The many characteristics of a long-term hybrid abutment crown

Viteo Base is the basis for the production of implant-supported single tooth restorations

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This article presents the new titanium bonding base Viteo Base for implant-supported single tooth restorations. The prefabricated prosthetic component has been specially developed for use together with ceramic restorative materials. Viteo Base has various characteristics that simplify the path to aesthetic, long-lasting implant restorations. The prefabricated connecting surface geometries are compatible with various implant systems. Viteo Base can be processed using the press technique (IPS e.max Press) and, alternatively, with CAM/CAD technology (Telio CAD, IPS e.max CAD). In the present case, the working steps involved in producing a pressed implant crown and the advantages of the Viteo Base will be shown.

Implant prosthetics is an ever-growing segment. It is becoming more and more popular to close single tooth gaps with an implant and the corresponding restoration in order to preserve the surrounding tooth substance. Modern prosthetic concepts and state-of-the-art materials enable the fabrication of functional and aesthetic restorations. Titanium bonding bases unite the advantages of a prefabricated component with those of a custom-made abutment. In a comparatively simple manner, the natural oval shaped emergence profile of the tooth is adapted to the round emergence profile of the implant. The design of the restoration and its connection to the underlying titanium bonding base are ultimately the elements which are essential for the success of the restoration.

Many characteristics, specifically incorporated to enhance the restoration material

With the new Viteo Base, the dental technician is provided with a titanium bonding base which ideally complements press and CAD ceramic (Fig. 1). This has numerous advantages, which will be discussed further throughout this article. The special soft edge design without sharp edges and protrusions, the recessed rotation protection and the preconditioned bonding surface of the titanium bonding base are responsible for these benefits. The connection between the titanium bonding base and the implant is certified and coordinated with the most commonly used implant systems. Viteo Base is available in two diameters: MD (Medium Design) and SD (Small Design). The chosen implant system determines the diameter to be used.

In other cases, it may be necessary to reduce the height of the Viteo Base to 4 mm with a separating disc. The shaft height must be no less than 4 mm. This is laser-marked on the abutment shaft.

The Viteo Base Press Sleeve, a modelling aid made from acrylic, is used to support the wax crown. The adhesive surface of the titanium bonding base is preconditioned, which means it is too rough for the wax to be applied directly. This is where the Viteo Base Press Sleeves come into play. As with the titanium bonding bases, they are available in two sizes (SD, MD). In this case the sleeve diameter was size MD, to suit the selected Viteo Base (Fig. 4). The Viteo Base Press Sleeve was then shortened with a special tool, the Viteo Base Trimmer, enabling the soft edge design (round-edged design) to be adapted to the underlying titanium bonding base (Fig. 5).

In addition, the minimum thickness of the restorative can be maintained, as the cement gap is even throughout the restoration. Stress can thereby be avoided.

The space available in relation to the antagonist tooth was ideal for the full-ceramic crown supported by a 6-mm titanium bonding base (Fig. 3).

Preparation

The titanium bonding base Viteo Base was chosen according to the implant system in size MD, then placed on top of the laboratory implant and screw-fixed with a torque of approx. 5 Ncm (Fig. 2). The recessed anti-rotation protection (vertical grooves) was positioned distally in the jaw for the production of the restoration. The Viteo Base can also be positioned in a mesial direction. The recessed anti-rotation protection is located vertically throughout the entire length of the shaft. It ensures that the titanium bonding base is situated correctly when it is cemented to the restoration material and it acts as a “guide”.

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The wax crown was lifted easily from the area of contact to the occlusal edge, giving monolithic restoration only requires glazing or finishing in the mouth. The IPS e.max Press Multi ingot (Programat EP 5010), the pressing procedure was started. After pressing, the ring was removed from the handpiece and allowed to cool. After placing the assembled press ingot (IPS e.max Press Multi, shade A 3.5), the disposable plunger and the aluminium oxide plunger (IPS e.max Press Multi Pin) were then placed into the preheated furnace (Fig. 12). The final firing was based on the IPS Multi Sprue Guide. In this case, the Viteo Holder made handling easier. The ceramic structure was then placed correctly on the Viteo Base, there was a clinical try-in. In the try-in, the dentist interfered to a tray as a thin flowing impression silicone (Virtual Extra Light Body Fast Set). The titanium bonding base was screwed to the laboratory implant. In this case, the Viteo Multi Screw Guide for better handling, the Viteo Base, screwed onto the laboratory implant, was attached to the Viteo Holder and then silicone was applied for the first clinical try-in.

