issn 1868-3207 Sondernummer • Vol. 5 • Issue 2/2021

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Georg Isbaner

Managing editor

Recognition of two-piece systems

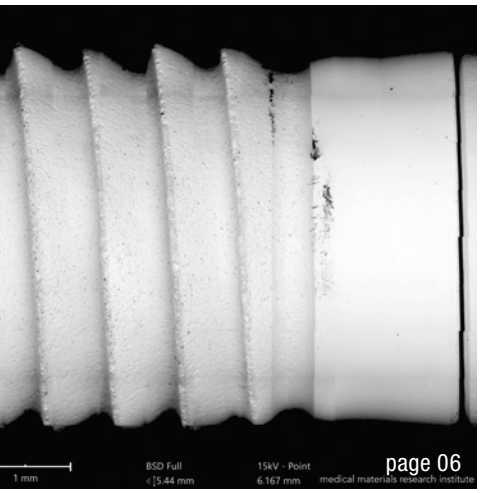
The past months have been game-changing for ceramic implantology. For one, manufacturers of two-piece ceramic implant systems are able to refer to new and reliable scientific long-term data. Besides the already known favourable soft-tissue reaction, the data indicates superior osseointegration compared to titanium systems. We are proud to have been able to exclusively interview Dr Roland Glauser, Switzerland, during the 2021 International Dental Show. Dr Glauser elaborates on the study design and the most important findings of the longitudinal study he conducted together with Dr Peter Schüpbach, Switzerland. On top of that, he provides insightful photo material (pages 42 and 43).

Modern one-piece ceramic systems have been a tried and tested option in implant therapy for a long time. “However, based on scientific statements and recommendations of professional associations, two-piece ceramic implants are still often denied this recognition with the argument that there is a lack of scientific evidence and consequently a lack of medical necessity for this type of implant”, it reads in a statement of the European Society for Ceramic Implantology (ESCI), which will exclusively be pre-published here in full (pages 54 and 55). In accordance with their role as a scientific and unbiased expert society and after scrutinising all hitherto available empirical data, the ESCI adopted a consensus paper concluding that the use of two-piece ceramic systems is deemed safe based on scientific evidence and that these systems may now be regarded as a suitable clinical option for implant therapy.

Contributing to the two above-mentioned theoretical aspects, one must mention that the reality in dental clinics and continuing education is further along. There is plenty of proof in the present ceramic implants— **international magazine of** ceramic implant technology. Several research articles, case reports, reviews of recent ceramic implantology events and previews of those that will take place in the near future testify of an extraordinarily active community. That is why the website ceramic-implants.info has been founded a few months ago and a matching LinkedIn-community has been established. In this way we stay abreast of the eclectic need for information of our readers and users. Stay up to date with us and follow us on LinkedIn and be sure not to miss anything.

Enjoy your read.

Georg
Managing editor



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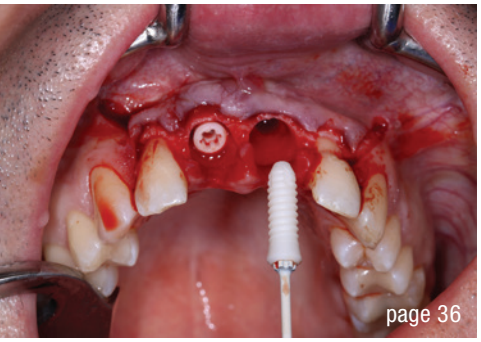
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Soft tissue augmentation

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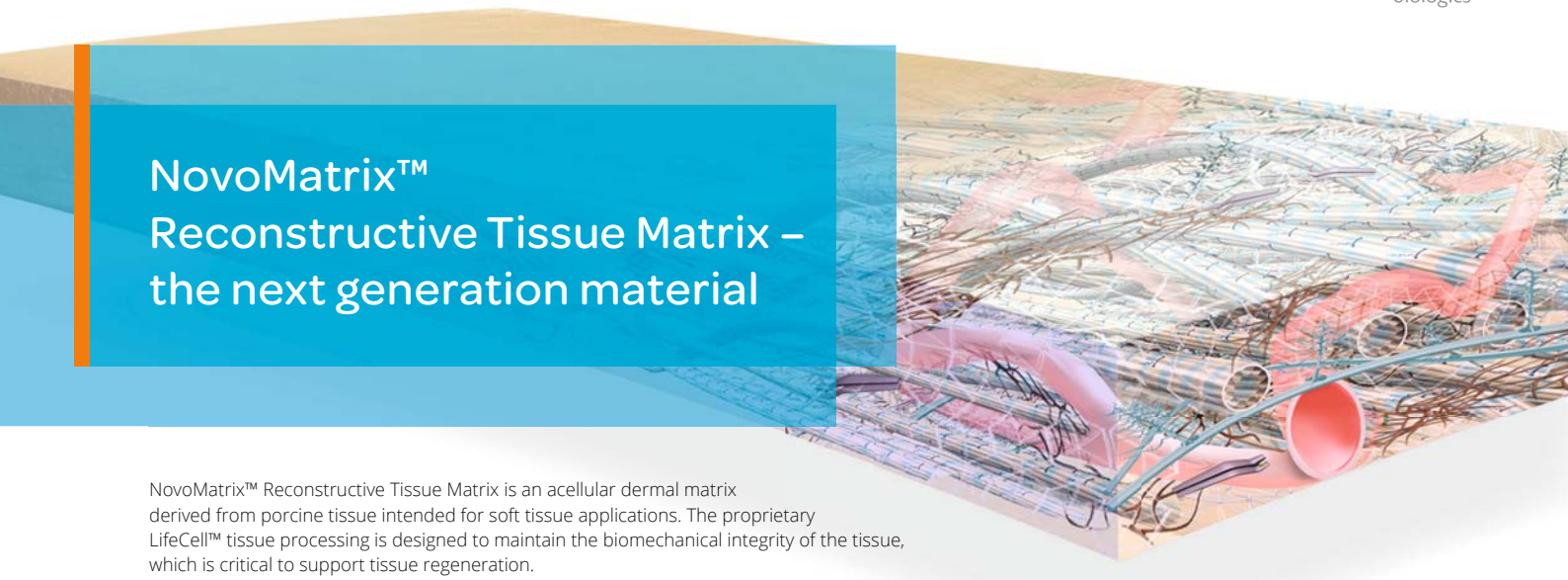

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[2] Schmitt et al. Clin Oral Implants Res. 2013, 24, 576.
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Room for improvement

Remarkable impurities found on randomly chosen ceramic implants

Dr Dirk U. Duddeck, Germany

This article summarises a recent peer-reviewed study that is a follow-up to a pilot study conducted in 2019 that focused on titanium-made implants and scientifically validated the implant quality assessment process utilised by the non-profit organisation CleanImplant Foundation. The new study examines five ceramic implant systems, which were purchased anonymously (blind shopping): implants from two Swiss manufacturers, as well as implants from a Taiwanese, a German and an Israeli company. The results will be published in the *International Journal of Oral & Maxillofacial Implants*. Three sterile-packed samples of each implant system were examined using scanning electron microscopy and a complex image-mapping technique, resulting in a large high-resolution image that covered the entire sample from the implant shoulder to the apex in material contrast. Contaminants were analysed by elemental analysis. Conspicuous impurities were then chemically identified using time-of-flight secondary ion mass spectrometry. In addition, the surface topography of all systems was evaluated, and different roughness values were compared. Finally, a search for clinical studies was conducted of the PubMed database, of the suppliers' websites and by written request to the individual implant manufacturers.

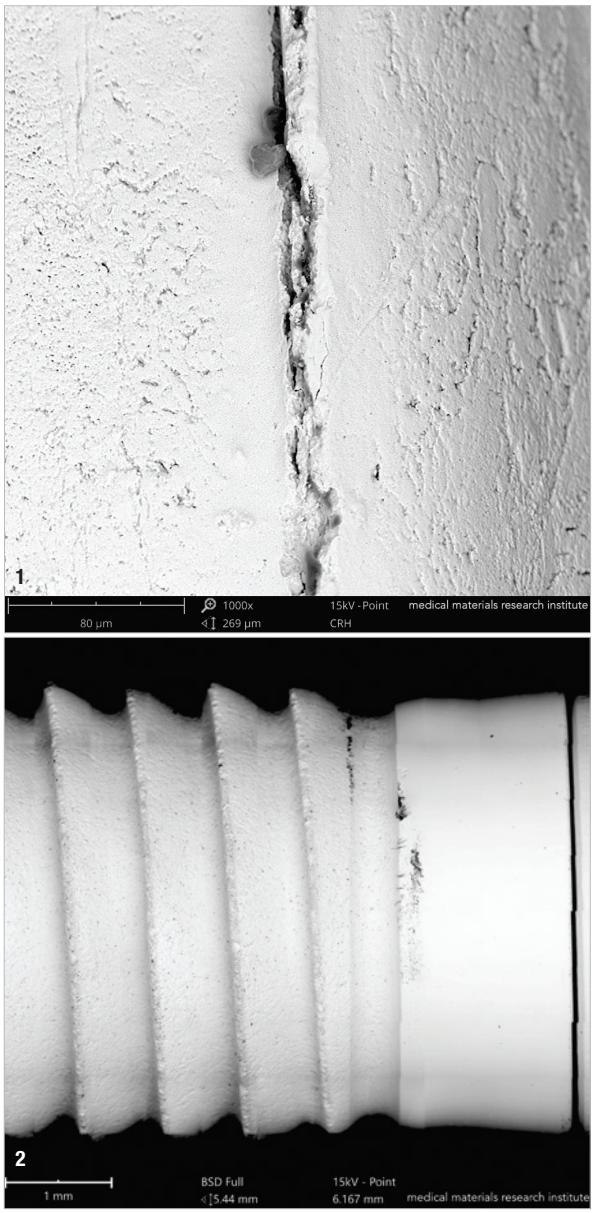

Fig. 1: Organic contaminants in a crack at the implant shoulder. **Fig. 2:** Plastic (polyoxymethylene) particles from the implant packaging on the first implant thread.

The Swedish-German research team from Charité Universitätsmedizin—Berlin (Duddeck and Florian Beuer), Sahlgrenska Academy at the University of Gothenburg (Tomas Albrektsson and Ann Wennerberg) and Malmö University (Christel Larsson), supported by the International University of Agadir (Jaafar Mouhyi), revealed some unexpected results. While the surfaces of two of the investigated implant systems were found to be largely free of particles, the other systems examined revealed significant carbon-containing organic impurities on their surfaces (Fig. 1). Subsequent time-of-flight secondary ion mass spectrometry analysis identified these contaminants as polysiloxanes, erucamide, aliphatic hydrocarbon compounds, fatty acid esters, talc and even polyacetal (polyoxymethylene; Fig. 2).

Remarkably, the study showed that in one system the sterile packaging itself was the cause of substantial plastic contamination on the sterile implant's surface—some of the contaminants were millimetres in size. Dodecylbenzenesulphonic acid (DBSA) was also detected on samples of two implant systems, which suggests that the manufacturers' cleaning process of the ceramic implants examined was insufficient. DBSA is an aggressive surface-active cleaning agent classi-

fied as hazardous by the U.S. Environmental Protection Agency. Four of the ceramic implant systems examined had a moderately rough implant surface. Only one ceramic implant system showed minimal surface roughness. Clinical studies were documented for three ceramic implant designs, and these had a follow-up period of up to three years and results ranging from 82.5 to 100% survival. The two other implant systems did not provide properly conducted clinical records.

The results of this study demonstrate that it is technically possible to fabricate largely residue-free zirconia implants. However, the large number of significant contaminants found in this analysis is a cause for concern, as every factory-related contamination may provoke unwanted adverse biological effects. It is worth noting that all systems evaluated in this study had CE markings or had received U.S. Food and Drug Administration marketing clearance. According to the authors, practitioners should always assume that foreign substances and contaminants can lead to undesirable biological effects—unless they have been proved harmless and not an impediment to the process of osseointegration. This precautionary principle should always be the guiding principle for any medical treatment, the authors concluded.

Editorial note: The article, "Quality assessment of five randomly chosen ceramic oral implant systems: Cleanliness, surface topography, and clinical documentation", referred to in the text is in press. Printed versions of the publication can be requested at publication@cleanimplant.org.

about the author

Dr Dirk U. Duddeck studied biology and dentistry and specialised in oral implantology. He is a guest researcher at Charité—Universitätsmedizin Berlin and founder and head of the non-profit organisation CleanImplant Foundation, both in Berlin in Germany.

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Measuring bone density by intra-oral ultrasound for secure implant insertion

Dr Johann Lechner, Germany

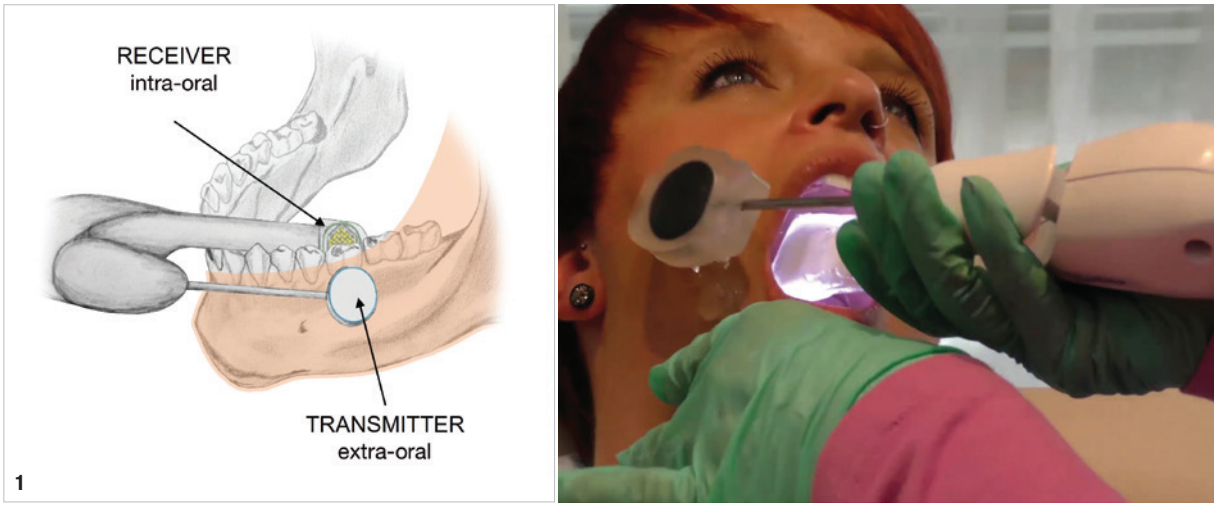

Fig. 1: Schematic representation of the positioning of the transmitter and receiver (left). Practical application of CaviTAU® with intra-oral measurement, using LED light for exact definition of the measurement area (right).

Introduction

In the medical field, ultrasonography is widely used to image various types of soft tissue. In principle, images of structures in the body are generated by analysing the reflection of ultrasonic waves. To derive useful information concerning the status of jawbone, different ultrasonic techniques must be employed, as the ultrasonic waves are almost completely reflected at the bone–soft-tissue interface. The *in vivo* measurement of ultrasonic velocity in human cortical bone was introduced as a rapid, reliable and non-invasive method which could be used to analyse the mechanical properties of bone.[1] Is a newly available ultrasonic device for the radiation-free measurement of bone density (CaviTAU®; Digital Dental & Healthcare Technology) suitable for visualising the condition of jawbone density?

Is the jawbone ready for implant insertion?

Researchers have reported microscopically proven chronic ischemic/inflammatory or fatty degenerative osteonecrosis of the jawbone (FDOJ):[2] FDOJ was found in >50% of 154 clinically and radiographically unremarkable edentulous jaw areas into which dental implants were to be placed. The following question is therefore justified: can aseptic bone necrosis pose a risk to implant placement?[3] The currently available literature offers an insight into anecdotal reports of "poor quality" alveolar bone discovered during implant surgery in edentulous sites. This poses a risk for the uninterrupted osseointegration of implants.[4] Aseptic bone necrosis has been reported after surgery, trauma and immunosuppressive therapy.[5,6] The evolution of aseptic necrosis is documented in the maxillomandibular region, particularly after osteotomies.[7,8] It has been found that micromotion of implants in soft bone is consistently high and that this can result in failed osseointegration. Scientists—such as those who have reported FDOJ from the Division of Periodontics of the University of Maryland School of Dentistry in Baltimore in the US1—speak of the phenomenon of a chronic ischemic/inflammatory or FDOJ. This pathology is thus internationally recognised and was first included in the tenth revision of the International Statistical Classification of Diseases under "aseptic ischemic osteonecrosis".

Assessing stability of the bone bed with ultrasound

Whether implants can be embedded in the jaw for extended periods depends primarily on the condition of the bone. In the anterior of the lower jaw, conditions are

usually ideal. However, in the upper jaw, the bone is naturally less dense. The dentist often only notices whether an implant will stay in place here when drilling or when cutting the thread for the implant into the bone, and even this impression can be deceptive: "There is no reliable method for predicting the success of dental implant insertion before the dental procedure," according to Prof. Robert Sader from the clinic for oral and facial plastic surgery at the Frankfurt university hospital in Germany. One solution is determining the density of the bone using ultrasound. This is because the propagation of ultrasonic waves in bone tissue depends on its density: the more stable the bone, the faster the waves move through it. Scientists at Johannes Gutenberg University Mainz have now investigated for the first time whether the method also allows conclusions to be drawn on the condition of the jawbone. Prof. Bilal Al-Nawas from the clinic for oral and maxillofacial surgery has investigated ultrasonic transmission velocity (UTV) in the lower jaw and pelvic bone of pigs. The results indicate that UTV is an accurate measurement of the level of mineralisation: bone sections with a critical bone density that would prohibit implant insertion were detected by the method in 75% of cases. Thus, determining the quality of the bone in the jaw with the help of ultrasound may even be more effective than radiography.[9] Torque and UTV were used to assess the bone implant sites in these studies.[10] UTV can be used to analyse the mechanical properties of the teeth after *in vitro*, *in situ* and *in vivo* loading.[11]

Is there an intra-oral technique to measure bone density?

The fundamental suitability of ultrasound for determining bone density and thus the length of time implants are in place has already been scientifically validated.[9–11] With ultrasonic devices, dentists can check jawbone quality to predict the success of dental implant insertion. The innovative CaviTAU® is a suitable ultrasonic device for transferring the mentioned findings into routine daily practice: CaviTAU® therefore offers application-oriented reliability for dental implantologists and prevents premature implant loss.[12]

What is CaviTAU®?

CaviTAU® generates an ultrasonic wave and passes that wave through the jawbone. This wave is produced by an extra-oral transmitter and then detected and measured by a receiving unit that is positioned intra-orally. Both parts (i.e. the sender and receiving unit) are fixed in a parallel position using a single handpiece. The size of the CaviTAU® receiving unit is configured such that it may be easily placed inside the mouth of a patient. CaviTAU® uses 91 piezoelectric elements that are arranged hexagonally. The jawbone must be positioned between the two parts of the measuring unit. With respect to the parts

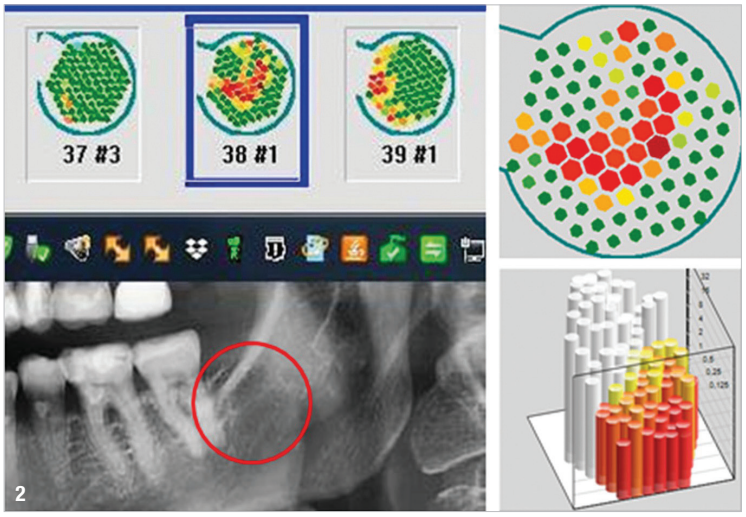

Fig. 2: Example of an inconspicuous radiographic image in area #38 (red circle). In contrast, measurement of bone density in area #38 compared with healthy tooth #37 (top left) with ultrasound shows conspicuous red areas in 2D and 3D representation (right).

of the measuring unit to be placed inside the patient's mouth, the acoustic coupling between those parts and the alveolar ridge is performed with the aid of a semi-solid gel. The contact between the jawbone and both the extra-oral ultrasonic transmitter and intra-oral ultrasonic receiver (Fig. 1, left) is optimised and individualised using a special ultrasonic gel cushion that was developed for this purpose. The results are shown on a colour monitor that displays different colours depending on the degree of attenuation. Thanks to the latest computerised miniaturisation of the measuring units, CaviTAU® now offers a wide range of applications. The CaviTAU® display is able to capture the following physical structures in the dentoalveolar region, with the corresponding colour variations of 91 colour columns per cm^2: (a) solid bone in the marginal cortical area (green or white/light blue); (b) healthy medullary cancellous bone (green or white/light blue); (c) chronic inflammatory medullary cancellous bone with fatty degenerative components (red or black/dark blue); (d) fatty nerve structures (yellow/light blue); and (e) extremely dense and complex structures such as teeth, implants and crowns (green or white/light blue; Fig. 2).

How to forecast the success of dental implants

The measurement of the quantitative ultrasonic transmission rate (UTV) has been established as an innovative, objective, valid and reliable method for repeated, non-invasive measurements of bone quality before dental implantation.[9–12] The use of a small UTV device in this study enabled the recording of intra-oral UTV values in a large and heterogeneous patient population.[12] Assessment of alveolar ridge UTV could provide a method for identifying critical bone quality before implant insertion or for monitoring bone healing (mineralisation) after

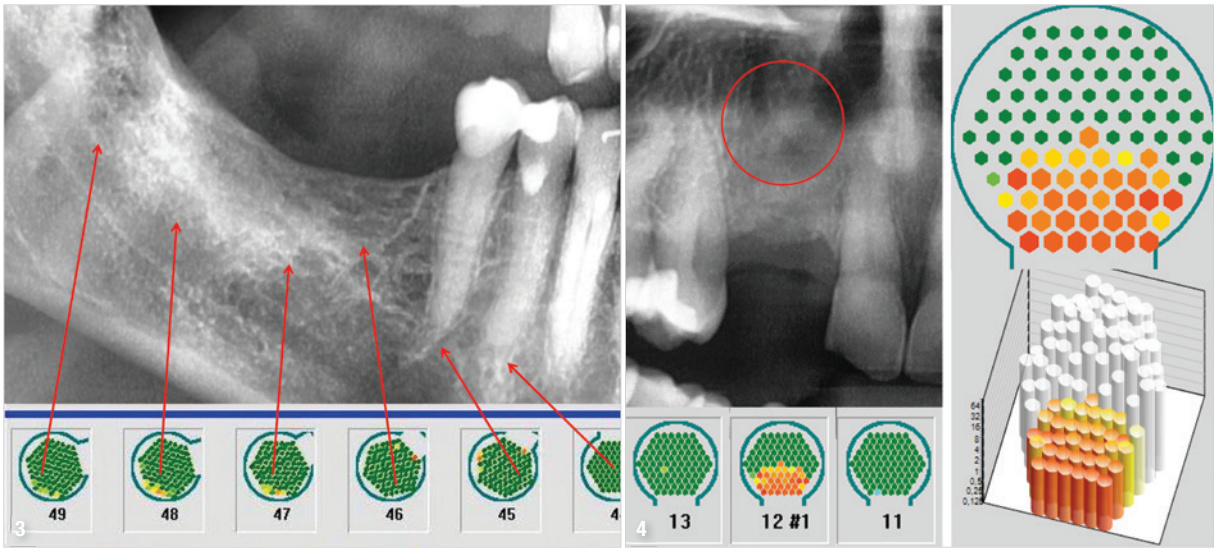

Fig. 3: Good example of a perfect state of mineralisation in a lower jawbone, which is characterised by widespread green colouration in CaviTAU® and is suitable for a prospectively unproblematic insertion of implants. This finding is consistent with good conditions for a long implant lifetime. **Fig. 4:** Example of an inconspicuous radiographic image in area #12 (red circle). In contrast, measurement of bone density in area #38 compared with healthy neighbouring teeth #13 and 11 (below left) with ultrasound shows conspicuous red areas in 2D and 3D representation (right).

augmentation procedures.[13] The main advantages of ultrasound are that it is non-ionising, non-invasive, tolerable and available at relatively low costs. Furthermore, the examination is not a complicated process and can be easily performed by clinicians.[14] CaviTAU® was additionally and specifically developed to detect and avoid traumatic defective jawbone areas or non-exposed early-stage bisphosphonate-induced osteonecrosis at implantation sites. For more information on this relatively unknown problem area, please also refer to our own PubMed-indexed publication.[15]

Does CaviTAU® display load-free jawbone for non-problematic and durable implant insertion?

