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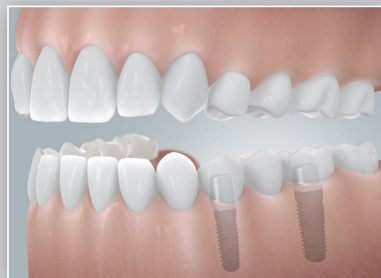
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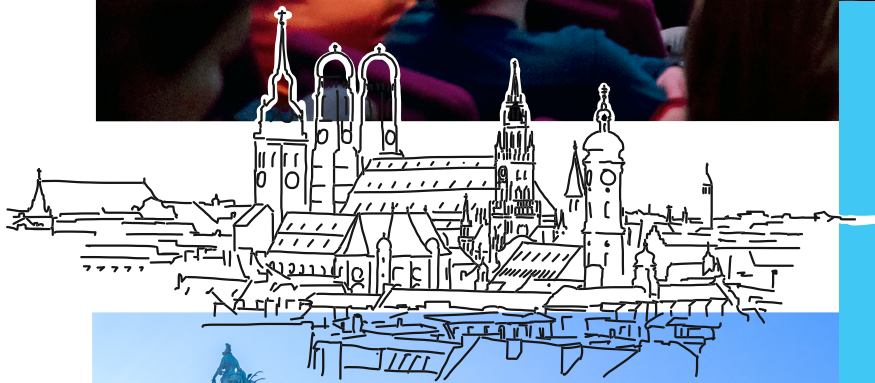
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COVER STORY

Big reunion in Munich

» The Oral Reconstruction (OR) Foundation invites you to its International Symposium in Munich, Germany, October 13-15, 2022. After the inaugural OR Foundation Global Symposium in Rotterdam in 2018, Camlog, being a Founding Sponsor of the OR Foundation, is now truly looking forward to the big "family" reunion in the cosmopolitan city with a heart.

Following a four-year forced break, everything has now been perfectly prepared to continue in the tradition of the earlier Camlog congresses, or rather today's OR Foundation symposia. The modern atmosphere and the spatial conditions of the Infinity Hotel in Unterschleißheim create the perfect framework conditions for an optimal transfer of knowledge, exchange of experience and personal encounters.

The combination of science and practice is a living philosophy at the OR Foundation. This is already reflected in the line-up of the scientific committee and is also expressed by the scientific program, which this time follows the theme of the congress "**Dreams and Realities - Treatment Concepts and Trends**". "The top-class scientific committee and the commitment of the internationally renowned speakers guarantee that you can expect a differentiated and groundbreaking program in Munich," is how Mariano Sanz (President OR Foundation) and Martin Schuler (Executive Director OR Foundation) summarized the event.

On **Friday** (14 October 2022) you will have the opportunity to enjoy twelve presentations - nine of them in German and two in English:

- Session 1: **Timing in Implant Dentistry** (Ilaria Franchini, Markus Schlee, S. Marcus Beschnidt). Moderation: Frank Schwarz.
- Session 2: **Treatment Concepts for Demanding Situations** (Arndt Happe, Peter Randelzhofer, Anette Strunz). Moderation: Katja Nelson.
- Session 3: **Treatment Concepts for Elderly or Edentulous Patients** (Knut A. Grötz, Sandra Maniewicz, Mario Beretta (EN)). Moderation: Luca Cordaro.
- Session 4: **Advances in Digital Workflow in a Team Approach** (Benedikt Spies, Vygandas Rutkunas (EN),

Claudio Cacaci and Uwe Gehringer). Moderation: Vincent Fehmer.

The **Saturday** (15 October 2022) begins with short presentations on research projects supported by the Oral Reconstruction Foundation:

- Session 5: **Focus on Innovations** (Stefan Krennmair, Sarah Al-Maawi (EN), Andres Pascual (EN), Joao Pitta (EN), Ana Molina (EN)). Moderation: Fernando Guerra.

The following sessions are dedicated to tissue regeneration:

- Session 6: **State-of-the-art Procedural Techniques for Tissue Regeneration** (Juan Blanco (EN), Katja Nelson).
- Session 7: **Management of Soft and Hard Tissue** (Michael Stimmelmayer, Andreas van Orten, Jan Klenke). Moderation: Sönke Harder.

The final highlight of the symposium will be three **case presentations** discussed by an international panel of experts (Kerem Dedeoglu, Tobias Fretwurst, Gerald Krennmair, Jörg-Martin Ruppig, Rémy Tanimura):

- Session 8: **Solutions for Demanding Situations** (Ramon Gomez-Meda, Frederic Hermann, Duygu Karasan). Moderation: Gerhard Iglhaut, Mariano Sanz.

Kick-off: Workshops

The symposium will kick off on **Thursday** (13 October 2022) with 17 workshops covering a wide variety of topics in the field of oral reconstruction; one workshop will be dedicated to the topic of personality development and one will focus in depth on patient communication.

Ten workshops will be offered in German, seven in English. The technical and scientific workshops will focus on soft tissue management, augmentation techniques,

«The top-class scientific committee and the commitment of the internationally renowned speakers guarantee that you can expect a differentiated and groundbreaking program in Munich.»

implant dentistry (immediate implantation and immediate restoration, COMFOUR) and implant prosthetics in the digital workflow. With workshops starting in the morning, there are also eleven workshops held during the afternoon and also three full day workshops throughout the day. Hands-on or practical exercises are compulsory in most cases to achieve the learning objectives.

Take advantage of the opportunity to specifically explore one of the many topics in depth during the symposium and discuss it with our experts. The course fees are priced reasonably at EUR 190 (half day) and EUR 350 (full day).

A format in its own right:

THE 7TH CAMLOG DENTAL TECHNOLOGY CONGRESS

And there is more to come, because on Saturday (15 October 2022), the 7th CAMLOG DENTAL TECHNOLOGY CONGRESS will be held in parallel with the scientific program. This gives dental technology and thus the team concept in reconstructive dentistry a platform of its own.

Since it was first held in 2009 (also in Munich, by the way), the CAMLOG DENTAL TECHNOLOGY CONGRESS has built up an excellent reputation in the world of dental technology and well beyond. It stands for the team approach in implant dentistry and dental prosthodontics and provides a clear focus on both dental technology and on establishing the link between dentistry and oral surgery with an appropriate program.

The 7th CAMLOG DENTAL TECHNOLOGY CONGRESS will be hosted by Dr. Martin Gollner and MDT Otto Prandtner. The program will be opened by DT Oliver Brix. This will be followed by three team presentations: firstly, Dr. Monika Bjelopavlovic, Dr. Maximilian Blume and MDT Alexander Müller; secondly, MDT Sebastian Schuldes and Dr. Alexander Volkmann; and thirdly, Dr. Benedikt Schebiella and MDT Bastian Wagner.

After the lunch break, the auditorium can look forward to a talk session or panel discussion with all team speakers on the topic: "Cooperation at eye level - what are the mutual expectations?" MDT Ilka Johannemann and DT Andreas Nolte will round off the discussion.

The professional program reflects the current challenges in prosthetic dentistry. In addition to a high professional standard, the organizers also attach great importance to ensuring that the personal character of the speakers is not neglected - after all, in addition to the scientific "hard facts" based on materials science, biology and anatomy, dental technology is also very much about the individuality of the patients and their encounter with a service-oriented and empathetic treatment team.

Joint Bavarian Night

The supporting program of the OR Foundation Symposium and the 7th CAMLOG DENTAL TECHNOLOGY CONGRESS will have its highlight on Friday evening in the legendary event location "Paulaner am Nockherberg". Experience an unforgettable "Bavarian Night" and celebrate the reunion of the "family" with us in the traditional style - quite deliberately a contrast to the otherwise modern setting of the symposium. And of course, this will be accompanied by one or two surprises.

We look forward to welcoming you!



The OR Foundation International Symposium in Munich promises to be a first-class event.



A few quick questions



Dr. Martin Schuler
Executive Director
Oral Reconstruction
Foundation

Dr. Martin Schuler took over from Dr. Alex Schär as Executive Director of the OR Foundation at the beginning of 2022. A good reason to ask him a few questions about this as well as the upcoming OR Foundation International Symposium.

Dr. Schuler, you've been in office as Executive Director for over six months now, you must feel at home at the OR Foundation by now ...

That's right, I feel at home again in the dental world. Having worked in the dental sector between 2007-2015, it was like returning home for me. But the environment is so dynamic that every day presents new and exciting challenges and permanent development is crucial.

What kept you most busy early on?

As a new Board of Trustees was also elected in November 2021, I was mostly busy setting up the new organization and structures as well as getting to know as many of the stakeholders as possible. Bumping into a lot of familiar people was also very helpful for sure.

What's your main task at the moment?

Together with the Board, we're currently defining the

OR Foundation strategy for the next five years. On the operational side of things, our team is already pulling out all the stops organizing our Global Symposium in Rome next May. What's more, we're creating several new formats for continuing education and hope to be able to report more on this in the coming months. Certainly the biggest challenge is to perform all these tasks most efficiently with our small team.

Where are you looking to make the most impact for the OR Foundation?

Thanks to my predecessor and the former Foundation Board members, the OR Foundation is very well positioned and enjoys an excellent reputation. My goal is now to make the OR Foundation better known globally, to offer more content and work together digitally, and to create new and innovative concepts in continuing education, as well as in research, in close collaboration with our KOLs and our Founding Sponsor. Not least, we strive to be a valuable and reliable partner for the OR Foundation Community.

What are your personal expectations for the OR Foundation Symposium in Munich?

At long last, we are able to host an international symposium in Europe again. That's why we're all working flat out on this project with heart and soul. We're looking forward to an exciting and interesting scientific program and plenty of workshops. The Dental Technology Congress will also be held at the same time. So, there'll be something for everyone and I'm really looking forward to this flagship event this fall and hope for a lot of participants!

Many thanks for your time, Dr. Schuler.



For more information and registration at



symposium2022.orfoundation.org



faszination-implantatprothetik.de

SCIENCE

Single tooth replacement on titanium bases CAD/CAM – stable restorations supported by scientific results

» Study results on the question of which materials for restorations on titanium bases and which pre-treatments of the bonding surfaces allow the greatest possible mechanical stability of implant restorations.

Introduction

The use of prefabricated titanium adhesive bases as abutments opens up numerous options for the practitioner in the choice of workflow - digital or analog - as well as the materials for the abutments. The advantages of these generally screw-retained restorations are known: the extraoral bonding of the mesostructure and/or the crown allows cement residues to be avoided, the emergence profile can be customized, and the titanium implant-abutment connection allows for secure and wear-free stability [1].

With the majority of CAD/CAM technologies in use today, titanium bases are becoming state-of-the-art in daily practice, particularly for single-tooth restorations. The numbers for this indication have increased markedly in recent years due to the healthy lifestyle and good hygiene of patients as opposed to larger restorations [2]. Due to the digital workflow, patients benefit from an efficient treatment protocol with excellent esthetics, fewer treatment appointments and lower costs [3].

The processing and combination of the various materials, such as titanium and ceramics, often determine the long-term stability of the restoration. The basic rule here is to follow the manufacturer's instructions. However, a variety of products and methods is available on the market for the pretreatment of the bonding surfaces, for cementation and for the supra-structures. Not all appear to be equally suitable and universally applicable.

Research at the University of Geneva – Prof. Sailer and Team

A research group at the Clinic for Fixed Prosthetics and Biomaterials at the University of Geneva, headed by Professor Irena Sailer, is focusing on the long-term performance of restorations with titanium bases with regard to the choice of crown material and preparation respectively pretreatment of the bonding surfaces. They have published their findings on this subject in several publications over the past three years.

Various test setups were used to investigate the mechanical stability and bonding strength between titanium bases and different abutment materials such as zirconia, lithium disilicate and others in the laboratory. The various prosthetic options were also taken into consideration here: the use of the titanium bases as temporary restorations with PMMA and as hybrid abutments or hybrid abutment crowns was also tested.

The results show significant differences in some cases and are therefore of valuable use for applications in the dental practice or the laboratory.

Insights into five publications of the research group

General test setup: thermo-mechanical aging

An almost identical test setup, which is also used in a similar form in the industry for the load testing of dental implants (ISO 14801 standard), was selected for each of the five differentiated questions. The test models to be investigated - 12 identically fabricated specimens per test group - each simulating an anterior incisor in the maxilla, were subjected to dynamic loading in the chewing simulator for artificial aging. Analogous to the standard, the implants were embedded with a simulated bone loss of 3 mm and clamped at an angle of 30° to the loading axis. To better replicate the clinical oral environment, the test samples passed through an alternating thermal bath between 5° and 55° for 120 seconds each in parallel to the chewing load. The load exposure lasted over 1,200,000 cycles and reflected a chewing load in practice over a period of approx. five years. After completion of artificial aging, the restorations were examined microscopically. Then, depending on the study question, the retention force of the crown, respectively the bond, was measured by means of a pull-off test, or the bond was statically loaded using a universal testing machine up to mechanical failure and from this the bending moments which cause compressive and tensile stresses in the implant bond were calculated.



Peter Thommen
Clinical Research
Associate Camlog


Methods for improving bonding strength by pre-treating the bonding surfaces of titanium bases *Corundum blasting of the bonding surfaces [4]*

The surfaces of the titanium bases CAD/CAM intended for bonding to the meso- and suprastructure are usually corundum blasted first. This abrasive surface treatment, which is also recommended by the manufacturer, inevitably leads to a rougher surface and thus to improved bonding strength during cementing. Different grit sizes from various manufacturers are available on the market for this abrasion method. To determine the stability of the bond and the bonding strength between titanium bases CAD/CAM and lithium disilicate crowns after applying different methods, a total of 60 samples were divided into four groups: prior to bonding with Multilink Hybrid Abutment (Ivoclar Vivadent), the titanium bases were blasted with either 30-µm, 50-µm or 110-µm aluminum oxide (Al₂O₃) particles. The control group received no pre-treatment. Finally, the prepared restorations were screw-retained to the embedded implants.

During a try-in of the abutment, for example when using a chairside workflow or when taking a digital impression at abutment level, the previously blasted abutments are contaminated with saliva. The manufacturer specifies that the parts should be cleaned and disinfected before and after each use on the patient without naming specific agents.

This study tested which cleaning steps are necessary after contamination with saliva to restore ideal adhesion levels of the surfaces. Again, the titanium bases were bonded to lithium disilicate crowns for the load test. After 1.2 million cycles, all samples treated prior to cementation with the cleaning methods a) water spray, b) alcohol bath, c) suspension of zirconium particles, or d) repeated blasting exhibited significantly increased bonding failures at a micro level compared to uncontaminated titanium bases. However, the retention strength of the abutment-lithium disilicate-crown connection was comparable in all but one case. Only the group cleaned with ultrasound in an alcohol bath exhibited a significantly reduced retention strength and therefore appears to be less suitable when compared with the other cleaning agents.

Conclusion: After contamination of the pre-treated bonding surfaces with saliva, the cleaning method with water (spray), treatment with a suspension of zirconium particles or repeated blasting are suitable for re-establishing a good bonding effect.



THE JOURNAL OF PROSTHETIC DENTISTRY

RESEARCH AND EDUCATION

Effect of airborne-particle abrasion of a titanium base abutment on the stability of the bonded interface and retention forces of crowns after artificial aging

João Pitta, Dr Med Dent MAS*, Felix Burkhardt, Med Dent,† Mustapha Mekki, PhD,† Vincent Fehmer, MDT,‡ Philippe Mojon, Dr Med Dent, Mostat,† and Irena Sailer, Prof, Dr, Med Dent

ABSTRACT

Statement of problem: Published data have shown that a mechanical surface treatment of titanium surface increases bonding potential. However, most of the studies are based on shear or tensile tests performed on flat surfaced specimens and do not take into consideration the retention given by the titanium base (ti-base) and walls and the thermomechanical loading seen in a clinical setting.

