Common therapy concepts with ceramic implants:

Reversibly screwed and yet metal-free

Ceramic implants have long been a domain of holistic dentistry, which has done valuable pioneering work. To the requirement. In the early days, many compromises were made in terms of fracture and success rates to correspond to “metal-free”. In modern implantology practice, such success rates are no longer below 90 percent to represent and at least to discuss between 90 and 95 percent. Our patients must be able to expect stable and safe therapy concepts in the long term. New concepts like ceramic implants need to be based on proven methods how to measure titanium implants and withstand comparison.

Further developments:

Material, surfaces, restorations Modern ceramic implants of the latest generation no longer need to shy away from this comparison. The rapid technical advancement of the essential success factors material [1], surface [2] and prosthetic restoration [3] brought them on a par with titanium implants, the survival rates have approached significantly [4]. The negative reputation of ceramic implantology must therefore be a thing of the past. This - in conjunction with the advantages of ceramics such as improved aesthetics [5] and soft tissue conditions [6, 7, 8] - is currently leading to ceramic implants increasingly finding their way into modern implantology as a supplement and alternative to titanium hold.

Watch the Guidelines ...

The same well-known biological principles apply to ceramic implants from osseointegration to augmentation as for titanium. But it is a different material. In order to avoid complications resulting from this, one should be familiar with handling system-specific features and fundamentals of the material. In particular, the guidelines of the respective provider should be observed.

- **Prosthetic Concepts**
- An important factor for the acceptance of new concepts such as ceramic implants is to be able to continue to implement proven and familiar protocols. The majority of the available ceramic implants are one-piece systems (monoblock). They have the advantage that they come very close to a natural tooth in the provision of the usual work of the dentist with impressions and cementation.

However, the restorative restoration on one-piece implants can also only be carried out by cementing. However, a removal of excess cement 1 to 1.5 mm subgingivally can no longer be reliably guaranteed [9]. Two-part systems are standard in general implantology today. They enable cementless screw-retained restorations, unstressed healing phases and extensive augmentation procedures, and are reversible and fl exible.

Das Ziel aller Hersteller von Keramikimplantaten ist es daher, auch in diesem Sektor zuverl ässige zweiteilige Systeme anbieten zu können. Meist geschieht dies derzeit über Verschraubung mit Metallschrauben (nicht mehr metallfrei) oder Ver-klebung des Abutments (nicht mehr reversibel).

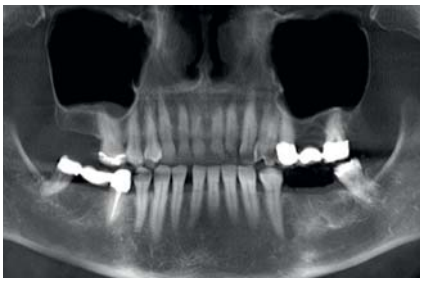

Fig. 1: Initial situation, restotitis region 36

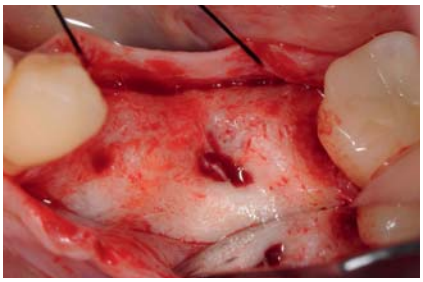

Fig. 2: Representation of the alveolar ridge before surgery

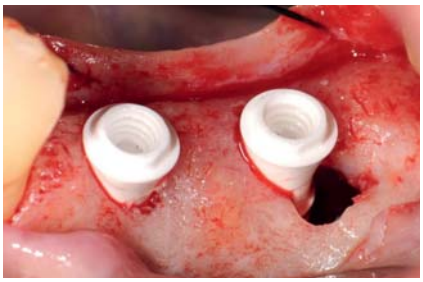

Fig. 3: Implants in situ

A system with a metal-free screw that consists of 60 percent carbon fiber in a PEEK matrix brings a new approach. According to the manufacturer's information, this screw allows a tightening torque of 35 Ncm equivalent to that of a titanium screw with a maximum torque of 85 Ncm.
As shown in the following case, such a two-part, metal-free system enables treatment protocols similar to those that are already standard for titanium implants:

Case report

In April 2015, a 68-year-old patient who was in good general condition and wanted ceramic implants presented to our practice on referral. The affected teeth 35 and 36 had already been removed six months earlier by her family dentist because of apical periodontitis. Since the patient absolutely wanted to have a metal-free restoration, she categorically rejected the titanium implants suggested as an alternative and, after being informed in detail, decided to replace teeth 35 and 36 with ceramic implants.

Diagnosis

The x-ray showed an extensive, not completely ossified defect area in the sense of a residual ossitis as a result of a wound healing disorder after tooth removal (Fig. 1). In our practice, an interdisciplinary general medical assessment of possible osteoporosis [10] and other diseases that affect bone metabolism [11] is carried out in our practice for differential diagnosis before implantation in such defect areas. Calcium, phosphate and vitamin D values were in the normal range, and there were no other local and general contraindications for an implantation either.

Implant selection

In order to withstand the tongue pressure during the temporary healing phase, a high primary stability of more than above 35 Ncm is aimed for for one-piece ceramic implants. Alternatively, a protective splint can be made, which the patient has to wear on his own responsibility. In the present case, however, due to the defect situation, such primary stability could not be reliably predicted. Otherwise necessary protective measures should be waived at the request of the patient. Therefore the Zeramex P6 (company Dentalpoint, Zurich) was selected as a two-part reversible, metal-free screwed ceramic implant, with which the same protocols as with a titanium implant could be implemented.

Surgery

With prophylactic antibiosis (single-shot dose of amoxicilin 1,000 mg 1 hour before surgery) and infiltration anesthesia, the implant site was opened in June 2015 with a crestal incision without relieving incisions. As expected, there was a broad alveolar ridge with the first cortical defects (Fig. 2). After the implant position had been determined and the opening of the cortex, which was minimally necessary for accessing the defect, the defect was curetted into the hard bone with a sharp spoon.

The implant bed was prepared according to the standard drilling protocol for the Zeramex P6 implant. Since this implant has the same shape as the Straumann Standard Plus SP implant, the drilling protocol and the original Straumann instruments can also be used.

Two Zeramex P6 implants with a diameter of 4.1 mm and a length of 12 mm were inserted (Fig. 3). The implant in region 35 could be inserted into a defect-free bone with 35 Ncm. The implant in region 36 also achieved an anchoring in the apical area with a covered uncovered

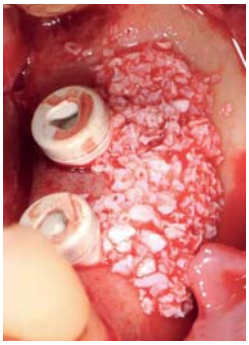

Fig. 4: Filling the defect

Fig. 5: Perforated Membrane

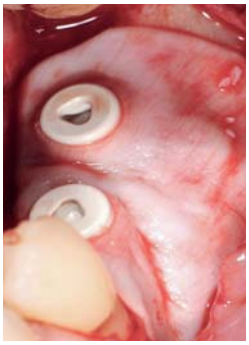

Fig. 6: The membrane was pulled over the healing caps.