Case 1: will implant insertion be successful in these jaw areas, and will implants last for a long time? The answer is yes (Fig. 3). Case 2: will implant insertion be successful in this jaw area,[12] and will implants last for a long time? The answer is no (Fig. 4).

Conclusion

The newly developed CaviTAU® ultrasonography device is able to detect and localise diminished bone density caused by the fatty degenerative dissolution of medullary trabecular structures in the jawbone (FDOJ).[16] As other studies have confirmed,[17,18] ultrasonography is a low-cost and efficient means of assessing jawbone health, and this has been replicated with the use of the new CaviTAU® device presented here. This study established a new value using CaviTAU® which provides a reliable indicator of poor bone quality, rendering the device a useful tool for treatment planning strategies in implantology, as well as for fostering cooperation among professionals when assessing or treating osteo-immunological disease and linking such disease with the immune system. CaviTAU® thus provides a non-harmful alternative to the use of X-ray irradiation, which is increasingly being criticised,[19,20] particularly in view of more stringent radiation protection laws.[21] CaviTAU® represents a novel type of imaging acquisition process in dentistry and offers the ability to non-invasively assess hidden FDOJ in the human jawbone. CAVITAU® displays load-free jawbone for unproblematic and permanent implant insertion. Measuring bone density before implantation could avoid failures and protect dentists and patients from the early loss of implants in the daily practice.

Author details

References

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Patent

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Ceramic implant placement in a high-load posterior situation

A case report with four years of follow-up

Dr Alexandr Bortsov, Russia

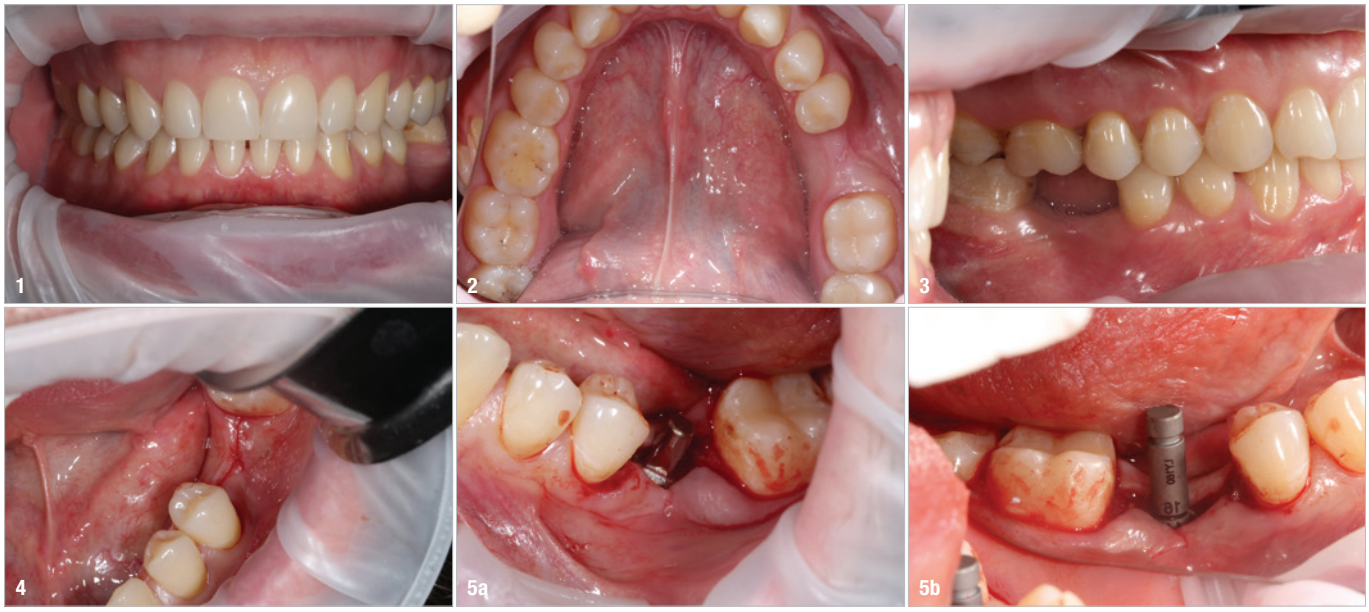

Fig. 1: Initial situation, frontal view. **Fig. 2:** Initial situation, occlusal view. **Fig. 3:** Initial situation, lateral view. **Fig. 4:** Incision. **Figs. 5a & b:** Checking implant position **(a)** and depth preparation **(b)**.

Dental implantation has become a mainstream treatment option, and most clinicians use titanium and titanium alloy implants in their practice. There is a growing patient demand for reliable, metal-free and naturally looking dental implants. Although niche, such demand is particularly pronounced in patients with a heightened allergic status who desire a highly aesthetic outcome. Zirconia implants are emerging as a viable solution to meet the demands of these patients. Clinically, ceramic implants offer the advantages of a natural tooth and root colour, superior soft-tissue healing and a reduced tendency to accumulate plaque. However, the patient concerns are usually centred on the mechan-

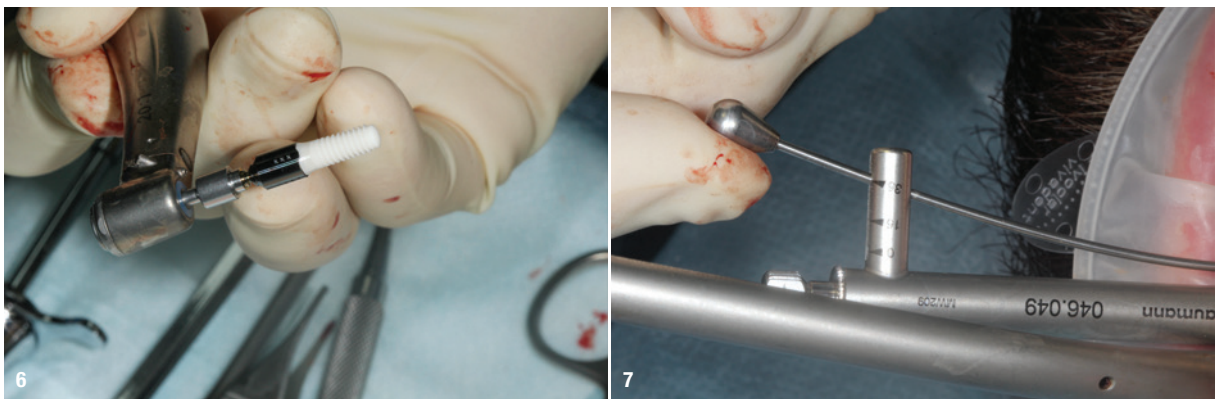

Fig. 6: Implant pick-up. **Fig. 7:** Inserting the implant with a torque of 35 Ncm.

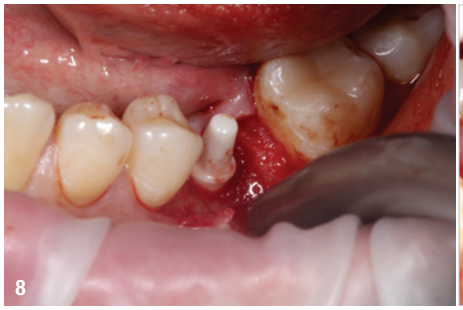
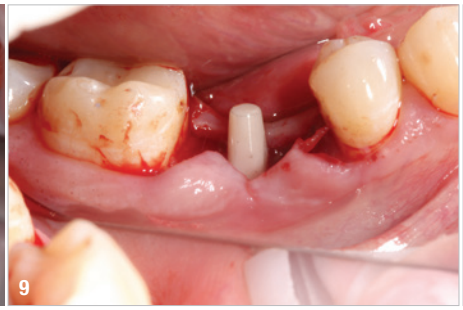
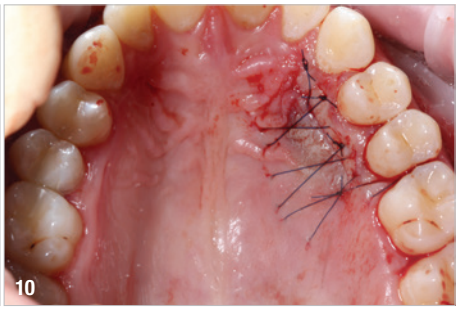

Fig. 8: Implant in final position. **Fig. 9:** Implant in final position, lateral view. **Fig. 10:** Suturing of the graft site.

ical stability of ceramic implants, particularly in the molar region with high masticatory forces. This clinical case report shows the 4-year follow-up of a Straumann® PURE ceramic implant placed to restore the first molar in the mandible.

Initial situation

A 32-year-old patient with a history of metal allergy and a heightened allergic status (increased IgE levels), without parafunctional habits, presented at the clinic for the replacement of missing tooth #36. The tooth had been removed more than five years ago and the patient had avoided restorations due to concerns about metal allergy. The patient wanted to have a metal-free restoration with a highly aesthetic outcome. The patient was also concerned about the functionality and mechanical strength of the restoration.

Treatment planning

During the clinical examination and the analysis of the radiographic image in the area of the extracted tooth, a combination of horizontal bone atrophy and a thin gingiva biotype were determined at the planned implant site (Figs. 1–3). The vertical bone dimension allowed the placement of an implant with 4.1 mm in diameter and 10 mm in length. Given the patient's medical history, high aesthetic expectations and the thin gingiva biotype, it was decided to place the Straumann® PURE monotype ceramic implant. To optimise the soft-tissue volume, soft-tissue augmentation with a direct temporary crown was planned. The Straumann® PURE Monotype Ceramic Implant with full-ceramic crown would, in this clinical case, provide a metal-free, aesthetic and mechanically strong restorative solution.

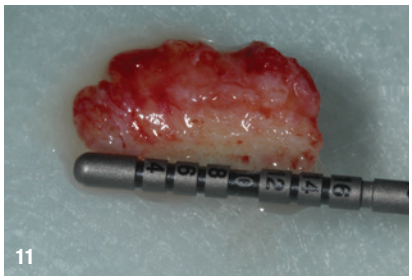
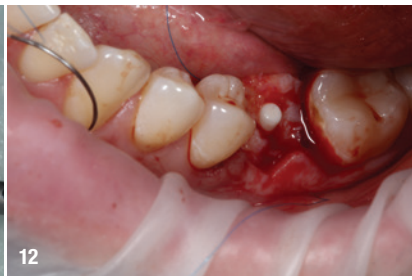

Fig. 11: Soft tissue graft. **Fig. 12:** Fixation of the soft tissue graft.

Surgical procedure

Under local anaesthesia, a marginal incision to reflect a mucoperiosteal flap was made at the intervention site (Fig. 4). The basic and fine implant bed preparation was done according to the Straumann® PURE Monotype surgical protocol. Since the implant is a one-piece monotype, the position indicator was carefully used to ensure the correct final position of the implant (Fig. 5a). A depth gauge was used to calculate the implant immersion depth (Fig. 5b). The use of a profile drill during the fine implant bed preparation avoided excessive compression of the cortical bone and facilitated the insertion torque of 35 Ncm (Figs. 6 & 7). To create an optimal soft tissue volume and attachment, the implant was placed 1.8 mm above the edge of the alveolar bone (Figs. 8 & 9).

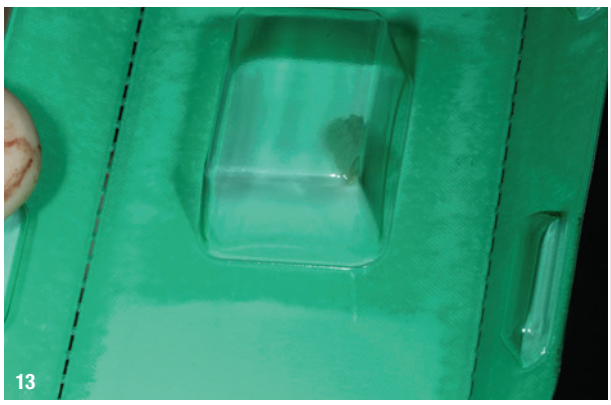
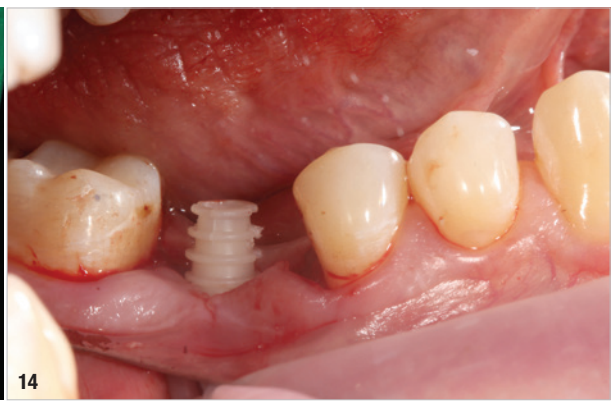

Fig. 13: Provisional coping. **Fig. 14:** Checking the fit of the provisional coping.


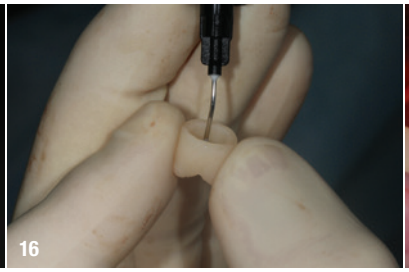
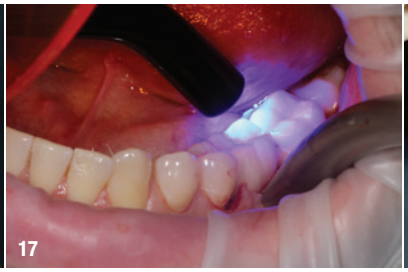


Fig. 15: Spacing of the provisional crown. **Fig. 16:** Filling up the provisional crown with relining material. **Fig. 17:** Provisional crown–light-cure bonding to coping. **Fig. 18:** Finishing and polishing of the provisional crown.

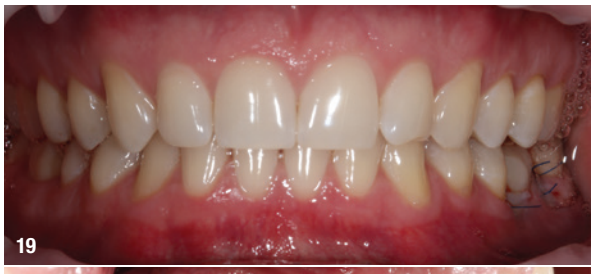
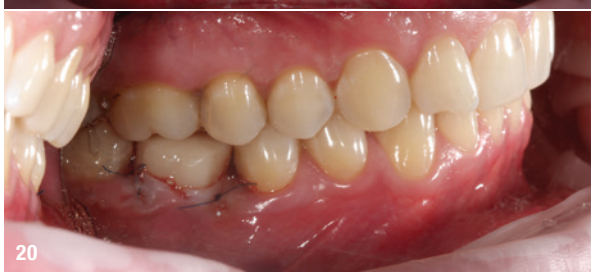

Fig. 19: Provisional crown in place, frontal view. **Fig. 20:** Provisional crown in place, lateral view.

The palatal region was selected as the donor area for the harvesting of the subepithelial connective tissue graft (Fig. 10). The isolated soft tissue graft (Fig. 11) was fixed with 5/0 interrupted sutures in the recipient area (Fig. 12).

Prosthetic procedure

Conventional closed-tray impression taking was done using the PURE Impression Cap. Immediate temporisation was planned. The provisional crown was made using the wax-up method with silicone key and the PURE Temporary Coping (Figs. 13 & 14). The provisional crown was made from the Luxatemp material and was then fixed (Figs. 15–18). The tissue-level design of the transgingival collar of the PURE Monotype, together with the temporary crown, effectively facilitated the soft tissue management and ensured that the tissue healing was not disturbed at any time after implant placement (Figs. 19 & 20). Such a built-in emergence profile helps make the prosthetic procedures straightforward. After 4 months, the final full-ceramic e.max® crown was fabricated and fixed.

Treatment outcome

The patient was satisfied with the functional and aesthetic outcomes and attended annual follow-ups. The 4-year follow-up showed a healthy volume of peri-implant soft tissues and the radiographic examination revealed stable marginal bone levels (Figs. 21–24).

about the author

Alexandr Bortsov, DDS is a prosthetically active surgeon. His focus areas are Implantology and Guided Surgery, Aesthetic Dentistry, and Digital Dentistry. He graduated in Dental Surgery from the State University of South Ural MoH, Russia. Dr Bortsov is the Director of the "Dental Art" clinic in Chelyabinsk, Russia. In addition, he is the Director of the ITI Study Club, also in Chelyabinsk, Russia.

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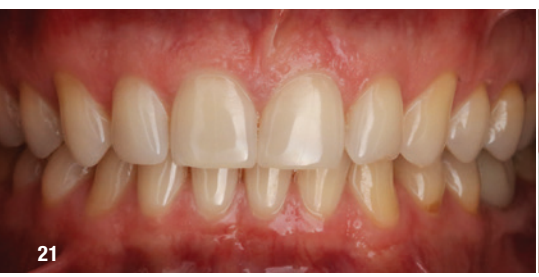
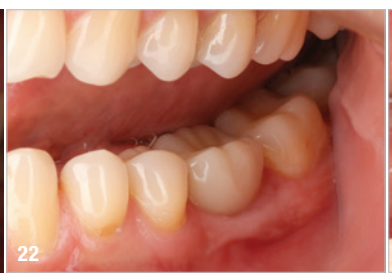
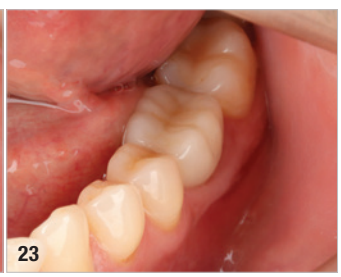
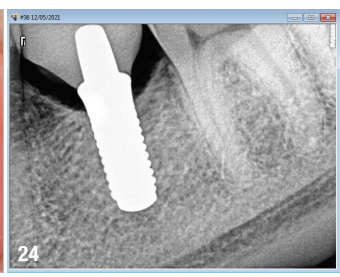

Fig. 21: Final crown after 4 years, frontal view. **Fig. 22:** Final crown after 4 years, lateral view. **Fig. 23:** Stable soft tissue volume, 4-year follow-up. **Fig. 24:** The control radiograph at the 4-year follow-up showed stable bone levels.

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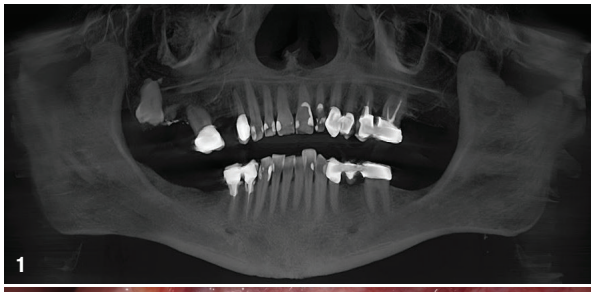
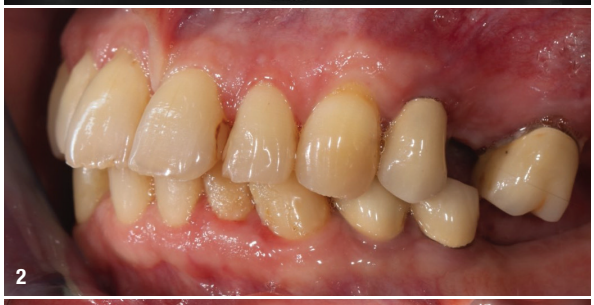
Floating implants with ceramic implants and the BISS

Clinical application of a new implant stabilisation system

Prof. Shahram Ghanaati, Dr Karl Ulrich Volz, Dr Rebekka Hueber & Caroline Vollmann, Germany & Switzerland

Bone atrophy is still seen as a challenge or even an obstacle to successful implant placement in both the upper and lower jaw, since osseointegration of the implant depends largely on rigid and motionless anchorage in the bone. Often, however, the bone is too soft or too severely reduced to allow stable placement of an implant. The latter problem is especially common in the sinus region. In a certain sense, this is paradoxical, as implantation is the most targeted and natural way of counteracting further bone loss. Progressive bone loss affects not only the stability, functionality and longevity of a planned dental prosthesis but also the extra-oral aesthetics. Bone loss can be caused by trauma and infection on the one hand and—more frequently—by generalised periodontal disease or tooth extraction on the other. Important bone parts such as the buccal lamella are often lost during extraction in particular. Perforation can also occur, negatively affecting the maxillary sinus. However, even in the case of an extraction without complications, increasing atrophy of the alveolar ridge occurs over time. In the maxillary posterior region, the absence of roots leads to increasing pneumatisation of the maxillary sinus with advancing age and thus to further bone loss.





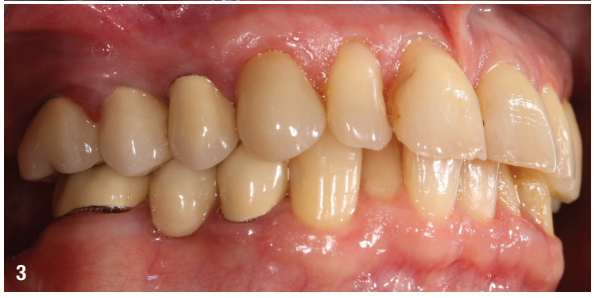


Fig. 1: Pre-op dental panoramic tomogram. Severe bone loss in the first and second quadrants. **Fig. 2:** Tooth #16 not worth preserving and generalised bone loss and severe vertical bone collapse in region #15. **Fig. 3:** Teeth #25 and 26 not worth preserving and generalised bone loss in the maxillary posterior region.