Purpose: The purpose of this in vitro study was to evaluate the influence of different airborne-particle abrasion (APA) methods of the ti-base surface on the stability of the bonded interface and retention forces between these titanium bases and lithium disilicate crowns after thermomechanical aging.

Material and methods: Six internal connection implants (Komet) were retained with lithium disilicate crowns and bonded to the corresponding ti-base (Covington). The ti-base were divided into 4 groups (n=15): 1) experimental groups applying different APA methods, 30 µm silica-modified Al₂O₃ particles (Cobra) (30 SD AIO), 50 µm Al₂O₃ (Cobra Aluoxyd) (50 SD AIO), 110 µm silica-modified Al₂O₃ particles (Dicoater Plus) (110 SD AIO), and 2) control group (NoTi). Ti bases were airborne particle abraded (10 seconds, 0.25 MPa at a 10 mm distance) under standardized conditions in a custom-made APA device. All crowns were cemented with a resin cement (Multilink Hybrid Abutment). After aging (2,000,000 cycles, 49 N, 147 Hz, 3–5.5 °C, 120 seconds), all specimens were assessed for the presence of bond failures by optical microscopy (50X). The retention force (RF) was tested by using a pull-off test (30 mm/min). Modes of failure were classified (Type 1, 2, or 3). An additional ti-base representing each group was prepared for surface roughness (Ra) calculation (Ra, Rz, Rq) with a noncontact laser profilometer, and representative scanning electron microscope (SEM) images were recorded (x1000). Outpaired tests were performed to analyze the bonded interface failure and modes of failure, and a Kowal-Walls test was selected to evaluate retention force values (in-N).

Results: The percentage of bonding failure after aging were 73.3% (NoTi), 40% (30 SD AIO), 6.7% (50 AIO), and 40% (110 SD AIO). The stability of the bonded interface was influenced by the APA method applied (P<0.05). Mean standard deviation retention force values varied from 206.3 (NoTi) (N) to 420 ± 135.5 (100 AIO), and the difference between these 2 groups were significant (P<0.05). Modes of failure were predominantly Type 2 (30 SD AIO; 50 AIO; 110 SD AIO) and Type 3 (NoTi).



Conclusions: Airborne particle abrasion of the titanium surface increased the bond stability and retention forces between the ti-base and the respective crown. The use of 50 µm Al₂O₃ provided the most stable bonded interface among the different treatments. (J Prosthet Dent 2021;126:214–21)

The use of titanium bases (ti-base) or titanium inserts as abutments for implant supported restorations is increasing and has become a popular option as part of the recently introduced digital workflow.^{1,2} These

After artificial aging, a number of bonds already failed. In the control group, 73% of the crowns loosened, and in the 30-µm and 110-µm groups respectively, micromovement was observed in 40% of the samples. Significantly better results were obtained with 50-µm blasting. Only 7% in this group failed the load test. In comparison, the highest pull-off forces (420 ± 139.5N; pull-off test) were measured in this group at the same time, due to the highest measured surface roughness across all groups.

Conclusion: In conjunction with lithium disilicate crowns, pretreatment with 50-µm Al₂O₃ particles (in the test: Cobra Aluoxyd; Renfert GmbH) can be recommended in particular.

Cleaning of blasted titanium bases [5]

Article

Retention Forces of Monolithic CAD/CAM Crowns Adhesively Cemented to Titanium Base Abutments—Effect of Saliva Contamination Followed by Cleaning of the Titanium Bond Surface

Felix Burkhardt*, João Pitta, Vincent Fehmer, Philippe Mojon and Irena Sailer

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Abstract: The aim of this study was to investigate the effects of saliva contamination and the cleaning of the bond surface of titanium base (ti-base) abutments on the bonding stability and retention force values. The bond surface of the ti-base abutments was treated with airborne-particle abrasion. After contamination, the ti-base abutments underwent different cleaning protocols: water spray (H₂O), alcohol (AlC), suspension of zirconium particles (SZP), modified airborne-particle abrasion (APA), and a control condition without contamination and cleaning (CTR). All titanium disilicate crowns were bonded to the ti-base abutments using a primer and a self-curing composite. Bonded specimens underwent thermo-mechanical aging. Bond failure analysis and pull-off testing were performed. Bond failure occurred more frequently in groups H₂O, AlC, SZP, and APA (p < 0.05). Significant differences in retention force values were only found between CTR and AlC (p < 0.05). Specimens which did not show bond failure after aging had higher retention force values than the specimens that showed bond failure (p < 0.05). Saliva contamination with cleaning can degrade the bonding properties to titanium. For the retention force values, only the protocol with alcohol after contamination could not reduce the values.

Keywords: bonding; CAD/CAM; implant dentistry; pull-off; retention force; saliva contamination; titanium base abutment

1. Introduction

Digitalization in the prosthetic implant dentistry, which started its development in dental laboratories, is now established in dental offices for the chairside fabrication of single-implant restorations [1]. To enable the fabrication and integration of full-color all-ceramic restorations milled from monolithic blocks with a prefabricated connection, the titanium base (ti-base) abutment serves as a standardized connection [2,3]. The impression can be taken in a full-digital protocol using two different techniques: (1) at the implant level, with a scan body directly screwed on the implant [1,2] at the abutment level, with the ti-base abutment connected to the implant and a scan body clipped on the abutment [5].

Studies have shown that the adhesive cementation of the restoration to a ti-base abutment can be predictably achieved by applying an airborne-particle-abrasion surface treatment to the titanium surface and conditioning the titanium and ceramic surface with a respective primer followed by a resin-based cement [6–11]. Primers are used to promote adhesion between dissimilar substrates. Although primers are substrate-specific, recent universal silane-based primers can be used with both ceramic and metal substrates since the mechanism of bonding is similar [11,12].

In general, a successful bonding is obtained in a controlled and clean situation extrorally [13]. However, in some clinical situations contact with oral fluids such as saliva is

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<https://www.mdpi.com/journal/materials>

Mechanical stability of various material compounds under load

Modern ceramics for the fabrication of dental restorations should address characteristics such as time efficiency in fabrication (CAD/CAM), low chipping risk, but also protection of the implant-abutment connection against overloading. When bonding with titanium

bases, it is of interest to achieve stable constructions that will ideally last for years without complications and aftercare.

Temporaries with titanium bases [6]

The suitability of titanium bases in temporary restorations was investigated with the question of how different cementation protocols affect the stability of the adhesive bond between titanium bases and temporary abutments made of PMMA. Whereas all bonding surfaces of the titanium bases were blasted

FUNDAMENTAL RESEARCH

Temporary Implant-Supported Single Crowns Using Titanium Base Abutments: An In Vitro Study on Bonding Stability and Pull-out Forces

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Purpose: To evaluate the effect of cementation protocols on the bonding interface stability and pull-out forces of temporary implant-supported crowns bonded on a titanium base abutment (TB) or on a temporary titanium abutment (TA). **Materials and Methods:** A total of 60 implants were restored with PMMA-based CAD/CAM crowns. Five groups (n = 12) were created: Group 1 = TB/SR; crown conditioned with MMA-based liquid (SR Connect, Ivoclar Vivadent); Group 2 = TB/SiO₂-MB; crown airborne particle-abraded with 50-µm Al₂O₃ and silanized (Monobond Plus, Ivoclar Vivadent); Group 3 = TB/SiO₂-GA+SiO₂; crown airborne particle-abraded with 30-µm silica-coated Al₂O₃ (CoJet, 3M ESPE) and conditioned with MMA-based liquid (SR Connect); Group 4 = TB/SiO₂-GA+SiO₂-MB; crown airborne particle-abraded with 30-µm silica-coated Al₂O₃ (CoJet) and silanized (Monobond Plus); and Group 5 = TB/TA/PMMA; crown manually enlarged, activated, and rebased with PMMA resin (Felix Lab, Ivoclar Vivadent). Specimens in the TB groups were cemented using a resin cement (Multilink Hybrid Abutment, Ivoclar Vivadent). After aging (120,000 cycles, 49 N, 1.67 Hz, 5°C to 55°C, 120 seconds), bonding interface failure was analyzed (50µ). Pull-out forces (N) (0.5 measurement) and modes of failure were registered. Chi-square and Kruskal-Wallis tests were used to analyze the data (α = .05). **Results:** Bonding failure after aging varied from 0% (Group 5) to 100% (Groups 1, 2, and 3) (p < .001). Mean pull-out force ranged between 53.1 N (Group 1) and 1,146.5 N (Group 5). The pull-out forces were significantly greater for Group 5 (p < .05), followed by Group 3 (p < .05), whereas the differences among the remaining groups were not significant (p > .05). **Conclusion:** The cementation protocol had an effect on the bonding interface stability and pull-out forces of PMMA-based crowns bonded on a titanium base. Airborne particle abrasion of the crown internal surface and conditioning it with an MMA-based liquid may be recommended to improve retention of titanium base temporary restorations. Yet, for optimal outcomes, conventional temporary abutments might be preferred. *Int J Prosthodont* 2020;33:546–552. doi: 10.11607/ijp.6778

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with 50-µm Al₂O₃, the inner surface of the PMMA crowns was treated as follows: a) conditioning with MMA-based liquid (SR Connect, Ivoclar Vivadent), b) blasting with 50-µm Al₂O₃ and silanizing (Monobond Plus, Ivoclar Vivadent), c) blasting with 30-µm silica-coated Al₂O₃ (Rocatec-Plus, 3M ESPE) and additional conditioning with MMA-based liquid (SR Connect) or d) abrasion with 30-µm silica-coated Al₂O₃ (Rocatec-Plus) and subsequent silanization (Monobond Plus). All samples were cemented with Multilink Hybrid Abutment. Result: variant c), in which the provisional inner surface was blasted and conditioned with a bonding agent, exhibited a higher mean pull-out force of the samples than the other test groups. In terms of retention failures following artificial aging, this group was also slightly better at 83% than the others, each with a 100% retention failure rate. However, in a direct comparison the conventional temporary abutments performed significantly better.

Conclusion: It is preferable to select conventional temporary abutments for provisional restorations. When applying PMMA crowns to titanium bases, it is recommended to blast the bonding surfaces of the crown with 30-µm and additionally condition with an MMA-based liquid to provide better retention of the bond.

Two-piece components: hybrid abutment crown [7]

One option for fabricating a final restoration is to completely extraorally bond a monolithic CAD/CAM fabricated crown directly to a titanium base as a single unit. In a study, the longevity, in other words the stability, of 12 screw-retained restorations each with either lithium disilicate, zirconia or a material consisting of a polymer-infiltrated ceramic network (PICN) was examined. Prior to cementation with Panavia 21 (Kuraray Noritake), the bonding surface of the titanium bases was blasted (50-µm Al₂O₃) and, in addition, the bonding surfaces of the crowns were pretreated in a material-specific manner: zirconia with blasting (30-µm Al₂O₃), lithium disilicate and PICN with etching (5% HF). After applying load in the chewing simulator, the following picture emerged: the restorations with lithium disilicate demonstrated no fractures and thus a success rate of 100%. With zirconia, a total of three abutment and one crown fracture were observed (67% success) and in the PICN group, a total of five fractured crowns (58% success). Closer examination of the remaining samples under the microscope revealed loosening in all groups. With 58% complications, the lithium disilicate compounds also performed much better in this respect than the zirconia and PICN compounds with 88% and 86% respectively. In a few PICN crowns, additional cracks were found in the material.

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ORIGINAL RESEARCH

Mechanical stability and technical outcomes of monolithic CAD/CAM fabricated abutment-crowns supported by titanium bases: An in vitro study

João Pitta¹ | Jenni Hjerpe^{2,3} | Felix Burkhardt¹ | Vincent Fehmer¹ | Philippe Mojon¹ | Irena Sailer¹

Abstract
Objective: To evaluate mechanical stability (survival and complication rates) and bending moments of different all-ceramic monolithic restorations bonded to titanium bases (hybrid abutment-crown) or to customized titanium abutments compared to porcelain-fused-to-metal crowns (PFM) after thermo-mechanical aging. **Material and Methods:** Sixty conical connection implants (4.3 mm diameter) were divided in five groups (n = 12): PFM versus gold abutment (GA) vs PFM, lithium disilicate crown bonded to customized titanium abutment (TB) vs LDS, lithium disilicate abutment-crown bonded to titanium base (TB) vs LDS, zirconia abutment-crown bonded to titanium base (TB) vs LDS, polymer-infiltrated ceramic-network (PICN) abutment-crown bonded to titanium base (TB) vs PICN. Simultaneous thermo-cycling (0–55°C) and chewing simulation (120,000 cycles, 49 N, 1.67 Hz) were applied. Catastrophic and non-catastrophic events were evaluated under light microscope, and survival and complication rates were calculated. Specimens that survived aging were loaded until failure and bending moments were calculated. **Results:** Survival rates after aging were 100% (TB) vs LDS, TB) vs LDS, 91.7% (GA) vs PFM, 66.7% (TB) vs ZR) and 58.3% (TB) vs PICN) and differed among the groups (p = .004). Non-catastrophic events as screw loosening (GA) and loss of retention or micro-macro-movement (TB) groups) were observed. Complication rates varied among the groups (p < .001). TB) vs LDS) had lower bending moment than all the other groups (p < .001). **Conclusions:** Hybrid abutment-crowns made of lithium disilicate can be an alternative to PFM-based restorations, although concerns regarding the bonded interface between the titanium base and abutment-crown can be raised. PICN and zirconia may not be recommended due to its inferior mechanical and bonding outcomes, respectively. Titanium customized abutment with bonded lithium disilicate crown appears to be the most stable combination.

KEYWORDS
 crowns, dental abutments, dental implants, fracture load, metal ceramic, monolithic, zirconia

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Conclusion: The authors concluded that hybrid lithium disilicate abutment crowns can be used for restorations. Zirconia and PICN are less recommended due to their high complication rates.

Three-piece components: hybrid abutment and crown [8]

The same issue regarding mechanical stability was applied in another study to abutments consisting of a titanium base - meso-abutment - crown, whereby

the individual mesostructure was made of zirconia. The crowns were milled from either lithium disilicate, zirconia or PICN. The bonds were pretreated in a material-specific manner analogous to the above test. The inner and outer surfaces of the meso-abutments were also blasted (30-µm) and the parts were cemented finally with Panavia 21. In this test setup, the samples of all groups survived the chewing simulation and no fractures or adhesive failures were observed. In the subsequent fracture test, all constructions fractured at the same point, namely with a fracture of the abutment screw in the implant. Further evaluation showed that the titanium-zirconia-zirconia connection resulted in the highest and statistically significant flexural moment in comparison and, in addition, exhibited no other failure patterns, such as cracks in the crown. Lithium disilicate and PICN crowns, on the other hand, exhibited small cracks after the fracture test, but these could have been test-related.

Conclusion: This study showed that all tested material combinations of crowns in combination with zirconia meso-abutments on titanium bases could possibly successfully withstand the load in the mouth. In this respect, the choice of material for the crown would appear to be secondary in this indication.

Summary

Titanium bases are suitable for esthetic and durable single-tooth restorations. Stable restorations which can withstand the chewing load can be fabricated in laboratory work by applying specific pretreatments to the bonding surfaces. The results of the research group in Geneva can be utilized as recommendations for this purpose. However, the mechanical tests cannot accurately reproduce the performance in everyday

Literature

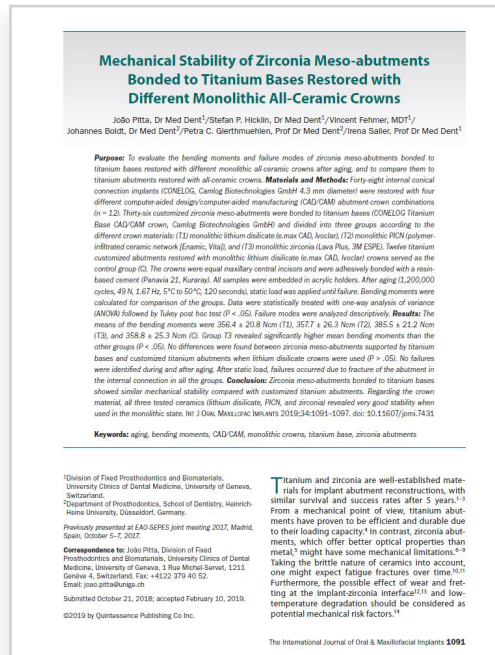
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clinical practice and still need to be confirmed by long-term clinical data. Professor Sailer's group continues its work on this topic and will be publishing further papers, for example on the type of bonding.

