



By Eugene Royzengurt

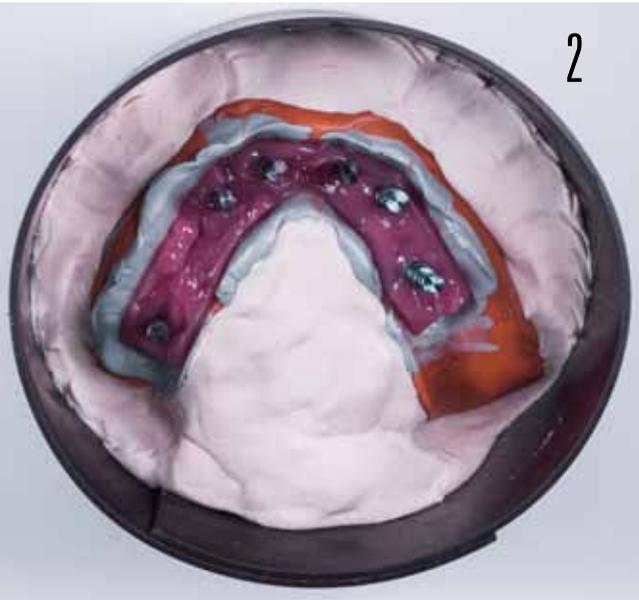
Double Structure Implant Retained Removable Prosthetics The “Road less Traveled” Approach

Whether it's an implant retained or implant supported restoration, knowledge of implant restorations has come a long way since the days of Dr. Branemark and the 1982 Toronto conference. With information coming at the speed of light, it is no wonder that things get scrambled every once in a while.



Dental professionals are expected to create the best possible restoration. Every once in a while, however, the best plans take a turn sideways and we must do everything in our power to get them back on track. That is the type of case I will be discussing. This is not the kind of case that is completely flawless as often seen in many articles, but the kind of case that makes you wake up in the middle of the night. In this case, I personally created the issues and therefore needed to figure a revised plan. Thankfully I was part of a bigger team. The following is my “Road less Traveled” solution to the situation at hand.

The patient presented with six Biomet 3i Certain implants placed in the mandible with superior surgical alignment and complete osseointegration at the sites. The maxilla was partially edentulous with six remaining anterior teeth (Fig. 1).



The patient was initially prescribed a maxillary Kennedy Class I RPD with a chromium cobalt framework and lower screw retained hybrid type restoration.