If the patient and the dentist decide in favour of an implant restoration despite the small volume of residual bone, the standard dental consensus for large multidimensional bone defects is still bone augmentation followed by late implant placement. In recent decades, various multistage guided bone regeneration techniques have basically fulfilled their purpose of restoring implantable space. However, these procedures often result in too much compression on the augmented surface, which can have a negative impact on adequate bone healing. On the one hand, this affects vascularisation: the more compressed the augmentation, the lower the probability of an efficient blood vessel supply developing, as there is insufficient space for the blood vessels to proliferate. Owing to their density, bone blocks are also often not connected to the blood supply, especially if the blood supply is coming centrally from the middle of the jaw and not peripherally, as is primarily the case in the dorsal mandible. On the other hand, it is often impossible to ensure the positional stability of the free augmentation and protect it against the effects of any forces it might sustain. For this reason, osteosynthesis plates, titanium-reinforced PTFE membranes or titanium mesh are used for space stabilisation.[1–5]

The problem with freely applied bone substitute materials is that the bone is frequently built up in the wrong location for reasons of simplicity. For example, there is often a lack of bone in the dorsal maxilla in the direction of the oral cavity (coronal) because the bone is increasingly modelled in the direction of the maxillary sinus by performing

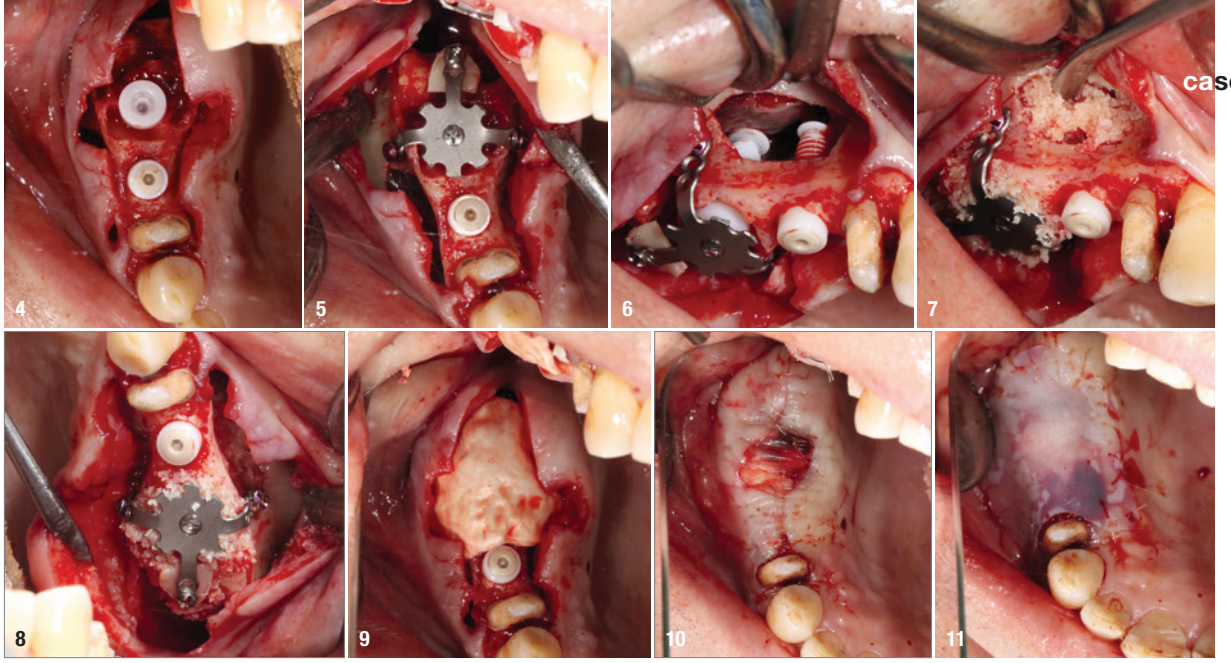


Fig. 4: Placement of two SDS ceramic sinus implants after external lift in regions #15 and 16. Implant #16, placed immediately, did not achieve sufficient primary stability in this case. **Figs. 5 & 6:** Fixation of a single-unit cage from the BISS using cortical screws in the surrounding bone to provide secondary stabilisation of implant #16, which was placed immediately and did not achieve primary stability, as a tent pole. Placement of a Khoury bone plate on the distal cage arm. **Figs. 7 & 8:** Allogeneic bone substitute material and autologous bone chips fill the space created. The volume should ideally be slightly over-modelled to allow for physiological shrinkage. **Fig. 9:** A resorbable collagen membrane protects the bone substitute material in the augmented space. The solid platelet-rich fibrin matrices overlying the bone substitute material promote wound healing and provide better soft-tissue management. **Fig. 10:** Surgical area after approximation of the wound edges using resorbable sutures. Apical mattress sutures ensured that there was no tensile stress in the soft tissue of the surgical site. **Fig. 11:** A PTFE membrane was temporarily sutured over the surgical site in accordance with the open healing protocol.

an external lift. As a result, the implant is located too far cranially, leading to an altered anatomy of the maxillary sinus area and an extended crown on the implant. This in turn is associated with an increased risk of loosening or fracture of the implant. Although positional stability of bone grafts can at least be ensured by certain established systems, these have invariably been associated with multiple surgical procedures. This not only significantly increases the likelihood of scar plate formation in the surgical area, but also places a significant burden on the surgeon's and, above all, the patient's time, financial and psychological resources. For these reasons, strategies for more immediate treatment options are desirable in the future in order to perform bone augmentation and implant placement as close together as possible.

Design, mechanics and functional principle of the concept

The BISS—Bone Implant Stabilization System—developed by the authors enables exactly this approach and pursues the goal of offering the patient implant-supported dental prostheses in almost any initial situation. The functional principles of the system have been proved scientifically in a range of studies.[1–20] They form the prerequisite for successful bone formation and will be illustrated in this section using the "tent pole umbrella" principle: a tent pole holds the required space in a stable position coronally and/or cranially, and an umbrella attached to it increases the volume. The larger the space created (shaded area), the more voluminous the bone gain.[21–25] The main component of the concept is the BISS cage, which embodies the umbrella according to the principle described and gives the body's own osteoinductive tissues, such as the periosteum and the Schneiderian membrane, space for regeneration. The cage consists of a titanium body and titanium arms. The body has one or more interfaces at its base—making it a single, double,

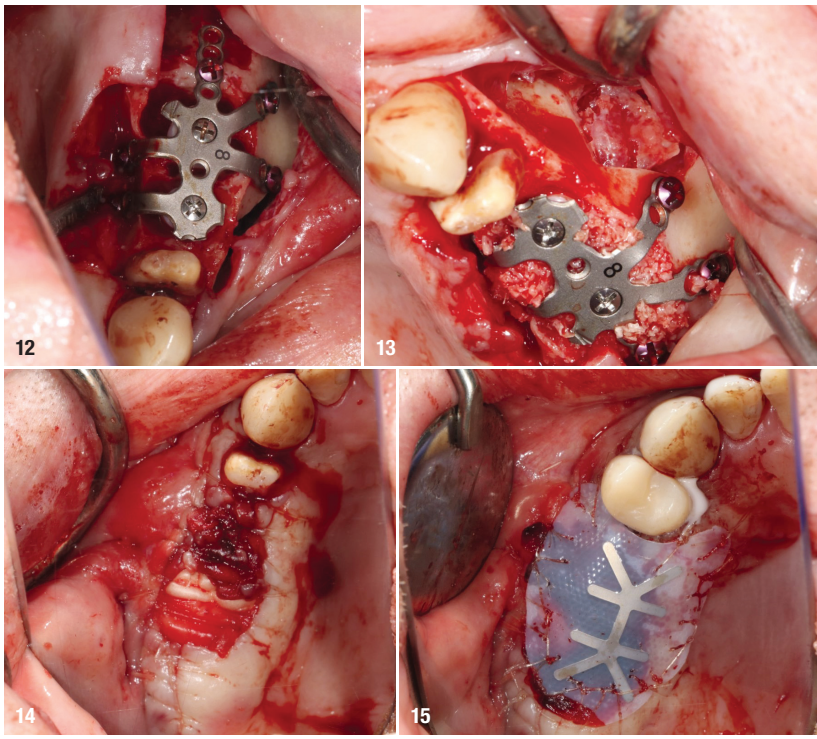


Fig. 12: Triple cage (used as a double cage) *in situ*. The primary stable implant #25 stabilised the cage in addition to the cortical screws so that the cage in turn could fix the floating implant #26 in the desired position. **Fig. 13:** Allogeneic bone substitute material and autologous bone chips fill the space created. Ideally, the volume should be slightly over-modelled to allow for physiological shrinkage. **Fig. 14:** Surgical area after approximation of the wound edges using resorbable suture material. **Fig. 15:** A titanium-reinforced PTFE membrane was temporarily sutured over the surgical area in accordance with the open healing protocol. Apical mattress sutures ensured that there was no tensile stress in the soft tissue of the surgical area.

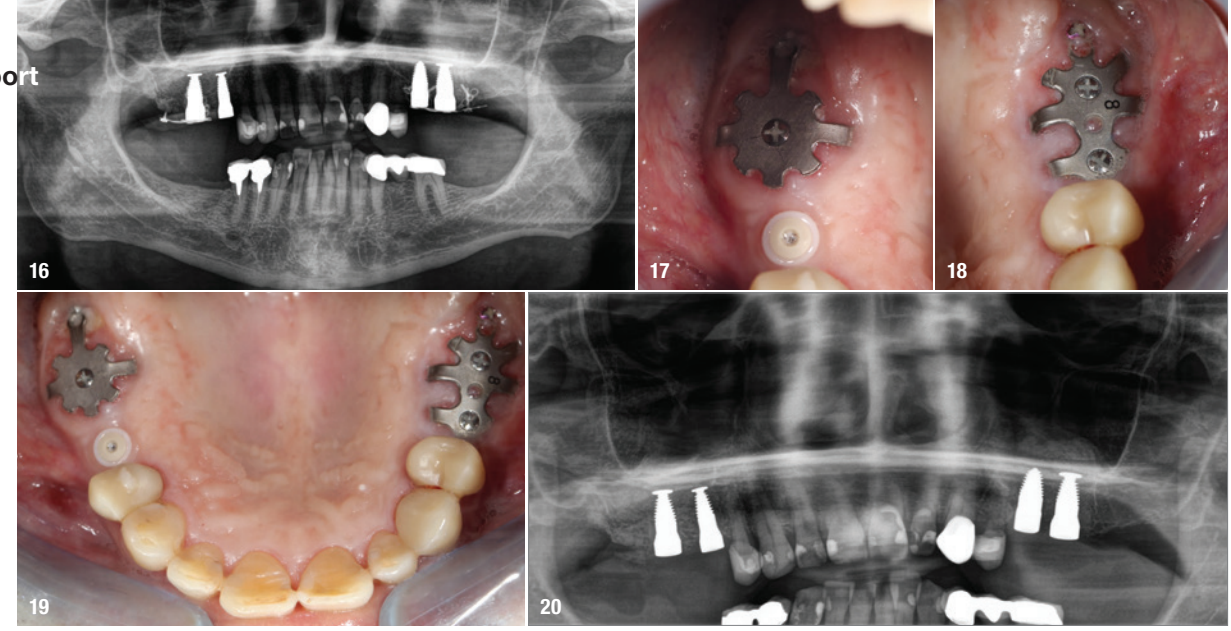


Fig. 16: Immediate post-op dental panoramic tomogram with BISS cage and SDS ceramic implants *in situ* in the first and second quadrants, respectively. **Figs. 17–19:** Almost eight weeks post-op and after removal of the PTFE membranes. **Fig. 20:** Five-month post-op dental panoramic tomogram. Dimensionally stable bone had been generated and all four implants had osseointegrated.

triple or quadruple cage. Umbrella screws can be used as tent poles; they are screwed firmly into the interfaces of the cages with their metric thread in the coronal–apical direction directly below the screw head and fixed in the bone with the self-tapping thread. In an ideal scenario, ceramic implants which can be firmly screwed in to the interfaces of the cage can be used as the tent poles instead of the umbrella screws.

Owing to their morphology, zirconium dioxide ceramic implants with aggressive apical threads offer the possibility of achieving unexpectedly high stability in 3D bone collapses. Depending on the bone situation, a distinction is made between two different application techniques with regard to the one-stage combination technique of cage and ceramic implants. If there is very little residual bone and the primary stability of the ceramic implants is not sufficiently achievable, they are stabilised secondarily by the cage. An implant of this kind can even be placed completely without bone contact ("floating implant") and osseointegrate in the long term. The arms can then be fixed to the residual bone with the cortical screws for stabilisation as often as required—both orally and buccally as well as between the implants on the coronal residual bone. In bone defects in which sufficient primary stability of the implants can be achieved, the implants stabilise the cage, which in this case is only used as the umbrella. In this situation, the arms can be bent into the desired position without being screwed to the bone. In any case, the arms should be shortened such that the last screw hole of the arm just touches solid bone. The system also offers the possibility of combining these techniques using umbrella screws, primary stable implants or floating implants within a cage with multiple interfaces.

A particular advantage is that the implants can be placed at the desired height or target position (corresponding to the prosthetic plateau at tissue level) without having to rely on bone in this area. The cavity created should ideally be filled with autologous bone chips or bone graft substitute, although allogenic bone substitute materials show the best results in large-volume augmentation.[13,26] According to the situation, the arms of the cage can always be bent, adapted and, if necessary, shortened in such a way that they best protect the bone substitute materials mechanically. Depending on the desired cavity anatomy, the arms can also serve as a holder for a bone disc screwed to them and thus increase the shielding effect in the sense of the Khoury technique. Because the ceramic implants are tissue-level implants with a tulip height of 3 mm (SDS Swiss Dental Solutions) and the prosthetic plateau is directly at the level of the inside of the cage when used simultaneously with the system, a physiological resorption of 3 mm is automatically taken into account by filling the cage completely to the top with bone substitute materials.

Perioperative aspects

Unlike a titanium implant, the ceramic implant heals in an immunologically neutral way.[27–36] Another decisive factor for successful healing and stabilisation is that the patient's bone metabolism is adequately adjusted. Therefore, micronutrients that are particularly relevant for sufficient bone metabolism, such as vitamin D_3, vitamin K_2 and magnesium, as well as the anti-inflammatory omega-3 fatty acid, the antioxidant vitamin C and a low low-density lipoprotein value as a pro-inflammatory marker, play an important role in the preoperative diagnosis.[37–48,20,49] Usually, primary coverage cannot be achieved in connection with the BISS insertion without traumatising the periosteum. Instead of vertical unloading incisions and periosteal slitting, Dr Alain Simonpieri's Soft Brushing Technique has proved to be an efficient and minimally invasive method for flap mobilisation. To avoid pressure on the augmentation, primary wound closure should not be attempted. It is thus recommended to cover the cage with a collagen membrane, several layers of advanced platelet-rich fibrin matrices and—for temporary protection—a PTFE membrane placed over the approximated wound

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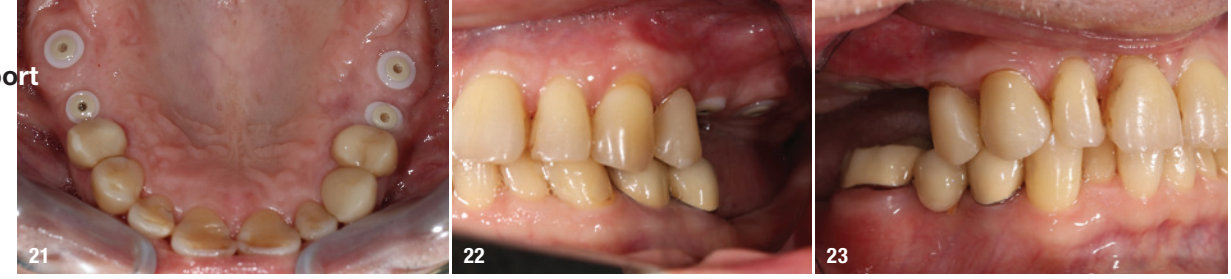


Figs. 21–23: After six months, all four ceramic implants had healed without irritation and could be provisionally restored or mechanically loaded.

margins as the final layer, according to Prof. Ghanaati's Open Healing Concept.[50,51] The PTFE membrane is sewn over the approximated wound margins on the alveolar ridge and should be removed after approximately one week or as soon as free epithelialisation of the wound margins over the augmentation is complete. It is important that the traction on the wound margins is completely

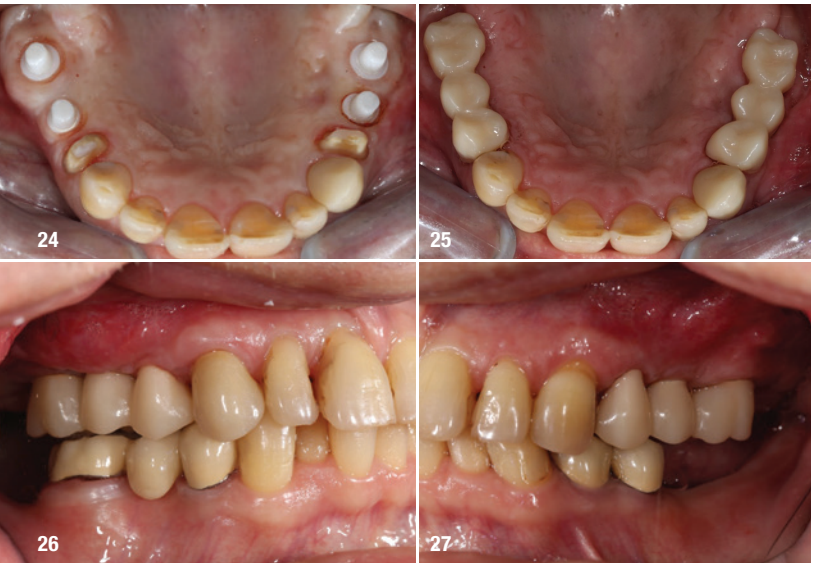


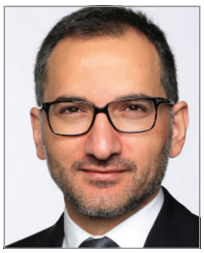
Fig. 24: The abutments were cemented on to the two-piece ceramic implants for the temporary restoration and additionally screw-retained. **Figs. 25–27:** After six months, the four stable ceramic implants were restored with long-term temporary restorations.

absorbed, which can best be achieved by placing a sufficient number of apical mattress sutures at least 10 mm above or below the wound margins. If this soft-tissue management protocol is used correctly, the main advantages are that patients usually experience very little swelling and pain, the vestibulum is preserved or even improved, and a fixed keratinised gingiva is created over the graft. The cage should be removed after four to six months. In this context, it is advisable to document the insertion day (photographs and sketches) so that the exact screw positions can be reproduced and the removal of the cage can be performed in a minimally invasive manner. For this reason, it is also recommended to remove all unnecessary arms on the day of insertion and to shorten the remaining arms as much as possible in order to make removal of the cage easier.

Conclusion

Physiological bone reconstruction follows certain biological laws. Provided that the patient's bone metabolism is functioning properly, bone growth can be supported by activating growth factors and by accelerating wound and bone healing. Because the Schneiderian membrane (endosteum) and the periosteum have osteoinductive effects, they help stabilise the volume over a defined period and maintain it in the long term, two of the most important measures of successful bone grafting. This, in turn, is based on adequate immobilisation of the graft and keeping it away from any compressive and tensile forces. The system presented here is capable of fulfilling these prerequisites and (re)generating high-quality bone when used correctly according to the tent pole umbrella principle. In addition, the combination of the BISS cage and ceramic implants provides an immediate solution for cases that appear unsuitable for (immediate) implant placement. The method, which can be implemented in a single session, not only reduces the psychological hurdle for the patient, but also has a number of advantages from a medical and health point of view. The healing period and the time until definitive restoration are shortened, and ineffective use of resources in terms of costs, time and effort, as well as repeated traumatisation of the tissue, can be specifically counteracted with the BISS system, which has been clinically proved to be successful multiple times. The guiding principle of the system can be summarised as follows: rather than first augmenting and then drilling away bone in order to place an implant after the graft has healed, bone is regenerated directly in the defect area.

about the authors



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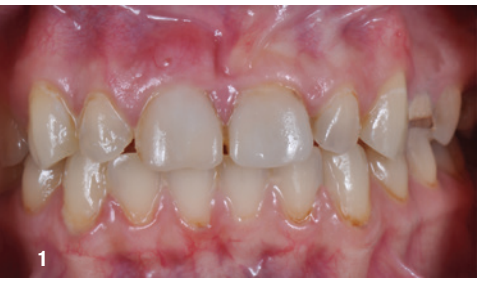
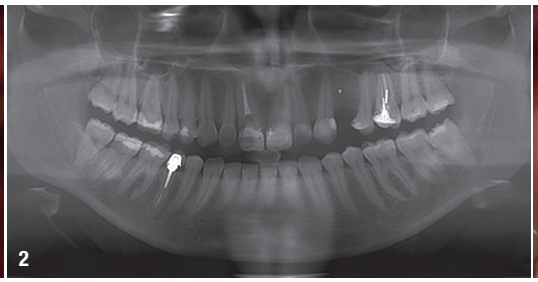




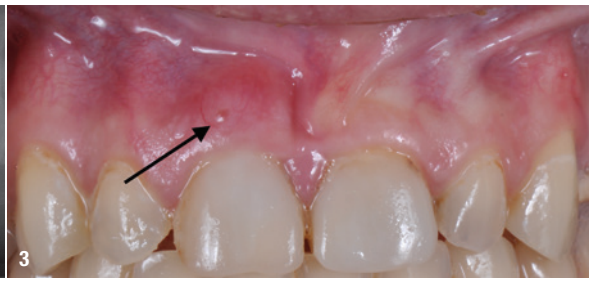
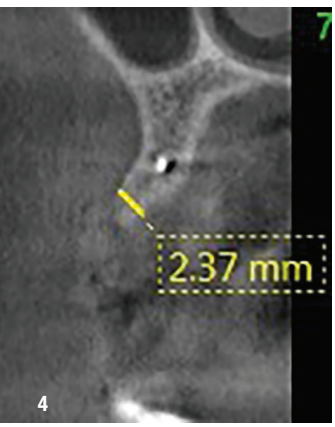
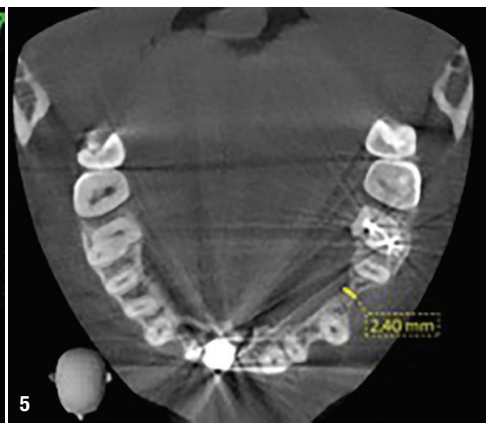


Fig. 1: Pre-op intra-oral view. **Fig. 2:** Pre-op panoramic radiograph. **Fig. 3:** Fistula formation at tooth #11.

Introduction

In recent years, there has been a tendency to avoid the use of metals in dentistry. On the one hand, patients demand aesthetic solutions, and from this point of view, metallic materials are of course inferior to ceramics. On the other hand, there is also a steadily growing number of patients who, for biological reasons, do not want any metallic materials in the oral cavity. Ceramic implants are thus increasingly perceived as an alternative to titanium implants that meet increasingly heightened aesthetic demand. The only ceramic material that currently meets the requirements for strength, biocompatibility and aesthetics is zirconium dioxide (zirconia). The fragility of zirconia materials is known. For this reason, in recent years, reinforced single-piece and even two-piece zirconia implants have started to be produced in different diameters. One-piece zirconia implants are preferred in the posterior region, where occlusal forces are intense, and two-piece zirconia implants are preferred in the anterior region. While immediate implant placement after tooth extraction is a frequently preferred method, especially in titanium materials, to prevent soft-tissue loss and bone resorption, methods such as platelet-rich fibrin (PRF) use and ozone applications to increase regeneration have been used extensively in the clinic in recent years.[1,2] Although there have not been enough clinical cases to state this definitively, the placement of zirconia implants in immediate extraction sockets together with PRF, ozone and autogenous or non-autogenous grafting materials gives very successful results.