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PRACTICE CASE

Digital dentistry intelligently combined with analog craftsmanship

» Dentistry is and remains a tangible and craft-based discipline, which has always utilized the latest production techniques, processes and high-quality materials. For many decades, the dental workflow in particular was dominated by materials such as wax, plaster and cast metal. If one exploits the potential of today's dentistry, then very precise plans can be created on the digital model, which visualizes all the treatment phases ranging from surgery through to prosthetic restoration. Implementation, too, can also be accomplished in a precise and targeted manner by applying modern CAD/CAM processes together with the dental laboratory and the industry.

Even in a digital age, the decision about the type and scope of restoration is a very personal one and is determined by the patient. Our task is to provide them with all the information they need and to share our knowledge to enable them to make this decision in a self-reflective manner.

Every patient is unique and each treatment plan must be tailored to the individual patient's wishes, but also to the patient's anatomical conditions and compliance. When the only tool available is a hammer, then every problem looks like a nail, however, patients should be approached with a well-stocked toolbox.

It is incorrect to claim that every periodontally damaged dentition precludes an immediate restoration on 6 implants. After all, our goal is to preserve teeth and, together with the patient, to exhaust all conservative options.

The patient in the following case was 82 years old at the time of initial presentation and was still very active both mentally and physically. He goes skiing several times a year, is an enthusiastic hiker and also actively participates in the grape harvest every year. He complained of highly mobile teeth in the upper jaw which would make painless chewing increasingly difficult. A removable denture was unthinkable for him, and he also wanted to avoid palatal coverage under all circumstances.

The concept of immediate prosthetic restoration with implants is basically nothing new. However, this has been greatly facilitated in many of the work steps in recent years through digital planning and production options. As a result, even comprehensive work can be precisely planned, as well as being fabricated cost-effectively and therefore made accessible to a broader patient clientele. The restoration options for existing or impending edentulism must be discussed in great detail.

These range from removable dentures, both on Locator abutments as well as on galvano telescopes, to screw-retained fixed implant restorations. They depend very much on patient compliance, motor skills as well as patient preferences.

Given the fact that complex alveolar ridge reconstructions are sometimes difficult to design in advanced age, as they often lead to postoperative complaints and prolonged treatment times, the screw-retained solution with the COMFOUR abutment system is recommended for older edentulous patients in the author's practice concept. Its implementation meets the wishes of many patients: usually only one surgical procedure, a short treatment period, no complex augmentative measures and a modest financial outlay. With fixed occlusal screw-retained bridges on four or more implants, augmentation measures can be largely dispensed with due to the option of inserting implants at an angle.

Digital imaging capabilities [1] are a prerequisite for the implementation of the concept. They not only facilitate planning, but also patient education. Even before a tooth is extracted, the patient can view his future dental prosthesis using the digital display options. Based on the 3D planning, the temporary restoration is fabricated pre-surgically, either in the laboratory or by a manufacturing service provider, so that the patient leaves the practice after the procedure with a fixed screw-retained but temporary prosthesis. With foresighted planning and exact implementation, such immediate loading concepts, which make optimum use of the available bone volume, are comfortable, economical and low-risk restoration options.



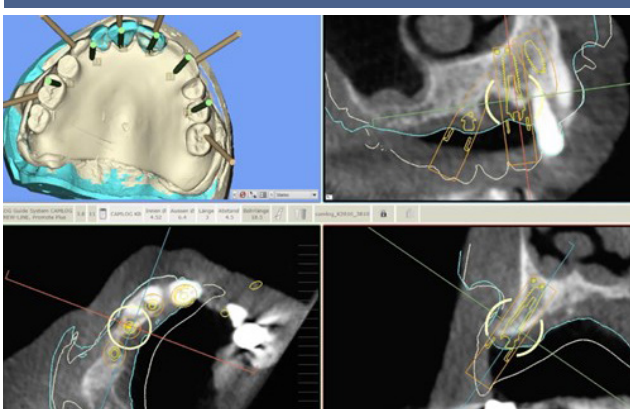
Dr. Maximilian Blume
Oral surgeon



1. An 82-year-old patient presented in the practice for the first time following recommendation by a friend. He complained that the teeth in the upper jaw were very mobile and it was becoming increasingly difficult to chew without pain. He was very active mentally and physically, and goes skiing and hiking several times a year. A removable denture was unthinkable for him, and he also wanted to avoid palatal coverage under all circumstances.



2. Due to the periodontal condition in the upper jaw, the prognosis for tooth-preserving therapy was not good. The lower jaw was free of complaints except for tooth 36; tooth 34 had received an alio loco root tip resection a few months ago. The patient was currently not participating in a prophylaxis recall or in supportive periodontal therapy (PPT), and systematic periodontal treatment had last been performed approximately 7-8 years ago.



3. Systematic periodontitis treatment was conducted at the beginning of therapy. As part of the anti-infective therapy, the teeth that were not worth preserving were extracted and a removable temporary denture was provided. Digital implant planning and fabrication of the implant template as well as the CAD/CAM-fabricated temporary restoration were performed by DEDICAM in close coordination with the dentist and dental technician (Müller-Edelhoff Laboratory/Wörrstadt).



4. The situation models with the original tooth status, which were scanned and digitized, were used together with the patient's DVT to plan the drilling template and the pre-surgically created temporary CAD/CAM bridge. The CAD/CAM-fabricated temporary restoration was to be based on the initial findings with regard to the shape and position of the teeth, which we modified in favor of esthetics as we proceeded.



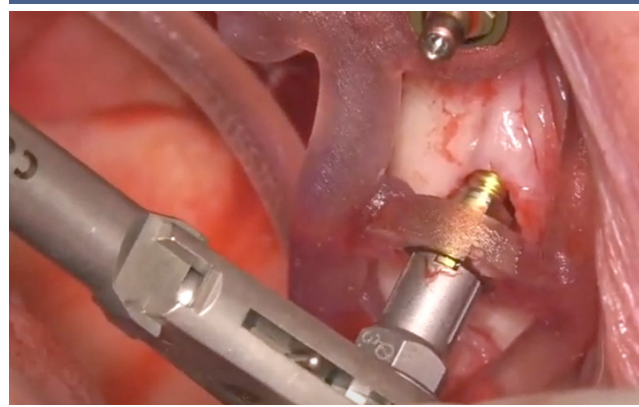
5. Final corrections to the implant position and axis inclinations were made in the planning meeting and the implant-prosthetic components for the restoration of the case were selected. The bridge was milled from a TELIO CAD blank in one piece. In addition to other advantages, such as the accuracy of fit and the correct milling of the adhesive channels, fractures, which occur frequently with conventionally manufactured temporary restorations, can be avoided.



6. On the day of surgery, the remaining teeth, which served to stabilize the interim prosthesis, were extracted in a bone-conserving manner. Attention was paid to protecting the vestibular lamella. Only a sufficiently high primary stability averaging 30 Ncm allows for a directly screw-retained temporary restoration in the edentulous jaw.



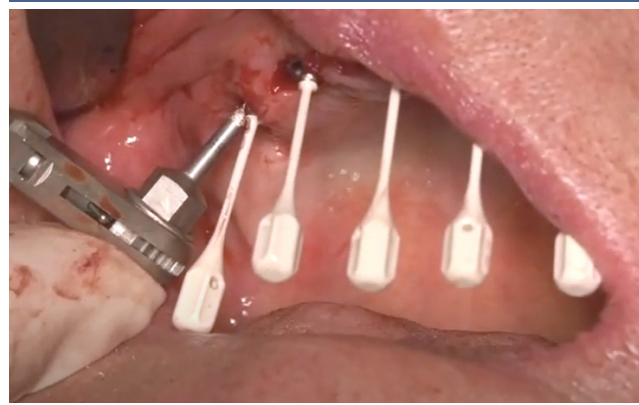
7. The SMOP template was designed by DEDICAM in consultation with the clinician. The skeletonized SMOP drilling template offers several advantages when compared to other templates. For one, the fit is achieved by punctiform support at selected points. They can be positioned such to allow flap preparations. Another advantage is the good view of the surgical site.



8. To increase the size of the loading polygon, the two terminal implants were inserted at a 30° angle. No difference is observed between orthograde or obliquely placed implants both in terms of survival rates or bone loss (BDIZ-EDI Consensus Conference 2016) [2].



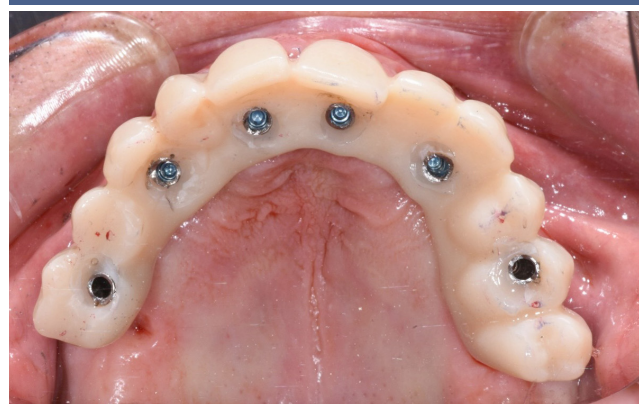
9. The implant sites are prepared according to the Guide System protocol for SCREW-LINE implants (13 mm L / Ø 3.8 mm). The correct alignment of the implant's inner configuration is extremely important for the insertion of the angled COMFOUR bar abutments. To do this, the markings on the guide sleeves must correspond with those on the insertion instruments.



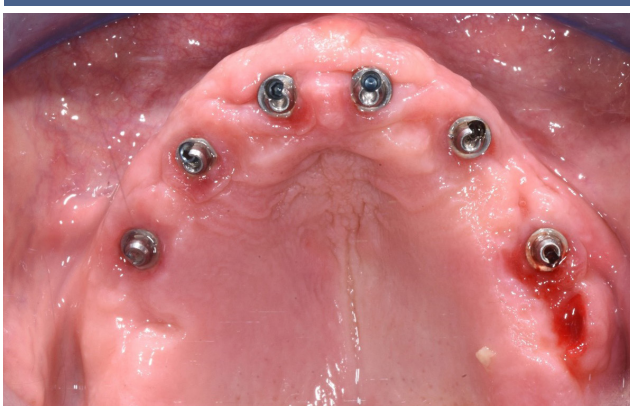
10. The COMFOUR bar abutments are inserted with the aid of the flexible plastic handle. The handle is fixed in the thread of the prosthetic screw and holds the pre-mounted abutment screw in the bar abutment in place. The handle can easily be bent sideways to tighten the screw.



11. Before the titanium caps are bonded into the temporary bridge, a check is made to ensure a tension-free fit. Sometimes it is necessary to widen the channels to be able to bond the titanium caps intraorally without stress and tension. First, the titanium caps are blasted with 70 µm zirconia to achieve a better adhesive bond with the plastic.



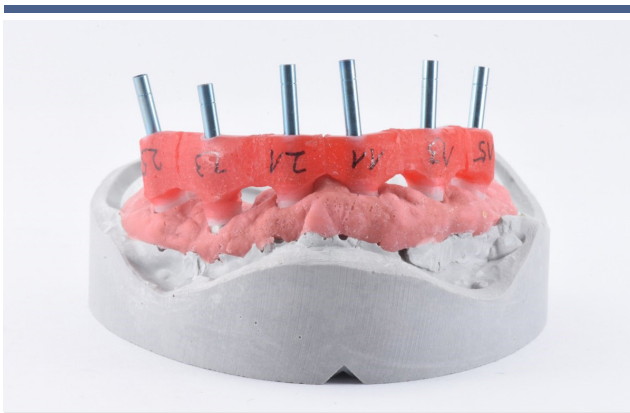
12. They are then inserted into the bridge, which is placed above the bar abutments. Only then are the titanium caps screw-retained to the abutments and bonded to the bridge with light-curing plastic. Shortening of the titanium caps is performed extraorally, as is the finishing of the bonding sites. The uniform polygonal load is checked and ground if necessary.



13. A conventional impression is taken six months after surgery to manufacture the definitive restoration. To do this, the temporary bridge is unscrewed and the COMFOUR abutments are cleaned. The impression is taken at the level of the bar abutments.



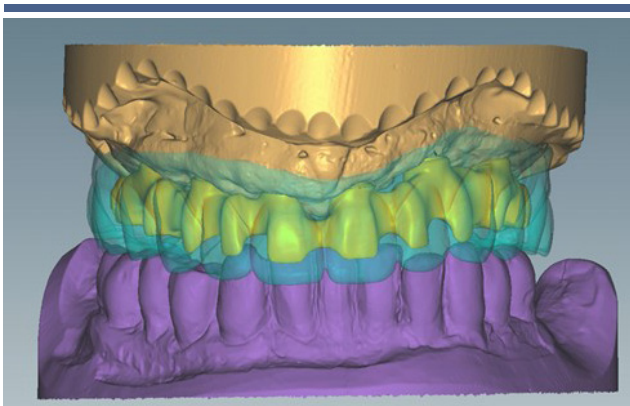
14. The posts for the closed tray technique were screwed on at abutment level and hand-tightened. The impression was taken using a modified plastic tray (Impregum/3M Espe). A master cast with removable gingival mask is created in the laboratory.



15. A correction splint is created on the master cast, which is used to check the accuracy of the impression in the patient's mouth. The passive fit is checked via the Sheffield test. This intermediate step is an important measure before the metal framework is designed and ordered. If there are any deviations in fit, the splint can be separated, re-bonded in the patient's mouth and the model corrected.



16. Bite registration is then performed in the mouth by applying a wax wall on the splint. Following bite registration and a functional-analytical diagnosis of the patient, the transfer is made to the articulator using a facebow. A wax-up is made from prefabricated teeth on the splint, which is screw-retained in the mouth and checked for esthetics and function.



17. The wax-up is scanned and merged with the previously obtained data. This results in the anatomically reduced design of the screw-retained bridge construction. This design is transferred to DEDICAM together with the physical master cast. In the case of comprehensive or directly screw-retained reconstructions, the model data are tactilely scanned by the manufacturing service provider and matched with the CAD laboratory data.



18. The connection points of the NPM framework to the abutments are machined and polished to the highest fit by the milling center. In the laboratory, the correct stress-free fit of the bridge construction is first checked by performing a Sheffield test. It is therefore essential to remove the gingival mask for an optimum check.



19. In addition to the basic type of prosthetic restoration, removable or fixed, the type and method of veneering were also discussed. Due to the higher susceptibility to repair of ceramic veneers and the higher costs, the patient opted for resin veneers. A silicone matrix had been fabricated based on the wax-up. Based on this, the spatial conditions for the veneer are checked.



20. Both the acrylic shells as well as the metal framework are blasted with zirconia and silanized by applying a silane primer to achieve a better bond between the two materials. Then, an opaquer is applied to prevent the metal framework from shining through. Retentive elements can be dispensed with due to the possibility of surface activation [3].