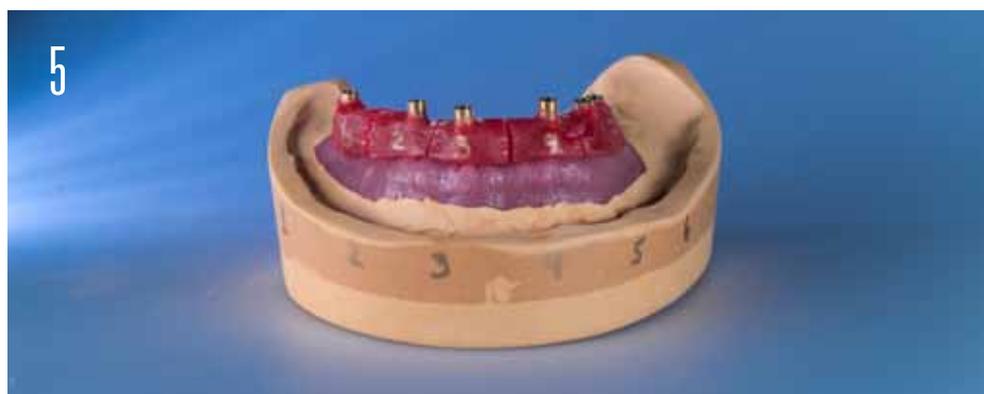
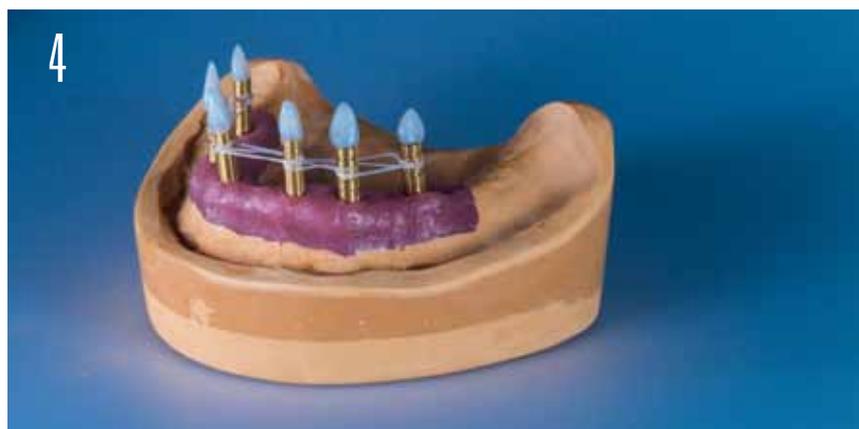
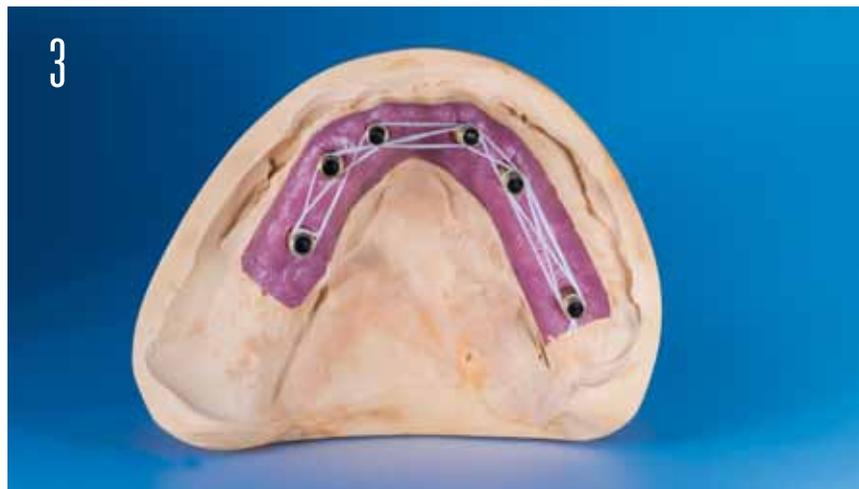
Closed tray impression copings were used to take a final mandibular impression. A maxillary PVS impression was also provided.

Impression copings were carefully removed from the impression and implant analogs were connected and reinserted carefully back into the impression.

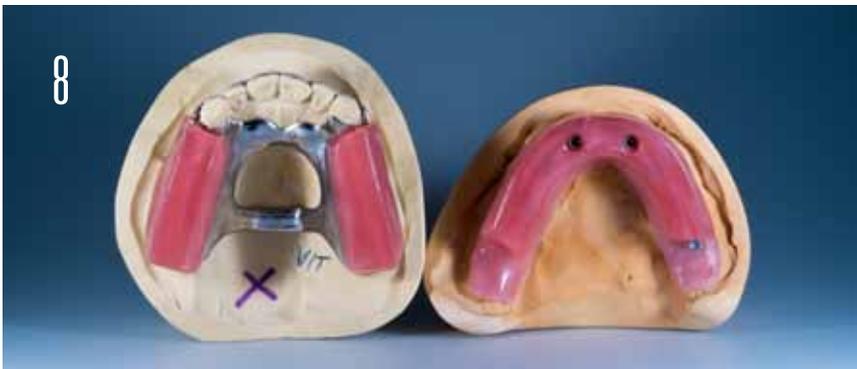
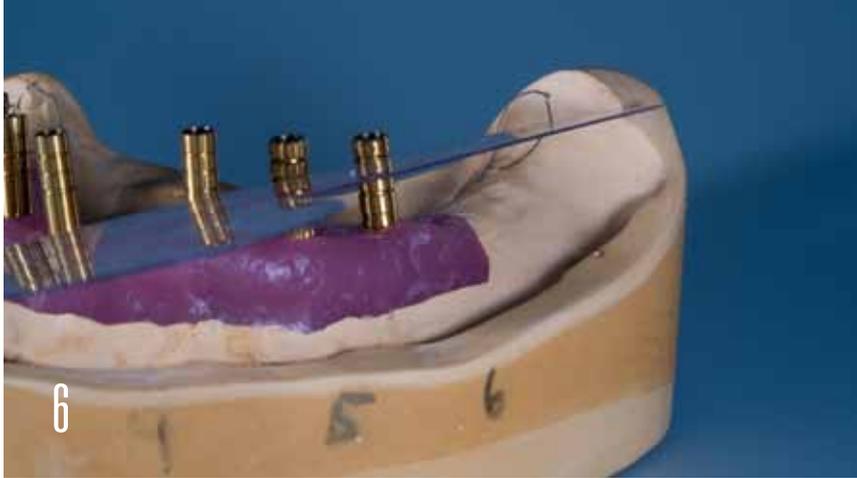
The gingival mask was placed and the impression was border molded with magnetic boxing strips and clay putty (Fig. 2).