Figs. 4 & 5: CBCT image of insufficient bone volume at area #24.

Initial clinical situation

A 35-year-old female patient presented with a request for general restoration of her teeth (Fig. 1). The patient was healthy and had an unremarkable medical history. The patient had problems in two different areas for which implant surgery could be considered. The first was a dental gap where tooth #24 had been missing for many years. The second was tooth #11 that had undergone root canal therapy previously (Fig. 2). The tooth, which was reported as mobile by the patient, was observed to have a fistula formation buccally (Fig. 3). It was also noticed that this tooth had a horizontal crown fracture under the gingiva. The treatment of these two areas is the subject of this case report.

Treatment planning and preoperative measures

A standard treatment planning protocol was followed. A CBCT scan was taken in order to evaluate the bone volume in the edentulous area and to evaluate tooth #11. After evaluation with CBCT and clinical intra-oral examination, a decision was made to extract the mobile tooth #11 and to place a zirconia implant in the edentulous area immediately. Since the defect was in the aesthetic anterior region and the patient had a thin gingival biotype, it was decided to insert a two-piece zirconia implant to avoid a greyish appearance and to satisfy the patient's expectations maximally. The width of the bone in the edentulous area #24 was found to be insufficient for implantation (Figs. 4 & 5). It was decided to increase the bone thickness by autogenous augmentation and then insert the implant. Every aspect of the treatment was shared with the patient. Moreover, she was given vitamin C and D supplements for one week preoperatively in order to strengthen the immune system and accordingly to provide better healing of bone and soft tissue. The use of the same vitamin supplements was continued for two weeks postoperatively.

Surgical procedure of tooth #11

Since the procedure would be in the aesthetic anterior region, it was intended that the patient would not be toothless after the surgical procedure. Before starting the surgical procedure, impressions were taken from the patient for a provisional restoration. After local anaesthesia, the extraction of the fractured tooth #11 was done atraumatically. A flap was opened in order to be atraumatic in the extraction of the tooth, whose crown and root were separated from each other (Fig. 6). At first, a dental extraction forceps was used in the root extraction of the tooth after the crown had been removed. In order not to damage the surrounding tissue and not to traumatise the soft tissue, the tooth was extracted with minimal movements without using an elevator. After the extraction of the tooth, the infected tissue in the area was completely cleaned with curetting. Severe loss of the anterior wall of bone due to the fractured crown was seen at the area. Ozone (Ozone DTA J-500, APOZA) was applied for 60 seconds to ensure disinfection of the extraction socket (Fig. 7). With ozone gas, it was aimed to decrease the amount of bacteria at the region,[3] increase the amount of oxygen carried by accelerating the blood circulation[4] and contribute to the decontamination around the implant.[5] The cavity was prepared using zirconia drills (ZiBone, COHO Biomedical Technology) in combination with metal drills (Zeramex, Dentalpoint; Figs. 8 & 9). Autologous bone chips were collected during the implant cavity preparation. Meanwhile, two tubes of blood were taken from the patient's forearm. Vacuum blood collection tubes (two 10 ml tubes) were used for preparing the PRF. The blood samples taken were centrifuged horizontally

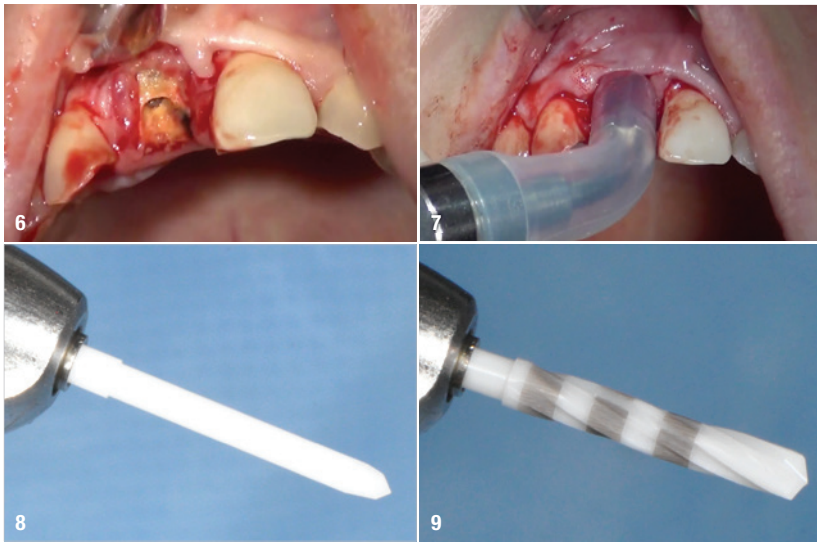


Fig. 6: Granulation tissue at fractured tooth #11. **Fig. 7:** Ozone application to the extraction socket of tooth #11. **Figs. 8 & 9:** Ceramic drills.

for 8 minutes at 2,300 rpm in the HORIZON 6 Flex PRF device (Drucker Diagnostics) to make them ready for use in the PRF application (Figs. 10–12).

After preparation of the implant socket, one piece of PRF membrane was inserted into the cavity together with a two-piece zirconia implant (Zeramex; diameter: 5.5 mm; length: 10.0 mm), achieving primary stability (Figs. 13–15). The implant collar was sunk 1 mm into the bone to ensure primary stability and enhance aesthetics by promoting a good emergence profile. Gaps around the implant were supported by a mixture of liquid PRF, autologous bone

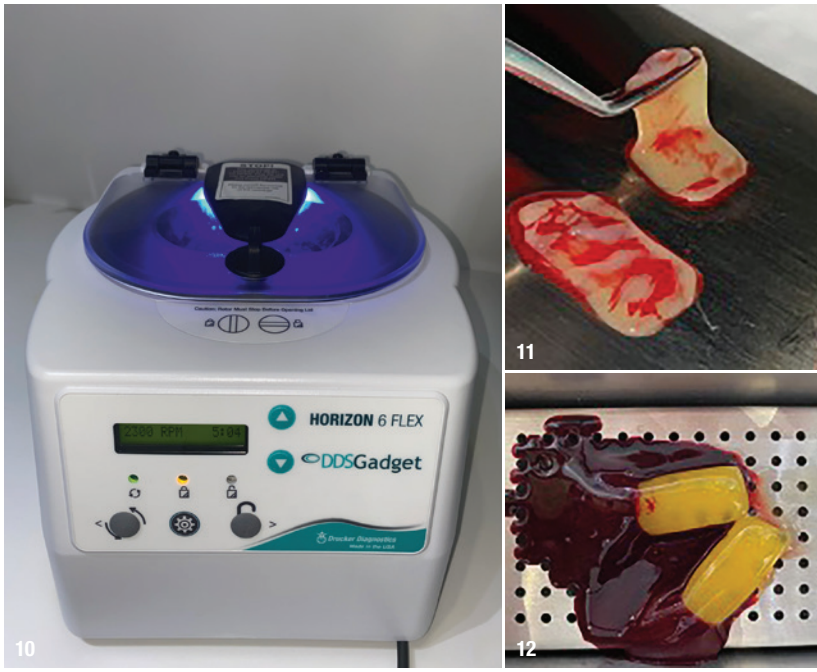


Fig. 10: The centrifuge used. **Figs. 11 & 12:** Platelet-rich fibrin production.

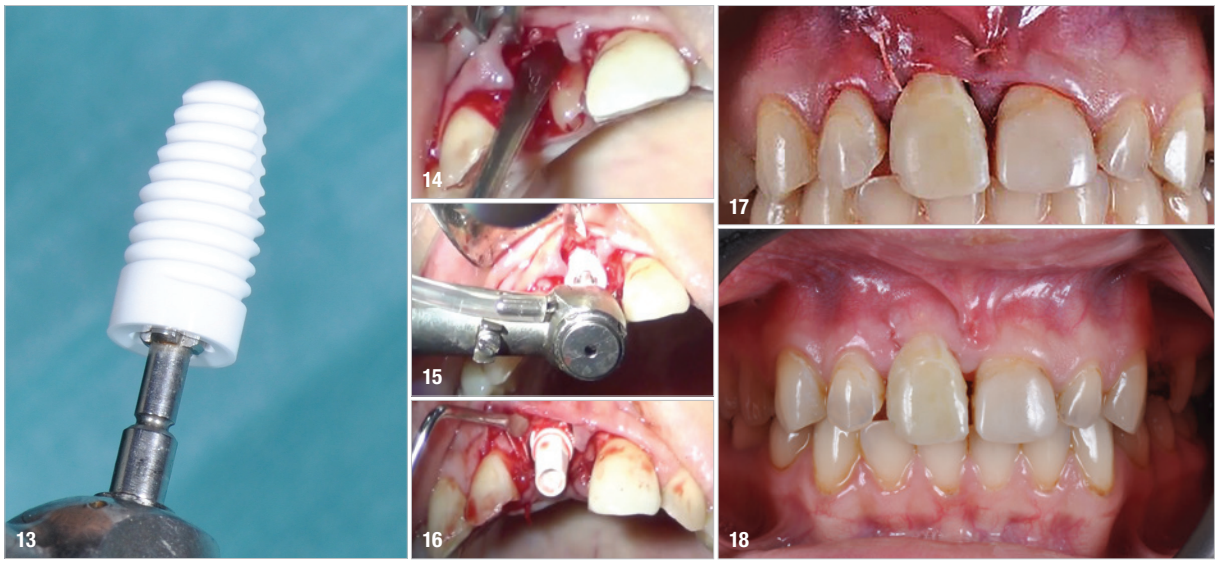
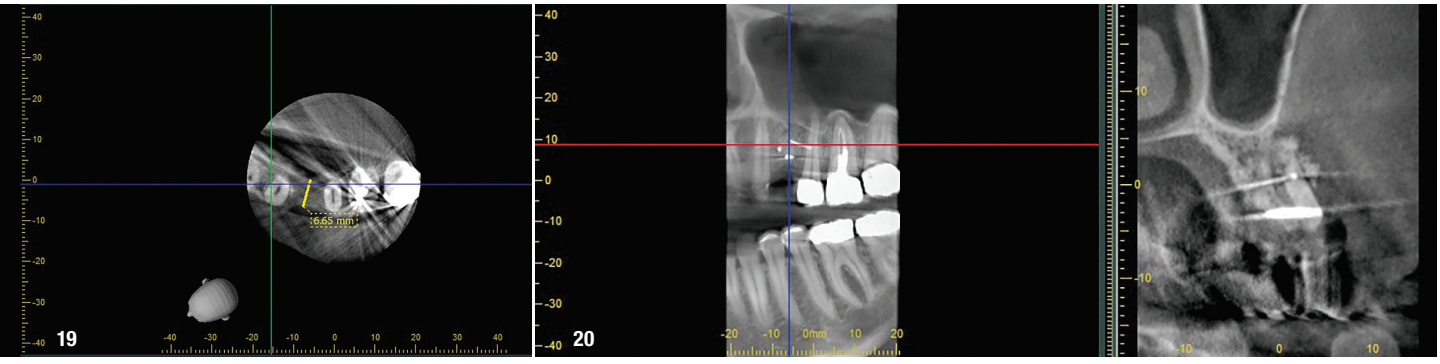


Fig. 13: Two-piece zirconia implant. **Fig. 14:** Platelet-rich fibrin insertion into the extraction socket of tooth #11. **Fig. 15:** Placement of the zirconia implant into the socket over the platelet-rich fibrin. **Fig. 16:** Seating of a 1 mm gingival height straight abutment over the implant. **Fig. 17:** Immediate loading of the provisional crown. **Fig. 18:** Post-op situation after two weeks of healing at area #11.

chips and solid PRF. It was aimed to accelerate the healing of hard and soft tissue in the area with PRF application. At the same time, this application contributed to the increase of vascularisation and regeneration.[6] In this surgery, the use of an artificial bone graft was not required. A straight 1 mm abutment was placed on to the implant (Fig. 16), and the surgical area was stitched up with resorbable VICRYL RAPIDE 4/0 surgical suture thread (Ethicon). After the wound area had been sutured, a provisional restoration was prepared for the patient based on the previously taken impression. The acrylic crown was immediately loaded (Luxatemp, DMG; Durelon, 3M ESPE; Fig. 17). The occlusion was adjusted until there was no contact from the opposing tooth. Amoxicillin and clavulanic acid (Augmentin 1 g, GlaxoSmithKline; twice a day), diclofenac potassium (Cataflam, Novartis) and a 0.2% chlorhexidine mouthrinse were prescribed for postoperative care. A panoramic radiograph was taken for control purposes after the procedure was completed. The provisional crown and soft tissue were checked again after two weeks, at which point the condition was found to be good (Fig. 18).

Surgical procedure of area #24

After the implant operation of the anterior region, autogenous augmentation surgery was planned in this region after CBCT measurement of the left premolar region. Under local anaesthesia and intravenous sedation, the left mandible retromolar area of the patient was selected as a donor site. The autogenous bone block was taken from this area and fixed to area #24 with the help of micro-screws. PRF was applied to the region to support regeneration. After three months for this area to heal, the bone thickness formed was measured by CBCT again and it was seen that it had reached sufficient thickness for implant placement (Figs. 19 & 20). The area was opened for the second time under local anaesthesia and prepared for the one-piece ZiBone implant with zirconia drills. Ozone was applied to the area before the implant (diameter: 4 mm; length: 10 mm) was placed. After implant placement, the autogenous augmentation area was supported with a collagen membrane and PRF in the buccal direction and closed with silk suture thread (Figs. 21 & 22).



Figs. 19 & 20: CBCT view after autogenous augmentation of area #24.

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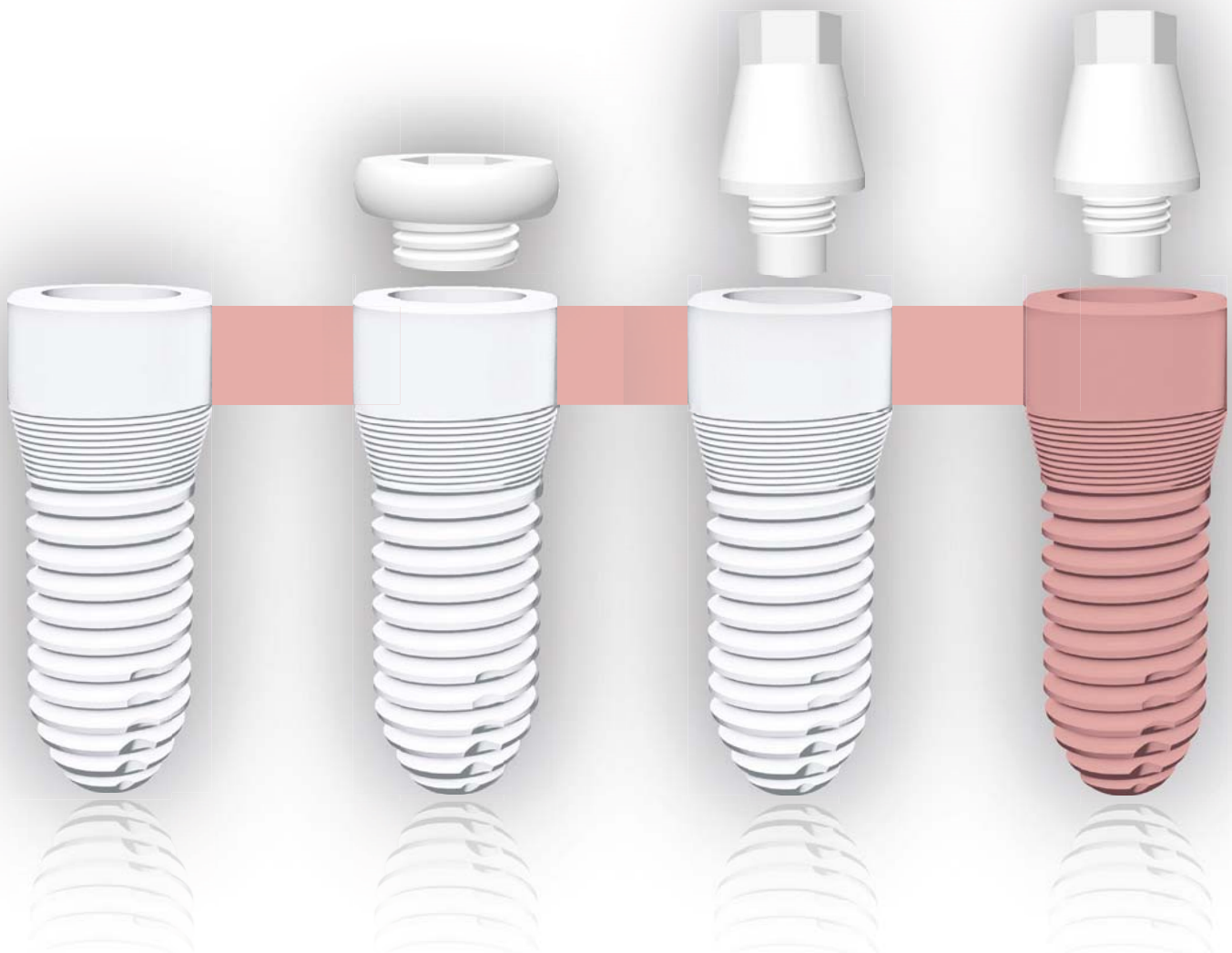

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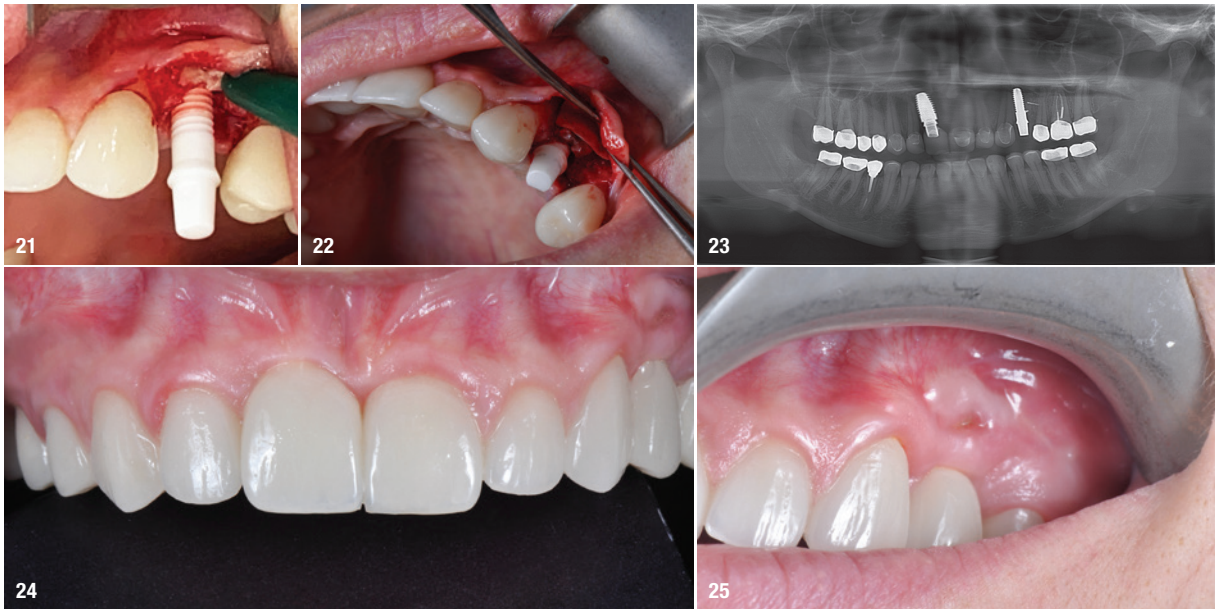

Fig. 21: Implant placement. **Fig. 22:** Collagen membrane coverage. **Fig. 23:** Post-op panoramic radiograph. **Fig. 24:** Final treatment view. **Fig. 25:** Healing after free gingival tissue flap placement over area #24.

No loading was done for four months to ensure that the implant had successfully osseointegrated.

Postoperative period

After the four-month long healing period, a panoramic radiograph was taken and the implants were evaluated with a view to the surrounding teeth. The implant stability quotient value (Osstell) was checked, and this value was found to be 77 (Fig. 23). Thereafter, impressions of the implants and teeth were taken. Loading and the permanent prosthesis stage was started. Zirconia porcelain crowns were prepared for all teeth and implants. After try-in and the patient's approval of the final aesthetics, cementation was carried out (Fig. 24). In order to thicken the gingival phenotype in the region, a free connective tissue flap was applied to area #24, making the region healthier for the future (Fig. 25).

Conclusion

First of all, for biological reasons, the use of ceramic implants has been increasing in recent years. Although the history of ceramic implant use is 30 years, the complication rate due to fragility has been reported to be very low in recent years related to the reinforced structure of ceramic implants. More comprehensive clinical and experimental studies should be carried out in order better to evaluate the fracture and osseointegration losses that may occur especially in ceramic implants. Although the failure rates are reported to be low, the use of two-piece ceramic implants in the anterior region and one-piece ceramic implants in the premolar and molar regions would be more logical and reduce the risk of complications.

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Dr Alper Çıldır

References

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Prof. Belir Atalay received his PhD in oral surgery in 2006 from Istanbul University in Turkey. He is a professor in the Department of Oral and Maxillofacial Surgery of the Faculty of Dentistry at the same university. He has been working primarily on ceramic implants, regenerative techniques and immediate loading in his clinic and at the university in recent years.

