Step by Step

Rhein83 Sphero Block Mandibular Restoration for Non-parallel, Space-Restricted Implants

PROVIDING BETTER WEAR RESISTANCE AND LONGER SERVICE LIFE

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A 72-YEAR-OLD RETIRED PHYSICIAN in need of restoration to his edentulous mandibular arch had five mandibular implants placed to add stabilization. Bone support was available only in the anterior mandible, the right retromolar pad, and site Nos. 19 and 20 on the patient's left side. The periodontist placed a single implant on the right side, two narrow-neck implants on the left side, and two regular-diameter implants in the anterior region. After osseointegration and healing, the healing caps were removed and a fixture-level impression was taken. A gingival mask soft-tissue master cast was then produced. The implants were evaluated for parallelism and cuff heights to help determine an appropriate attachment. Four of the five implants were relatively parallel and dictated the path of insertion and removal (Figure 1).

Pre-manufactured Rhein83 Sphero Block abutments were selected for the two anterior implants (Figure 2). A Sphero Block abutment has a 2.5-millimeter ball attachment and is available for most implant systems and platform sizes. Custom abutments were made to make the path of insertion and removal parallel for the three other abutments.

A pre-manufactured, gold-collared plastic waxing UCLA abutment was used to restore the implant on the lower right. The two narrow-neck diameter implants on the lower left were splinted together using two plastic UCLA waxing abutments to create a small implant bar. The implants on the left were supragingival. The UCLA abutment's internal screw shoulder was several millimeters taller than the margin of the abutment, leaving minimal space before breaching the plane of occlusion. The lack of vertical space dictated that the attachment should be offset, and, therefore, was placed on the distal of the bar ensuring that the attachment itself was parallel to the path of insertion dictated by the two anterior implant abutments (Figure 3). The right retromolar pad attachment was also offset because space was limited in that area to allow for the framework, dentures, and screw access of the UCLA abutment (Figure 4).

Rhein83 manufactures Sphero Block titanium nitride-coated single-threaded sphere, which is a 2.5-millimeter ball with a 1.3-millimeter hex hole in the top of the ball to screw it in (Figure 5) and a 2-millimeter thread stem on the bottom. These ball attachments may be threaded into a custom abutment or CAD/CAM bar that has been tapped with a 2-millimeter tap.

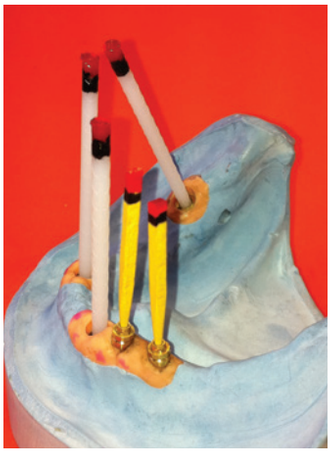

Fig 1. Along with the divergence of about 25 degrees on the lower-right posterior implant, the proximity to the retromolar pad made using a stock abutment impossible.

Fig 2. Two titanium nitride-coated Sphero Block abutments.

Fig 3. The two supragingival implants and high internal screw shoulder made using a small bar with the attachment offset necessary.

Fig 4. Retromolar pad custom abutment with attachment offset.

Fig 5. Note the 1.3 hex on the top of the ball for inserting and replacing if it gets worn or damaged.

Pre-manufactured spheres were utilized rather than using the castable balls for longevity and maintenance. One advantage is that the balls are titanium nitride coated for better wear resistance and a longer service life. Another is that they can easily be replaced if the prosthesis loses retention due to excessive wear.

The custom abutments were waxed using a plastic pattern for the 2-millimeter thread hole and invested and cast in a palladium-based Type IV crown-and-bridge alloy. After they were finished and polished, they were screwed into the implant analogs in the master model. The single-threaded spheres were secured into the custom abutment by coating the threads with 3M ESPE metal-to-metal composite cement and torqued to 25 Newton cm (Figure 6 and Figure 7).

The cobalt-chromium superstructure was fabricated by: 1) blocking out all undercuts on the master cast using a 2-degree tapered wax scaler; 2) placing 22-gauge pressure sensitive relief wax over all of the tissue areas; and

Fig 6 and 7. All abutments placed on model and Rhein83 soft retention caps placed on the custom abutment balls framework using acrylic.

Fig 8. Internal partial fitted with all attachments engaged.

Fig 9. Underside of the framework with the Rhein83 soft retention pink caps inserted.

Fig 10. The setup after try-in, ready for duplication and processing.

Fig 11. The case was returned to the laboratory after 4 years to have the Rhein83 inserts changed. The prosthesis shows little wear and continues to work well for this patient.

3) placing tissue stops on the left posterior and right canine areas. Finally, the custom abutments were relieved with a light wash of wax, so they would have no direct contact with the prosthesis while under load.

The four Rhein83 attachments were placed on their respective abutments using directional rings to guarantee their parallelism. The nylon caps were placed over the directional rings and rotated until all four were parallel with each other and in line with the predetermined path of insertion. The blocked-out model was duplicated using a two-part silicone, and a refractory model was made from a high-quality oxyphosphate investment that, in turn, was waxed, invested, burnt out, and cast in Noble Star Ultra cobalt-chromium alloy.

The framework was fitted (Figure 8) and finished to completion, and pink medium-soft retention-level attachment inserts were placed inside the framework using the Rhein83 insertion tool (Figure 9). The authors chose not to use pre-manufactured stainless steel housings luted to the cast framework for the Rhein83 system and decided to incorporate the housings for the attachments directly into the framework. When casting the attachments' housings as part of the framework, the framework must fit passively just like a CAD/CAM superstructure. Framework binding or pressure from the shrinkage of the casting or duplication distortion must be addressed prior to setting up the teeth. The denture teeth were set up on the framework, waxed for try-in, and sent to the office for an intraoral try-in. The dentist successfully tried in the appliance, evaluating the accuracy of the implant abutments, the fit of the cast overdenture superstructure framework, esthetics, and bite relationship. The case was returned to the laboratory for acrylic processing and final adjustments (Figure 10 and Figure 11).

Prior to acrylic processing, the master model was duplicated in silicone and four Rhein83 stainless steel processing analogs were placed, prior to the die-stone gypsum being poured. The duplicate stud model was compared with the master model for accuracy, which was verified by using the try-in cast overdenture. The final overdenture was processed on the duplicate stud model using an injection technique, deflasked, finished, polished using standard acrylic finishing and polishing techniques. The four Rhein83 plastic inserts that were used during processing were removed and metal was blasted using glass beads. They were replaced by four new pink inserts. The completion of the appliance was dependent on its custom fit to the master model and articulation to the patient's bite registration. The final appliance was delivered to the patient, who has been extremely successful with maintenance of the retentive caps being replaced every 18 to 24 months.

One advantage is that the balls are titanium nitride coated for better wear resistance and a longer service life. Another is that they can easily be replaced if the prosthesis loses retention due to excessive wear.

Conclusion

The case above describes the advantages of using Sphero Block. One advantage is that the balls are titanium nitride coated for better wear resistance and a longer service life. Another advantage is that they can easily be replaced if the prosthesis loses retention due to excessive wear.

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