In order to provide the most precise restoration, each step needed to be fabricated as precisely as possible. Materials used are critical, and for implant restorations I needed stone that had the least amount of expansion. I used GC Fujirock Imp die stone since it has 0.06 % expansion rate.

Master cast verification is an important step and should not be skipped. As technicians, we can only fabricate our restoration to the cast, and the cast MUST be accurate, especially with SLM technology. There are several techniques that are commonly used in order to prepare a verification jig. I used a combination of dental floss (Fig. 3) and GC pattern resin luted to the titanium temporary cylinders. Since this particular jig was sliced and related intra-orally, there was no specific need to compensate for shrinkage of the luting material at this time. Access holes to the temporary cylinders were covered with putty in order to prevent resin blocking the screw access holes (Fig. 4). Either a



model separator or a plastic sheet was used to prevent pattern resin from accidentally adhering to the master cast. The tissue side of the jig needed to have sufficient clearance above the tissue to allow for impression material to flow under in case a new impression is required. Each section of the verification jig, as well as the cast, was marked to help manage the pieces easily (Fig. 5). While sectioning the jig I made sure to create minimal separation between the portions in order to minimize material distortion during the reconnection procedure. Creating a custom tray is very helpful if a new impression is required.



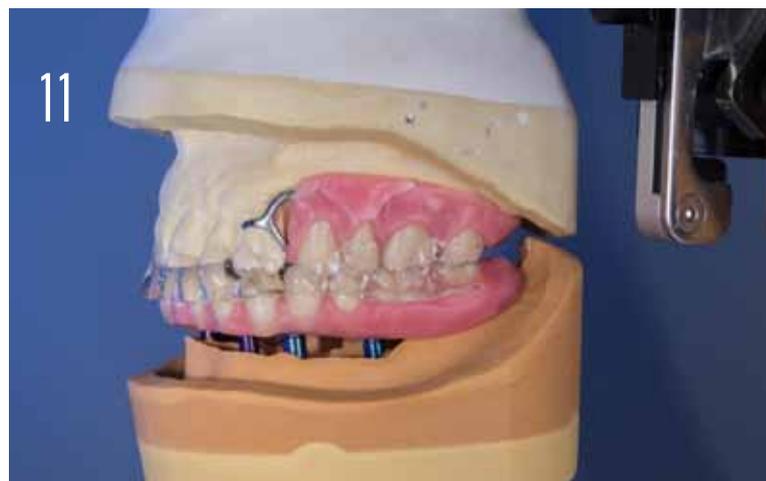
The clinician reattached the verification jig pieces intra-orally with pattern resin. The verification of the implants in relation to the implant analogs in the master cast is generally done in two steps. Step one consists of radiographic verification of the temporary cylinders in the jig fully seating in position. Step two is performing the Sheffield one screw test of the reconnected verification jig on the master cast. If the jig does not pass the one screw test, a new impression and master cast is necessary.