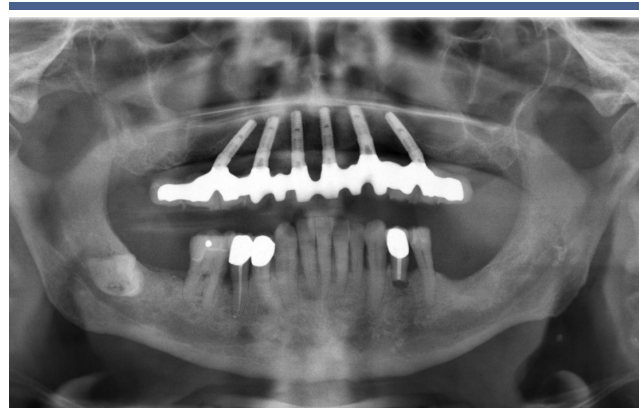
21. After a renewed functional and esthetic check, the bridge was completed. The screw channels were sealed with Teflon tape and filling composite. The two distal channels were sealed with tooth-colored composite and the four channels in the anterior, non-visible area were sealed with a translucent material, which makes it easier to locate the screws in future check-up appointments.



22. The biological and physiological load of the entire reconstruction is achieved with this concept. The necessary domestic oral hygiene is indispensable for long-term success. This is now mainly the patient's own responsibility. The patient is trained in the use of aids such as dental floss or interdental brushes. In addition, the restoration features a basal convex design and cleaning channels in the area of the implants.



23. Six months after the surgical procedure, a stable hard and soft tissue situation is evident. As the temporary restoration matched the original tooth position, the patient, his wife and we too, decided to correct the tooth position and shape during the treatment period to achieve a more esthetic overall result.



24. At the time of insertion, a stable bone bed around the implants is evident to provide long-term preservation of the prosthetic restoration. During the course of treatment, tooth 36, which was already conspicuous at the initial presentation, had to be extracted.

Discussion

A screw-retained fixed bridge on four or six implants is a scientifically documented treatment therapy for the edentulous jaw. Implant survival rates ranged from 95.5 to 100 percent in a retrospective review for a time period up to ten years [4] and in a prospective study up to seven years [5]. The method, first introduced by Paolo Maló, is one option for restoring edentulous jaws without bone augmentation procedures.

This form of therapy based on the Malo Clinic protocol has been successfully performed in our practice for a long time. The indication is given when a patient who is either already edentulous or where the residual teeth are not worth preserving wishes a fixed denture that is both time- and cost-efficient. The prerequisites for immediate restoration protocols, such as bone height and width, should be evaluated prior to surgery using a 3D scan [1]. Implementation follows clear guidelines in terms of backward planning, surgery and prosthetics - in the immediate restoration phase as well as in the second phase: the manufacturing of the definitive screw-retained bridge as well as the professional hygiene measures or recall appointments.

It is well known that workflows in practices and laboratories can be optimized through digitization. Thus, a predictable outcome is possible through planning and guided surgery.

Cooperation with a partner or service provider specializing in digital processes is advantageous and cost-efficient.

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Cooperation with the DEDICAM services is absolutely flexible. The technicians of the Implant Planning Service create a drilling template on the basis of the model documents and the DVT, in close consultation with the dentist and laboratory technician, order the temporary immediate restoration from the data records created and send all the components required for restoration at the same time. The framework for the definitive restoration is manufactured in a CAD/CAM process on high-precision milling machines with a perfect fit, following prior measurement with tactile scanners.

The time required to produce the reconstruction can be reduced. It can already be ready for use after one session.

Conclusion

The CAMLOG COMFOUR system and the cooperation with DEDICAM have proven their value to our practice for a long time and provide us with the option of a wide variety of occlusally screw-retained large-span restorations. This combination offers both the practitioner and the dental technician enormous creative leeway in the implementation of customized work for the patient.



OP video

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- Specialist for oral surgery in own practice with a focus on oral surgery, implant dentistry and periodontology
- Lecturer and clinician within the framework of the Masters of Science in Oral Implantology for postgraduate education at the Carolinum of Frankfurt University

PRACTICE CASE

Guided Surgery – minimally invasive, scar-free, tissue preserving

“The ultimate goal of long-term stable implant therapy, besides patient satisfaction, is an esthetic and durable reconstruction. Anatomical preservation of the peri-implant tissue structures is paramount. Perfectly coordinated communication between the surgeon, prosthodontist, dental technician and patient is the key to success here. Optimal pre-surgical 3D planning and minimally invasive guided surgery help achieve these goals predictably with immediate implant placement in the anterior region, provided certain criteria are met and the facial lamellae are largely intact.

If a tooth that cannot be preserved has to be extracted in the esthetic region, then immediate implant placement should be taken into consideration. Here, it is imperative to consider any complications that may arise vis-à-vis the potential biological compromises associated with delayed implantation.

These could include surgical reconstruction of the resorbed buccal bone lamella as well as thickening of the soft tissues. An immediate implant can largely preserve the surrounding tissue structures, provided that the buccal alveolar wall is intact or that only minor bone defects are present, that the tooth socket is free of inflammation and that there is sufficient bone in the apical region for the primary stable anchorage of a sufficiently long implant.

The patient's wish for a temporary immediate restoration must be balanced in line with the functional load. If, for example, therapy-resistant parafunctions occur, then immediate loading is an increased risk for osseointegration of the implant.

The macrodesign of the implant system as well as the structural and auxiliary components matching this concept are essential for the success of immediate implantation. In the case described in the following, the CAMLOG® PROGRESSIVE-LINE implant was selected. In addition to the quality of the implant bed preparation, the thread flanks, which penetrate deeply into the alveolar bone, and the apically tapered implant body meet the requirements for immediate restoration protocols. The precise Tube-in-Tube® internal configuration eliminates micromovements to a large extent and the platform switching option allows creating sufficient space for the soft tissue cuff.

Correct, positionally stable insertion of the implant

can be achieved with the aid of a drilling template created on the basis of 3D planning. The guidance of the drills in the template ensures accurate axial implant bed preparation without any lateral deviation.

This prevents an undesired change in direction of the drills and the inserted implants. In addition, the drilling protocol which is adapted to different bone qualities leads to achieving predictable primary stability.

Minimally invasive surgery following tooth extraction reduces surgical trauma due to flapless surgery, implant placement without creating flaps, and shorter times for surgery. Associated postoperative symptoms, such as swelling or pain, are also minimized.

Particularly in surgical practices with a referral structure, immediate restoration concepts should be discussed in detail by the treatment team, consisting of surgeons, prosthodontists, dental technicians and also the patients, to avoid any misunderstandings and to understand the different expectations. However, the correct digital positioning of the implant always remains the responsibility of the implantologist. He/she will plan the prosthetically oriented placement based on a digital or digitized wax-up.

It is advantageous to realize manufacturing of the tooth-supported drilling template as in the present case within a short space of time between the scan and implantation. Due to possible loose teeth or tooth migration, this increases the accuracy of the template fit and subsequently of insertion and contributes to therapeutic safety.



Dr. Christoph Wenninger
Dentist



Dr. Christoph Schmidtner
Dentist



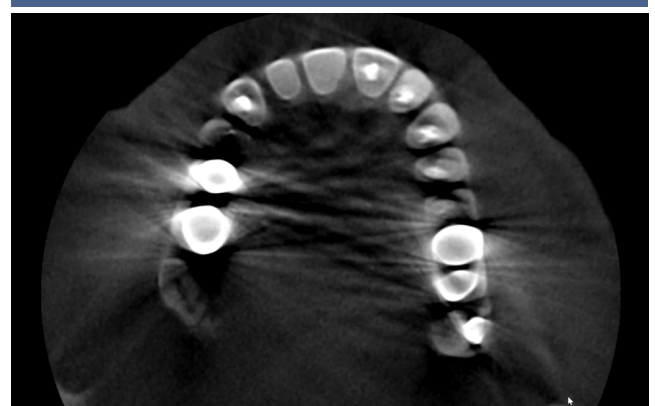
1. A 52-year-old patient presented in the practice. Medically inconspicuous, he had been referred by his family dentist with a request for a treatment proposal after a defective ceramic crown 21 and a fracture of tooth 22 had been diagnosed. The dentist had removed the defective crown and replaced it with a temporary.



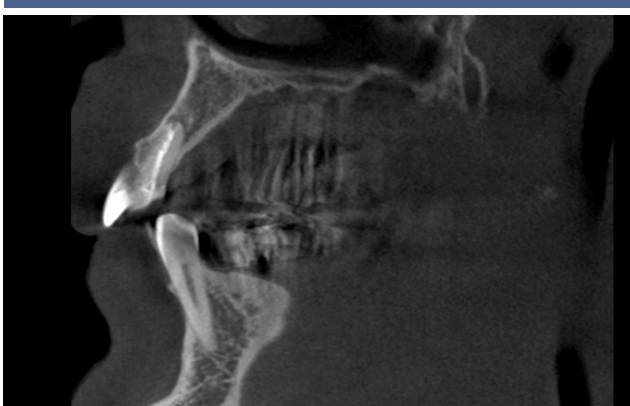
2. The clinical findings revealed significant abrasion of the natural anterior teeth and a sunken jaw relation and function-related changes in the horizontal plane. Tooth 22 was deeply fractured subgingivally, painful and exhibited an apical lesion.



3. The soft tissue in regio 22 was anatomically shaped and presented as a thick biotype. At first sight, good conditions to consider immediate implantation. However, due to the functional abnormalities, immediate loading had to be refrained from. The therapeutic concept of immediate implantation was now clarified via DVT diagnostics.



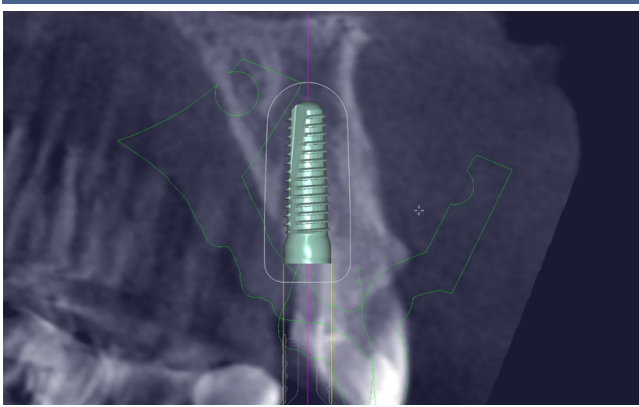
4. Due to the large number of pretreatments, complex overall evaluation using three-dimensional imaging (DVT 10 x 10) was performed following the clinical diagnostics. With the opportunity of viewing the imaged structures from all sides, treatment planning improves as does patient safety.



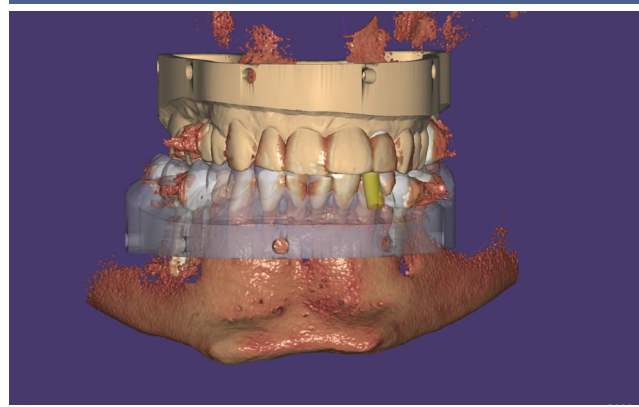
5. This revealed an intact buccal lamella with moderate deterioration of the crestal alveolar bone. The apical lesion at 22 as well as the epicrestal fracture line were clearly visible. Due to the lack of a ferrule effect, a revision of the root filling with a post build-up did not promise a stable long-term prognosis.



6. At the same time, digital impressions were taken of the maxillary and mandibular situations. For one, to meet the requirement of adequate time management. For the other, to appropriately shape or support the soft tissue with the aid of a pre-surgically manufactured temporary restoration.



7. Many of the more popular implant systems are integrated in the planning software. For immediate implantation, a PROGRESSIVE-LINE implant was selected, which is particularly suited for immediate restoration protocols due to its macro design. However, at the time of planning, the data were not yet stored in the software (exoplan). A SCREW-LINE implant (same diameter and length) was used for the correct virtual positioning of the implant.



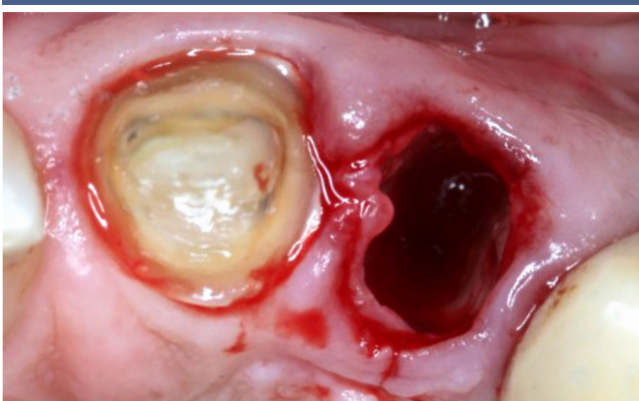
8. The X-ray and surface scan data of teeth and jaw sections were superimposed in the software to establish the relationship of the virtually planned implant with regard to the tooth surface and mucosa. When placing the implant, attention was paid to place the screw access channel of the subsequent hybrid crown in the palatal surface.



9. The preparation of tooth 21 and the fabrication of an acrylic temporary with attachment were performed in the practice of the family dentist. For this purpose, dental technician (MDT Oliver Förster, Gauting, Germany) removed tooth crown 22 in the digital model and designed the base in the form of an ovate pontic to stabilize the peri-implant soft tissue during the healing phase and to maintain an anatomical emergence profile.



10. On the day of surgery, tooth 22 was extracted using microsurgical instruments in a tissue-sparing manner with the aim of preserving the buccal alveolar bone and without damaging the interdental papillae. Exposure of the alveolar bone was to be avoided because of esthetic limitations due to scarring. At the same time, the associated resorption of the bone lamella is minimized.



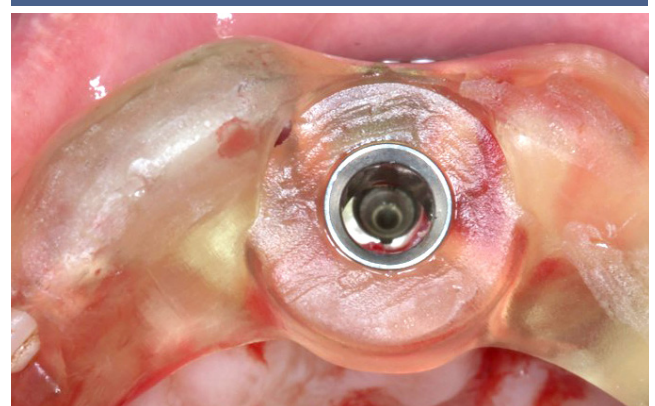
11. The bone compartment was cleaned and the apical lesion was completely curetted. The preparation was to be flap-less, according to the standard drilling protocol of the PROGRESSIVE-LINE implants with a pre-surgically prepared drilling template. The implant bed was prepared precisely with the completely guided drills of the guide system, whereby its sleeves prevent any deflection.



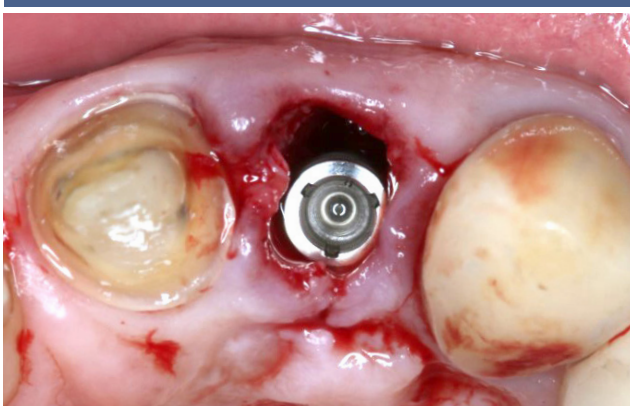
12. The virtual template design was converted into a delicately designed navigation template after approval. As the template was supported on the natural teeth, it was essential to keep the time span between impression taking and surgery as short as possible, as potential movement of the teeth could have a negative impact on the precise fit of the template and thus on the correct implant bed preparation and implant positioning.