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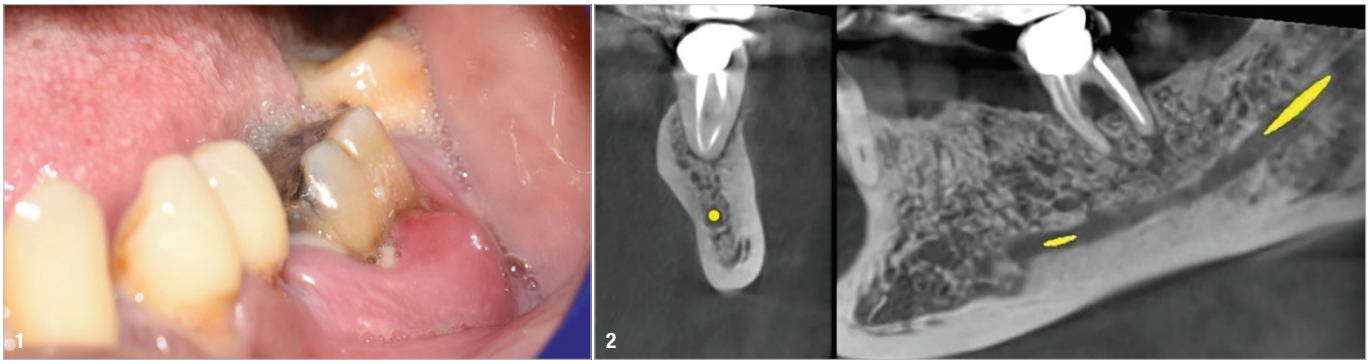
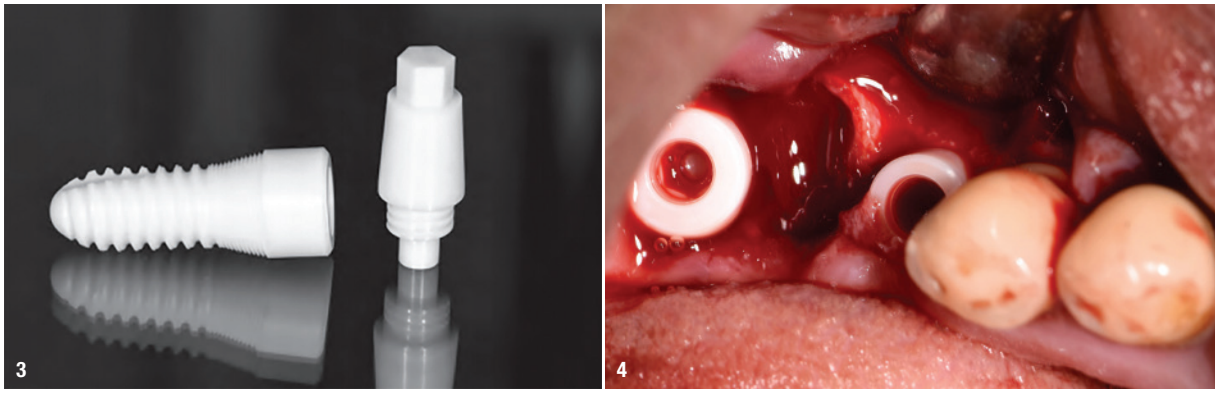


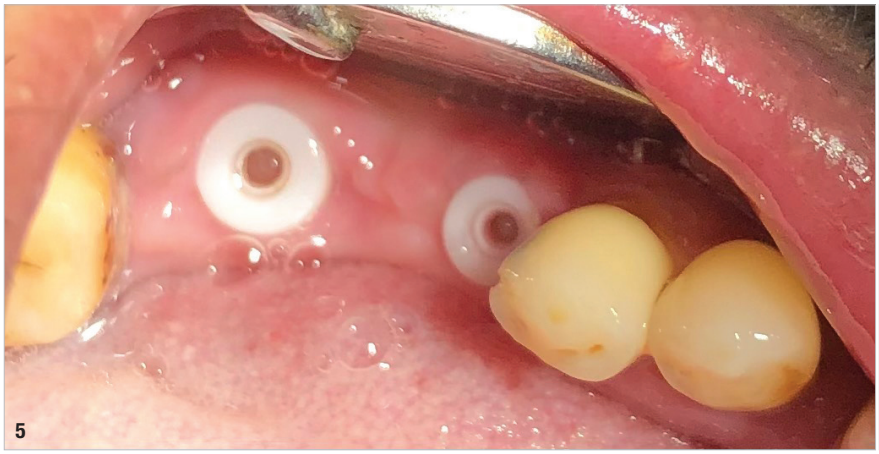
Introduction

Zirconia implants have established a strong presence in implant dentistry. Patient demand for metal-free solutions is increasing, and the development of new biomaterials, micro-rough surface techniques and improved treatment protocols has enabled practices to use zirconia dental implants as a reliable treatment alternative to titanium dental implants. Multiple studies have proved that zirconia implants induce little to no peri-implant tissue inflammation and allow for high levels of epithelial attachment. Additionally, these implants are more natural-looking; hence they provide improved aesthetics. Furthermore, they do not have metal components, which makes them ideal for people with metal sensitivities and patients who would prefer their implants to be metal-free. The patient should be informed about the pros and cons of both material options and involved in decision-making if a zirconia implant is presented as a treatment option.[1–5] This case report describes the replacement of mandibular posterior teeth with zirconia dental implants.

Clinical situation and treatment planning

A 47-year-old healthy male patient presented at my clinic requesting restoration of a missing premolar (tooth #35) and a solution for an endodontically infected molar (tooth #36; Fig. 1). The premolar had been extracted about ten months before, and the molar had been endodontically treated seven years before. The CBCT examination showed a fully healed site #35 and an endodontic and periodontic lesion affecting tooth #36 (Fig. 2). Tooth #36 was planned for extraction. The patient was informed about ceramic implants as an alternative to titanium implants and the AWI zirconia dental implant system (WITAR) as a metal-free solution. After a detailed explanation and





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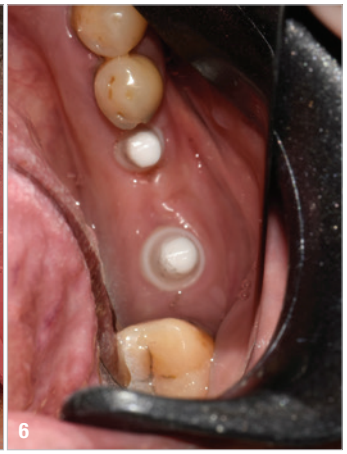

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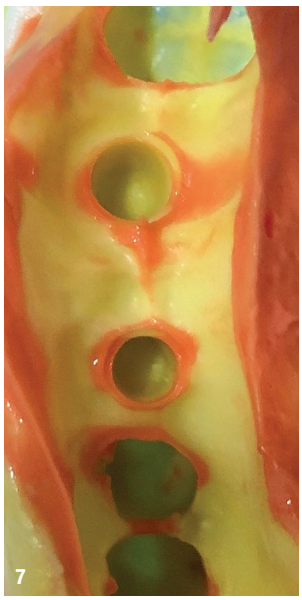
discussion, the patient decided on this treatment option. The main reason for his decision was the prognosis of less inflammation of the peri-implant tissue with ceramic implants and a metal-free solution.

Surgical and restorative protocols

Curettage and laser debridement with a 940 nm wavelength diode laser (BIOLASE) of the alveolar socket was performed after extraction of tooth #36. Surgical guidelines for the drilling protocol were followed, and two-piece zirconia dental implants (AWI G-Line) of sizes 3.9 × 12.0 mm and 4.5 × 10.0 mm were used for the replacement of teeth #35 and #36 (Figs. 3 & 4). Both implants were inserted with the connection level supragingival to a torque of 35 Ncm. The transgingival shoulder with its smooth surface provides the optimal conditions for soft-tissue adhesion. Primary stability was achieved. The implants were covered with cover screws *in situ*, and the site was closed without any grafting procedure. Four months after surgery, the restorative process began with removal of the cover screws and placement of straight cementable zirconia abutments with external threads (Figs. 5 & 6). The abutments were screwed and cemented with glass ionomer cement (SHOFU) for a permanent abutment–implant connection. The glass ionomer cement was applied only to the external threads and was torqued to 15 Ncm. The abutments were prepared like a natural tooth with red-ring diamond burs, followed by a conventional impression taking procedure for definitive restoration.

The soft tissue was healthy and keratinised around these abutments when direct impression taking was performed (Fig. 7). Monolithic zirconia crowns were selected as the prosthetic solution (Fig. 8). To achieve a tension- and bending-free connection between the restorations and the implants, the zirconia restorations were cemented intra-orally to the abutments according to the standard procedure using glass ionomer cement (Figs. 9a & b).



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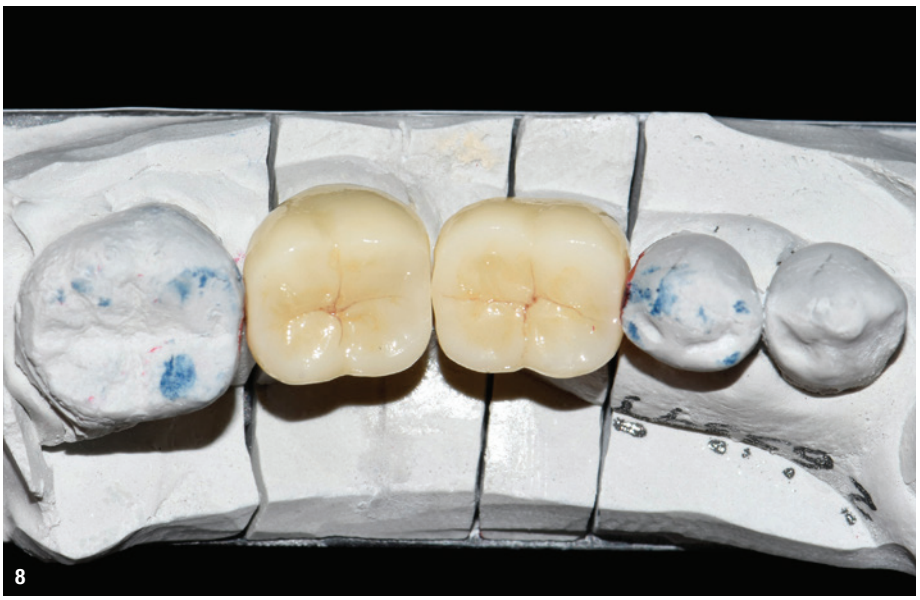

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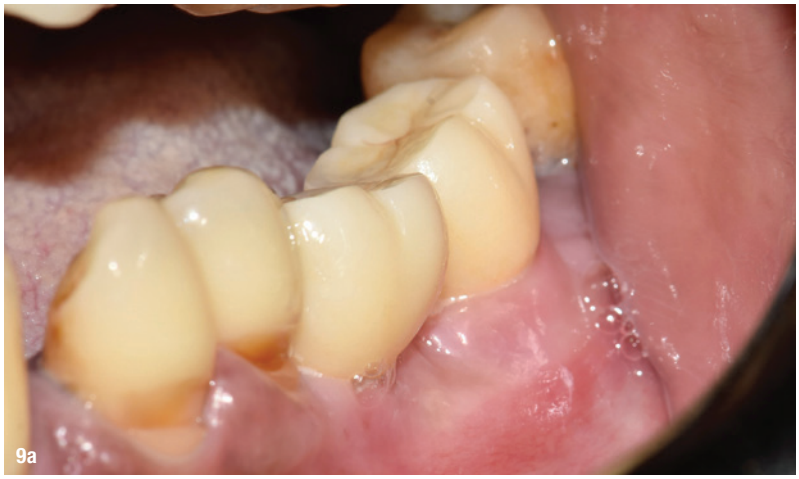
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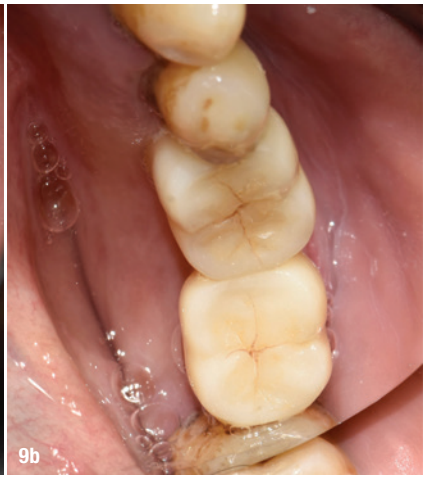
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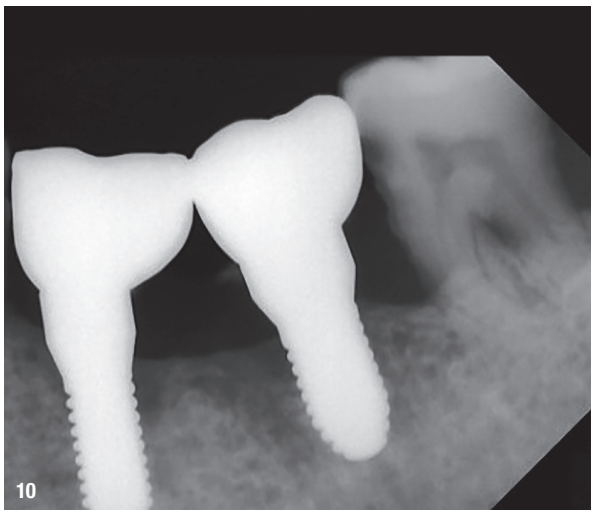
Clinical outcomes

The result was beautiful with excellent tissue healing, and the patient was highly satisfied. No inflammation or prosthetic problems occurred during the follow-up period. The result in this case was metal-free implants and crowns (Fig. 10).

Conclusion

The AWI dental implant system is designed for a broad range of indications, from single units to multiple units. It performed extremely well in the case presented, with conventional and immediate implant placement in the infected socket. The surgical and prosthetic protocols are comparable to those of titanium implants. These are important factors for the successful integration of a new dental implant system in the daily dental practice. My main reasons for using the AWI dental implant system in the case presented were as follows: the implant used is designed to support a natural soft-tissue appearance, especially for patients with a thin mucosal biotype; zirconia generally shows lower plaque accumulation and bacterial adhesion than does titanium—the surface of these implants is micro-rough and hydrophilic for successful osseointegration, while the implant collar is partially machined, designed for excellent soft-tissue attachment and a low inflammatory response; these implants also provide a mechanical strength advantage: they are made out of yttrium tetragonal zirconia polycrystals, which yields improved hardness, bending strength and toughness; they offer great restorative flexibility owing to the two-piece, cemented internal connection design; conical micro-threads in the area of the cortical bone allow better primary stability and axial loading; the clinical protocol is comparable to that of titanium implants; and it is a metal-free solution, as even the screw threads are incorporated on abutment with strong ceramic-to-ceramic connection, which is highly biocompatible.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about the author

Dr Saurabh Gupta graduated from Manipal College of Dental Sciences in India with a BDS and holds a master's degree in oral and maxillofacial surgery from Rajiv Gandhi University of Health Sciences in Bangalore. He is an international and national lecturer and a board member and global education and training manager of the International Academy of Ceramic Implantology. He is a member of the Zirconia Implant Research Group, which aims to orient and lead research in the field of metal-free implantology. He founded and directs WhiteZ Dental in Bangalore.

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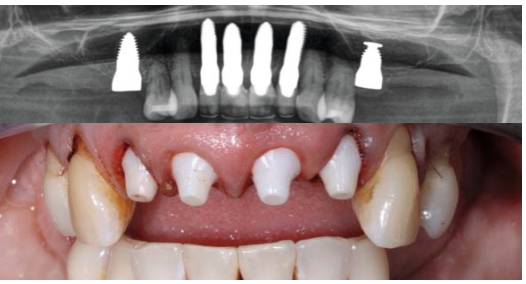

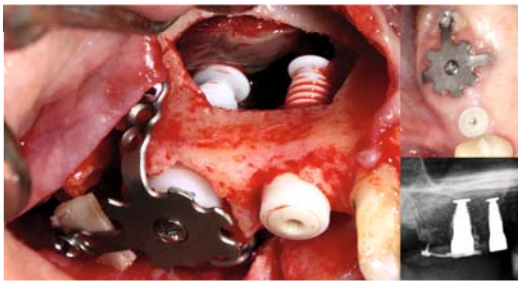

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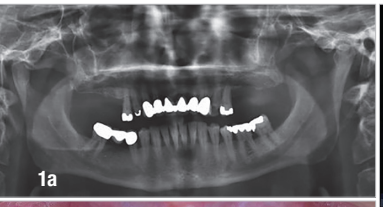
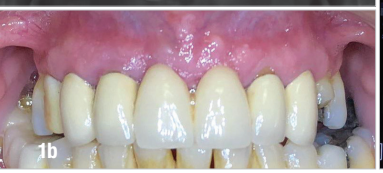
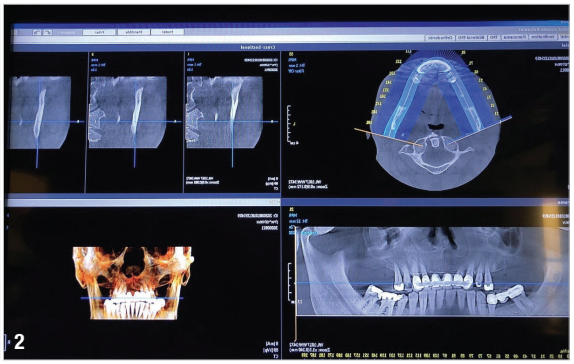

Fig. 1a: Panoramic radiograph of the initial situation. **Fig. 1b:** Patient before treatment. **Fig. 2:** CBCT scan of pre-op situation.

Case presentation

A 54-year-old male patient consulted our dental practice at the beginning of 2020 expressing the wish for the full restoration of his teeth on the basis of implants. He appeared to be in good general health without any major background conditions. Panoramic photographs and CBCT scans were captured in the practice (Figs. 1a–2). The patient had advanced aggressive periodontitis. A blood test indicated that the patient had mild hyperglycaemia and increased cholesterol levels. The treatment plan was discussed with the patient, who gave his consent for the extraction of the teeth in the upper jaw and replacement with two-piece zirconia implants, which would support immediate loading. Radiographs were taken to evaluate the quality of the bone in both jaws in order to support the implant placement. After I found that bone augmentation would be needed, my recommendations were discussed with and approved by the patient. The planning was for ten TAV Dental implants in the upper jaw. The number of implants that were inserted in the upper jaw were ten as planned and they lent sufficient stability.

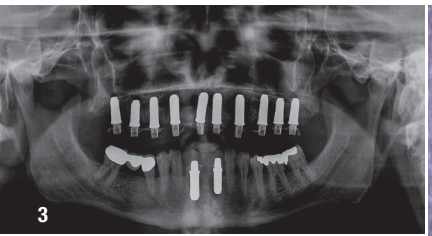
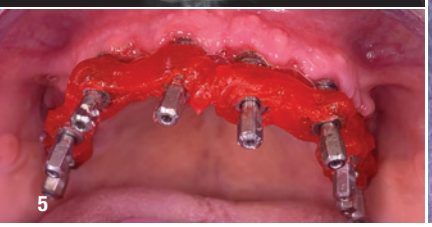
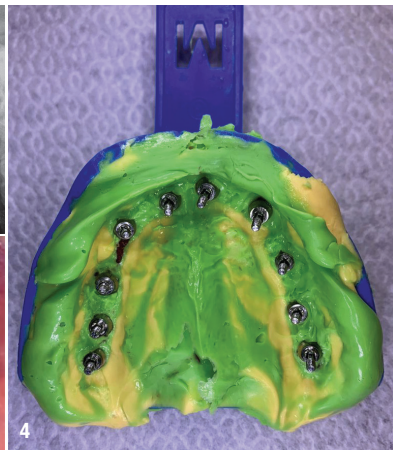

Fig. 3: Panoramic radiograph post-op. **Fig. 4:** Closed-tray impression post-op. **Fig. 5:** Post-op situation with healing abutments and platelet-rich fibrin mixed with bone grafting material draped around the implants and abutments.

Treatment procedure

The patient was brought into deep sedation by an accompanying anaesthetist. Surgery commenced with the atraumatic manual extraction of the teeth, first loosening the gingiva from the tooth with a scalpel, then gently pulling from the upper jaw using a manual spoon excavator. The sockets were cleaned manually, and a laser was employed to clear the periodontal ligament. Finally, the sockets were treated with ozone therapy to safely sterilise the alveolar bone and clear it of all pathogens. The implant sites were prepared by adjusting and aligning osteotomies in each socket. The sockets of the incisors received four implants of 12.0 mm in length and with a diameter of 4.1 mm, using a contra-angle handpiece, which served to speed up the process. Locations #16, 17, 26 and 27 received four implants of 10 mm in length. The lengths of the implants were determined on the basis of the CBCT scans, which gave insight into there being sufficient bone height, taking into consideration that the implant has to enter 1–2 mm beyond the apex of the extracted tooth. The posterior jaw had less bone than the incisor area, which is why the shorter implant was selected. Once the implants had been inserted (Fig. 3), to maintain and protect the soft tissue, healing abutments of 5 mm in height and made of titanium (TAV Dental) were screwed on to the implants. A closed-tray impression was then taken (Fig. 4). Acrylic was applied around the impression copings, and the excess material removed. The closed-tray impression was employed by the in-house laboratory. The impression was supplemented by scans taken with an intra-oral scanner. The images and impression together were used for the CAD/CAM complete provisional restoration, which was delivered to the patient on the same day.

In locations #12 and 14, an allograft (Cortical Mineralized/Demineralized Blend, Maxxeus) was mixed with a liquid platelet-rich fibrin (PRF) to create a high-viscosity bone grafting material that is adhesive to the natural bone, achieves quicker healing and supports the immune response. The fibrin is extracted from the patient's blood sample by spinning it in a centrifuge. The graft was applied to fill up any remaining space around the implants and on the buccal side. The implant area bone was flattened. The abutments were partly covered by the grafting material as well (Fig. 5). A PRF membrane was then applied to fit snugly around the healing abutments and to cover the bone grafting material on the labial and buccal sides. To allow the abutments to peek out, holes were punched into the PRF membrane with a biopsy punch. The PRF membrane is designed to hold the bone grafting material in place as well as promote the growth of soft tissue. The surgical sites were then sutured using PTFE suture thread. Upon being made ready, the provisional restoration was fitted and then attached using Temp-Bond cement (Kerr; Fig. 6). A mix of air and water was sprayed over the gingiva to remove any clinging cement residue, to prevent it from invading the operation sites. After the patient was checked again by the anaesthetist and after some resting time, during which he was provided with postoperative care instructions to promote healing, he was released. In terms of postoperative care, the patient was called in for check-ups every two to four weeks. After two weeks, the sutures were removed. After one month, it was found that the implants had achieved proper stability, and after six weeks, the membrane was removed with a probe.

Prosthetic restoration

After a total of five months of healing, the patient was invited back to the practice to evaluate restoration in his upper jaw. There was perfect healing of the gingiva with no signs of inflammation around the implant areas or at the papillae. At removal of the provisional restoration and abutments, a clear pink profile was exposed with healthy soft tissue around the zirconia collars of the implants. A panoramic photographic and CBCT scan showed that the bone was healthy around the implants. In two further sittings, the provisional restoration was replaced by another provisional restoration, made of acrylic, before the definitive complete restoration made of zirconia. The procedure for this was as follows. A total of eight tailor-made zirconia abutments designed by our in-house dental technician were made, aided by CAD/CAM. The new acrylic provisional restoration was placed over this and bonded with Temp-Bond. At the following appointment, the acrylic restoration was removed to take an impression again of the zirconia abutments (Fig. 7). Two weeks later, the definitive complete denture made of zirconia was delivered without glazing. The colour and shape were evaluated before it was glazed. One week later, the denture was cemented with Premier Implant Cement (Premier Dental; Fig. 8). The patient expressed his delight at the functional and aesthetic result and said the teeth felt natural in his mouth (Fig. 9).

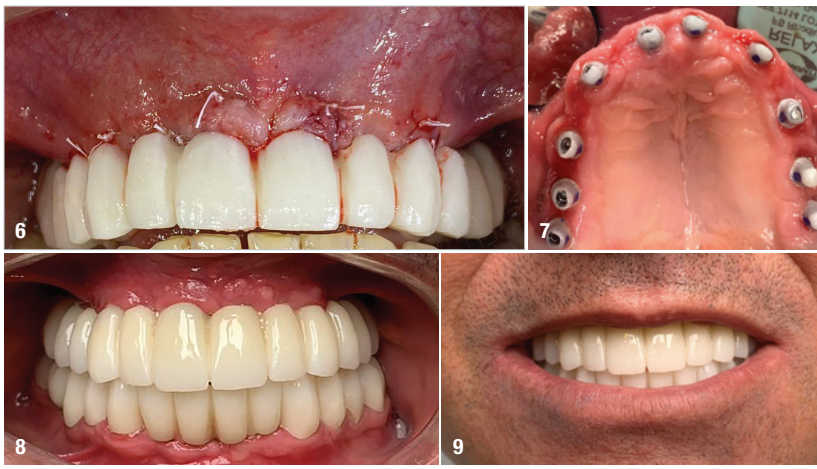

Fig. 6: Provisional acrylic restoration fitted and healing site sutures. **Fig. 7:** Intraoral situation of upper jaw with zirconia abutments. **Fig. 8:** After placement of zirconia complete denture. **Fig. 9:** Final result: the patient's smile.