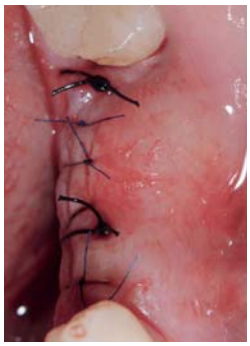

Fig. 7: Primary wound closure

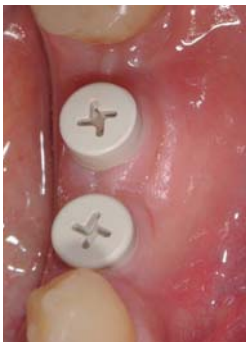

Fig. 8: Gingiva former after reentry

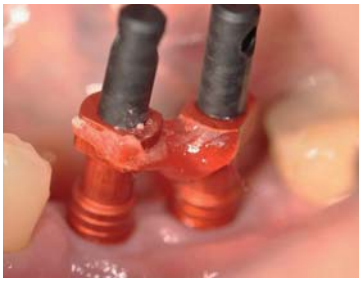

Fig. 9: Blocked impression posts for open impression taking

Fig. 10: Impression taking with reduced laboratory analogs

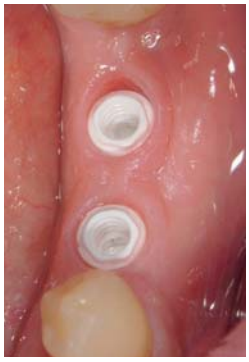

Fig. 11: Irritant mucosal relationships

Fig. 12: Shortened abutments on the master model

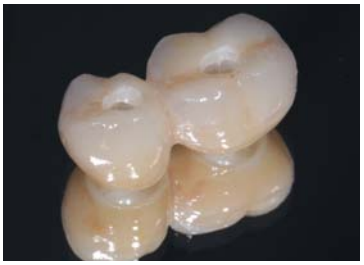

Fig. 13: Splinted crowns

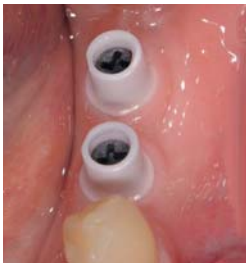

Abb. 14: Abutments in situ

had sufficient primary stability of 20 Ncm. The remaining intraosseous defect was carefully filled with BioOss granules (0.25 mm) (Geistlich Pharma, Switzerland) (Fig. 4). After inserting the healing caps, a Bio-Guide membrane was attached to the implant positions perforated with sterile rubber dam forceps (Fig. 5), pulled poncho-like over the implant caps and the defect covered with the double-layer technique due to the proximity of the implant [12] (Fig. 6). After slitting the periosteum, a tension-free and tight wound closure could be achieved (Fig. 7). The wound healing proceeded without irritation without dehiscences.

reopening

Due to the augmentation measure, the reentry did not take place after three months, as usual, but only after four months. After a small crestal incision with flap formation, the gingiva formers (Fig. 8) could be inserted and the flap could be fixed around the gingiva formers with three button sutures. The implants were both completely osseointegrated and stable.

Prosthetic phase

The impression and creation of the master model was carried out in the same way as the usual procedure for titanium implants. Two impression posts for open impressions were blocked with Palavit G and an open impression was taken with an individual tray. (Fig. 9, Fig. 10). The master model with gum mask was fabricated using laboratory analysts.

The external hexagon (Fig. 11) of the Zeramex implant enables the exact repositioning of the

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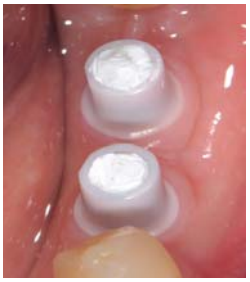

Fig. 15: Abutments sealed with Te fl on tape for bonding; extraoral cement removal and polishing

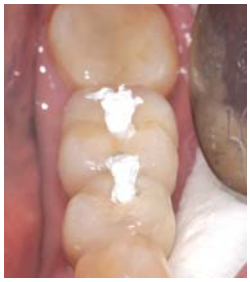

Fig. 16: Restoration bonded in situ, Te fl on tape is already removed through the screw channel.