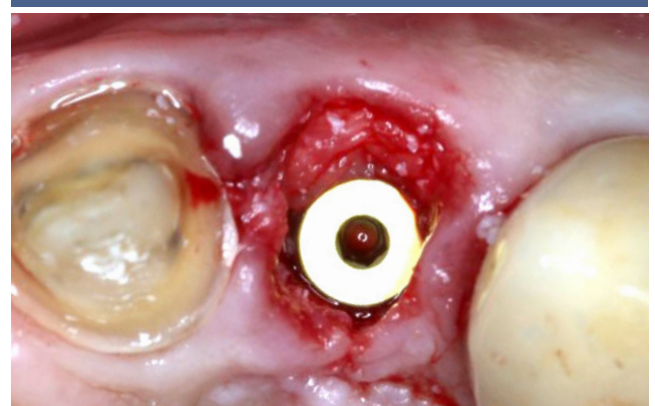
13. After completely guided preparation of the implant bed, the surface of the implant (CAMLOG PROGRESSIVE-LINE Ø 3.8 mm / L 13 mm) was biologized with PRGF. By modifying the surfaces with cell-biological, active substances, reactions are intended to be triggered to improve healing behavior in the bone.



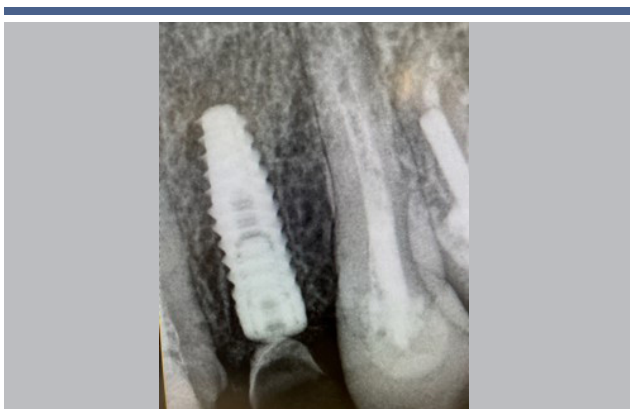
14. The implant was also inserted completely guided via the GUIDE sleeve in the template. Deflection of the self-tapping implant is prevented by the guide and the implant is placed precisely three-dimensionally according to the planning. The stop of the insertion post on the sleeve ensures correct and slightly subcrestal positioning of the implant.



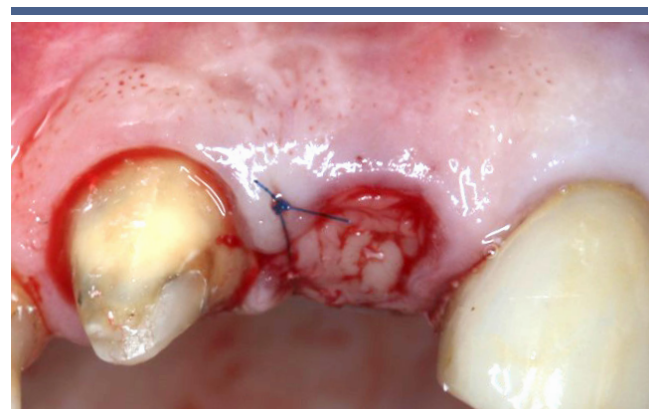
15. The implant was placed in the palatal region of the alveolus and anchored in the jawbone with sufficient primary stability via the conical apical portion. Positioning allowed the hybrid crown to be screw-retained in the palatal surface of regio 22.



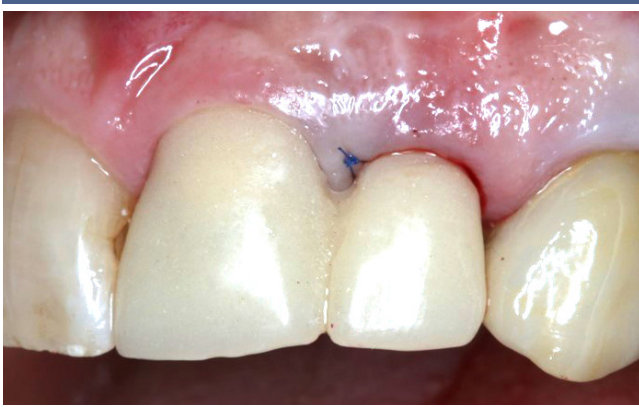
16. The cavity between the implant and the buccal lamella (jumping distance) was filled with xenogenic bone graft substitute (The Graft™ / Regedent) mixed with PRGF (BTI) to stabilize the alveolar wall.



17. The X-ray control image illustrates anchorage of the apical implant portion in the residual jawbone and the approximately one millimeter subcrestal placement of the implant shoulder.



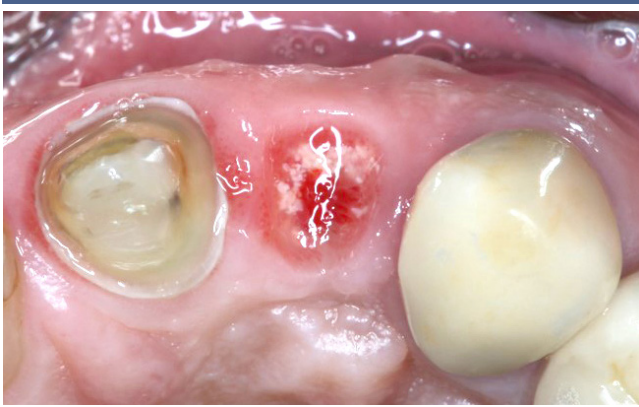
18. The implant was covered with an autologous fibrin matrix, which was applied compressed to the surgical site. A connective tissue graft did not prove necessary in this case. A single button suture was used to stabilize the mesial papilla.



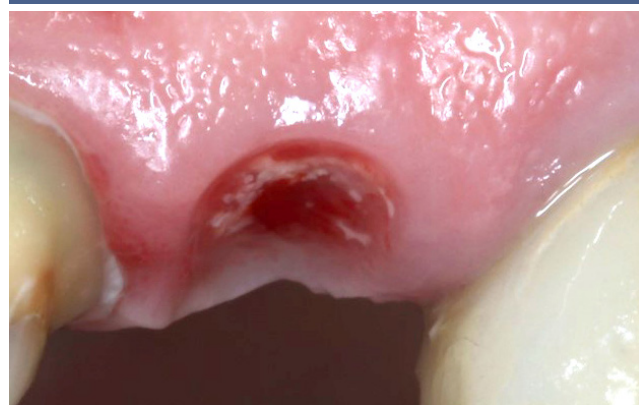
19. The temporary CAD/CAM-manufactured restoration was inserted immediately after the surgical procedure. The ovate pontic design of the crown attachment supported the soft tissue and shaped the gingival garland precisely to match the original shape of the crown.



20. Four weeks after implantation, a healthy, irritation-free tissue situation and anatomically shaped interdental papillae were observed.



21. The temporary restoration was removed at the follow-up appointment. The healing process was free of complications. The emergence profile was shaped perfectly due to the basal design of the crown anchor.



22. The close-up shows the scar-free, naturally stippled soft tissue. Two months after the surgical procedure, the implant was exposed with a puncture incision, a gingiva former was inserted, and the temporary restoration was adjusted minimally. After a further follow-up appointment, the patient was referred back to the family dentist.



23. The definitive restoration - a monolithic zirconia crown in regio 21 and a monolithic hybrid crown, bonded to a CAMLOG titanium base CAD/CAM, screw-retained directly in the implant - was manufactured with CAD/CAM support on the basis of the obtained pre-surgery data and a scan of the implant position and the surrounding tissue.



24. A few days after insertion of the definitive restoration, a highly satisfied patient attended the follow-up appointment at the surgical practice. The monolithically manufactured and colored crowns blended harmoniously with the overall picture.

Discussion

In addition to the long-term preservation of the implants, the focus in modern implant dentistry is on protecting the marginal soft tissue architecture and the bony structures. To prevent the resorptive changes after tooth extraction, the concept of immediate implantation has been increasingly applied in recent years. Sufficient primary stability is essential, as immediate implants cannot be fully anchored in the alveolar bone. In addition to shortening the duration of treatment, this form of therapy offers several other advantages. For example, under certain conditions, the implant can be restored immediately, either with a gingiva former or a temporary screw-retained crown. Postoperative pain or swelling are also reduced due to a minimally invasive procedure and the original gingival architecture and bone structure can be preserved [1]. In the field of esthetics, a surgically atraumatic procedure is preferable, provided there is sufficient bone supply and attached gingiva, without having to prefer the preparation of a mucoperiosteal flap [2]. This is because mobilization of the periosteum cuts the blood supply, which can result in resorption of the bucco-oral dimension and lead to a vertical change. According to existing studies, chronic apical foci do not appear to be problematic for immediate implantation [3]. However, inflammation of the adjacent tooth can affect the success of implants [4].

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Imaging procedures such as a DVT, digital impression taking by means of an intraoral scan and virtual representation of the definitive restoration enable comprehensive diagnostics as well as precise three-dimensional positioning of the implants.

A drilling template with sleeves created from digital planning, which allows both the drills as well as implantation to be completely guided, increases both therapeutic and patient safety. State-of-the-art implant systems adapted to the digital workflow and immediate restoration concepts achieve the required primary stability (35 Ncm), better survival rates and shorter healing times than was possible in the past due to their macrodesign [5,6].

Conclusion

Navigated implant bed preparation in combination with optimal implant design enables a safe form of therapy with immediate implants. Furthermore, the precise transfer of 3D planning and controlled achievement of the necessary primary stability speak in favor of completely navigated implant surgery.

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- since 1998 in own practice with Dr. Brigitte Schmidtner
- Special focus: prosthetic restorations, pediatric dentistry, implant dentistry, esthetic dentistry
- Member of the German Association for Implant Dentistry

PRAXISFALL

Immediate restoration with Guided Surgery and the Socket Shield Technique

» In conjunction with immediate implantation in the esthetic zone and immediate insertion of a temporary restoration, the preservation of a buccal root segment to stabilize the buccal lamella has proven to be a promising treatment option. The so-called socket shield technique is a technique used since 2010 for the primary prevention of both hard and soft tissue profile changes following tooth extraction in the buccal region. Pre-surgical digital planning enables optimal, minimally invasive implant positioning using guided surgery. If an implant that achieves predictable primary stability is used, then temporary immediate restoration is beneficial for preserving the peri-implant mucosa.

Close to twelve years ago, Hürzeler et al [1] reported on a novel approach to preserve hard and soft tissue following tooth extraction. The key factor is the preservation of the bundle bone into which the periodontal fibers enter. Destruction of the fibrous system induces resorption of the bundle bone and consequently leads to thinning of the buccal bone lamella. The authors suggested preserving part of the buccal root in the crestal region of the alveolus during immediate implantation. The proof-of-concept study in beagle dogs showed that retaining the buccal aspect of the root at the time of implantation does not appear to compromise osseointegration and may be beneficial for buccal bone preservation. Since then, the socket shield technique as originally described by Hürzeler et al [2,3], or in complex situations such as multiple adjacent implants [4], has been further clinically evaluated with encouraging esthetic results.

The most recent critical literature review by Blaschke et al [5] on the clinical data of the socket-shield technique summarized promising results and its high potential to reduce invasive bone grafts around implants in the esthetic zone. However, they also concluded that the supporting clinical data are very limited.

The socket shield technique should be used by experienced surgeons as it is very technique sensitive. The following case report describes a completely guided immediate implantation and immediate restoration applying the socket shield technique as an efficient treatment concept with highly esthetic results.

The patient case

A 69-year-old man presented to the practice in good health (ASA I) with a fracture of a central incisor. The general state of health was good. All teeth had been restored alio loco with lithium disilicate crowns because, as the patient reported, the teeth were severely worn as a result of intense bruxism and grinding of teeth. And although the anterior crowns had been splinted, the crowned anterior tooth 21 fractured horizontally at the gingival level.

The thermal sensitivity test with CO₂ snow showed no response to the stimulus. The peri-coronal tissue was irritated but without any active purulent infection. Hard and soft tissue exhibited no signs of bone loss or recession, and no structural differences were evident when comparing the two quadrants of the upper jaw. No changes or signs of fracture were seen radiologically on the root remnant. Oral hygiene was good.

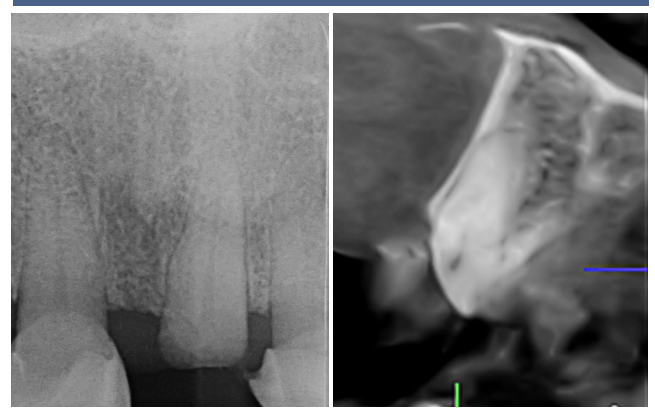
Tooth preservation was considered feasible but did not seem to have a long-term prognosis because of the lack of a ferrule effect. As an alternative to implant restoration, a conventional bridge restoration was discussed with the patient. The patient opted for reconstruction with the aid of an implant.



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Oral surgeon



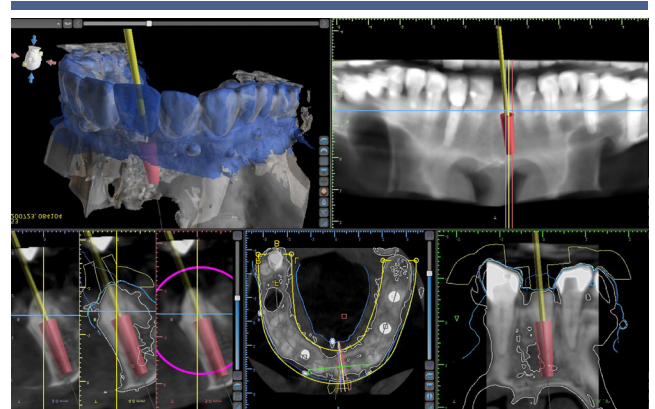
1. In a 69-year-old patient suffering from bruxism, the anterior tooth fractured to gingival level despite being splinted. Tooth preservation appeared possible but did not seem to offer a long-term prognosis due to an inadequate ferrule effect. The incisal edge of the lithium disilicate crown on tooth 11 had chipped off due to grinding.



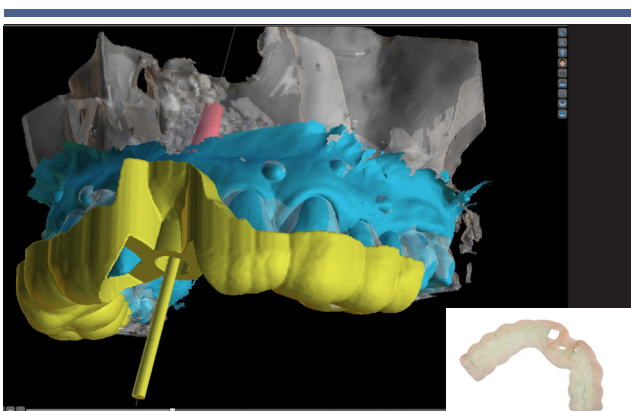
2. No changes or signs of fracture were displayed radiologically on the root remnant. The bundle bone was radiographically well visible and fully preserved. Implantation was to be performed according to the socket shield technique. By leaving a root remnant in the crestal area, the periodontal ligament and bundle bone were to be preserved to avoid resorption processes of the facial bone lamella following tooth extraction.



