The passive abutment

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One of the main problems faced by both prosthodontists and dental technicians, with regards to implant supported dental prostheses is the problem of producing a repeatable passive fit which would eliminate the need for complex and intense laboratory procedures, usually undertaken to improve the fit of castings e.g. sectioning and soldering.

The Passive Abutment (Fig. 1) is unique to Southern Implants and has been in clinical use since 1998. It allows one to achieve a predictable passive fit of cast structures in a practical way.

The unsatisfactory fit of prosthodontic work on implants is due not only to the distortion caused by the physical process of investing, casting and sandblasting, but also from the distorting forces which develop when the casting is exposed to repeated high temperature cycles while baking porcelain. All these parameters cause the collection and entrapment of energy resulting in tensile, which are then transferred to the prosthetic screws. Consequently we have fractures of screws, destruction of the prosthesis (porcelain fracturing) and perimplantitis. Finally there is breakdown of relationship between the patient and the dental practitioner and tension among members of the implantology team as well (technician/dentist/prosthodontist/surgeon).

After years of research by Southern implants, the first prosthetic abutment with a passive fit was presented to the dental implant market in 1994.

The philosophy of the passive abutment is innovative in the field of dental implantology and has reduced the stress experienced by the technician and the dentist, especially when it comes to the fit of the prosthesis.

By reviewing data from x-rays of patients who have dental implants with fixed prostheses, one can see marked differences between those with passive abutments and those without.

Passive fit is achieved by luting a premachined titanium interface component onto the finished casting. By luting the titanium interface component onto the finished casting and using the laboratory master model as the blueprint for fit, the luting takes place in the dental lab by the dental technician. No additional clinical steps are required.

The discrepancy between the passive ring and implant reaches as low as 2 microns, independent of the length of the span of the bridge. The titanium interfacial component is kept separate from the manufacturing of the casting and is therefore not subjected to degradation by heat cycles or de-vesting and finishing procedures as a cast-to-gold cylinder would. The integrity of the machined part is therefore maintained in the original condition.

For assembly, the titanium interfacial component is clamped to the analogue on the master model by means of the luting screw. The luting screw ensures that the interfacial component is held in full contact with the implant analogue.

The finished prosthesis is then luted to the clamped interfacial ring using a dual-cured resin cement.

In this way the resin cement serves as a space filler between the casting and the interfacial ring, thus compensating for any minor casting and finishing discrepancies, so eliminating misfit of the casting to the implant. At placement in the mouth, the prosthetic screw retains the completed prosthesis (both casting and interfacial ring together) to the implant and maintains a compressive force over the cement line. This is achieved because the prosthetic screw engages onto the casting and not onto the interfacial ring. The cement is therefore not responsible for retention of the prosthesis, but is merely a space filler.

Fig. 1. The Passive Abutment

Fig. 2. The Passive Abutment Assembly

Fig. 3. Comparing Fitting Surfaces

Fig. 4. Different Radiographic Appearance Of The Same Miss Fit Depending On X-Ray Beam Angulation/Orientation

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Fig. 9. Luting screws and interfacial rings

However are subject to significant difficulties. Significant deterioration of the fit is generally required when compared to complex casting procedures with gold cylinders. The Passive Abutment System is available for direct connection to all Southern Implants product ranges. Passive Abutments are also available for Conical Conical Abutments.

For direct connection to Externally Hexed, IT, Tri-Neck, Deep Cone and Internally Hexed connection implants, both non-engaging and engaging versions are available:

1. Non-hexed or non-engaging versions are indicated for multi implant cases (bridges).
2. Hexed or engaging versions are indicated for single implant cases and multi-unit custom abutments cases.

Problems of Conventional Cast Fragments

Framewoks incorporating cast to gold cylinders are very commonly used in implant reconstructions, as are castings fabricated using plastic burn-out cylinders. These castings however are subject to significant difficulties. Significant deterioration of the fit is generally required when compared to complex casting procedures with gold cylinders. The Passive Abutment System is available for direct connection to all Southern Implants product ranges. Passive Abutments are also available for Conical Conical Abutments.

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implant using a syringe with a blunt delivery tip.

c. Place the loose Passive rings individually into position on the implants and press the down into place using a flat-ended “plastic” instrument. When the rings are seated, the gel helps hold them in place. The soft tissue surrounding the rings also holds them in place quite well.
d. Place the metal structure over the rings in the mouth, taking care to align the casting properly so as to not disturb the rings.
e. Screw retain the structure by placing a few prosthetic screws in strategic places.
f. When removing the frame, take care of any rings that may drop. Some rings may get left on the removed frame while others may be left on the implants. Count the rings to make sure you have all of them.

It is an advantage of the Passive system that the fitting surfaces can be removed from the casting to avoid damage by heat cycles during the repair process and then be refitted.

Delivery of the Final Prosthesis

Once the final prosthesis is placed into the patient’s mouth, peri-apical X-rays should be taken in order to verify the positive fit onto the implants. The x-ray beam should be oriented perpendicular to the implant/prosthesis interface in order to increase the chances of detecting a potential discrepancy (miss fit).

Eliminating a Miss Fit

In case that a miss fit is detected, make sure that no soft or hard tissues are interfering with the positive sitting of the prosthesis. As mentioned above, Passive Abutments can eliminate all discrepancies introduced into the prosthesis during the laboratory steps of the manufacturing.

If a miss fit is detected, this is attributed to one of the following reasons:

- distorted implant impression
- increased implant component tolerance
- distorted plaster implant model

In order to eliminate a miss fit, a new implant impression should be taken and a new plaster implant model should be poured again. The laboratory technician is going to use the new implant model as a blueprint in order to recement the passive abutments (Fig. 15).

As a result of these actions the new radiographic examination should reveal no discrepancies to the fitting of the prosthesis onto the implants.

Conclusion

The Passive Abutment from Southern Implants allows one to achieve a predictable passive fit of cast structures in a practical way. It is easy to use, cost effective and has repeatable results, which eliminate the need for complex and intense laboratory procedures like sectioning and soldering.

Contact Information

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Dr. Petros Yvanougli is co-director of the Branemark Osseointegration Center Dubai. He qualified as a dentist in 1995, receiving his dental degree summa cum laude from Semmelweis University in Budapest, graduating with exceptional high grade, top of his class as valedictorian. He has lectured extensively on the “Same Day Implants & Teeth” reconstruction protocol. Together with Dr. Costa Nicolopoulos (Oral & Maxillofacial Surgeon), they are the cofounders of “Same Day Dental Implants” Clinic in Dubai Health Care City, U.A.E.