Fig. 17: Restoration bonded to the abutment

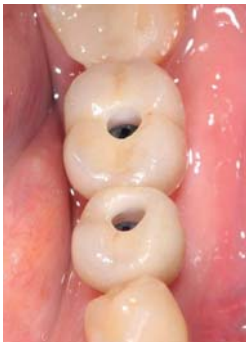

Fig. 18: Restoration incorporated with a torque of 35 Ncm

Fotos: Dr. Jens Tartsch

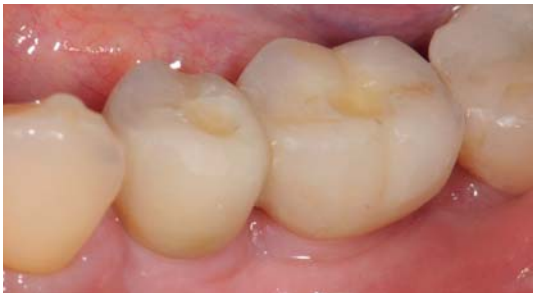

Fig. 19: Crown with composite closure of the screw access canal

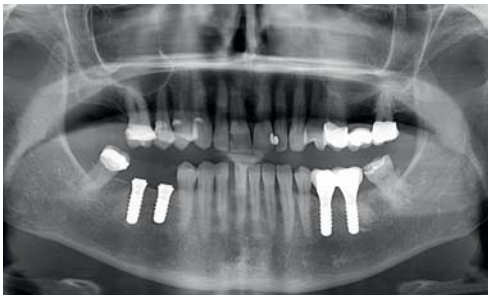

Fig. 20: Control image on the occasion of further implantation

The pressure post and the abutments serve to prevent rotation and prevent forces from being introduced into the implant body. The connecting screw consists of a PEEK matrix with a 60 percent share of embedded carbon fibers. This material allows a tightening torque of the screws of up to 85 Ncm, with 35 Ncm being clinically recommended.

Since it is a two-part system, the abutments can be adapted and individualized to the requirements. In this case, the height of the standard abutments was reduced (Fig. 12). As a rule, our practice also provides for a restoration with two single crowns in the posterior region with two implants.

However, the augmentation on 36 caused us to splint the two crowns in this particular case. In the CAD / CAM process, a monolithic framework made of zirconium dioxide (Zolid FX, Amman Girrbach) with occlusal access to the screw channel was fabricated and veneered with feldspar ceramic **(Fig. 13)** (Dental Laboratory Studio für Zahntechnik, Dirk Tartsch).

Inclusion

In order to avoid possible internal tensions in the ceramic implant-abutment connection, especially due to the blocking, the restoration was glued to the abutments intraorally in the patient's mouth after closing the screw channel with Te fl on tape analogous to a titanium adhesive base (RelyX unicem, 3M Aspen) **(Figs. 14 to 16).**
The restoration bonded to the abutment was then removed again, excess cement removed and the crown-abutment transition was polished to a high gloss **(Fig. 17)**.

The specified tightening torque of 35 Ncm for the abdominal screw must be observed for definitive integration **(Fig. 18).** After filling the screw channel with Teflon tape, the access cavity is sealed with composite as usual **(Fig. 19).**

The result is a metal- and cement-free, screw-retained and reversible restoration that can also be used for bridge restorations. The radiological follow-up image in December 2017 showed stable peri-implant bone conditions **(Fig. 20)** and an osseous defect. The recognizable bone remodeling in Analogous to the Straumann SP implant, the neck area is a typical feature of this implant geometry and remains stable over the long term [13].

Summary

As shown in the present individual case, the surgical and prosthetic protocols familiar from implantology with titanium implants can now also be partially adopted for ceramic implants.

The prerequisites for this are the creation of further evidence, the knowledge of the possibilities and limits of the material, the professional handling of it, the observance of the system-specific requirements, the selection of the correct indications and above all the involvement and comprehensive advice of the patient .

If these points are guaranteed, modern ceramic implants already represent a useful enrichment and addition to the implantological spectrum.

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