3. For correct implant planning, the crown of the fractured tooth was first fixated with plastic. A digital impression for 3D implant planning was followed by an alginate impression for manufacturing a deep-drawn splint, which was bonded with a fractured crown and used as a temporary restoration. For manufacturing the screw-retained temporary restoration on the day of surgery, the dental technician based his work on the shape and shade of the original.



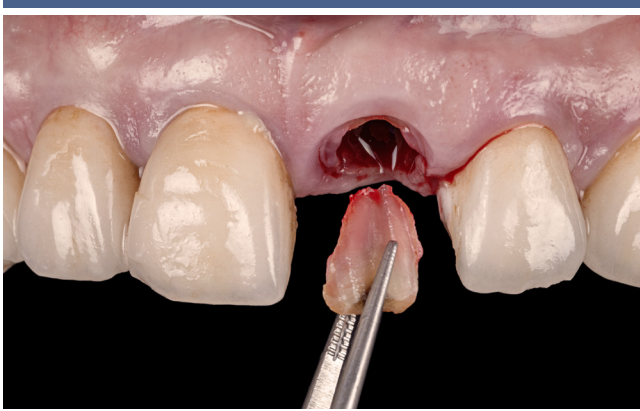
4. A CBCT scan was performed to plan the 3D implant position (Planmeca Promax 3D Plus). Particular attention was paid to the integrity of the cortical plate and adequate bone volume in the apical region. By superimposing the intraoral scan data of the maxilla and mandible (3Shape, TRIOS), exact placement of the implant position was determined in terms of backward planning.



5. Based on the virtual wax-up, the ideal prosthetic emergence profile was first determined and then the exact positioning of the implant was determined for all three planes. A drilling template was then designed and immediately created in the practice using a high-quality 3D printer.



6. After local anesthesia, the drilling template was placed and a pilot hole was drilled through the root of the tooth. To allow a good view of the surgical site, a very small-sized buccal full flap was mobilized by flap preparation whereby the papilla preserved, under consideration of biologically induced tissue resorption. The root was halved vertically.



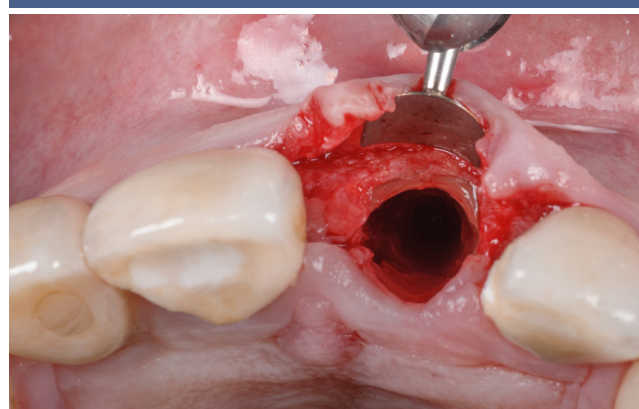
7. The palatal root portion as well as the complete root apex are removed in individual sections. A root fragment with a healthy periodontium remained in the crestal region on the labial side of the socket [1]. This fragment was to provide the soft tissue, but in particular the bundle bone, with the biological information that the periodontal attachment remains intact, as if the tooth were still in the alveolar compartment.



8. Animal studies have documented the preservation of buccal periodontal structures both at the histological level and the volumetric stability of the surrounding structures when the socket shield technique is used [6]. The implants exhibited physiologic osseointegration with new cementum formation in the coronal region and true periodontal attachment.



9. Prior to implant bed preparation according to protocol, the root fragment had to be thinned out somewhat to avoid direct contact with the implant. Precise preparation of the tooth fragment and insertion of the implant in the palatal alveolar bone are key to successful treatment with the socket shield technique [7].



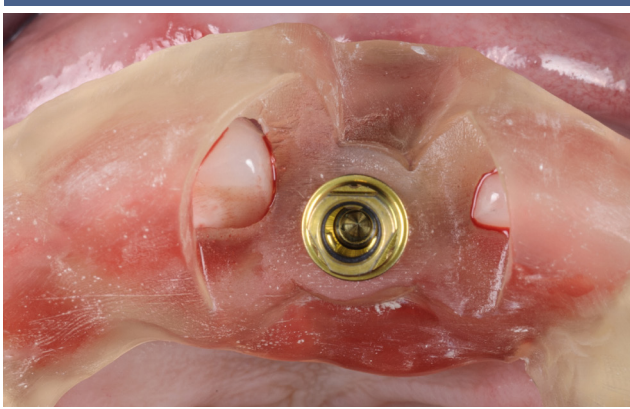
10. The prepared buccal root remnant supports the crestal region of the vestibular bone lamella. When applying the socket shield technique, filling of the jumping distance with bone substitute material can be dispensed with. The precise, palatally oriented positioning of the CONELOG PROGRESSIVE-LINE implant is performed with the aid of guided surgery. The macro design of the implant is designed for immediate restoration protocols.



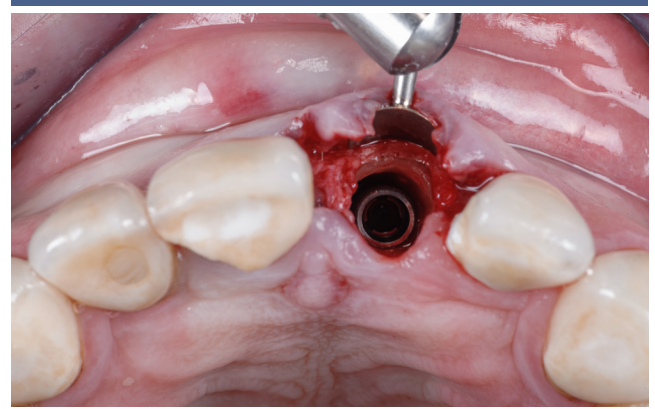
11. The drilling template was placed and the implant bed was prepared with intermittent movements according to protocol. Tempered sterile saline solution was used as cooling fluid throughout the drilling procedure.



12. A PROGRESSIVE-LINE implant (CONELOG 3.8 x 13 mm) was inserted fully guided in the correct prosthetic 3D position in the palatal part of the extraction socket. The apically conical implant body as well as the projecting thread design allow for sufficient primary stable anchorage.



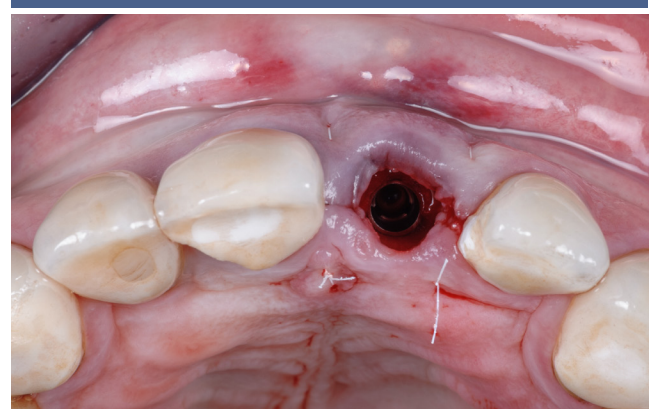
13. The implant was screw-retained up to the predefined stop on the insertion post, whereby an insertion torque of more than 35 Ncm was achieved. Insertion with the aid of a template offers advantages particularly in these cases, as slipping of guided drills is avoided from the outset.



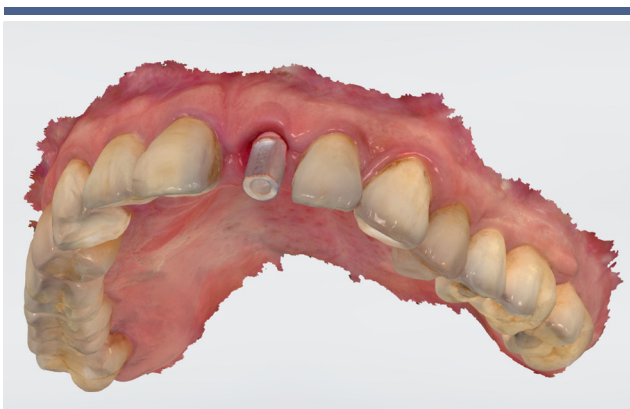
14. The implant was placed approximately 1.5 mm subcrestally in the palatal alveolar wall, at a sufficient distance to the root remnant. Due to the conical apical implant body, there was no risk of injuring the buccal apical bone lamella. Augmentations and replacement material were dispensed with.



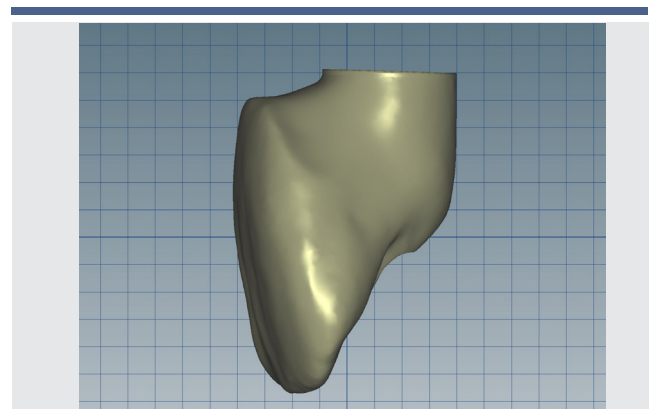
15. As the implant achieved an insertion torque of more than 35 Ncm, it could be immediately restored with a screw-retained, one-piece temporary crown. Therefore, a scanbody was screwed in immediately after implant insertion to record and digitally scan the 3D position of the implant.



16. To fixate the flap, the soft tissue was sutured microsurgically and atraumatically (Cytoplast 6-0 PTFE). As a result of this minimally invasive implantation, there was no bleeding or pain, nor swelling or hematoma.



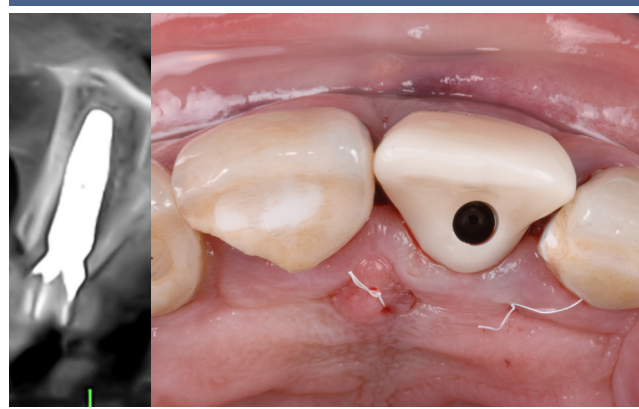
17. After importing the STL file into a professional software (Exocad dental-CAD), the interim restoration was finalized on a titanium-based CAD/CAM in the practice and milled within half an hour (Ceramil Motion 2 5X, Amann Girbach AG).



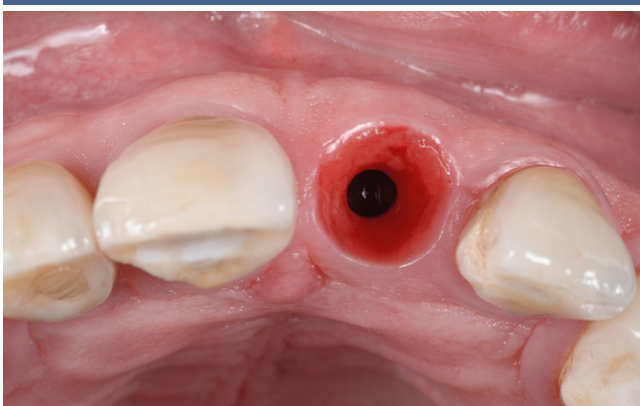
18. When designing the temporary crown, the focus was on the design of the peri-implant soft tissue as well as an esthetic shape of the crown. The concave portion provides sufficient space for the formation of a thick soft tissue cuff. The transition to the labial shape defines the crown emergence profile.



19. The temporary restoration was cemented onto a Ti-base (CONELOG titanium base CAD/CAM crown) using a composite cement (Speedcem Plus, Ivoclar Vivadent). Both the subgingival design and the platform switch of the CONELOG conical connection will support tissue healing.



20. This temporary, customized "healing abutment", which was placed immediately after implantation precisely covered the extraction wound. A control X-ray confirmed the correct position of the implant, the positional stability of the shield and the correct distance from the tooth shield to the implant.



21. After a ten-week healing phase, the peri-implant mucosa impresses through voluminous and healthy soft tissue. The applied socket shield technique can support the esthetic outcome by reducing resorption processes in the width and height of the buccal lamella, thus preserving the peri-implant marginal bone level.



22. The final restoration, based on the data from the temporary crown, was inserted after a functional and esthetic try-in. The zirconia crown was cemented extraorally with (Multilink Hybrid / Ivoclar Vivadent) on a titanium base CAD/CAM. The hybrid crown was screw-retained with 20 Ncm and the screw access channel was sealed with plastic.



23. Immediately after insertion of the definitive hybrid abutment crown, the slightly chipped adjacent crowns were built up with composite. The control X-ray shows the preserved bundle bone in the crestal facial region.



24. At the follow-up six months after insertion of the definitive restoration, the crown is perfectly integrated. The coronal gingival margin is garland-shaped and a broad band of naturally stippled attached gingiva is visible.

Discussion

The concept of incision-free immediate implantation has gained in popularity in recent years. Meanwhile, it has been proven that the survival rate is on the level of late implantations in healed edentulous jaw sections. Convincing arguments are the reduced number of surgical procedures and the shortened treatment time in addition to higher patient comfort. The postoperative quality of the soft tissue is also better due to less surgical manipulation.

However, there are some challenges to consider with immediate implantation. Next to achieving sufficient primary stability, these primarily relate to subsequent defect formation in the crestal alveolar region. Complete preservation of the peri-implant tissue structures in esthetically relevant areas can to date still only be achieved in rare cases. A complicating factor in planning is that the extent of resorption to be expected varies greatly in individual cases.

The main reason for the loss of resorption is the biological remodeling process following tooth extraction. Crucial etiologic factors in this context are a thin buccal bone lamella and, from the resulting loss of the periodontium, induced degradation of the alveolar-lining bundle bone [8]. A key factor in stabilizing the midfacial crestal alveolar bone could be the targeted preservation of the bundle bone in this region. To preserve the periodontal attachment including cementum, periodontal

ligament and bundle bone, the socket shield technique has increasingly moved into the focus of treatment in recent years. This should prevent the resorption cascade from being set in motion in the first place.

Conclusion

This case illustrates an experimental technique for preserving a buccal root segment in conjunction with immediate implantation and a temporary restoration. The socket shield technique is proving to be a valuable technique for minimizing buccal profile changes following tooth extraction, resulting in increased volume stability of the mucosa adjacent to the inserted implant. Even though the clinical application of the socket shield technique is still difficult and very technique-sensitive - with an apically tapered implant designed for high primary stability, such as the PROGRESSIVE-LINE, the dentist can achieve both good control over the implant position as well as a fairly favorable cost-benefit ratio with this technique. This case also demonstrates that the PROGRESSIVE-LINE implant is a reliable implant for immediate restoration protocols. The capabilities of computer-aided planning and guided surgery allow the benefits of a fully digital workflow to be realized in full.

However, in the future, the long-term stability of the esthetic outcome must be evaluated in addition to the safety of the technique.

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- Postgraduate studies in periodontology and implant dentistry
- International lecturer in periodontology, implant dentistry, esthetics and multidisciplinary treatments

PRODUCTS

The truFIX fixation system – the all-in-one bone fixation and membrane stabilization solution

» Bone blocks or bone substitute materials which are fixed in a stable position with screws or pins are often used for the reconstruction of larger bone defects. The complete system is designed for the primary fixation of bone graft materials and contains all the components for picking up and screwing in the truSCREW and the truTACK. The truFIX system will soon be added to the Camlog portfolio.