With the cast verified, I was now ready to fabricate the base and bite rim. This was where I made my first mistake. I removed the temporary cylinders in order to reuse them in the base and bite rim. I learned that removing temporary cylinders from the verification jig is not a good idea because the jig may be needed later if there are fabrication issues. The cylinders were cut (Fig. 6) in order to facilitate the proper dimension of the rim (Fig. 7). VLC material and baseplate wax were used to fabricate the bite rim. The vitalium cast frame was fabricated for the maxilla and the wax rim was attached (Fig. 8). Both casts were sent in for bite registration.

Proper vertical dimension was verified clinically and a Kois analyzer was used to help with average value articulation. The casts were mounted on a Stratos 200 articulator with low expansion mounting stone in order to minimize the vertical dimension errors. This was the point where I made my second mistake, which in conjunction with the first mistake, caused me to take the “Road less traveled” approach.

The case was mounted to the bite registration. It is important to remember that the registration is a record that is only partially controlled by the clinician and is largely influenced by the patient. In our case the bite registration was improper but it was decided to fabricate the try-in in order to minimize the office visit time. The lower was setup as a hybrid type restoration with the upper RPD setup opposing it. The case was sent in for the clinical verification and bite adjustment if needed. Even if the bite is not correct when the case is initially mounted, it is a good idea to set some teeth--if not all--in order to give the patient the feeling of teeth which might improve the bite taking process (Fig. 9).

In our case the bite was wrong, but it provided feedback from the patient that he wanted a ridgelap prosthesis. A screw retained maxillary hybrid was no longer a good option. A hybrid prosthesis with a ridgelap intaglio is extremely difficult for the patient to clean and maintain, potentially leading



to periodontal issues, implant health, and of course halitosis.

The case needed to be remounted to correct dimensions and occlusion. While trying to remove the lower cast from the mounting it fractured and was no longer usable. Two of my previous mistakes made it impossible for the cast to be reused. If the cast was mounted magnetically it probably would not have fractured (**Fig. 10**) but even if it did we could have repositioned the analogues with the use of the verification jig. Since both of these solutions were eliminated, a new impression was necessary.

Steps were taken in order to minimize chair time. The fractured cast was glued together and used to fabricate a new verification jig. We also remounted the fractured cast to the new bite and fabricated a new setup, which was later transferred to the new master cast (**Fig. 11**). We preserved the bite registration record and made sure the implant position was the same on a few implants on both of the casts. Non-engaging impression copings were provided by Preat Corporation and I was able to make a new verification jig without using a high speed drill to eliminate the engaging portion of the cylinders.

The new wax set-up was verified by the dentist and approved for fabrication of the lower implant retained primary bar and secondary structure. I fabricated a new master cast and transferred the records to the new mounting. The split cast mounting was used and the verification jig was not disturbed in any way.

The lower tooth setup records were transferred into the verticator (**Fig.12**) in order to facilitate the transfer of denture teeth onto the secondary structure. The tooth set-up and verified cast was then sent in to Preat Corporation for the PRISM team to scan, design, and print the primary and secondary structures.

The verified cast and tooth setup were received, validated and scanned. After I spoke with the dentist



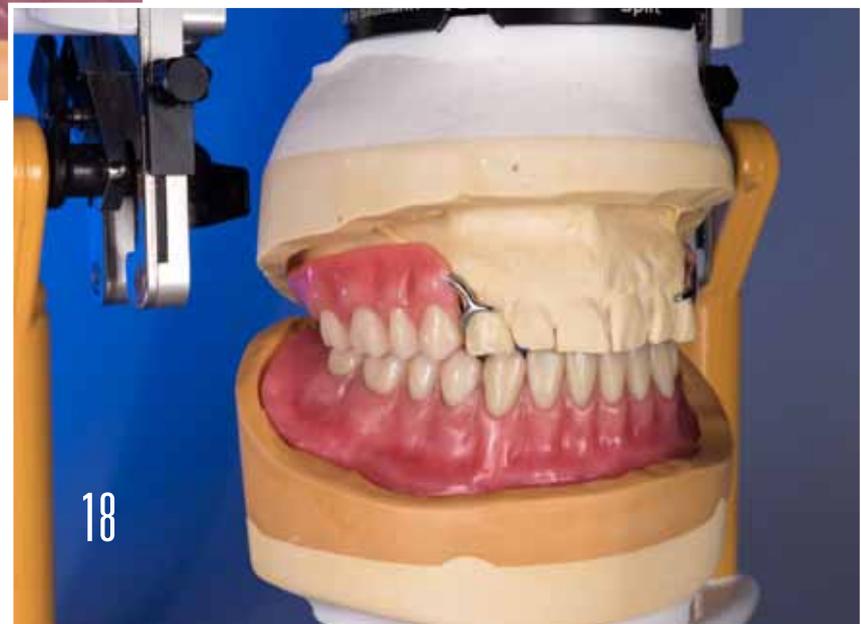
and learned more about this patient, we agreed that a primary secondary structure would be the best solution. A rigid bar structure would provide lip support for esthetics, be removable to allow the patient to maintain good hygiene, and would feel “fixed” since the prosthesis would be non-moving. The primary bar was designed to provide support for the secondary structure, while keeping space open between the underside of the bar and gingiva to make cleaning easy (**Fig.13**). The retentive elements chosen

