THE TRUTH ABOUT FRICTION-RETAINED HYBRID PROSTHESES

Proper protocol produces a very viable restoration

By Conrad J. Rensburg, ND, NHD

ONE OF THE MOST POPULAR new approaches to implant dentistry involves the use of removable, friction-retained hybrid prostheses. The concept is based on the time-tested SynCone system.[1] In the early days of implant dentistry, restorative options were easily defined as either supported or retained options,[2] but with innovation and change often comes confusion and questions. The concept of a removable, friction-retained hybrid prosthesis truly epitomizes the gray area between implant-supported and implant-retained prosthetics. Experience has taught today's professionals to restore retained and supported protocols with different techniques. Unfortunately, using a protocol that relies on both systems for success can become a more daunting task.

A friction retention system inherently brings many advantages but also some challenges when not well understood and processed correctly. In a 2008 paper, Zhang, et al, describe the true long-term value of a friction-fit retention system;[3] friction force value between telescope elements declines in the first phase of the wearing period and, subsequently, maintains a particular constant value of 8 to 10 N. Most patients found this to be true, with some even comparing the prosthetic to new shoes that become more comfortable over time. The key is "getting those shoes to a comfortable place."

Understanding this system—including both its benefits and its pitfalls—is important for laboratories that are consulted in such situations. The author's laboratory has restored hundreds of these cases, processed with an array of clinicians, some of whom were using friction-retained prostheses for the first time, and others who had more experience with the concept. The fact that both groups are now consistently achieving predictable results is a testament that following correct protocols is more important than simply having experience. The author's laboratory found its protocols to be very predictable as long as the clinician is able to establish the correct amount of retention intraorally. Once a manageable retention is achieved chairside, patient acceptance, function, and comfort are found to be extremely high.

Some of the most significant advantages of friction retention include:

- Can be restored with or without a vestibule or palate
- Fulcrum point adverse; great option where a clip denture has failed
- Shallow AP implant spread does not influence functional feel
- Can be utilized in full or partial arch application
- Retrievable option that functions like a fixed hybrid
- Can be restored on most popular internally hexed implants
- Can correct for draw up to a combined 30º (shared 30º among all abutments)

There are some concerns as well, including:

- Because of exceptional friction retention, removal requires the patient to have good dexterity
- Must be removed on a daily basis to avoid prosthesis cold-welding onto the abutments, so not a good option with noncompliant patients
- Changing tissue position, overgrowth, or compression greatly influences the retention of a friction-fit system

The author is often disappointed to hear from frustrated clinicians about failed cases involving this concept. Today's restorative teams have a multitude of different restorative options at their disposal; identifying the correct patient is just as important as choosing the right restorative path and following proven restorative protocols. The same as with any other implant-based prosthesis, friction retention

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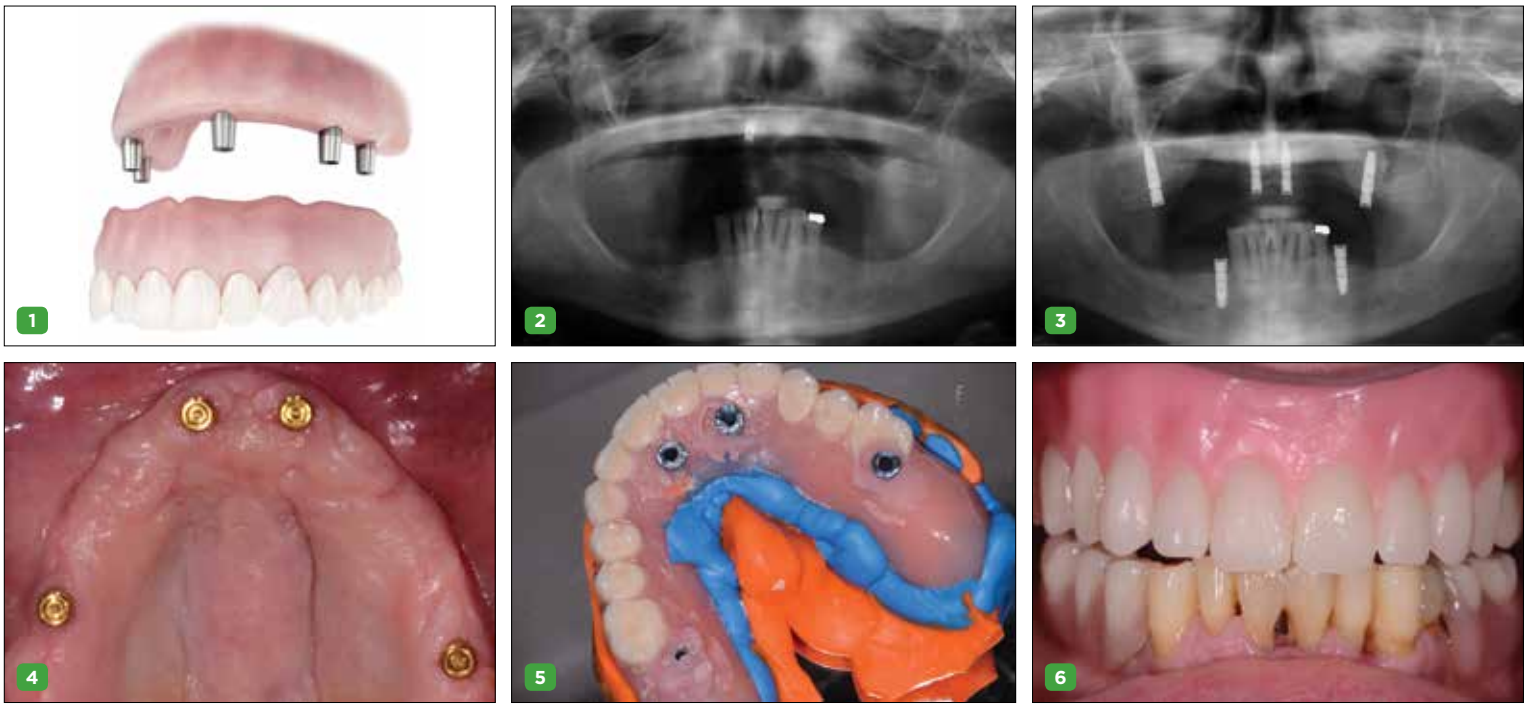