This allows the restoration of the alveolar ridge profile with the aid of osteosynthesis screws, tenting screws as well as pins. By stabilizing the bone blocks and membranes, sufficient space is created for the inserted regenerate to allow rapid penetration by blood vessels and to contain soft tissue pressure.

The truFIX system is a user-friendly complete set for dental practice, which makes the use of further systems and components unnecessary.

truTACK, truSCREW and truTENT

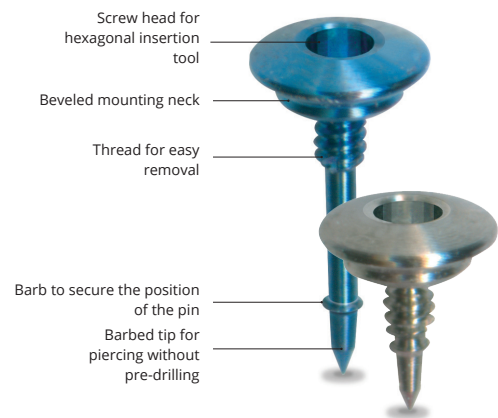
The truTACK makes the stabilization of membranes quick and trouble-free. The unique pin incorporates a hexagon on its head and threads on its shaft, allowing for easy removal. The truTACK is inserted like a pin and removed like a screw - a unique feature.

The truSCREW, with its self-tapping thread, is the ideal bone screw for the fixation of small bone blocks within the oral and maxillofacial environment. This thread eliminates the need for any pre-drilling (in most instances). The patented design of the screw enables effortless insertion into all types of bone.

The truTENT is a supplement to the truSCREW. Its extended shaft and wider head was developed to support a membrane or titanium mesh during augmentation procedures. Even smaller, multi-wall defects can also be successfully regenerated with the aid of the tent screws, as they further expand the space and reduce soft tissue pressure by holding back the gingiva over a larger area.

Titanium Meshes

If, for example, augmentation covers more than two tooth widths and also features an increasing vertical component, then titanium meshes are increasingly attracting attention in therapy in addition to the veneer technique. These are available from Camlog BioHorizons in different sizes and shapes to match the truTENT screws.



truTACK
Head Ø 2.5 mm
(available in different lengths)

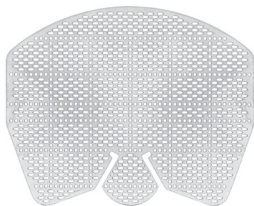


Properties

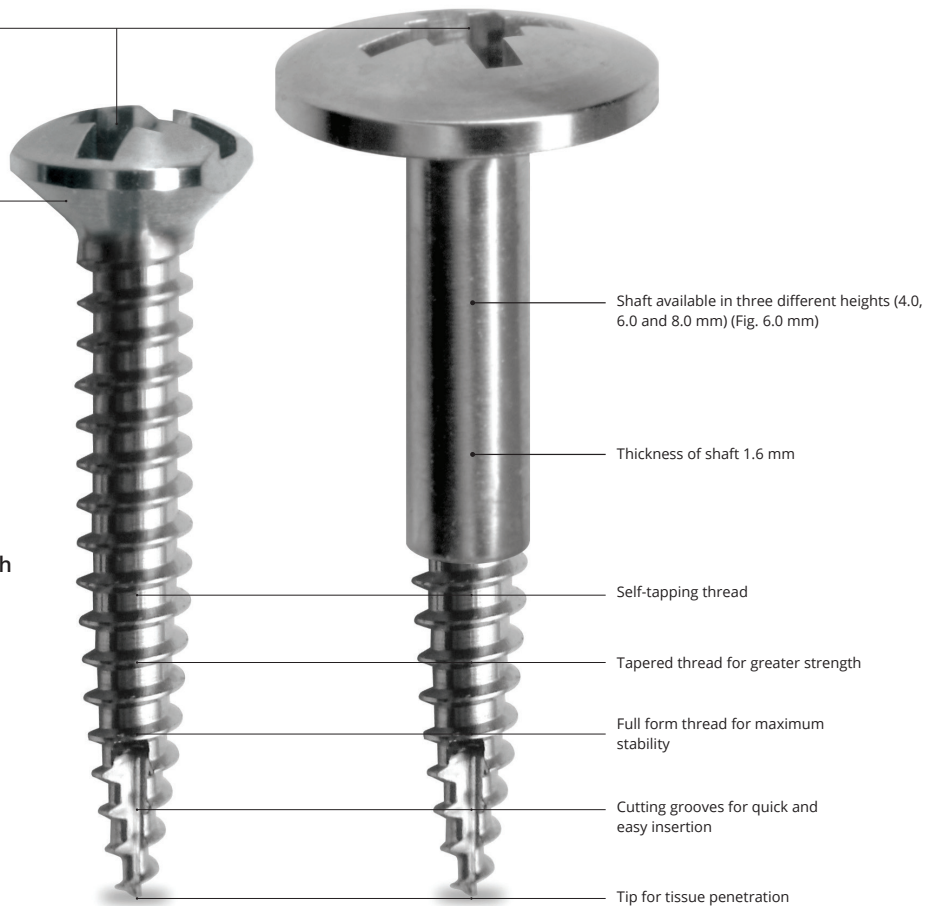
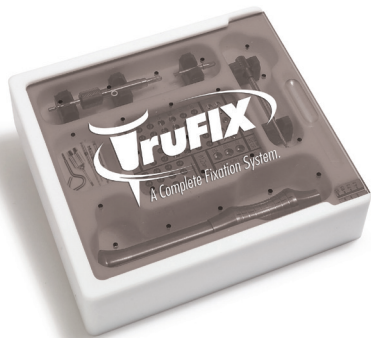
- » Centered patented self-locking connection
- » Precise axial alignment with every pickup
- » truSCREW: self-tapping screw - designed for easy insertion with maximum fixation
- » Patented truSCREW removal sleeve for disengaging the screw from the driver without damaging the screw head
- » truTACK: fixation pin with hexagonal socket and mandrel tip for piercing without pre-drilling
- » Easy insertion and easy screw-like removal of the truTACK

Patented cross-slot socket for insertion tip

Beveled screw neck



Titanium-Single-Butterfly-Tenting-Mesh
30 × 80 mm, 0.25 mm thick



truSCREW
Head Ø 3.0 mm
(available in different diameters and lengths)

truTENT
Head Ø 5.0 mm
(available in different shaft heights)

PRODUCTS

New: Titanium bases CAD/CAM free – flexible solution for the angled screw channel

» To ensure that the conventional direct screw-retained hybrid crown no longer poses more of a challenge than a solution, Camlog will soon be offering CAD/CAM free titanium bases for the angled screw channel for the CAMLOG and CONELOG implant systems.

Implantological restoration concepts with cementless direct screw fixations have become established in recent years due to cement-induced peri-implantitis. However, they pose many a challenge, especially in the esthetic anterior region. In addition to optimal implant positioning, the placement of the screw access channel must be taken into consideration during planning. Particularly in the anterior region of the upper jaw, the longitudinal axis of the implant may come to rest on the incisal edge or even in the labial veneer surface. The titanium bases CAD/CAM free allow palatal or lingual access to the abutment screw.

But it is not only in the highly esthetic area that the axis alignments can be corrected by up to 25° with the titanium bases CAD/CAM free. Also in the posterior region in cases where the surgical placement of

the implants is not optimal, the challenge of an unfavorably exiting screw access channel can be solved in the superstructure. In the event of a small mouth opening, it is also possible to position the abutment such that the correction angle can be optimally utilized to be able to tighten the abutment screw from the front with the required torque (20 Ncm) using a screwdriver placed at an angle. It should be noted here that the screws of the titanium bases CAD/CAM free require a specially configured screwdriver. These are available for manual and machine use.

No more screw access channels in the visible area or undesired cemented solutions.

Product features at a glance

- » Axis correction possible up to 25° vertically and 35° horizontally (for CONELOG with 2 mm gingival height up to 15° vertically)
- » Anti-rotation protection for precise bonding of the ceramic crown
- » Optimal placement of the screw access channel
- » 2 channel lengths (4.7 mm and 6.5 mm) for both CAMLOG and CONELOG implants
- » Roughened bonding surface
- » One channel geometry for all implant diameters (except Ø 5.0 mm)
- » 1 gingival height and for each implant diameter one standard and one platform-switching version each for CAMLOG
- » 2 gingival heights (0.8 mm and 2.0 mm) for CONELOG implants
- » A new specially configured screwdriver required
- » Before bonding the crown to the titanium base CAD/CAM free, it is imperative to insert the abutment screw. The hybrid crown is delivered with a "trapped" screw to the practice.



PRODUCTS

NovoMatrix[®], expanded range of indications in the GBR technique

» As GBR procedures are routinely used in practice and are often combined with soft tissue augmentation, biomaterials that act as a certain barrier to new bone formation and at the same time as a scaffold for soft tissue augmentation would prove very beneficial for both patients and dentists. The logo editorial team spoke with Branislav Kostadinov, Head Biomaterials Camlog Biotechnologies Europe, about the properties and advantages of using NovoMatrix[®] as well as the prospects for new indication areas.

The indications for the NovoMatrix are predominantly regarded as being in recession coverage or soft tissue thickening around teeth and implants. More recently, however, acellular dermal matrices (ADMs) have also been used as biological membranes for soft tissue management in guided bone regeneration procedures. How does the NovoMatrix perform in these procedures?

The application is based on the recently conducted systematic reviews by Troeltzsch et al [1] and Troiano et al [2]. They evaluated the efficacy of augmentation materials in the reconstruction of the alveolar ridge in terms of guided bone regeneration (GBR). The barrier effect of an acellular dermal matrix of human origin (Alloderm/BioHorizons) has been demonstrated in guided bone regeneration procedures. From this, it is hypothesized that a porcine ADM will have equivalent results compared to an established collagen barrier membrane in terms of new bone formation, during a GBR procedure in conjunction with implantation [3].

What has happened to current treatment concepts with the advent of porcine matrices?

The new generation of acellular dermal matrices convinces with the remarkable property of rapid and intensive absorption of growth factors. This is largely achieved by the porous and unique natural structure of the matrices together with their surface properties involved in cell recognition and binding [4].

What are the benefits of the NovoMatrix?

NovoMatrix covers a broad spectrum of indications. The advantages clearly lie in their easy handling, excellent tissue integration, scar-free healing, excellent adaptation of the color and tissue structure to the natural surrounding tissue, and therapeutic safety.

Which properties are decisive for therapeutic success?

After application, a membrane should possess its

own positional stability. The NovoMatrix, for example, perfectly meets this requirement as it adapts very well to the abutment contour. According to the latest findings, it stabilizes the graft material with additional fixation and takes on a certain barrier function. Mechanical protection of the mucoperiosteum as well as the graft material is crucial for clinical success, the latter especially in case of dehiscence.

Diffusion of nutrients and vascularization must be ensured for optimal nutrition of the bone as well as incorporation of the membrane into the autologous tissue. Wound healing should be supported by the membrane. Even in the case of dehiscence, the soft tissue should heal through secondary granulation on the membrane surface.

For which indications is the NovoMatrix particularly suitable?

According to the current state of knowledge, the NovoMatrix can basically be used in the augmentation of attached tissue around teeth and implants, the reconstruction of the alveolar ridge for prosthetic restoration as well as in controlled tissue regeneration and for root coverage in recession defects.

The NovoMatrix appears to be very versatile. Does it therefore lead to success in every situation?

The NovoMatrix makes a safe surgical technique safer, but it does not make an unsafe one safe! It is therefore crucial that the basic surgical principles are adhered to, because so-called "miracle cures" do not exist in either implant dentistry or soft tissue surgery - even if this is sometimes presented as such for promotional reasons.

Several variables can influence clinical outcomes. When considering patients' quality of life, the recovery times and risks, the product must be chosen with care and the different characteristics weighed against each other.

« The NovoMatrix demonstrates excellent results in GBR procedures »

In addition to the barrier function, other properties of a membrane are becoming increasingly important.

What effect does the NovoMatrix have on the soft tissue?

NovoMatrix has consistently shown stronger positive effects on oral cell behavior than comparable products according to studies, suggesting improved soft tissue regeneration capabilities [4].

The NovoMatrix serves as a guide for the soft tissue and optimally supports it during closure and thickening. Secondary granulation may even improve the soft tissue situation as the strip of keratinized gingiva is widened.

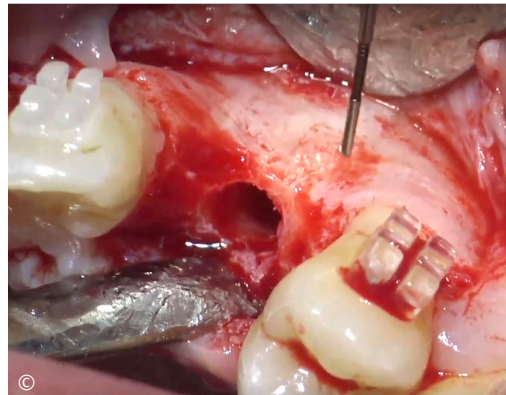
What role does membrane vascularization play and to what extent is early angiogenesis into the collagen structure beneficial?

Basically, vascularization is a prerequisite for life and therefore also for new tissue. In addition, cellular defense can only be successful when vascularization is present, because cells are transported by blood vessels. Vascularization is the first step in the incorporation of a material. Early vascularization is evidence that the membrane is readily biocompatible and determines whether a foreign material is rejected or accepted. Thus, resorption is not a prerequisite for tissue formation, but the nature of the tissue-implant contact and the subsequent behavior of the matrices is of enormous importance.

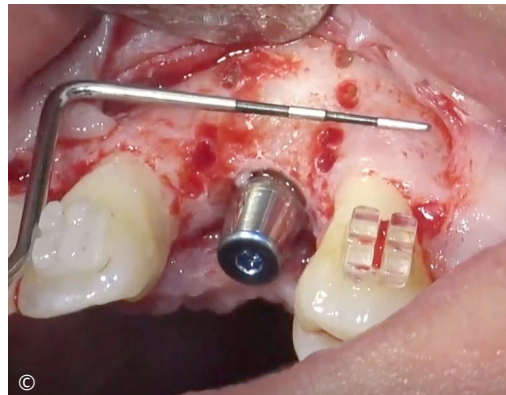
As, for one, there are no foreign body reactions to the natural structure and, for the other, there is no fibroblast apoptosis, the body therefore initially sees no reason to degrade the NovoMatrix. Due to protein permeability and the colonization with cells and vessels, the NovoMatrix is revitalized, behaves biomimetically vis à vis the mature tissue and is then included in the natural remodeling process according to the description of remodeling.

Camlog's portfolio now includes membranes of porcine, bovine or synthetic origin with different properties. What criteria are critical for selection and clinical success?

A membrane provides mechanical protection for both the graft material as well as the soft tissue. It acts as a kind of "buffer" that minimizes the external mechanical stress caused by tongue movements, chewing, temporaries, suture tension, as well as the internal stress caused, for example, by the additional volume or the form of a block support, on the oral mucosa. As a general rule, any treatment must be "biologically adequate" and related to the indication. For the treatment strategy, this means that risk factors and the patient's overall situation are ultimately decisive for the choice of membranes.



Bone deficit of the facial alveolar bone



Evaluation of the defect size and freshening of the bone



Bedding of the bone substitute material



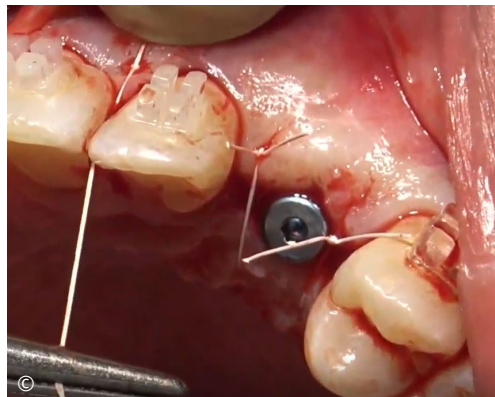
Covering the site with a trimmed NovoMatrix

However, it is absolutely essential that the basic surgical principles, such as tension-free closure of the soft tissue or positional stability of the graft, are observed.