were Universal Plunger Locs (**Fig.14**) in the posterior with secondary structure having a telescopic fit. The Plunger Locs stop posterior liftoff and movement, don't take much space, and are simple for a patient to insert/remove without the need to carry a tool at all times. The primary structure was approved and the secondary was designed. The secondary was designed to have a 4 degree taper as well as the PRISM Pearl surface finish. One of the benefits of SLM/Printing Technology is the Pearl retentive surface (**Fig.15**). This surface provides maximum retention for acrylic and composite while uniquely saving space for acrylic and a full denture tooth. After both the primary and secondary structures were printed and passed all quality control and testing, the case was sent back to me.

Once the case was received back from Preat I double-checked the components. I knew two methods

of processing the case. The patient had not been setup for the secondary try in appointment, but I had to think ahead because it would be difficult to change things after the case was setup. The simplest solution was to block out the secondary structure and process directly to the wax up.

This was an efficient solution, but there was a risk of irregularities in the acrylic. One may argue that since the denture is implant supported the tissue aspect is secondary in importance. I however felt differently and decided to process on the duplicate cast. The secondary structure was fit over the primary (**Fig. 16**) and the borders sealed with wax. The cast was duplicated in silicone and the primary bar was duplicated inside the secondary structure with bur shank and pattern resin (**Fig. 17**). Class 3 stone was poured over the structure and allowed to set.



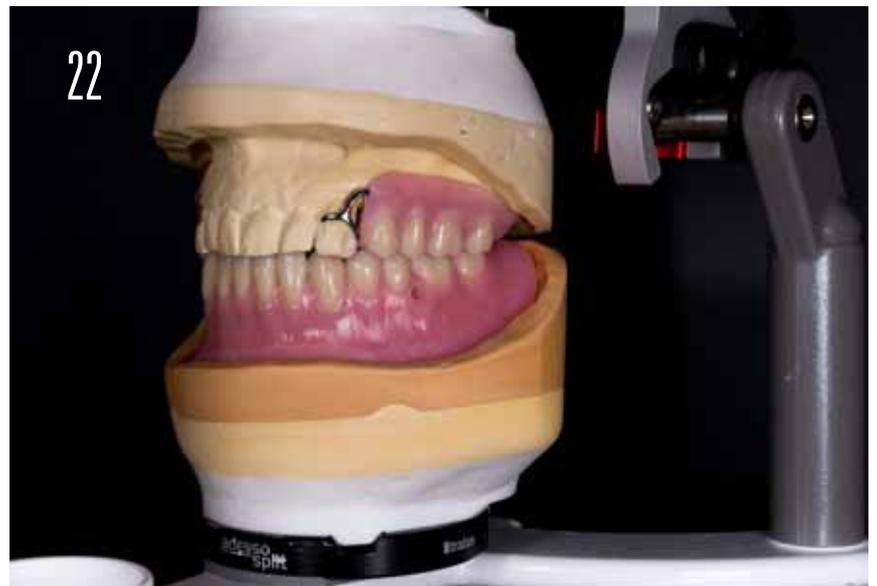


The case was then reset onto the secondary structure. Some tooth adjustment was required on the saddles in order to accommodate proper seating. The case was sent back to the clinician and bar try-in was performed with the setup over it to reassure proper fit and occlusion (Fig. 18).