Conclusion

Two-piece zirconia implants were chosen over one-piece implants for the upper jaw, as these are much easier to handle in case of breakage or implant failure, in which case the entire implant does not need to be lost. The use of zirconia is almost an obvious choice these days, not least for the aesthetic advantage of avoiding a grey border shimmering between the tooth and the gingiva. In addition, there is the important and scientifically proven advantage of zirconia, being non-metal: biocompatibility with the hard and soft oral tissue. The two-piece implants in our case were cemented. In many cases, a two-piece implant will be screwed, which is more friendly to the gingiva in that it avoids the need for cement, which could potentially harm the soft tissue.

about the author

Dr Nashat Gara is a leading Israeli implantologist and aesthetic dental surgeon. In 1995, he graduated with a DMD from Goethe University in Frankfurt am Main in Germany. In 2010, he completed an MSc in oral surgery and implantology at Danube University Krems in Austria. He established his own private dental centre in Tel Aviv in Israel in 2000. In 2010, he took over a dental practice in Hilversum in the Netherlands, which provides implant and surgical procedures to patients from the Netherlands and Belgium.

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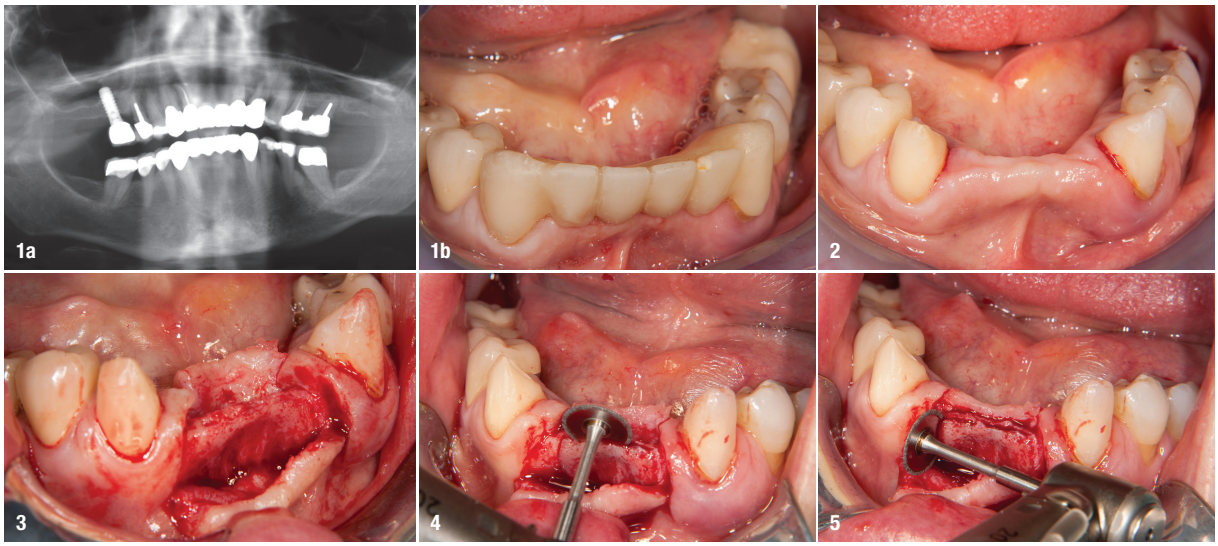
Complete rehabilitation of an unsatisfactorily restored mandible

Two-piece implants and the alveolar ridge-splitting technique

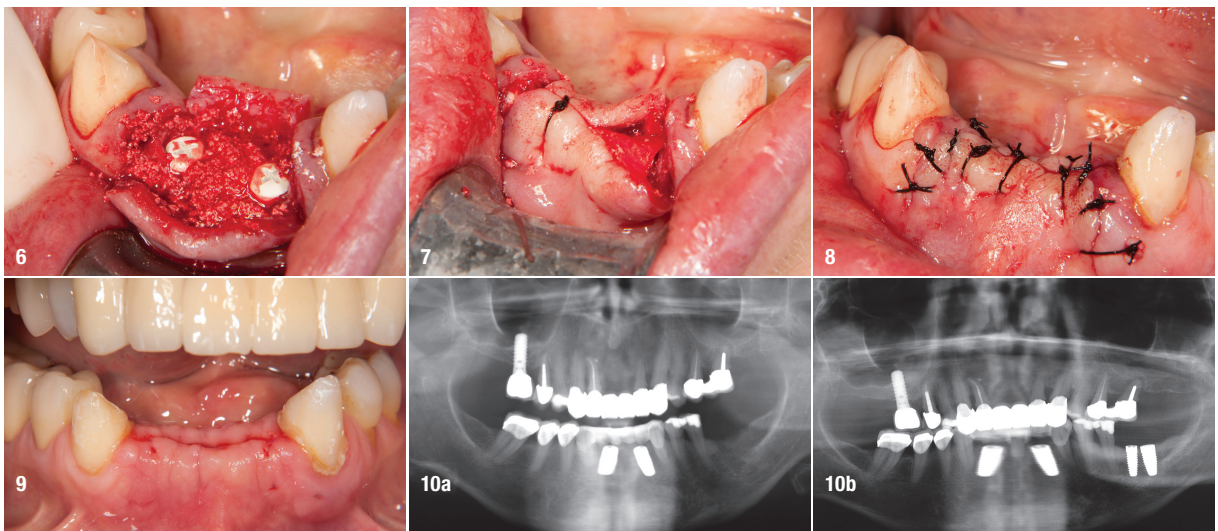
Dr Michael Leistner, Germany



Figs. 1a & b: Initial situation: radiograph **(a)** and clinical view **(b)**. **Fig. 2:** Intra-oral situation after tooth removal and completed tissue healing. **Fig. 3:** Opened and mobilised flap and exposure of the residual bone. **Fig. 4:** Sagittal cut to split the bone ridge using a small fine-grained diamond disc. **Fig. 5:** Vertical cuts at the outer limits of the bone flap. **Fig. 6:** Situation after spreading of the bone, implant placement and filling of the remaining defects with autogenous bone chips. **Fig. 7:** Subsequently, covered with a removable membrane, the flap is repositioned and fixed with sutures. **Fig. 8:** Wound closure after completion of the surgery. **Fig. 9:** Clinical situation after two weeks and suture removal. **Figs. 10a & b:** OPG four weeks after bone splitting and placement of the two Zeramex XT implants in regions #32 and 42 **(a)** and three months after implant insertion in the posterior region (regions #36 and 37; **b**).

Case description

A 65-year-old female patient presented herself with insufficient fillings, crowns and bridges in the mandible (Fig. 1). The first molar on the left side showed advanced mobility (Grade III). The bridgework in the anterior region was to be replaced by single-tooth crowns on the remaining natural teeth and a bridge supported by two implants in regions #32 and 42 was planned. By using the bone-splitting technique, the local bone in this area was to be enhanced (Figs. 2–5). After removal of the hopeless teeth #36 and 37 and sub-



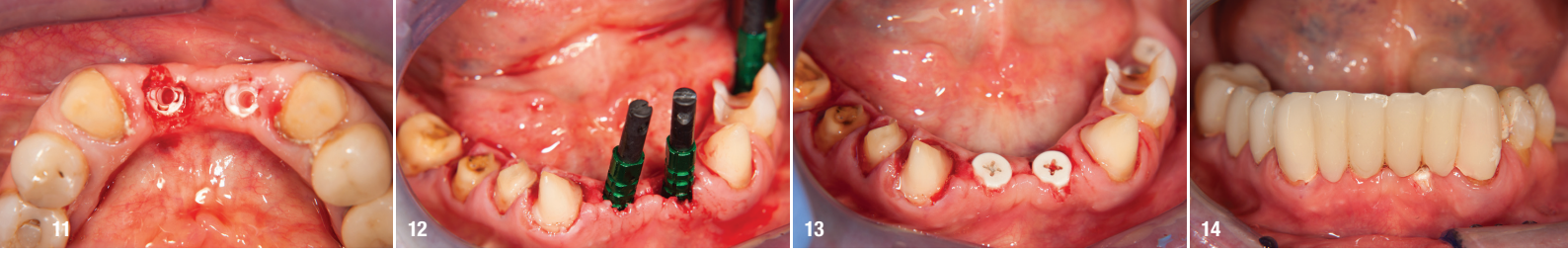


Fig. 11: Both anterior implants were uncovered using a tissue trimmer (NTI-Kahla), retrieval of the healing caps. **Fig. 12:** After preparation of the remaining natural teeth, an impression was taken including impression copings on the implants (open-tray technique). **Fig. 13:** Healing abutments were inserted on to the implants for soft-tissue adaptation. **Fig. 14:** Provisional restoration inserted.

sequent bone healing, two ceramic implants were to be placed in these regions. In addition, all remaining natural teeth required new prosthetic restoration with crowns.

Materials

The implants used in this case were Zeramex XT implants (Dentalpoint) with diameters of 4.2 mm (regular base) and 5.5 mm (wide base) and a length of 10.0 mm. In addition, maxresorb inject (botiss biomaterials) and a Jason membrane (botiss biomaterials) were used as part of the bone grafting procedure to cover the bony structures (Figs. 6–14).

Conclusion

After more than ten years of working with two-piece ceramic implants and with more than 1,100 Zeramex implants of several types and generations having been placed, the author feels confident in using this technology in conjunction with ceramic implants restored with bridges. In his daily routine, the Zeramex XT implant with its internal geometry in combination with the carbon fibre-reinforced high-performance PEEK screw (Vicarbo screw) allows patient-specific prosthetic restorations, including bridgework and removable dentures, with reliable long-term success, including stable aesthetic outcomes (Figs. 15–19).

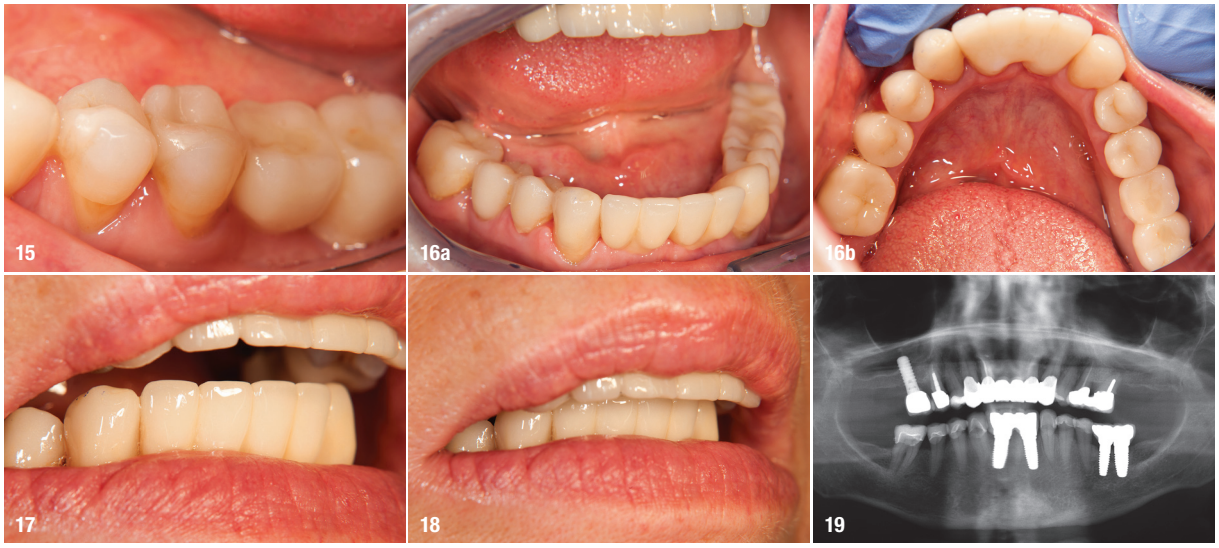


Fig. 15: Delivery of the final posterior superstructures. **Figs. 16a & b:** Definitive anterior bridgework: anterior view **(a)** and occlusal view **(b)**. **Figs. 17 & 18:** Image of the harmonious interaction of the prosthetic restoration with the lip line. **Fig. 19:** X-ray to control the fit of the prosthetic restorations after four months.

Practical relevance

Alveolar ridge-splitting and expansion techniques are suitable and well-established methods for managing narrow residual bone with relatively minor effort.[1] Different techniques and utilisation of various types of instruments are described in the literature, and only minor differences between them are reported regarding survival of the implants.[2,3] Furthermore, study reviews have revealed a low rate of intra- and postoperative complications, such as buccal wall fracture, which requires careful preparation of the ridge and prudent selection of patients.[4] Based on the clinical experience of the author, the technique employed for this case works particularly well in combination with ceramic implants owing to their high biocompatibility and material properties.[5]

about the author

Dr Michael Leistner is a Germany-based dentist specialised in dental implantology, focusing particularly on the use of ceramic implants. He runs a private practice in the city of Merzhausen in Germany.

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References

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Rebuilding aesthetics with customised abutments on ceramic implants

A post-traumatic case

Dr Rouven Wagner, Germany

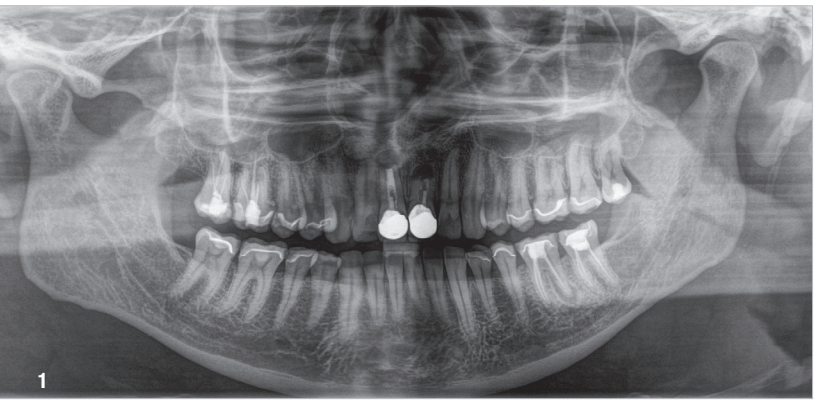


Fig. 1: Initial clinical situation in early September 2017.

Clinical problem

A 35-year-old male patient presented to the clinic of the author in 2017, suffering from constant discomfort in the highly aesthetic zone between teeth #11 and 21. He revealed that he had had an accident at the age of 23 and, as a result, had undergone root canal therapy in 2004. Additionally, he had had two root tip resections in teeth #11 and 21 at another practice, in 2012 and 2014, respectively. He came to the consultation because he was unsatisfied with the prosthetic outcome of wearing fully veneered metal crowns. Unwilling to damage his remaining healthy teeth by having a bridge placed, for instance, he was looking for a metal-free implant solution.

Clinical evidence

There is a clear trend in implant dentistry today towards a growing demand for and, as a result, clinical use of metal-free implants. These ceramic implants are aimed at achieving high aesthetic outcomes, and the clinical results with regard to osseointegration and biological reaction of the surrounding tissue are increasingly encouraging. Former limitations regarding the selection of prosthetic parts have vanished owing to the increasing indications offered by two-piece ceramic implant

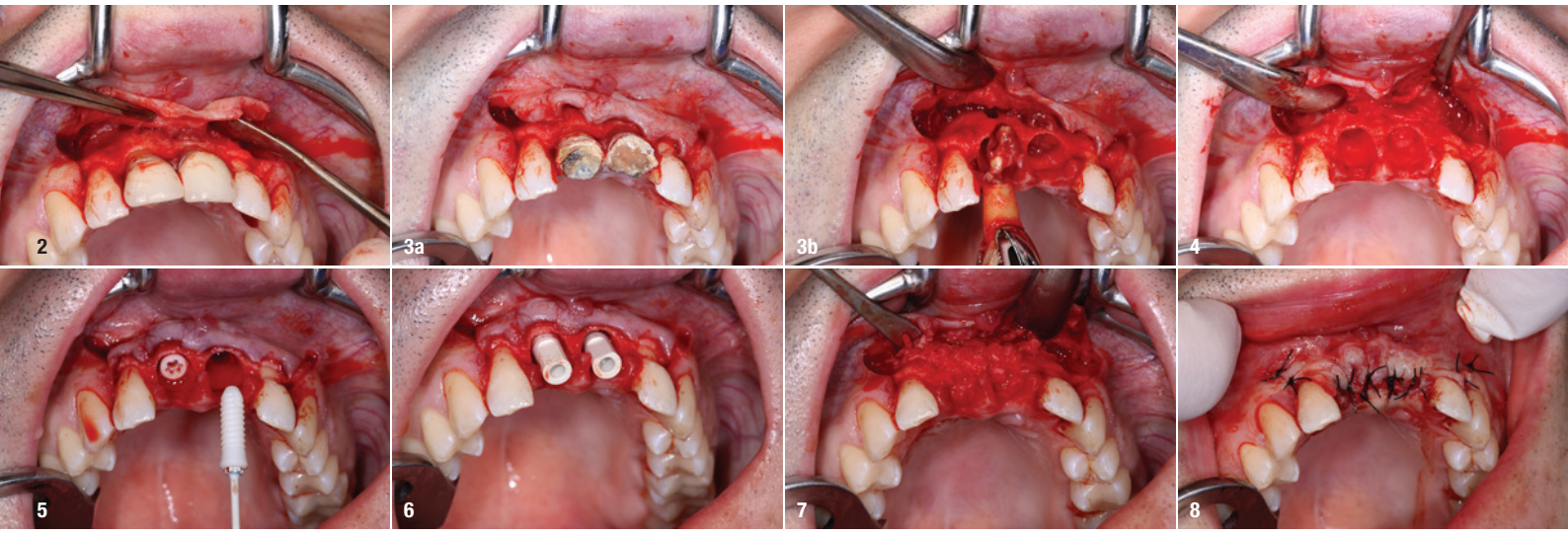


Fig. 2: A flap was elevated prior to the extraction. **Figs. 3a & b:** Extraction of teeth #11 and 21. **Fig. 4:** Intra-op situation immediately after extraction. **Fig. 5:** Placement of the two two-piece CERALOG implants. **Fig. 6:** Taking digital impressions for the preparation of the individual abutments. **Fig. 7:** The implants were covered with bony chips. **Fig. 8:** The implants were sutured for covered healing.

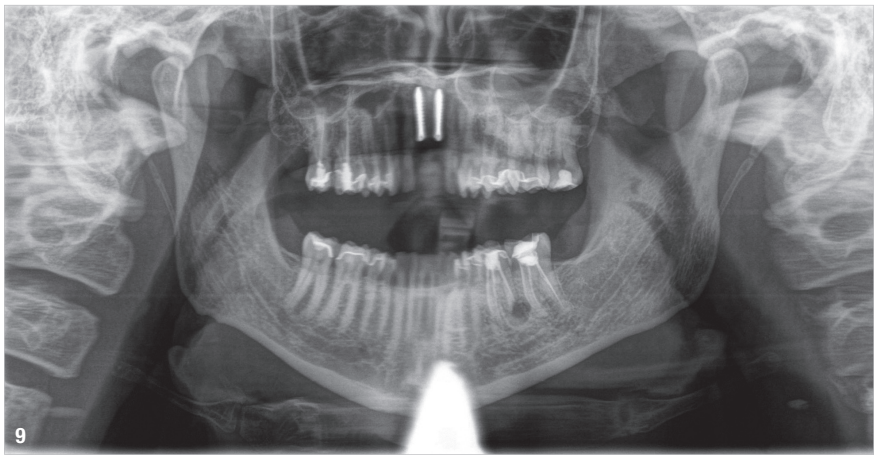


Fig. 9: Radiograph immediately after surgery.

systems such as CERALOG Hexalobe (CAMLOG), which was used in the case described in this article.

Management

Prior to the operation, an immediate implantation treatment plan using the two-piece dental implant system CERALOG was developed on the basis of radiographic imaging (Fig. 1) and 3D planning (Orthophos SL 3D, Dentsply Sirona). In a first surgical step, a flap was elevated, both teeth #11 and 21 were extracted, and extensive periapical cysts were removed (Figs. 2–4). Two implants, 12 mm in length and 4 mm in diameter, were then immediately inserted (Fig. 5). Afterwards, an optical impression (CEREC Omnicam, Dentsply Sirona) was taken for the production of CAD/CAM-designed individual abutments (Fig. 6), which were planned to be seated at the implant exposure after six months. The two-piece implants were covered with bony chips gained from the posterior region of the mandible during the surgical procedure by means of a Geistlich SafeScraper TWIST (Geistlich Pharma; Fig. 7). The operation site was then sutured for covered healing of the implants (Fig. 8). In addition, a radiograph was taken immediately after surgery (Fig. 9).

The individual abutments, which had been designed and produced post-

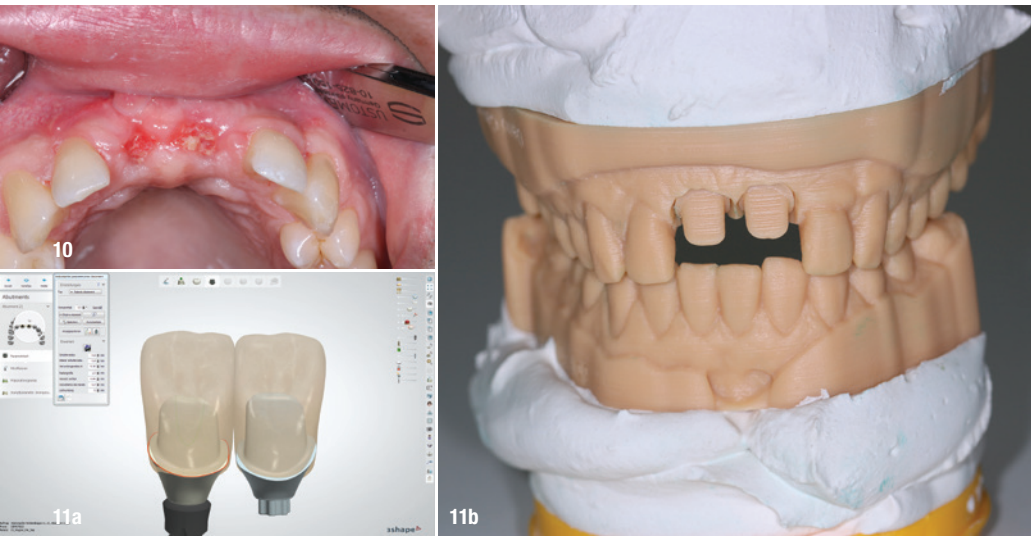


Fig. 10: Situation three months after implant insertion. **Figs. 11a & b:** Design and production of the individual abutments and crowns.