In summary, the results support the positive impact of the NovoMatrix on the recruitment, growth and osteogenic differentiation of osteoprogenitor cell types as well as improved wound healing potential of primary human oral fibroblasts and periodontal ligament cells.



Double bedding of the L-PRF membrane



Tension-free wound closure at open healing

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Branislav Kostadinov,
Head Biomaterials Europe,
answered questions from
logo editor Ingrid Strobel



OP video of Prof. Juan Blanco during
his Sepa 2022 lecture





PRACTICE MANAGEMENT

Cross-media marketing of ratings – knowing how!

» In medical history forms, up to 90 percent of patients state that they came to the practice on recommendation. Many physicians assume this is based on personal recommendations. It is often overlooked that the far greater majority finds its way via the Internet. In the last two articles, I looked in detail at the topic of physician ratings. In this article, I will address the cross-media marketing of ratings in order to shed some light on how targeted recommendation management can be used to attract new patients.

Rating management

Reviews are the most important source of guidance for new patients. According to the Google Consumer Panel, about 20 percent of all customers base their purchases on reviews from other buyers. This figure is significantly higher for services, as these cannot be rated factually in the same way as a product. Recipients of services are forced to make an emotional investment in advance, which is why the review of experiences by others are of particular importance. Good PR can therefore ensure a high level of patient satisfaction and is also the best tool for attracting interested parties to the practice. Active rating management is thus indispensable to present oneself attractively on the Internet and to draw attention to

oneself. That is why rating management should form an integral part of any well-thought-out practice marketing strategy.

Recommendation marketing - a sure-fire success

In an economic context, referral marketing combines all the effective measures for acquiring new customers and is an effective and inexpensive alternative to classic advertising. If you let your patients speak on your behalf, you need relatively little budget for this purpose. For your referral marketing to be successful, there are a few things you should bear in mind. Perhaps the most important prerequisite for success is satisfied and loyal patients. No doubt you have some loyal patients who like coming to your practice



Andrea Stix, M.Sc., MBA
Strategic consultancy



and appreciate the advice you give them. Trust your people skills and find out from talking to patients if they could qualify as potential referral sources.

What really counts

When patients visit a portal, they are usually already well advanced in their decision-making process. When it comes to the actual choice of physician, the profile pictures then take on significant importance, as the eye only differentiates between images, but not between faceless - i.e. neutral - profiles. Whether 1.0, 1.3 or 1.6 - with a good rating, the specific grade is much less important to recipients than many physicians might assume. Far more relevant are the sympathy and trust that an image radiates. In addition, a current photo is also helpful for reviewers, as it is not uncommon for namesakes or practice partners to be rated by mistake. For this reason, attention should generally be paid to having a professional and up-to-date presence in all relevant portals.

Why a single communication channel is not enough

Cross-media marketing refers to the use of different, but at least three, communication tools to market a product or service. The interaction of different communication instruments in the various communication channels can prove very effective. It is particularly important that the messages follow a common idea, that the communication instruments are coordinated in terms of timing, form and content, that they are chosen to suit the target group and

that they fit in with the brand strategy. For example, marketing esthetic treatments and the associated target group may result in a fundamentally different media selection than when targeting new patients for implantology procedures or if the objective is to push geriatric concepts. Marketing via various communication channels increases the recall factor and makes it easier to get inside the mindset of potential patients.

Integration of recommendation management

First of all, one should determine which rating platforms are relevant for the practice. Generally speaking, these are Jameda and Google; however, regional platforms may also offer a certain level of reach and importance. The integration of ratings on one's own practice homepage is advisable in any case. This can be accomplished via so-called widgets - banners of the respective platforms - which give the score of the practitioner, the practice or a top-level ranking. This is a useful element for website visitors because, in addition to the practice owner's own statements, patient reviews can also be used in the decision-making process when choosing a physician. To highlight a certain unique position, widgets with practice or top-level scores should be positioned prominently on the home page. The individual scores for the physicians can then be added under the respective CVs. While this increases the reputation of the practice from the patient's point of view, these so-called linkbaits lead to an increase in the reputation of the portal site in terms of search engine optimization

and this is indirectly a bonus for those listed. An interface could also be used to automatically import the latest rating into the practice homepage. It is recommended to link these platforms several times to the practice homepage to the respective relevant places and not merely to the landing page, as this generates valuable references, so-called backlinks, to the own homepage. Some portal entries make it possible to store relevant keywords and thus achieve greater exposure not only in the portal, but also in the Google search results.

But beware: not every seal of approval is recommendable! Even if offers from various portals may sound flattering, one should carefully check whether a quality seal without transparent rating rules is really positive for the reputation of the practice. In addition, paid listing in many portals is not that useful, as it displaces your own web presence in the Google ranking.

Active recommendation management

The first step in recommendation management is to actively motivate patients to pass on their positive impressions. Here, you and your staff should communicate in a well-dosed balanced manner. If patients express satisfaction on their own initiative, you can tell them directly that you would welcome them to recommend your practice to others. You can also ask patients who express their enthusiasm for a particular treatment to share this information on the web.

Make a note to that effect when a patient tells you that they became aware of you following referral from a specific person. If a patient has recommended your practice repeatedly, speak to that patient directly and thank him/her. According to the Anti-Corruption Act, you may not give gifts that are directly related to a dental service or offer reduced-price treatments or discounts. However, a friendly reward for recommendations in the form of a small gift is allowed.

Cross-Media – wherever possible

Generate your personal QR code with a free generator that links directly to the desired content and place your code on all communication tools. Be it the practice brochure, flyers for individual treatments, the practice sign or the letterhead: a discreet reference via a QR code to the portal most relevant to you certainly makes sense. The copywriter of your website can also include a note in the meta tags of your site, so that this information already appears in the Google search results. Facebook, Instagram, TikTok, LinkedIn – your practice rating is always worth a post. Do you place advertisements in daily newspapers or do you work with citylights, advertising on buses or in subway stations? Here too, a reference to your ratings, top ranking, or practice score may prove useful. Be it radio spots or telephone announcements - acoustic communication can also be used in rating management. Refer to your favorite rating portal on your business card. On occasions it might

prove opportune to give patients several business cards to pass on instead of just one. And in the case of e-mails, a link in the signature can refer directly to your portal listing. In short: there are numerous ways you can incorporate free of charge into your existing communications strategy to best push your rating management.



A tip:

Also involve your practice team and turn your employees into ambassadors! It is always important to manage recommendations consciously, as this lets you ensure, at little additional effort, that existing patients recommend your practice to others and lets you attract new patients.

Your reviews reflect the experiences of your patients. And this always includes the entire practice team. For this reason I will dedicate the next article to the topic of employee satisfaction.



NEWS

We say thank you – and wish you an exciting start to the new stage of life

» Françoise Peters, Head of Clinical Research since 2006 and a valuable member of the logo editorial team, started a new phase in her life in June. Françoise is well known to most (younger) researchers, as she coordinated study and grant applications on behalf of the Oral Reconstruction Foundation as Senior Clinical Project Advisor. Since 2009 - logo No. 19 - Françoise has been responsible for the science section in our partner magazine, which will in future be edited by Peter Thommen, her long-time colleague.

Dear Françoise, we have come to know you as a reliable, team-oriented colleague. Our customers know you as a competent power woman with a French accent, who tirelessly supports studies and publications. Where did your interest in research come from?

I have always been interested in medicine, the effect of drugs or food on the human body. I acquired my knowledge base of clinical research in the pharmaceutical industry. I have been working for oral implant dentistry companies for over 20 years now, have a degree in Business Administration and a Masters in Public Health.

What falls under Clinical Research?

The patient is always at the focus of studies. We test our own products scientifically for safety and efficacy with the aim of providing evidence-based proof of the properties of the implant systems and to ensure the long-term clinical success of the implants. Depending on the objective of the studies, case documentations, large field studies or randomized, controlled multi-center studies are employed. The stud-

ies are conducted worldwide in cooperation with universities, but also with private dental practices to cover the entire patient spectrum. To protect study participants, high ethical, methodical and scientific requirements must always be complied with in the planning, execution and evaluation.

Where are the study results presented?

The results of the clinical studies on topics such as the clinical long-term success or the effectiveness of treatment options contribute to the improvement and further development of our products and are presented regularly at congresses and then published – on the website of the OR Foundation or in the literature review Camlog & Science or articles and of course in logo. Peter and I have been working together on logo publications for a long time now. And he will do this very well in the future, without a doubt.

At the congresses of the OR Foundation you support the section for young scientists.

Oh yes, this is one of my pet projects. I have been

So I'm done, would you like to hear my good (non) retirement resolutions sometime?



involved in this research almost from the beginning, as I coordinate the study and grant applications and submit them to the OR Foundation Board for a decision on whether to support a research contract. Once the studies have been judged, the winners, young clinicians, are given the opportunity to present their projects at the congress. Sometimes this is their first time on a big stage, they are incredibly excited and not only require my advice, but rather my personal assistance. And when they have mastered their presentation, that fills me with pride. It's a bit like the feeling when your own children started out into the big wide world. In addition, I coordinate the Research Award as well as the Poster Award - a time-consuming task, but one that is a lot of fun and expands my personal network daily.

Big wide world, that's my keyword. What will you be doing after Camlog?

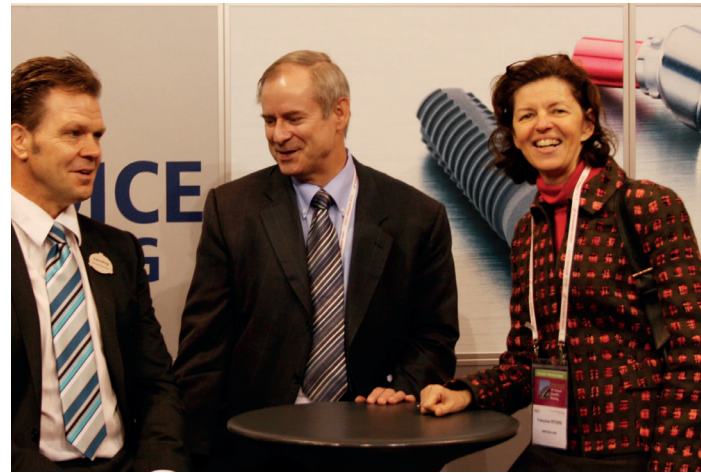
First of all, I will remain faithful to one thing, which is reading. No more studies or clinical papers in the future, I will dedicate my time to my hobby which is European and World History. And to deepen my knowledge of history, I will then travel to exactly these countries. I am in a literature circle with 15 other readers interested in diverse literature. Reading a book is a beautiful thing, however, you can really experience it in a circle. You get background on the author and the subject, share your own impressions, and learn the opinions of other readers. The different views on a book are very exciting and inspiring. We review newly published books once a month. To stay fit and enjoy the sometimes strenuous trips, walking and cycling are part of my daily schedule. And of course I would like to improve my golf handicap.

That sounds like a pretty exciting life. I will miss the shoptalk with you and your reliable support in the preparation of technical publications. As Wilhelm Busch once pointed out: «When two people separate, one of them usually suffers more»

I will be leaving with a smile in one eye and a tear in the other. I will now have more time for the family, but saying goodbye after more than 16 years at Camlog is not easy either. But one thing is certain: I am handing over my duties to Alastair Lomax and Peter Thommen in an orderly manner and with a good feeling.

Dear Françoise, on behalf of the entire logo editorial team, we wish you all the best and look forward to seeing you again at the OR Foundation Congress in Munich or at the next Christmas party.

The interview was conducted by Ingrid Strobel in May 2022.



Peter Thommen

joins the logo editorial team and will be in charge of the science section in future. Thommen holds a master's degree in natural sciences with a focus on biomechanics, exercise and sports sciences from ETH Zurich and has been involved in issues related to clinical research for more than 16 years. For the past 12 years, he has worked in Camlog's Clinical Research Department, coordinating studies in the field of dental implant dentistry and oral regeneration. With his expertise and a keen interest in research, he is dedicated to bringing current science into focus for readers.

NEWS

Camlog Group on course for growth: Groundbreaking ceremony for Altatec's extension building

» In spring 2022, the symbolic groundbreaking ceremony took place for the expansion of the production and logistics building of ALTATEC GmbH in Wimsheim. Altatec has been firmly rooted in the community since 2004 and now employs around 250 people. This is now the fourth investment in the expansion of the site, worth EUR 16 million, and reflects both the growth and the expected success on the market.

Next to additional workplaces, an area of 6,500 square meters will also provide more space for the assembly and secondary packaging areas as well as for the main warehouse, the clean room and future-oriented technologies such as the modern 3D printing area. At the same time, the laboratory where surface finishing of the implants is performed and which is currently located in Tübingen, will move to the new building. This will allow production processes to be further optimized and production capacities to be expanded, on account of Camlog products being in demand worldwide. In addition, travel distances are also reduced in the interests of sustainability.

Sustainable building

Sustainability is of enormous importance to Altatec. In addition to its social commitment in the region, the company has been exemplary in environmental matters for many years. For example, the current extension is aiming for the gold certificate of the German Association for Sustainable Building (DGNB). The DGNB certification system is considered the most advanced in the world and is recognized as an international benchmark for sustainability.

"We feel obliged to consider all aspects of sustainability equally. Social conduct and environmental responsibility are particularly close to our hearts," says Daniel Balduf, Managing Director of ALTATEC GmbH. "It is important to us that our employees feel comfortable and safe at their workplace. We therefore involved them in the construction project at an early stage and took their wishes into account in terms of planning. This allows us to set the right course right from the beginning and promote sustainability in every aspect."

The ceremony was also attended by Dr. René Willi, President of the Global Oral Reconstruction Group of Henry Schein, Inc, Altatec's parent company. "The expansion of Altatec is the visible beginning of a new chapter in our corporate history," explains Dr. Willi. "The groundbreaking marks the beginning of a major project that stands for a bright future for the company, its employees and the entire region."

Completion of the new building and the start of production are scheduled for 2023.





NEWS

New: Defect Regeneration – a casebook

» Camlog's casebook, which is being published for the first time in this form, has been available since April. This is a compendium of case reports by renowned authors illustrating the many options available for hard and soft tissue regeneration - with valuable advice on surgical concepts and techniques. The therapies of the extensively documented patient cases are based on the many years of experience and expertise of our customers and authors in the fields of hard and soft tissue reconstruction, periodontology and implant dentistry.

With our portfolio of regenerative products, which we launched very successfully in 2017 and supplemented with well-known synthetic and xenogeneic products in January 2022, we cover virtually all conceivable material and application preferences. But which substitute material is the right one for the therapy in question? This is not so easy to answer. Additional information on the indication-specific different regeneration behavior of BioHorizons Camlog biomaterials provides an aid to decision-making.

The casebook presents different options for building up deficient hard and soft tissues in which the authors, based on clinical evidence and individual preferences, have chosen what they consider to be the best therapy for the patient. The role played by regenerative biomaterials is described clearly and comprehensibly in the case documentations. The focus is on the benefits in everyday practice and the requirements for the use of the biomaterials as well as the various surgical techniques. The aim is to improve the quality of life of patients with their more

or less large tooth gaps and hard and soft tissue defects and to achieve the desired clinical outcome in functional, structural and esthetic terms. In implant therapy in particular, long-term success depends on volume-stable peri-implant tissue structures to a large extent.

We are very pleased to pass on the know-how accumulated in the Casebook - Defect Regeneration to you as readers and customers. Customer Service gladly welcomes your request for the free book. You can reach us at: 07044 9445-100

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