A Contemporary Solution to a Common Esthetic Problem with Implants

New option eliminates potential problems of using angled abutments

David R. Avery, CDT, AAS

Successful restoration of the edentulous maxillae is considered the most difficult of prosthetic procedures. Although root form implants stabilize the definitive prosthesis, proper execution of clinical and laboratory techniques is required for success. Proper vertical dimension of occlusion must be determined, anterior tooth position must satisfy phonetic and esthetic criteria, and the residual ridge must be recorded accurately.

Implants placed in an exaggerated labial position in the pre-maxilla is a common esthetic challenge, possibly caused by inadequate planning and the absence of prosthetically-driven surgical guides. When these factors are combined with implant emergence from the long axis of the available maxillary osseous process, dentists invariably have a potential esthetic emergence compromise. Historically, when a fixed prosthesis is the goal, a substructure/suprastructure prosthesis was developed to hide the unfavorable screw access holes from view, at significantly increased restorative cost.

To address these esthetic and financial concerns, the dental and laboratory communities now have the option of incorporating PRISM 24° Angled Access Channels (Preat Corporation, www.preat.com) into the substrate. To avoid visibility of the screw access hole on the labial surface, a hexalobular driver and hexalobular screw head is used. Use of the PRISM 24° Angled Access Channels provides two prosthetic benefits: First, it allows the elimination of transmucosal angled abutments, reducing the required vertical area by 3 to 5 mm, depending on the abutment. This is especially crucial in the edentulous maxillae, where adequate vertical restorative space is typically at a premium. The alveolar resorption after extraction of the maxillary teeth is mostly palatal and minimally vertical. The minimum vertical restorative space for a fixed detachable restoration is 10 mm from the crest of tissue to the occlusal surface. Second, use of PRISM 24° Angled Access Channels repositions the screw access holes to esthetically acceptable positions. This simplifies the production of the restoration and aids in cost control without functional compromise.

Case Presentation

A patient presented with an existing maxillary fixed detachable restoration supported by Straumann tissue-level regular neck (RN) implants (www.straumann.us) placed in sites No. 3, No. 6, No. 9, No. 11, and No. 14. The restoration was fabricated in February 2011 with

FIG. 1

(1.) Existing esthetically unacceptable restoration.
a CAD/CAM-milled titanium substrate supporting veneered tooth and gingival composite shaded resins.

The retaining screws securing the anterior implants emerged from the facial aspect of teeth No. 6, No. 8, and No. 11. The initial attempt to improve the resulting esthetic compromise involved placing veneers over the affected teeth. Upon repeated debonding and fracture of the veneers, composite resin was used to cover the access openings. After a few months, the composite discolored and ultimately broke down, leading to esthetic failure (Figure 1).

The supporting implants were well integrated, and it was determined that a new prosthesis was indicated. A thorough diagnosis suggested the ideal retreatment should be an implant-retained overdenture.7 As in the original diagnosis, the patient adamantly refused a removable appliance.

As previously discussed, the unfavorable emergence of the anterior fixtures presented a significant esthetic compromise. The PRISM 24° Angled Access Channel restorative solution was chosen in this case to provide the opportunity to redirect unfavorable emergence positions in the esthetic zone.

Clinical Procedure
An occlusal registration was completed to record the relationship between the existing restoration and the opposing arch. The case was impressed with the open tray technique, during which polyvinyl siloxane material “picked up” the existing restoration. This

![Clinical view of tissue impression.](image1)
![View of “picked up” prosthesis in impression.](image2)

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required guide pins to retain the prosthesis. The impression technique included syringing of material between the inferior surface of the prosthesis and the residual ridge; the external surfaces were captured with a loaded tray with access holes for the guide pins to come through (Figure 2 and Figure 3).

This technique proved to be efficient and extremely accurate because of the clinically verified inter-implant and occlusal relationships provided by the existing appliance, as opposed to using a conventional occlusal rim and cast verification index.

Laboratory Procedure
The master cast was created by loading the appropriate analogs and pouring the beaded and boxed impression. After articulation, a study cast was developed by impressing the appliance, which provided the data required to match the existing teeth unless a change was requested. New prosthetic teeth were set on a screw-retained baseplate and returned to the clinician for try-in, confirming the occlusion and the esthetic arrangement of the teeth. After successful try-in, putty matrices were developed relating the prosthetic teeth to the opposing arch and the master cast.

Implant Bar Fabrication Processes
The current arena of titanium implant bar fabrication includes two options. The first is commonly referred to as “subtractive” technology, ie, CAD/CAM milling of the support component from a solid blank of titanium alloy. The improved accuracy of this technology compared with analog hand-fabricated components is well documented.8,9 The second method is Selective Laser Melting (SLM), commonly referred to as “additive” technology.

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The recent adaptation of additive technology in the manufacturing community is also referred to as “rapid prototyping.” Milling has been replaced in large part by this more efficient process. Through this direct manufacturing process, the efficiency and dimensional adaptation of metal dental device fabrication are improved dramatically by elimination of traditional wax pattern fabrication, investing, and casting steps. From a clinical standpoint, the “pearl” macro-retentive surface, an enhanced retention feature that provides an excellent surface for veneering, is only possible with SLM fabrication technology. The virtually unlimited design possibilities of additive technology may be the greatest advantage in dental applications.

As always, in developing technology, cost appropriateness for the intended user comes over a period of time and adaptation. Currently, the SLM process is cost-effective only in central manufacturing business models and when applied to multiple-unit implant prostheses.10

In this case, the master cast, wax setup, and a prescription were sent to Preat Corporation...
for fabrication of the SLM titanium bar. Upon receiving the bar, we conditioned it with bonding agent and applied composite opaque to the surface with A2 and gingival shades accordingly (Figure 4). The prosthetic teeth were transferred to the framework and returned to the clinician for a final clinical try-in. It was determined that some minor anterior tooth movement was needed to correct the tooth relationship to the smile line, so No. 6 was moved apically 1 mm and No. 10 and No. 11 were moved incisally 1 mm. The case was processed using the appropriate tooth-shaded and gingival resins (Figure 5).

Successful retreatment for this patient illustrates recently developed options for corrected emergence and enhanced surface macro-retention of resin to supporting substrates. Figure 6 and Figure 7 show intraoral, fully retracted views of the prosthesis, its contours, and its relationship with the tissues.

Digital technology’s rapid development is improving our ability to constantly enhance the treatment caliber for our patients in every discipline. Analog processes are complimented by and eventually replaced with fully digital options. Clinical and laboratory professionals are becoming more efficient and certainly more consistent as a result of these tools. Fortunately, decisions for patient treatment require understanding of biologic and functional requirements, and are still best accomplished by well-trained professionals.

Disclosure
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References

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