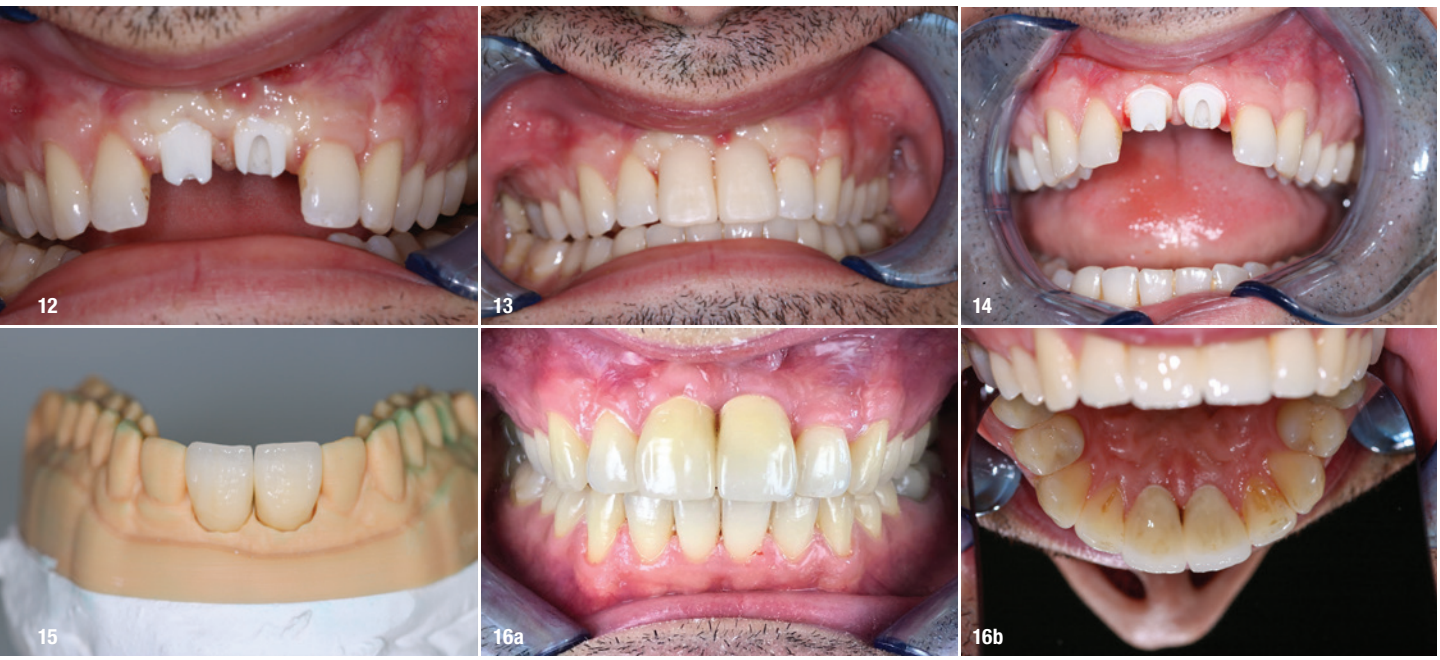
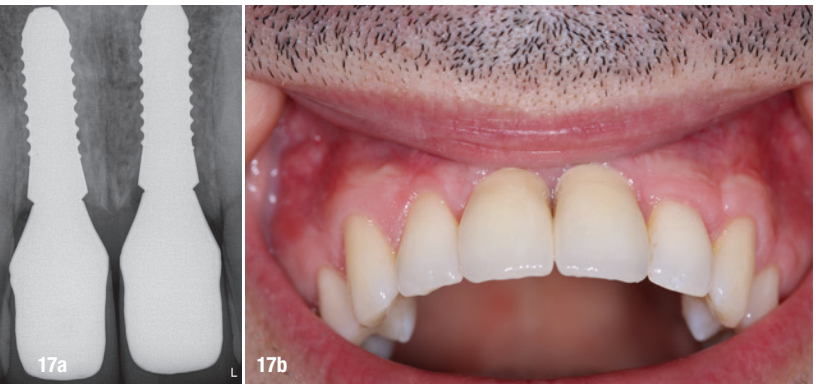


Fig. 12: View of the exposed implants with individual abutments in place six months post-op. **Fig. 13:** View of the provisional crowns made of PMMA. **Fig. 14:** Situation at nine months post-op. **Fig. 15:** The definitive crowns made from monolithic lithium disilicate. **Figs. 16a & b:** Situation once the definitive crowns had been inserted, also at nine months.

operatively (DEDICAM Scan & Design Service, CAMLOG), were inserted during the implant exposure and directly covered with prefabricated provisional crowns (Telio CAD, Ivoclar Vivadent). At the follow-up after a healing period of three months, the provisional crowns were removed and replaced with individual IPS e.max single crowns (Ivoclar Vivadent; Figs. 10–11b). Another follow-up followed at six months, at which the individual abutments were seated (Figs. 12 & 13). At nine months postoperatively, the definitive crowns were inserted (Figs. 14–16b).

Outcome

The two-piece CERALOG Hexalobe implant system is a solid dental implant system which allows the use of highly aesthetic prostheses. Additionally, bone augmentation procedures can be used effectively in combination with these implants while offering all the flexibility of implants made of titanium. At the follow-up in late 2019, the clinical case had shown stable biological outcomes for more than two years (Figs. 17a & b).



Figs. 17a & b: Radiographic and clinical view 18 months post-op.

about the author

Dr Rouven Wagner is a Germany-based dentist who specialises in implant dentistry with a particular focus on ceramic implants. He runs a private practice together with Dr Sandra Wagner in the city of Dortmund. The clinical case described in this article was originally part of a presentation given at the 2017 congress of the European Society for Ceramic Implantology in Zurich in Switzerland and was awarded first prize in the digital poster competition.

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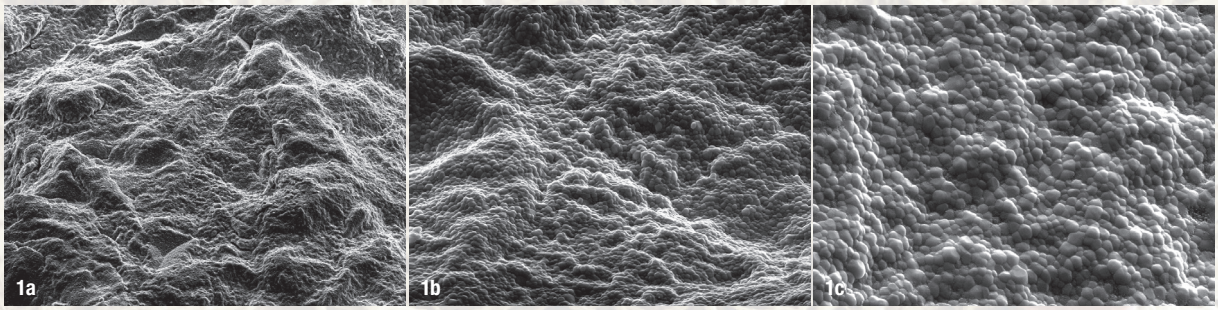
Safe and fast osseointegration with two-piece zirconia implants

An interview with Dr Roland Glauser, Switzerland



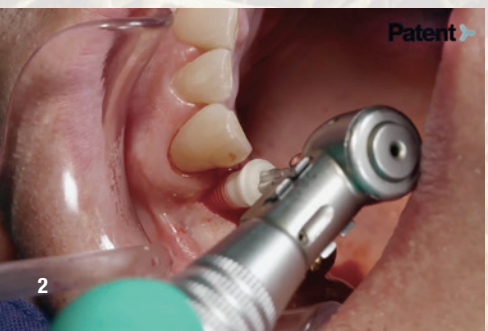
Figs. 1a–c: Patent™ Implant surface (from left: x2,500/x10,000/x20,000). **Fig. 2:** Hydrophilicity: the implant surface attracts blood. **Fig. 3:** Human blood on the Patent™ surface—within ten minutes the fibrin network is attached to the surface. This attachment is a prerequisite for contact osteogenesis. **Fig. 4:** Histology showing hard- and soft-tissue adaptation at four weeks. *(Images 1a–c, 3 & 4: © Dr Peter Schüpbach)*

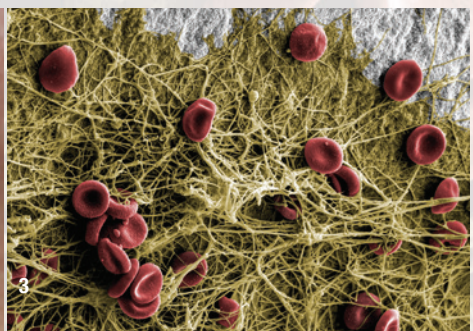
Predictable osseointegration of dental implants with a strong soft-tissue seal arguably leads to healthy hard and soft tissue that are maintained in the long term. To scientifically substantiate this view, Swiss-based implantologists and researchers Dr Roland Glauser and Dr Peter Schüpbach recently conducted a study on mini-pigs to evaluate the healing around freshly inserted Patent™ zirconia implants. ceramic implants had the opportunity to speak with Dr Glauser at the 2021 International Dental Show about the study design and the implications of his findings regarding clinical application.

Dr Glauser, you have been using and investigating zirconia implants for years. What needs to be considered when working with zirconia implants?
As a clinical user, I find it important that long-term data is available for the product I am using and that an implant design has been chosen that respects the characteristics of the implant material. Fast and safe osseointegration is particularly important, as this reduces risks for the patient.

What factors play a primary role when it comes to the healing of hard and soft tissue around dental implants?
First of all, the protocol established for each individual implant system on the market is of great importance. The practitioner must know and accept this in detail and integrate it into his or her clinical workflows. In addition, an awareness of how to correctly and gently handle hard and soft tissue in the context of implant restorations is crucial. Furthermore, the hardware components that interact and react with the surrounding hard and soft tissue immediately after insertion are crucial for a successful long-term treatment outcome. If these three points are taken into account, successful and rapid osseointegration can be achieved. Two different mechanisms of bone healing around implants have been documented. Distance osteogenesis is the first documented mechanism of bone healing and was first described in the late 1960s. Within the context of distance osteogenesis, which proceeds rather slowly and is primarily found with classically machined surfaces, fresh bone forms in the osteotomy in the direction of the free surface of a placed implant. With modern moderately rough and osteoconductive implant surfaces, we increasingly see the mechanism of contact osteogenesis: starting from a single point of contact with the bone, a migration of bone-forming cells along the free implant surface begins, accelerating the overall process of bone healing around the implant.

> “In terms of bone healing speed, the Patent™ Implant system outperforms all previously documented systems with a BIC value of over 70% after just four weeks.”



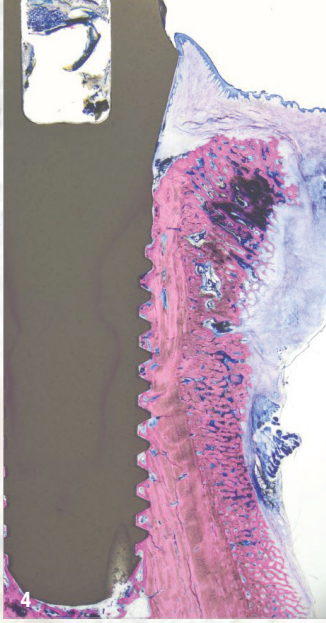


What further properties must an implant possess to achieve such accelerated hard- and soft-tissue healing?
With a view to the current literature, the architecture and the structure of the implant surface as well as its chemical properties are crucial for achieving a rapid healing cascade. In the case of modern implant surfaces and in particular the surface of the Patent™ Dental Implant System, which I have investigated together with Dr Peter Schüpbach as part of an animal model study, another decisive mechanism can be observed: bone debris and a bone smear layer are found along the free implant surface that has not yet been in contact with the surrounding bone. I have been conducting research on this very topic together with Dr Schüpbach for 14 years now, and we have found that this area in particular has high osteogenetic potential. Furthermore, in our research on the Patent™ Dental Implant System, we have found that especially its highly rough surface in the endosseous part, which is at least twice as rough as other well-established implant surfaces, has a beneficial impact on bone healing. With its highly rough surface, the Patent™ Implant is virtually at the other end of the scale of Albrektsson and Wennerberg. Owing to the contact osteogenesis described earlier, which is facilitated by this highly rough implant surface, the Patent™ Implant system achieves an enormously high bone–implant contact already a short time after insertion.

You mentioned an animal model study that you conducted in collaboration with Dr Schüpbach to evaluate the healing around Patent™ Implants. How was this set up, and what were your results?
Since we wanted to create conditions that were as controlled as possible, we chose a preclinical study design. To establish real-life transferability, we decided to work on mini-pig animal models and did what is done in clinical practice in the same way: we extracted teeth and subsequently placed implants in immediate implant placement procedures. After healing times of four and eight weeks, respectively, we removed the placed control and test implants. The control implants were established titanium implants and the test implants were Patent™ zirconia implants. We deliberately avoided influencing factors such as bone augmentation. In cross section, we were then able to take a close look at the healing of the soft tissue and bone at the two explantation time points. For us, the unknown variable was what happens at the free surface at which the implant comes into direct contact with the bone.

Upon evaluating the data, our preliminary conclusion is that the healing success of the Patent™ Implant surface outperforms that of all other surfaces investigated in comparable animal model studies to date. Whereas a bone–implant contact value of just 30–40% has been documented for machined implants after a healing period of 12 weeks—the steady state in mini-pigs—and a value of about 60% at the time of the steady state has been found in studies on modern implant surfaces, Patent™ Implants achieved a value of about 70% already four weeks after insertion. Furthermore, we found that the steady state for Patent™ Implants was already reached after a healing time of eight weeks at the latest. For everyday clinical practice, this means that regardless of the protocol that is being followed, practitioners and patients have greater security at an earlier stage and they can assume that even 20 years after implant placement—with a possible gingival retraction of 1.0–1.5 mm—no major problems will occur. As far as I am concerned, this is the compelling argument for Patent™ Implants from a biological point of view.

> "The healing success of the Patent™ Implant surface outperforms that of all other surfaces investigated in comparable animal model studies to date."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The second surprising finding from our study is that the vertical histoarchitecture of sulcular epithelium, junctional epithelium and connective tissue at the soft-tissue level around Patent™ Implants has a highly favourable structure and that the soft-tissue seal around these implants remained consistently above soft-tissue level after a healing period of four weeks. In contrast, significant accumulation of calculus and plaque was observed around the control implants, spreading downward towards the junctional epithelium, the point at which the human body begins to react. This is consistent with observations from the literature that plaque accumulation around zirconia implants is significantly lower than around titanium implants.

In conclusion, what do you believe are the advantages of the Patent™ Dental Implant System, as opposed to other leading zirconia technologies on the market?
The Patent™ Dental Implant System is purposefully designed to meet the material characteristics of zirconia. I must say that Zircon Medical has truly mastered the complex manufacturing process. The outcome is a unique hydrophilic surface on the intra-bony part. As mentioned, we have seen in preclinical and clinical investigations on the Patent™ Dental Implant System that the implant outshines all previously documented systems (titanium as well as zirconia systems) in terms of bone healing speed. Not least because of the incredibly positive feedback from patients, I am convinced that the Patent™ Dental Implant System will change many things in dental implantology for the better.

Video: Dr Glauser on Patent™

About Dr Roland Glauser

contact

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Fig. 1: The 10th IAOCI Anniversary Annual Congress was held from 19 to 21 August 2021 at the Paris Hotel in Las Vegas, NV, USA. **Fig. 2:** From left: Susan Wingrove (USA), RDH, BS, Dr Richard J. Miron (USA), Dr Sammy Noumbissi (USA) and Dr Yuriy May (USA). **Fig. 3:** Dr Setareh Lavasani (USA) was part of the team of internationally-renowned speakers. **Fig. 4:** The hybrid-format of the congress allowed participants to attend virtually or in person. **Fig. 5:** Ceramic implant manufacturers like Zircon Medical (Patent™ Dental Implant System) were invited to showcase their products at the congress.

The 10th IAOCI Anniversary Annual Congress

Dr Sammy Noumbissi, USA

For the second year running, the International Academy of Ceramic Implantology (IAOCI) hosted its annual Congress under extremely challenging and difficult circumstances. Held from 19 to 21 August 2021, the event was also a milestone as the academy celebrated its 10th Anniversary. This year the theme was *"Ceramic Implantology: Past, Present and Future"*.

As you can imagine with all the travel and logistical challenges imposed on us by COVID-19, the congresses' physical footprint was scaled down and we had to be creative by adaptively converting the event into a hybrid format where we had both virtual and in-presence attendees and speakers. It turned out to be very successful not only because of the content of the programme, the outstanding logistics, and the will of so many dentists to attend in person, but also thanks to the virtual attendees, who in some cases were in 10 to 15-hour time difference zones, and who found a way and the time to participate virtually. Once again, we reached our goal to provide a programme that was informative, well sequenced with a good balance of scientific content as well as clinical experiences from our speakers. This year we returned with the poster presentation competition. We accepted five finalists one of which was virtual and another with an industrial background. We awarded the top three presenters cash prizes for their presentations. We were also honoured and privileged to have two new players in the ceramic dental implant industry, namely Patent™ Dental Implant System from Switzerland and MAAB'S Z7 implants from Argentina, choose our event to introduce their systems to the North America market during our congress. We want to extend many thanks to all the attendees and speakers, both in-person and virtual, for allowing our 10th Anniversary Annual Congress to be unique and successful. We also want to thank all the exhibitors and sponsors who—despite the circumstances—came from far and near to participate in and celebrate this milestone.

As we look ahead to our 11th Anniversary Congress which is going to take place in Washington DC in the spring of 2022, we have once again already gathered a fantastic line-up of speakers and scientists to come and share their experiences with us. The list and provisional programme are going to be posted on our website (www.iaoci.com/iaoci2022) in the upcoming weeks and on an ongoing basis. Given the success of the poster presentations, we will continue to host the poster competition and accept both virtual and in-person entries. The IAOCI intends to continue to host both in-person and virtual educational events on ceramic implants and implant-related topics across North and South America and other parts of the world. We invite you to visit our new website www.iaoci.com/events to see more information on our upcoming events and how you can be a member and part of our organisation.

contact

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Silver Spring, MD, USA
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sammy@iaoci.com

Author details

May 19-22, 2022 • Save The Date!

11th IAOCI WORLD CONGRESS

Washington, DC

CERAMIC IMPLANTOLOGY: 3 DAYS OF EXCEPTIONAL EDUCATION HANDS-ON COURSES AND NETWORKING

Past Presenters and topics include:

Andrea Borgonovo, Jaafar Mouhyi, Ulrich Volz, Heinz Kniha, Marcel Wainwright, Daniel Olmedo, Jerome Chevalier, New Generation of Zirconia Based Ceramic Materials, The Corrosion Problem in Implant Dentistry, Blood Concentrates for Optimal Bone Healing and Osseointegration and Tissue & Cell Behaviour Towards Zirconia...

WWW.IAOCI.COM

The American Ceramic Society www.ceramics.org | International Academy of Ceramic Implantology | IAOCI | ASCI American Society of Ceramic Implantology

Fig. 1: Some of the speakers at the first Joint Congress for Ceramic Implantology. From left: Dr Judson Wall, Dr Augusto C. Moreira Tralli, Dr Ana Tralli, Dr Johanna Graf, Dr Rebekka Hueber, Dr Dirk U. Duddeck, Dr Uwe Drews, Dr Karl Ulrich Volz (head of the congress), Dr Johann Lechner, Dr Saurabh Gupta and Marco Gadola.

First Joint Congress for Ceramic Implantology held with great success

Caroline Vollmann, Switzerland

Renowned scientists and dental professionals from around the world with expertise on all relevant topics related to ceramic implantology gathered at the SWISS BIOHEALTH EDUCATION CENTER in the city of Kreuzlingen in Switzerland on 15 and 16 October 2021 to launch the first Joint Congress for Ceramic Implantology. From the more than 300 participants from 16 countries, 130 guests attended the event in person, making it the largest congress of its kind to date.

Among the internationally renowned speakers and the audience were not only implantology-savvy dentists but also medical experts who were keen on sharing their insights on, in addition to ceramic implants, the topic of biological dentistry, which deals with optimising the general health of patients by means of targeted intake of vitamins and micronutrients, for instance, in order to systemically prepare their bodies for surgery and support the subsequent healing period. In addition to the hosting expert society, the International Society of Metal Free Implantology (ISMI), Dr Karl Ulrich Volz, ISMI president and head of the congress, invited six other renowned medical associations to the congress. They contributed to the congress programme substantially by providing top-tier speakers, and the various invited ceramic implant manufacturing companies and other industry partners were given the opportunity to share their latest research findings and technologically advanced product innovations with the congress participants as part of the complementary industry exhibition. For instance, members of the US-based International Academy of Ceramic Implantology expert society or the German Society for Blood Concentrates and Biomaterials, which was founded under the leadership of congress speaker Prof. Shahram Ghanaati in 2020, were invited to contribute to the event with their professional expertise. To provide the best experience possible for the international audience, the congress was held bilingually in that it was interpreted simultaneously from English into Ger-

Fig. 2: As head of the congress, Dr Karl Ulrich Volz moderated the open Q & A sessions. **Fig. 3:** Dr Kurt Mosetter (second to right) led a workshop on the topic of Myoreflex therapy.

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Fig. 4: Various manufacturing companies including Zeramex/Dentalpoint were invited to share their product innovations with the congress participants. **Fig. 5:** Dr Karl Ulrich Volz (ISMI president and head of the congress, left) and Marco Gadola (former CEO and current member of the board of Straumann Group).

man and vice versa. What was conveyed theoretically in exciting lectures was also demonstrated practically with a live surgery carried out in the surgical facilities of the adjacent SWISS BIOHEALTH CLINIC, where implants from the ceramic implant manufacturer SDS Swiss Dental Solutions were inserted, further consolidating the newly acquired knowledge on the part of the participants.

In addition to attending the congress in person, all those interested in ceramic implants had the opportunity to either follow the congress online from home via livestream, which was also transmitted 9 hours later for the international participants, or watch it via interactive Zoom, while also being able to actively participate: during open Q & A sessions, the Zoom-participants were connected live and thus had the opportunity to interact directly with the on-site audience in the training centre. For guests who attended the congress in person, an all-inclusive service was offered for the breaks, allowing them the opportunity for personal exchange during those times. The White Night with its gourmet and bar stations and its musical programme involving a DJ set and live performance of a band was certainly another highlight for all guests looking to review the eventful congress days with colleagues in an informal atmosphere. In summary, Dr Volz described the congress as a complete success and said that he was grateful for the fruitful exchange of experience between those attending, some of whom have been using ceramic implant systems for decades to great success. Marco Gadola, speaker at the congress, former CEO and current member of the board of Straumann Group, sees ceramics as the implant material of the future and predicts that in 2025, the clinical use of ceramic implants will have grown by a factor of 40.

The second Joint Congress for Ceramic Implantology will take place on 14 and 15 October 2022, again at the SWISS BIOHEALTH EDUCATION CENTER in Kreuzlingen, to jointly discuss topical research results as well as current methods and treatment approaches in relation to ceramic implantology. Three-quarters of the on-site participation capacities for the second event are already booked. More information will be made available in due course at www.swissdentalsolutions.com/en/joint-congress-ceramic-implantology.

contact

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Fig. 6: Dr Dirk U. Duddeck, Managing Director of the CleanImplant Foundation, awarded Dr Karl Ulrich Volz (CEO of SDS Swiss Dental Solutions) the prestigious "CleanImplant Trusted Quality Certification" for the SDS 2.2 ceramic implant system. **Fig. 7:** The White Night with its musical programme involving a DJ set and live performance of a band was another highlight for the congress participants.

bredent medical

The new generation of whiteSKY ceramic implants

The whiteSKY implant system from bredent has already been on the market for over 15 years and the first generation of whiteSKY implants is one of the best documented zirconia implant systems available. Numerous studies have proven their stability, good osseointegration, superior aesthetics and longevity. The system has also proven itself in the clinical practice: The long-term survival rate of zirconia implants is at par with implants made of titanium. The new, slightly concave shape in the sulcus area of the whiteSKY T.L. offers more space for the peri-implant soft tissue which further improves the aesthetic result and soft tissue seal, especially in the area of transition from the gingiva to the implant crown. In addition, the design of the abutment has been optimised for direct intra-oral scan and CAD/CAM restorative workflow. With the whiteSKY T.L. implant, the demanding production from HIP (Hot Isostatic Pressed) zirconia and the proven surface treatment of its predecessor have been retained. This autumn, the whiteSKY Tissue Line will be complemented by the whiteSKY Alveo Line.