Before the ceramic crown was permanently cemented with the Viteo Base, there was a clinical try-in. The two parts were temporarily attached to each other with a thin flowing impression silicone (Virtual Extra Light Body Fast Set). The titanium bonding base was screwed to the laboratory implant. In this case, the Viteo Holder made handling easier. The ceramic structure was then placed correctly on the Viteo Base, there was a clinical try-in. In the try-in, the dentist interfered to a tray as a thin flowing impression silicone (Virtual Extra Light Body Fast Set). The titanium bonding base was screwed to the laboratory implant. In this case, the Viteo Holder made handling easier. The ceramic structure was then placed correctly on the Viteo Base, there was a clinical try-in. In the try-in, the dentist interfered to a tray as a thin flowing impression silicone (Virtual Extra Light Body Fast Set). The titanium bonding base was screwed to the laboratory implant. In this case, the Viteo Holder made handling easier. The ceramic structure was then placed correctly on the Viteo Base, there was a clinical try-in. In the try-in, the dentist interfered to a tray as a thin flowing impression silicone (Virtual Extra Light Body Fast Set). The titanium bonding base was screwed to the laboratory implant. In this case, the Viteo Holder made handling easier. The ceramic structure was then placed correctly on the Viteo Base, there was a clinical try-in. In the try-in, the dentist interfered to a tray as a thin flowing impression silicone (Virtual Extra Light Body Fast Set). The titanium bonding base was screwed to the laboratory implant. In this case, the Viteo Holder made handling easier. The ceramic structure was then placed correctly on the Viteo Base, there was a clinical try-in. In the try-in, the dentist interfered to a tray as a thin flowing impression silicone (Virtual Extra Light Body Fast Set). The titanium bonding base was screwed to the laboratory implant.

The occlusal surface of the wax crown was polished towards the bottom of the ring base. The upper position was checked with the IPS Multi Sprue Guide (Fig. 13). The proximal contacts were checked, along with the static and dynamic occlusion. Any interfering contacts were removed before the try-in.

Transferring the wax crown into ceramic
Lithium-disilicate glass ceramic IPS e.max Press is well proven for good press results in ceramic. High strength of 450 MPa, exceptional esthetics and excellent light-optical properties ensure a life-like restoration. The polychromatic press ingot IPS e.max Press Multi, with lifetime grading colour and translucency from the dentin structure to the incisal edge, gives monolithic restorations the desired aesthetic appearance. In general, after pressing, the restoration only requires glazing or it can be customized with the IPS Ivoclar stains.

The versatile Press Multi ingot
The IPS e.max Press Multi ingot has significantly more chroma in the lower region than in the upper third. A special sintering technique is used in order to ensure that the ingot’s colour layers are in the correct position on the crown after pressing. For this purpose, the waxed crown was connected to the side of the ring base. Instead of wax rods, a prefabricated precision wax pattern (IPS e.max Press Multi Wax Pattern) was used. The wax crown was positioned vertically central to the wax pattern and attached at the mesio-buccal side, so that an optimal colour grading could be achieved in the visible area (Fig. 10). The crown was spurred onto the 200 g IPS Multi ring base. The occlusal surface of the wax crown was polished towards the bottom of the ring base. The upper position was checked with the IPS Multi Sprue Guide (Fig. 13).

New investment material used
The object was invested using a new investment material: IPS Press/Vest Premium. After mixing, investing and setting, the ring was placed in a preheating furnace (ISO C) for 60 minutes. The press ingot (IPS e.max Press Multi, shade A 3.5), the disposable plunger and the aluminium oxide plunger (IPS e.max Press Multi Pin) were then placed into the preheated furnace. After placing the assembled press ingot into the preheated press furnace (Programat EP 5010), the pressing program was started.

After pressing, the ring was removed from the furnace and allowed to cool slowly (Fig. 13). Using glass blasting beads, the ring was first diversified (4 bar pressure) and then finely (2 bar pressure). The fit of the pressed crown on the Viteo Base was checked. In this case, the crown was a little too tight; it was adjusted with a diamond grinding bur (Fig. 14). The crown was then screwed onto the master model together with the titanium bonding base. The proximal contact points were checked, along with the static and dynamic occlusion. Any interfering contacts were removed before the try-in.

Trying-in the hybrid abutment crown in the mouth
Before the ceramic crown was permanently cemented with the Viteo Base, there was a clinical try-in. The two parts were temporarily attached to each other with a thin flowing impression silicone (Virtual Extra Light Body Fast Set). The titanium bonding base was screwed to the laboratory implant. In this case, the Viteo Holder made handling easier.

The clinical try-in, the dentist checked the emergence profile, the proximal contacts and the occlusion of the crown. The try-in in the patient’s mouth confirmed the good fit of the restoration. Note: The light-optical properties cannot be assessed during the try-in. Finally, the ceramic is still matt at this time as it is still un-finished. Secondly, the permanent luting composite (Multilink Hybrid Abutment) has different degrees of translucency, through which the Viteo Base visually “disappears”. Regardless of these limitations, it was apparent that IPS Ivoclor stains would be needed to optimally adjust the shade of the crown’s occlusal surfaces to adapt to and harmonize with the surrounding teeth.

The try-in confirmed the good fit
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Finishing the crown/individualization

The pressed IPS e.max crown was stained with the universal stain and glaze range of IPS Glaze (Fig. 18). A warm color was applied to the central feature to give the impression of depth. The cusp tips were accentuated with white (Fig. 19). A wash of blue stain was gently added to the incisal area to intensify the translucency of the crown. After the stains had been fired, the IPS Vocolo Glaze Paste was applied to the crown and Glaze firing was carried out. The contacts were then checked again in the articulator.