Fig 1. A friction-retained hybrid prosthesis. Fig 2. Pre-operative x-ray shows the failed implants. Fig 3. Post-operative x-ray shows the new implants. Fig 4. A locator-supported denture is fabricated. Fig 5. The patient's prior denture is used for bite and impression. Fig 6. Wax-based tooth try-in is used.

is very dependent on the aforementioned factors for a successful outcome. An article by Hakkoum, et al, accurately explains the advantages of a telescope in lieu of a clip denture and also points out the importance of following the correct protocols and steps when restoring these cases.[4]

The author's journey with these restorations has not been without incident. However, learning from the initial mistakes has allowed his team to streamline protocols and help assist restorative clinicians in restoring these cases with exceptional predictability.

In this article, the author will demonstrate a proven workflow by showing a successful case and also attempt to guide the reader on a predictable journey by pointing out the simple, yet costly, mistakes he has made himself.

Case Study

A female patient was referred to the laboratory in 2013 by a local oral surgeon, Gary Jones, DMD. The patient had previous implants and a bar-retained removable prosthesis placed by a different dentist around 2003. The implants eventually failed (Figure 2). She lost the implants and, thus, the bar and restoration. The dental team, including restorative dentist David Hedgecoe, DDS, treatment planned four implants for a locator-supported prosthesis in the areas of teeth Nos. 3, 8, 9, and 14. Astra Osseospeed implants (Dentsply Sirona, dentsplysirona.com) were used—4.0s x 13 mm for Nos. 3 and 14, and 3.5s x 11 mm for Nos. 8 and 9 (Figure 3). Once these were placed and integrated approximately 3 months later, a locator-supported prosthesis was fabricated (Figure 4). The patient was very pleased with the esthetics of the original prosthesis, but retention was an issue. Every attempt was made to improve the retention, but after exhausting all options the team decided to fabricate an Atlantis Conus prosthesis (Dentsply Sirona). Because the patient was happy with the current esthetics, the technicians wanted to duplicate the tooth position exactly. The patient was thrilled at the prospect of having the amount of retention she desired while being able to replicate the appearance that she liked.

> During the first appointment, if possible, the impression copings should be tied together using an acrylic material. Friction-retained hybrids can only be restored at the implant level.

First Appointment

This appointment was dedicated to taking a traditional, open-tray, implant-level impression. An open-window implant custom tray was made based off the preoperative models. If possible, the impression copings should be tied together using an acrylic material. Friction-retained hybrids can only be restored at the implant level, which often causes the impression copings to be undercut. In cases where the clinician cannot establish draw, the option to use a combination of closed- and open-tray impression copings works well. At this appointment, it was also important to register an opposing impression.

The laboratory subsequently poured the implant-level soft tissue model and fabricated an implant-supported bite rim.

Second Appointment

At this appointment, the clinician registered a bite using traditional removable denture protocols.

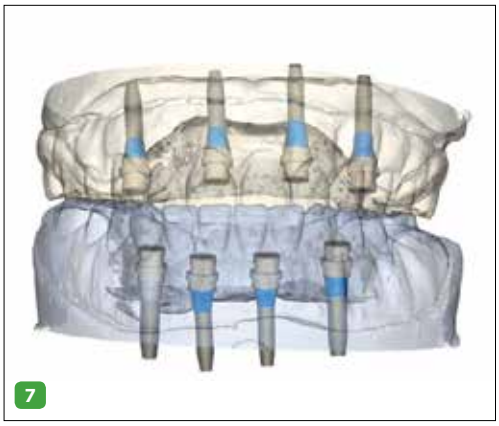

Fig 7. The digital design concept. **Fig 8.** Components are ready for pick-up and verification. **Fig 9.** Place polymerization sleeves, position SynCone caps, and tap down. **Fig 10.** Seat the support frame over the SynCone caps and lute in place with acrylic pick-up material. **Fig 11.** Index abutment positions. Drill receiving area and soft reline existing denture. **Fig 12.** High-water PMMA milled sleep denture offers friction fit only, with no caps. **Fig 13.** Final denture and removal tool are ready for delivery. **Fig 14.** Prosthesis is shown in mouth at final delivery.