The case was returned to the lab after all parameters were verified. The maxillary partial was processed in a brass flask utilizing the press pack technique. The lower was also processed in the same manner but with some deviations. The wax up needed to be fit over the duplicated pattern resin primary bar. Since the only possible way to make sure that the wax up fit completely over the duplicated bar was to visually observe it, I decided to cut a window in the lingual portion (Fig. 19) of the wax up and seat the denture over the cast.

The Preat Universal Plunger Loc attachment was used as the retentive mechanism for the secondary structure. The attachment was processed in to the denture, and later the housing insert was easily replaced. An alternative was to process the attachment analog, remove the analog, and cold cure the attachment in to place. I chose to process the analog and some modifications were made due to the close proximity to the molar margin. I was concerned that if I blocked the analog in the first stone pour, the margin of the molar would be unclear and the thin stone might fracture. Therefore I cut the analog, placed it slightly short of the secondary structure in wax (Fig. 20), and locked it in with the second pour. The case was boiled (Fig. 21) out and processed in traditional press packing method with the pearl titanium secondary opaqued prior to trial packing.

Once processed and divested, the prosthesis was fitted on the master cast with the opposing processed maxillary partial and equilibrated using the adjustable (Fig. 22) articulator. The attachment analogs were





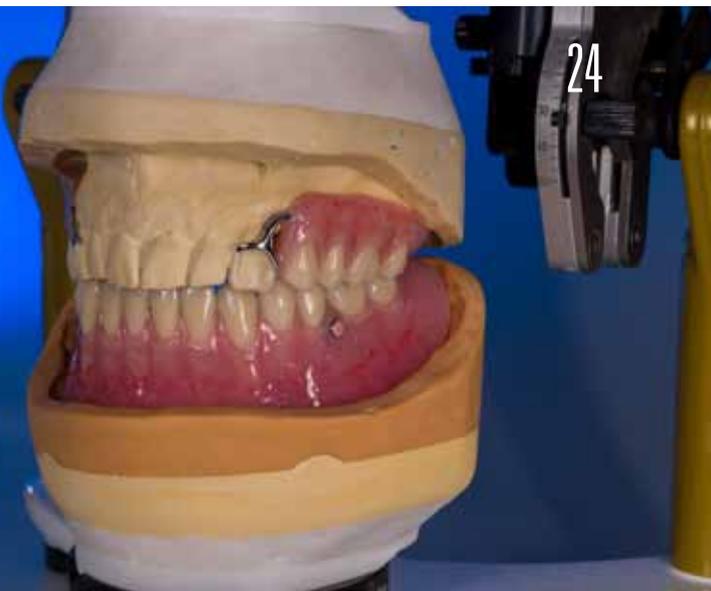
About the Author

Mr. Eugene Royzengurt has been working in the dental industry since 1996. He began as a Dental Assistant, later becoming an In-house Laboratory Technician, specializing in Removable Prosthodontics. Mr. Royzengurt's education includes an Associate's Degree and certificates in Dental Assistance and Radiology. He is also currently pursuing a degree in Denturism. He has published several peer review articles on the subject of Removable Prosthetics and currently lectures in the United States and internationally. Mr. Royzengurt has been a member of the Dental Technicians Guild since 2013. He currently resides in Sandy, Utah, where he owns Apple Dental Laboratory L.L.C.

removed and the attachments were trimmed to proper length and secured with cold cure acrylic (**Fig. 23**).

Once all the functional parameters were finished, the case was reduced and sandblasted and the gingival contours customized with Gradia Gum composite (**Fig. 24**). Finally, the prosthesis and primary structure were sterilized and delivered to the patient with minimal clinical adjustments (**Fig. 25**).

I suggest that following proven protocols is the best way to avoid complications down the line when engineering any type of prostheses; however, some deviation from norm may at times create a positive outcome and further educate you to be able to handle difficult prosthetic situations in the future. **JDT**



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