Permanent cementation of the prosthetic implant restoration (Fig. 20)

The cementation process of a ceramic crown and titanium bonding base is a delicate working step, which requires high precision. Since the Viteo Base is already precondensed, it does not have to be sandblasted before cementation. This saves one working step and therefore saves time. Nevertheless, this does not apply if the abutment is shortened.

The shortened surfaces have to be re-sandblasted in order to achieve an ideal bond and a good marginal seal. In this case, however, the Viteo Base was used with a 6 mm shaft height and was not shortened. The titanium bonding base was immediately cleaned in the ultrasonic bath and then additionally steam cleaned. In doing so, all wax residues and other impurities could be removed thoroughly prior to the bonding procedure. A uniform matt surface color showed that the drying and conditioning process was successful.

As with the temporary placement procedure, the titanium bonding base was cemented on the laboratory implant and placed in the Viteo Holder for easy handling. The ceramic object had been previously marked with a water-resistant pen for correct positioning and subsequent bonding with the Viteo Base.

The universal primer Monobond Plus ensures optimal bonding to the metal. It was applied to the bonding surface of the Viteo Base and allowed to act for 60 seconds (Fig. 20). Any excess was dried with oil-free compressed air. Etching gel was applied to the bonding surface of the ceramic object (IPS Ceramic Etching Gel) (Fig. 21), then the area was thoroughly rinsed and dried. Next, Monobond Plus was applied to the ceramic surface and allowed to act for 60 seconds. Any excess was blown away. Alternatively, the innovative single-component primer Monobond Etch & Prime can be used here. It etches and silanizes the glass-ceramic surfaces in one working step. Before cementation, the screw channel had to be closed in order to prevent composite residues from falling into it. The Viteo Screw Channel Pin was used for this purpose. For easier handling, this was shortened and then inserted into the Viteo Base screw channel.

The IPS max Press ceramic structure was bonded to the Viteo Base using the Multilink Hybrid Abutment self-curing luting composite, which is specially designed for the permanent cementation of ceramic structures to titanium/titanium alloy bases. It is available in two levels of translucency. In this case we used the version with a higher degree of opacity (VHD c) (Fig. 20). The Multilink Hybrid Abutment composite was applied to the bonding surface of the Viteo Base and to the inner surfaces of the ceramic object. Thanks to the previously applied pen mark, both components could be easily placed in the correct end position. The restoration protection, which runs along the entire length of the shaft, acted as a guide.

Both components were firmly pressed together for five seconds. Any excess composite – a gel-like consistency – was removed with an instrument during the setting phase (Fig. 24). The application of Liquid Strip glycerine gel on the joint prevented an inhibition layer from forming during setting. After seven minutes, the glycerine gel was rinsed off with water and the Viteo Screw Channel Pin was removed from the screw channel. Finally, the joint was carefully smoothed over with a fine rubber polishing wheel at low speed (500 rpm) and gentle pressure. In order to leave the connection to the implant as untouched as possible, it is advisable to leave the Viteo Base in the Viteo Holder, or at least screw it onto a laboratory implant. The restoration was polished with goat hair brushes and universal polishing paste (Fig. 25). A smooth and homogenous surface is important, so that the gingiva can adapt properly to the restoration.

Inserting the prosthetic implant restoration

The assembled and cleaned hybrid abutment crown was prepared for insertion in the mouth. It is advisable to autoclave the hybrid abutment crown prior to intraoral insertion. The temporary Telio CAD restoration in region 46 was removed by the dentist, the implant lumen was flushed (Cervitec Liquad) and the peri-implant tissue (emergence profile) was examined. The crown was screwed to the implant using the originally packed Viteo Screw. It was screwed to the implant using the Multilink Hybrid Abutment, it ensures a secure connection of the ceramic object and the Viteo Base to avoid chipping problems, the lack of or weakness of a bond or inadequate force distribution. One of the advantages of the Viteo Base is the special soft edge design without sharp edges and projections, which on one hand strengthens the restoration material and on the other hand provides optimal force distribution under pressure.

The preconditioned, in other words sandblasted surface saves an additional working step and therefore saves time. In combination with the appropriate composite system, it ensures a secure connection of the titanium base and the restoration material. This is a key factor for the longevity of the restoration and its integration into the oral environment. Due to the industrial precondensation the surface of the Viteo Base is very uniform. Together with the appropriate composite (e.g. Multilink Hybrid Abutment), it ensures a permanent marginal seal.

The screwed rotation protection means the cement gap is very even. Compressive or tensile stresses are avoided. The restoration material is strengthened.

Conclusion

Ideal coordination of ceramic materials

The Viteo Base is ideally suited for use with ceramic materials. It helps to avoid chipping problems, the lack of or weakness of a bond or inadequate force distribution. One of the advantages of the Viteo Base is the special soft edge design without sharp edges and projections, which on one hand strengthens the restoration material and on the other hand provides optimal force distribution under pressure.
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