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Amann Girrbach

High-speed sintering—so fast, so beautiful, so safe

Consisting of the High-Speed Ceramill Therm DRS sintering furnace and the specifically developed Zolid DRS zirconia, the High-Speed Zirconia Kit provides the perfect basis for the ultra-fast fabrication of highly aesthetic zirconia restorations. The restorations can be sintered in just 20 minutes and offer maximum efficiency with a natural appearance due to the perfectly coordinated 16 VITA shades with integrated shade and translucency gradient. The focus of the development was clearly on the issue of safety, as only durable restorations are of benefit to the laboratory, the clinician and the patient. For this reason, numerous studies were conducted by renowned external institutes during the development phase. The result was conclusive: the fast sintering cycle has no relevant influence on optical or mechanical properties. In addition, the high flexural strength of >800 MPa and the associated classification as a Class 5 zirconia provides an additional safety cushion. Both laboratories and dental practices benefit from this innovative high-speed sintering process enabling them to add the so-called “Same Day Crown” to their service offering. Due to the extremely shortened sintering process, single-tooth crowns and three-pontic bridges can be realised in just one day. What’s more, the fabrication of other indications can also be shortened considerably. For example, an implant restoration consisting of a zirconia abutment and a crown can now be fabricated in less than 24 hours with the High-Speed Zirconia Kit.

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Straumann

Natural ceramic—proven quality

PURE ceramic implants have an ivory colour that resembles natural tooth roots. This gives the most natural look even in thin gingiva biotypes. ZLA, the surface of the PURE ceramic implant, is characterised by macro- and micro-roughness which is similar to the original Straumann SLA surface. In several studies, the ZLA surface has also demonstrated similar healing patterns, healing times and osseointegration qualities with regards to peri-implant bone density and bone-to-implant contact (BIC). In addition, the zirconia-based ZLA surface of PURE implants shows a favourable formation of the epithelial attachment, as well as significantly lower bacterial accumulation compared to titanium-based SLA surfaces.

Compared to titanium implants, a higher degree of soft-tissue integration around the PURE ceramic implant was observed in scientific studies. By placing the Straumann PURE ceramic implant system, excellent aesthetic outcomes with favourable soft-tissue attachment and papilla formation around the implant can be achieved.

Institut Straumann AG
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+41 61 9651111
www.straumann.com

ZiBone

A wide range of zirconia products

Based on more than 30 years of experience, COHO has been producing orthopaedic and dental implants, and surgical instruments made from zirconia for many years. In collaboration with renowned experts and research units from National Taiwan University, a wide variety of ZiBone zirconia products have been launched in the past, including implant drills, pilot drills, tissue punch devices, tissue trimmers, scalpels, or elevators. COHO is always looking to advance research on surface treatment to reduce metal-related health risks for patients and to facilitate safety and convenience during surgery. COHO is currently working towards the market entry of Zircasso, IZI and a tissue-level implant system. In addition, COHO offers the new Deguide Kit, a set of accurate tools designed and developed by Dr Noran Debasso, which provides patients with a simple way to clean their implants and achieve good oral hygiene. Based on a novel, encompassing technique from Dr Noran Debasso, the Deguide Kit is a solution that does not require CBCT and that fits every type of dental implants. To find out more, go to www.zibone.com.

COHO Biomedical
Technology
Taiwan
+886 3 3112203
www.zibone.com

Z-SYSTEMS

Z-SYSTEMS Ceramic Implants—100% Ceramic, 100% Swiss

Ceramic implants have been at the cutting-edge of dental implant technology for over a decade, and are becoming increasingly popular with patients and practitioners worldwide. As a market leader, Z-SYSTEMS has taken another leap forward with its innovative Z5-BL (Bone Level) and soon-to-be-released Z5-TL (Tissue Level): the world's first two-part, screw-retained implants made entirely of ceramic. For the first time, completely submerged healing is now also possible with ceramic implants. The Z5-BL's advantages are evident in its beautiful bone level design and a unique variety of abutments. A high-precision, extremely stable conical connection between the abutment and the implant makes it possible to use this material even for the occlusal screw. Many practitioners also like to work with tissue level implants—especially in biological dentistry. In recognising these clinical demands, Z-SYSTEMS is rapidly following the release of the Z5-BL with an equally-revolutionary Z5-TL. These latest releases build on the proven platform of Z-SYSTEMS heritage line: the Z5m, Z5m(t) and Z5c. Each Z-SYSTEMS product features the technology's unique, patented laser surface for outstanding osseointegration. The company's proprietary manufacturing process has produced a top-quality implant family renowned for its great durability. In addition to fixed restorations, removable locator-like abutments are also possible on all two-piece Z-SYSTEMS implants. Available lengths are 8, 10 and 12 mm and diameters are 3.6, 4.0 and 5.0 mm.

Z-SYSTEMS Ceramic Implants
Switzerland
contact@zsystems.com (for USA/Americans & UK/MEA)
support@zsystems.com (for EU costumers)
www.zsystems.com

Zircon Medical

Master of zirconia:
The Patent™ Dental Implant System

Zircon Medical, Swiss-based manufacturer of the Patent™ Dental Implant System, has truly mastered zirconia with its complex proprietary manufacturing process. Patent™ Implants feature a unique and purposeful design that works together perfectly with the material characteristics of zirconia. On its intra-bony portion, the Patent™ Implant has an incredibly rough surface (6 µm), which attracts bone cells to a particularly high degree. This hydrophilic and osteoconductive surface facilitates the rapid forming of a fibrin network only a few minutes after implant insertion, which accelerates contact osteogenesis and particularly optimises the early stages of healing. The result is rapid and successful osseointegration of the Patent™ Implant. This was recently demonstrated by Dr Roland Glauser and Dr Peter Schüpbach, who reported in an in-press study on mini-pigs that Patent™ Implants achieve a bone–implant contact of roughly 70% after only four weeks of healing, outperforming every implant system documented to date. On its transmucosal portion, the implant has a machined surface which attracts epithelial cells, creating an incredibly strong attachment of the soft tissue. The Patent™ Implant system incorporates yet another unique solution: the system's tight prosthetic connection is achieved by means of a high-tech glass fibre post, which is cemented to the implant and which can easily be prepared for any kind of crown or bridge restoration. Zircon Medical produces everything in-house and can therefore guarantee quality control regarding the production of the components for the ultimate benefit of the patient.

Zircon Medical Management
Switzerland
+41 44 5528454
www.mypatent.com

EACim
European Academy of Ceramic Implantology

One-Day Course

BluePoint Brussels Conference Center

April 23, 2022
Brussels (Belgium)

One-Day Course **ON CERAMIC IMPLANTS**

Co-organised by EACim and Société de Médecine Dentaire (Belgium)




MORNING BLOCK
FROM 9:00 TO 12:30

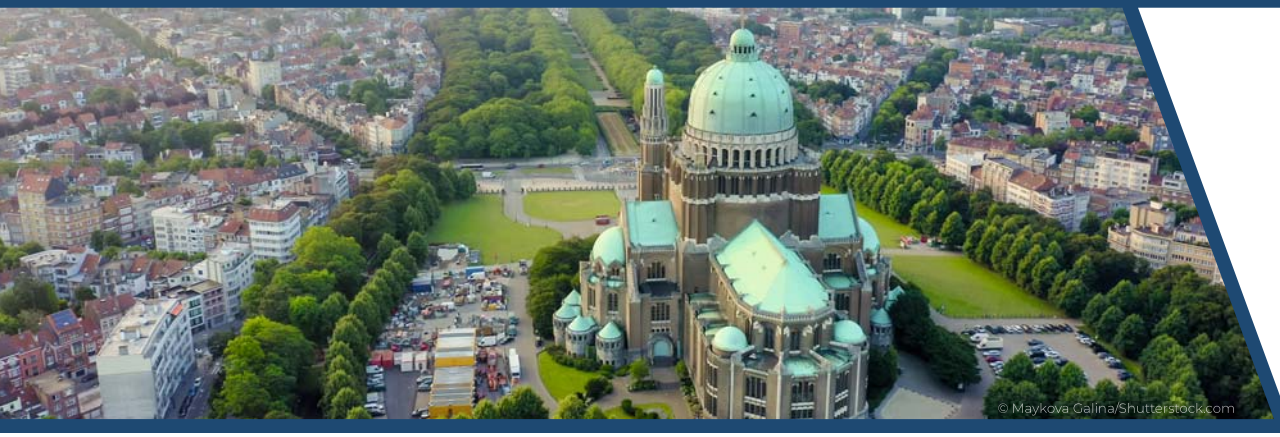
- DR PHILIPPE DUCHATELARD (FR):
  Is Zirconia an Alternative to Titanium in Implant Dentistry?
- PROF. ERIC ROMPEN (BE):
  Osseo- and Muco-integration of Ceramic Implants.

AFTERNOON BLOCK
FROM 14:00 TO 17:30

- DR GIANCARLO BIANCA (FR):
  Zirconia implant: Close to the Natural Root?
- DR PASCAL EPPE (BE):
  Prosthetics on Ceramic Implants: The Keys to Success

Lecture Program in French.

For further info and registration contact: **secretariat@dentiste.be**



association dentaire belge francophone
SOCIETE DE MEDECINE DENTAIRE
asbl

https://eacim-ceramic-implantology.com/

TAV Dental

Innovation for a healthier world

TAV Dental is focused on developing and manufacturing zirconia dental products using the advanced ceramic injection technology with a vision to redefine the quality of zirconia dental products and its performances and to make these premium implants common worldwide. We offer a variety of solutions in the field of dental implants under one roof. The passion behind developing zirconia products for dental implantology is to provide patients with products that are much healthier for their bodies along with the advantage of uncompromising aesthetic results. The white colour of zirconia ceramic implants, its biocompatibility and low plaque affinity, along with its high mechanical properties and osseointegration rates, make it a material of choice. TAV Dental offers a one-piece zirconia implant with integrated abutment and a two-piece zirconia implant with slot connection geometry, which optimises the force transfer applied on the implant connection during insertion and, as a result, simplifies implant placement.

TAV Dental · Israel · +972 4 9808615-503 · www.tavdental.com

CaviTAU®

The radiation-free view into the jawbone

The newly developed CaviTAU® is an imaging ultrasound technique for displaying bone density & quality in the jaw area. CaviTAU® therefore provides implantologists with practice-relevant information on implant success. Ultrasound-based imaging is a safe and minimally invasive technology in medicine. CaviTAU® penetrates solid and healthy bone tissue faster than structurally damaged bone tissue. Alveolar cancellous bone pathologies with low bone density can be safely assessed with the CaviTAU® technique of trans-alveolar ultrasonography (TAU). CaviTAU® measurement results are displayed on a colour monitor and determine bone density with different colours. Digital X-ray technology determines the available bone quantity for the implantologist and Digital CaviTAU® technology determines the available bone quality for the implantologist—both procedures together ensure implant success.

CaviTAU® · Germany · +49 89 90421762 · www.cavitau.de

Dentalpoint

Your partners for the fully digital workflow with ceramic implants

With Zeramex Digital Solutions and the new CS 3800 from Carestream Dental, it will now be even more convenient to plan and implement ceramic implant restorations precisely and completely digital. Zeramex Digital Solutions offers the complete digital workflow to create patient-individual restorations on Zeramex XT ceramic implants: from abutments and healing caps to monolithic restorations without any cementation gap. All components made of zirconium oxide are also available as multilayer and stained and glazed—within one week. These CAD/CAM treatment options are ideally complemented by the new CS 3800 intra-oral scanner. Stefan Haupt, Solutions Product Specialist at Carestream Dental, sums up the advantages: "The slim and wireless design of the CS 3800 ensures better handling with increased comfort during the scanning process. The enlarged field of view as well as the depth of field of 21 mm even enables the simple scanning of edentulous patients." With the CS 3800, Carestream Dental paves the way to absolute freedom with all the options of a real end-to-end workflow. "It is a great opportunity to enter the completely digital workflow with Zeramex implants", explains Adrian Hunn, CEO Dentalpoint, and "we are convinced that two-part ceramic implants and the digital workflow will remain the dominant topics in implantology."

Dentalpoint AG
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digitalsolutions@zeramex.com

CAMLOG

Natural aesthetics with the CERALOG® Implant System

The demand for highly aesthetic, natural-looking restorations is continually increasing. This trend favours ceramic implant solutions with high levels of biocompatibility, particularly zirconia, known for its excellent soft-tissue compatibility. The CERALOG® Implant System is established and has been in clinical use for more than seven years. It offers a high level of predictability and provides aesthetically pleasing results. The two-piece design of the system that allows for screw-retained prosthetics offers great benefits. CERALOG® is easy to use, owing to the simplified prostheses, lean instrumentation, and clearly structured surgical procedure. Options for the treatment workflow include flexible trans- or submucosal healing of the two-piece CERALOG® Hexalobe implant and transmucosal healing of the CERALOG® Monobloc implant. The implants are made of yttria-stabilised tetragonal zirconia, which is a ceramic widely used in the dental industry and other highly demanding medical fields. The ivory colour of the material, which is very close to that of a natural tooth, and the properties of zirconia lead to natural-looking results. Zirconia is chemically inert, making it especially suitable as an implant material. Due to its manufacturing process called ceramic injection molding (including sintering and hot isostatic pressing), it offers an outstanding combination of excellent mechanical properties and high strength.

AESTHETICS
The ivory colour, which is close to the natural tooth colour and the properties of zirconia supports high aesthetic results.

IDEAL CONNECTION
Hexalobe – the ideal implant–abutment connection for ceramic implants. The torque is transmitted tangentially to the implant, which allows a much higher torque compared to hexagonal connections, and also more rotational stability.

CAMLOG Biotechnologies GmbH
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+41 61 5654141
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ESCI European Society for Ceramic Implantology

consensus statement
"two piece ceramic dental implants"
www.esci-online.com

ESCI Statement

Consensus statement by the ESCI

Two-piece ceramic dental implants

The development of high-performance ceramics—such as zirconium dioxide (zirconia, ZrO_2)—has created new, metal-free treatment options for both patients and practitioners in various fields, including dental implantology. Owing to its superior biomechanical and biocompatible properties, zirconia has prevailed over other oxide ceramics and has been used in dentistry for about 25 years. Thus, ceramic implants made of zirconia represent a significant complement to titanium implants and thus an expansion of the treatment spectrum in dental implantology. Fortunately, different consensus papers from various professional societies have confirmed that one-piece ceramic implants are sufficiently documented in the scientific literature and regard this as the main reason why one-piece ceramic implants have found their way into clinical practice. In this context, for example, the medical necessity of ceramic implants has already been accepted by the cost bearers in Germany as a central service requirement for cost coverage. However, based on scientific statements and recommendations of professional associations, two-piece ceramic implants are still often denied this recognition with the argument that there is a lack of scientific evidence and consequently a lack of medical necessity for this type of implant.

The European Society for Ceramic Implantology (ESCI), a scientific and independent medical society, is of the opinion that, when determining the medical necessity of two-piece ceramic implants, the assessments of specialist and topic-specific professional societies should also be taken into account in particular. Furthermore, the ESCI is of the opinion that a well-founded and fundamental consensus statement by a medical society on the clinical reliability of two-piece zirconia implants is required in view of the literature available to date on this type of implant. Against this background, the ESCI has taken on the task of compiling an official evidence-based statement on the clinical use of two-piece ceramic implants. This statement was prepared, formulated and consensually adopted by the Scientific Advisory Board and the Board of Directors of the ESCI, which consists of renowned scientists and experienced experts in the field of ceramic implantology: Prof. André Chen, Prof. Jérôme Chevalier, Prof. Jens Fischer, Prof. Michael Gahlert, Prof. Ralf Kohal, Dr Frank Maier, Prof. Mutlu Özcan, Prof. Michael Payer, Prof. Corrado Piconi, Dr Stefan Röhling, Dr Jens Tartsch and Prof. Werner Zechner.

For this statement, the currently available literature was reviewed and clinical experience was taken into account. It objectively and independently reflects the state of evidence on two-piece ceramic implants, the general background to ceramic implants is presented as an introduction and the current scientific assessment of the ESCI on two-piece ceramic implants is given. A final legal assessment is not within the realm of responsibility of the ESCI.

The key points of the statement are as follows:

- The two-piece zirconia implant concept offers advantages over the one-piece concept regarding prosthetic flexibility and clinical indications.
- Two-piece zirconia implants can resist clinical masticatory forces.
- Fracture resistance and mechanical stability of two-piece zirconia implants may vary as a function of different manufacturing processes, material properties, implant geometries and prosthetic connection concepts.
- One- and two-piece zirconia implants demonstrate the same level of osseointegration and biological integrity.
- For clinical success, each manufacturer's guidelines regarding strict application for the specified clinical indications should be followed for the respective two-piece zirconia implant system.
- The ESCI Scientific Advisory Board states, based on the conclusions above, that the two-piece zirconia implant concept is appropriate for clinical application.

For more information on the recently released consensus statement and the full statement, visit the ESCI website at https://esci-online.com/en/statements.

Source: European Society for Ceramic Implantology

SDS Swiss Dental Solutions to hold

Interactive Zoom Day in December

This December, the Interactive Zoom Day will be held at the SWISS BIOHEALTH EDUCATION CENTER in Kreuzlingen, Switzerland. The online course is promised to be one of the most successful formats of the continuing education centre at Lake Constance. Dentistry according to the SWISS BIOHEALTH CONCEPT by Dr Karl Ulrich Volz combines proven basic biological principles with innovative technology. This unique treatment concept is aimed at optimising the health of patients by incorporating the immunological mechanisms of the oral cavity and the entire body—this is especially important in times of a pandemic, when the quest for health is becoming an increasing focus of society. In combination with state-of-the-art developments, biological dentistry opens up enormous perspectives for dental professionals and their patients: made from zirconium oxide, the metal-free ceramic implants from SDS Swiss Dental Solutions offer promising and scientifically sound solutions, especially in the context of immediate implant placement—even with minimal bone supply. At the Interactive Zoom Day, ceramic pioneer Dr Karl Ulrich Volz will personally share his in-depth knowledge on the most relevant aspects of biological dentistry and ceramic implantology. Additionally, expert discussions and Q&A sessions will reinforce your newly acquired knowledge. Simply join from home and be part of it.

Registration

Source: SDS Swiss Dental Solutions

2021 EACim Online Congress

Held with great success

On 25 September 2021, the Online Congress of the European Academy of Ceramic Implantology (EACim) was held. Over the course of an entire day, internationally renowned experts in the field of ceramic implantology shared their professional knowledge to a virtual audience from all over the world. Among the speakers were Drs Rouven Wagner, Pascal Valentini, Saurabh Gupta, Andrea E. Borgonovo, Ted Fields, Pedro Silva, Sammy Noumbissi, and Prof. Eric Rompen and Prof. Marcel Wainwright. The overarching theme of this year's congress was "Zirconia Implant, from Single to Plural, from Simple to Complex Rehabilitation". The lectures were translated simultaneously from English into French and covered virtually every aspect of ceramic implantology, including the digital workflow, the current state of research on zirconia implants, and restorative possibilities. Additionally, the attendees experienced fruitful discussions between the speakers, which were led by the moderators Dr Pascal Valentini, Honorary President of the expert society, and Dr Norbert Cionca from the University of Geneva. Despite the limitations regarding its virtual format, the 2021 Online Congress turned out to be a great success. Replay will be available soon. For more information on this and upcoming EACim events, go to: https://eacim-ceramic-implantology.com

EACim
European Academy of Ceramic Implantology

Source: European Academy of Ceramic Implantology

New member in the family of certified clean implants:

SDS receives the prestigious CleanImplant Trusted Quality Award

During the first Joint Congress for Ceramic Implantology (JCCI) in Kreuzlingen, Switzerland, Dr Dirk U. Duddeck, Managing Director of the non-profit CleanImplant Foundation, awarded the sought-after "CleanImplant Trusted Quality Certification" to Dr Karl Ulrich Volz (CEO of SDS Swiss Dental Solutions) for the SDS 2.2 ceramic implant system. After a strict peer-review process, two members of the CleanImplant Scientific Advisory Board confirmed that the test results of five randomly selected implant samples met the CleanImplant consensus-based quality guidelines for contamination-free dental implant surfaces. Dr Volz of SDS was delighted to receive this certificate and took the opportunity of highlighting the importance of surface cleanliness in the field of ceramic implantology at his congress. The CleanImplant Foundation aims to raise awareness for a better quality of dental implant systems. Worldwide quality assessment studies performed by the foundation in collaboration with renowned universities showed considerable differences in the quality of dental implants made of zirconia and titanium.

Source: CleanImplant Foundation

The 11th IAOCI Annual Congress

To be held in spring of 2022

IAOCI | International Academy of Ceramic Implantology

Following the great success of the their 10th Anniversary Annual Congress in August of 2021 in Las Vegas, USA, the International Academy of Ceramic Implantology (IAOCI) is already looking ahead to their 11th Anniversary Congress which is going to take place in Washington DC, USA, in the spring of 2022. For the upcoming event, the US-based expert society for ceramic implantology has once again gathered a fantastic line-up of top-tier speakers and scientists to share their professional knowledge and experiences with the audience. Given the success of the poster presentations at past IAOCI congresses, the organisers have decided to continue to host the poster competition and accept both virtual and in-person entries. The list and provisional programme are going to be posted on the IAOCI website in the upcoming weeks and on an ongoing basis and online registration will be made available in due course too (www.iaoci.com/events). Become a member of the IAOCI today at https://www.iaoci.com/membership.

Source: International Academy of Ceramic Implantology (IAOCI)

6th Annual Meeting of ISMI

To be held in Berlin next year

Mark your calendars: The International Society for Metal Free Implantology (ISMI) invites interested parties to participate in their 6th Annual Meeting, to be held on 24 and 25 June 2022 in Berlin, Germany. The two-day further training event will commence on Friday with pre-congress symposia involving the live-streaming of surgeries into the conference hall, followed by the first part of the scientific lecture programme. Saturday will then be dedicated entirely to scientific lectures delivered by renowned speakers from Germany and abroad. The theme of the congress will be „Ceramic Implants—State of the Art". On both congress days, the programme will be complimented by an industry exhibition, where the latest in ceramic implant innovation will be on display. ISMI was founded in 2014 in the city of Constance, Germany, with the aim of promoting metal-free implantology as an innovative and particularly forward-looking branch of dental implantology. Since then, the expert society has been providing its members with continuing education offerings dedicated to ceramic implantology on a regular basis. More information on the upcoming Annual Meeting of ISMI will be made available in due course on www.ismi.me and on www.ismi-meeting.com.

Source: OEMUS MEDIA AG

Congresses, courses and symposia

EACim One-Day Training Course

23 April 2022
Brussels, Belgium
https://eacim-ceramic-implantology.com

11th IAOCI World Congress

19–22 May 2022
Washington DC, USA
https://www.iaoci.com

6th Annual Meeting of ISMI

24–25 June 2022
Berlin, Germany
ismi-meeting.com

2nd Joint Congress for Ceramic Implantology

14–15 October 2022
Kreuzlingen, Switzerland
www.swissdentalsolutions.com/en/joint-congress-ceramic-implantology

ceramic implants

international magazine of ceramic implant technology

Imprint

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Published by
OEMUS MEDIA AG
Holbeinstraße 29
04229 Leipzig, Germany
Tel.: +49 341 48474-0
Fax: +49 341 48474-290
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Printed by
Silber Druck oHG
Otto-Hahn-Straße 25
34253 Lohfelden, Germany

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