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Reference guide

Considerations - dental implant restorations

With decades of experience restoring dental implants, we can help explain the variations in products available in the dental marketplace today. We help dentists successfully restore dental implants daily.

At Vitalab, our products are designed around function first, without discounting the importance of aesthetics. We know dental implants. We understand that the contour of an implant abutment, and their crown, bridge or denture, is critical not only to aesthetics, but to the patient's ongoing health. We make every effort to design implant prosthetics that help maintain bone and therefore tissue. These design considerations as part of our ongoing attempts to put your patients first, allow us to produce implant restorations that are both beautiful and that remain in service and out of mind.

Important factors regarding Implant prosthetics

The following notes are generic. They are to help clinicians better understand the prosthetics they are responsible for placing. These notes do not favour, or even consider, any individual implant or component manufacturer or reseller. They are made to convey some of the known issues or variations we have encountered through many years of studying dental implants as well as studying and fabricating their prosthetic components. Neither Vital Lab nor its employees, gain financially or benefit from expressing these opinions. Our intention is only to help more dentists successfully restore, in a trouble-free way, dental implants.

Abutment to implant interfaces - Implant crowns are most often comprised of an integrated implant, and a separate abutment which is attached to the implant and holds the final clinical crown. There are many different materials and components incorporated into implant/abutment designs. Our ability to supply a specific abutment design can be limited by the implant and/or the abutment manufacturers.

In the following section, we are trying to explain some of the indications and complications with dental implants and abutments, that should be taken into consideration when requesting implant borne restorations.

One piece abutment & implant - The implant and the abutment are one piece. This design alleviates any complication from screw loosening, and possible wear or damage to the implant head. In North America, these one-piece designs are most often root form. Another successful one-piece design is the subperiosteal designs. Both similar in prosthetic design, but vary by manufacturer. Often limited in prosthetic options which are significantly narrowed and even compromised by the fixed position of the abutment portion of the component. Emergence profiles can also be restricted by these one-piece implants. Subperiosteal dental implants are among the oldest designs and have a very long-proven history.

Titanium abutment – (Vitallab product of choice). Titanium abutments can be used for either cementable or screw retained restorations. Still one of the best options, modern, well designed, titanium abutments rarely encounter screw loosening or fracturing complications. If the abutment does become loose, damage to the implant head is very rare. A titanium abutment, like the implant, is very biocompatible. The drawback sometimes seen with titanium abutments is mainly aesthetic. Visible metal and/or greying of the tissue around the abutment are two such factors. Titanium abutment are sometimes coated with titanium nitride which produces a thin gold colored finish. When not lost through adjustment or polishing, a titanium nitride finish is an aesthetic improvement over non-coated titanium.

Zirconia abutments – hybrid variations.

Hybrid zirconia implant abutment – Zirconia is highly aesthetic and biocompatible when used as a dental implant abutment material. Comprised of a zirconia abutment with a metal interface which fits into the abutment and between it and the dental implant. This interface isolates the dental implant from the very hard zirconia material, which otherwise could cause serious damage to the implant in the event of screw loosening. If severe enough, such damage could cause the need for implant replacement.

Made by both implant and by aftermarket manufacturers, these components simplify the manufacturing of zirconia implant abutments by allowing a standard fitting component for the zirconia abutment on one side and multiple implant interfaces on the other.

These interfaces, often made of titanium, are comprised of the gasket area, a flat surface which isolates the zirconia from the dental implant, and a central post.

The purpose of the central post is what differentiates hybrid zirconia abutments. There are generally two different designs.

Variation #1 – The abutment is cemented to the insert, the fully seated screw retains the insert with the cemented abutment to the implant. – The components, the zirconia abutment and the insulating alloy insert are cemented indirectly before abutment insertion. (cementation is done in the laboratory). Vitallab uses Ivoclar hybrid dual cure resin abutment cement. We believe this to be the best hybrid cement available.

With this design, the screw retains the metal insert which retains the zirconia material by cementation. While a solid design which bypasses the possibility of implant damage from screw loosening, there are now several studies indicating the likelihood of delamination in the 4-6-year range. Taller, and larger, cementable inserts lengthen the time before delamination, and reduce the risk of zirconia fracture.

These abutments are functionally well designed, will not damage the dental implant, but will require re-cementation or replacement in time.

Variation #2 – The fully seated screw, retains the abutment to both the insert and the implant. – (Vitallab product of choice).

With this design the screw retains the zirconia abutment, pinching the metal insert between the abutment and the implant, thereby protecting the implant from damage without the possibility of cement delamination. Care must be taken on insertion to ensure the insert portion of the abutment stays positioned in the zirconia until seated on the implant. The possibility of screw loosening is increased by the zirconia screw seat, although still rather rare. At Vitallab we believe this design to be the best of the zirconia based abutment designs.

Zirconia abutments – All zirconia

Zirconia is highly aesthetic and biocompatible when used as a dental implant abutment material. All zirconia abutments, which means abutments comprised of 100% zirconia, without an interface between the abutment and the implant, can be negatively effected by screw loosening. When screw loosening does occur, which is rare, the very hard zirconia material will damage the softer titanium implant. Excessive damage can result in the need for replacement of the implant. Zirconia is more prone to screw loosening, and less resistant to fracturing than titanium. **Vitalab** does not recommend zirconia abutments without an interface.

Lithium Disilicate (e-max®) abutments

Similar in design to zirconia hybrid abutments, and normally cemented to the alloy insert, pre-delivery by the lab, Lithium disilicate is softer than zirconia, has similar abrasive qualities when compared to enamel, and is strong with 500Mpa of compressive strength, this material is highly aesthetic and biocompatible. Lithium disilicate requires slightly more material space around the insert than zirconia. Lithium disilicate makes a stunning implant abutment which can be used to resin bond, rather than cement, a final crown, or can be directly porcelain layered in the lab.

Zirconia occlusion – The advantages of zirconia as a crown material are varied. Very hard, and strong, but brittle, zirconia is a good frame material. Zirconia occlusion on the other hand is unproven. Currently the study results available and generally accepted are from a study commissioned by a large US based dental lab. In short, the study's findings are that polished zirconia is less abrasive to natural teeth than any other material. This study is based on open and closing cycles only and does not consider eccentric movement which is the biggest factor in the wear of natural dentition. Currently there are several studies being undertaken which should present more relevant conclusions. The University of Michigan is currently undertaking a modern restorative materials study which includes material wear in average functional use. Indications thus far are similar to some of the earlier zirconia wear studies showing the highest abrasion rates, significantly higher than any other modern material. Highly polished zirconia having improved wear rates although still far higher than other materials. Lithium Disilicate and mid to high gold alloys are showing wear rates among the closest to natural enamel. The addition of eccentric occlusion is showing a different, and more accurate picture, than the current generally accepted study conclusions commissioned by the large US lab depict. The University of Michigan study is expected to be completed and published by the end of 2021.

The periodontal ligament and proprioception. The loss of the periodontal ligament, as well as the loss of proprioception are likely the biggest drawbacks to replacing natural tooth roots with implants. This loss causes increased bite forces as well as a less resilient crown support. Properly indicated materials, and well designed prosthetic occlusion can significantly reduce the possibility of damage to implant restorations caused by these losses. The loss of proprioception in the upper canine region is a more significant factor than in any other region of the mouth.

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