them over bars and in tight vertical situations without the need for excessive adjustment that compromises the teeth and their bond to the base acrylic. Additionally, PMMA is incorporated into the material to achieve a good, strong chemical bonding between the tooth and denture base material as long as the proper procedures of removal of wax residue, surface roughing and cleaning with monomer are followed.

The teeth are injected using a seamless molding technology as opposed to being pressed; consequently, there are no “flash lines” common in other denture teeth. This process also provides for a high density that promotes color stability and stain resistance.

A New Level of Respect

Significant technological advancements over the past few years have brought fixed/detachable, removable implant prosthetics to a whole new level. The rapid pace of development requires that technicians stay on the cutting edge of products and techniques to incorporate them into their labs as well as offer guidance to dentist-clients, the need for which has grown exponentially.

The reverse engineering process greatly enhances the opportunity for case planning, proper design and strategic placement of components, which then translates to a smooth and successful final assembly.

This new level of implant and CAD/CAM dentistry allows removable technicians to participate at a very high level and gives us the respect as oral engineers that we deserve. ■

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Figure 1: Maxillary attached overdenture bar with four Locators.



Figure 2: Mandibular milled titanium (MT) bar on a screw-retained hybrid (SRH).



Figure 3: Attached overdenture bar with four lingual VKS matrices.

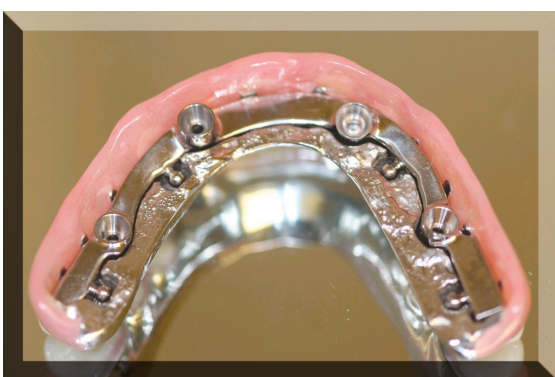


Figure 4: Tight vertical case using Bredent VKS on the lingual of the bar.



Figure 5: Tissue side of a finished, four-Locator bar overdenture.

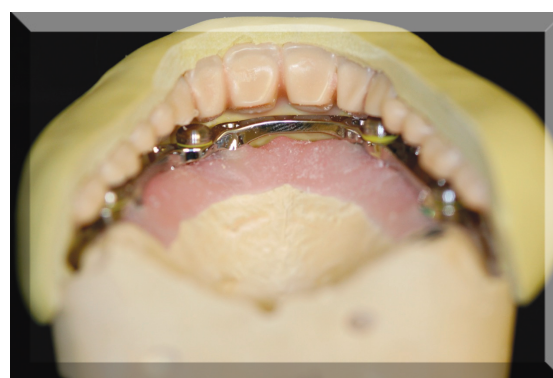


Figure 6: Precision component stacking; cast reinforcement frame still to be added.



Figure 7: Mandibular SRH bar using multiple systems (Nobel Replace Select and Straumann Tissue Level).

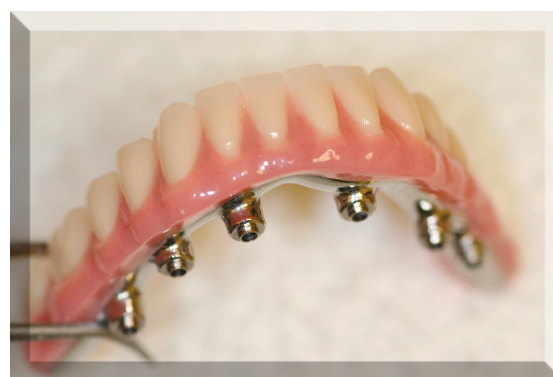


Figure 8: Finished mandibular SRH on an MT bar with a convex, mirror-finish surface (Montreal Style Bar).

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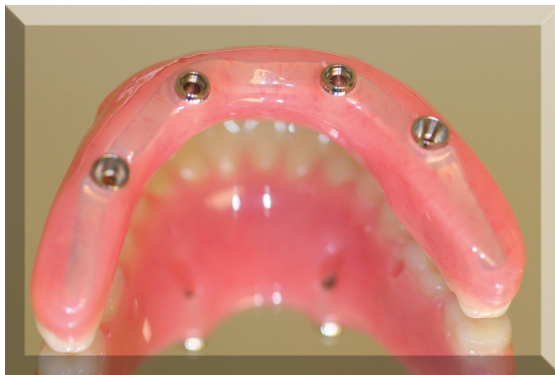


Figure 9: Finished mandibular SRH on an MT bar, full wrap.

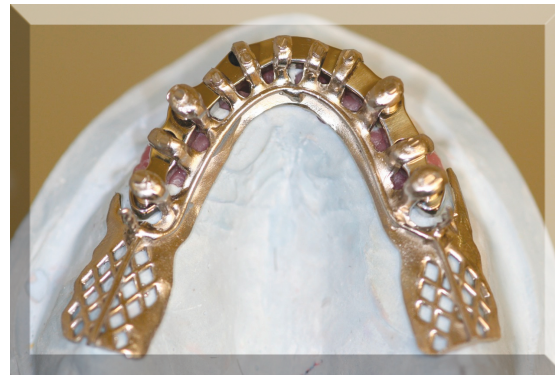


Figure 12: Reinforcement framework on an MT bar; note that the Locators are covered.



Figure 10: MT bar with four Locators for attached overdenture.

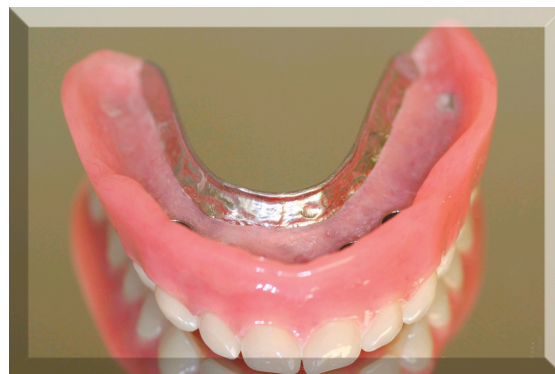


Figure 13: Direct-attached Locator, implant-assisted overdenture with metal lingual.



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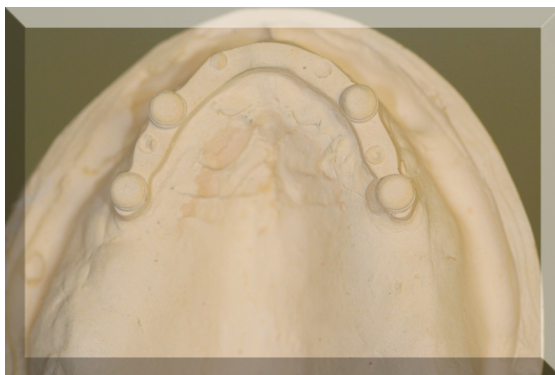


Figure 11: Duplicate stone (or refractory) model.



Figure 14: ^{SR}Phonares NHC wax setup.