The laboratory set up a traditional wax-based tooth try-in, using only high-quality teeth approved for hybrid applications.

The patient in this case had an existing tissue-borne denture that she wanted replicated for bite as well as tooth shape and color. The restorative dentist used the existing denture as a custom tray (Figure 5), taking the impression while registering the bite. This allowed the second appointment to be used as a final tooth try-in for patient approval. This variation shortens the restorative process and eradicates the need for a bite registration appointment.

Third Appointment

The third appointment was for the wax-based tooth try-in, bite evaluation, and esthetic evaluation (Figure 6). Patient approval was required before proceeding to the next step. The abutments and support frames are costly and fabricated within the bucco-lingual parameters set by the approved try-in denture (Figure 7). Any tooth position or bite changes after this step could potentially require a complete remake.

> Using the existing denture as a custom tray allowed the second appointment to be used as a final tooth try-in for patient approval.

The laboratory designed and ordered the abutments and positioning jigs and then fabricated the cementing structure and new custom tray for final pick-up.

Fourth Appointment

The fourth appointment was 90 minutes long and was crucial to a successful outcome. The titanium abutments were pre-set in a printed positioning jig, and gold-machined SynCone retention caps (Dentsply Sirona), cementing support structure, denture in wax, and a new custom tray were

returned (Figure 8). Because processing at a neutral tissue position plays such a vital part in the success of a friction retention system, a new pick-up impression was crucial. Luting the retention caps into the support structure effectively verified the impression before processing.

The abutments were transferred to the mouth using the indexed abutment carrier and torqued to the manufacturer's standard. Correct position and rotation are crucial, as any discrepancy will create an undercut. The Ankylos polymerization caps (Dentsply Sirona) were placed over the abutments. The gold caps were positioned on the abutments and the dentist tapped down lightly with an intraoral mirror handle (Figure 9). An acrylic-type pick-up material was flowed into the receiving caps of the support structure (Figure 10). The frame was seated lightly over the caps without compressing the tissue stops and allowed to cure in place.

Next, the supplied custom tray was filled with PVS material, and the dentist picked up the frame while indexing a neutral tissue position. It is crucial not to remove the abutments after this step. If this step is not followed, the model verification will be lost, which causes delivery issues.

PVS material was then placed in the intaglio surface of the existing denture, seated over the abutments to index the abutment positions. A receiving area was drilled inside the existing denture to allow the denture to seat over the abutments (Figure 11). A soft reline was performed to allow the patient to wear the existing denture as a temporary over the abutments. Because of tissue changes between the first impression and the time of processing, this step is the most crucial part of the protocol. Removing the abutments after indexing can create immense delivery issues.

The laboratory poured a new abutment-level model from the pick-up impression by using duplicate abutments (no laboratory analog was available at the time). The teeth were placed back onto the supporting frame, and the bite was verified. The case was then processed for final delivery. The laboratory also fabricated a PMMA-milled (high-water) sleep denture and provided a removal tool. This will assist the patient with initial retention release of the friction fit.

Fifth Appointment

For the hour-long fifth appointment, the laboratory returned the final denture with the caps processed, the removal tool to help the patient disengage initial retention, and a printed or processed high-water friction fit PMMA sleep denture (Figure 12).

In approximately 60% to 70% of cases delivered, the retention was satisfactory to maintain the denture under function, yet still manageable enough for the patient to be able to remove it with minor effort. Effort is required to release the caps from the abutments; therefore, it is important to explain that some effort will be required to release the initial retention. The removal tool plays an integral part in helping the patient release the initial friction retention.

If retention needs to be customized, the author recommends removing only the posterior caps, replacing the denture, and testing for a passive fit with only the anterior caps engaged. This is done to test the amount of retention adjustment needed.

If more retention is required, place the caps and tap down with a mirror handle. If less retention is required, place the caps by hand, and turn while pushing down. Set the retention where the cap grabs the abutment. Pick up the caps with acrylic by having the patient bite down very lightly, but do not compress the tissue with heavy bite forces. Test the retention, and if it still needs fine tuning, then repeat the steps above with the anterior caps. Cutting inside the caps or adjusting the abutments will destroy the machined interface and will not resolve retention issues.

Conclusion

After 3 years of successfully restoring friction-retained hybrid cases, the author feels very confident that most initial failures were due to either processing or patient compliance issues. Selecting a viable candidate for this protocol, ensuring that the entire dental team is well-versed on the process, and following every restorative step without deviation helps guarantee a predictable case result and a happy patient.

REFERENCES ONLINE
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