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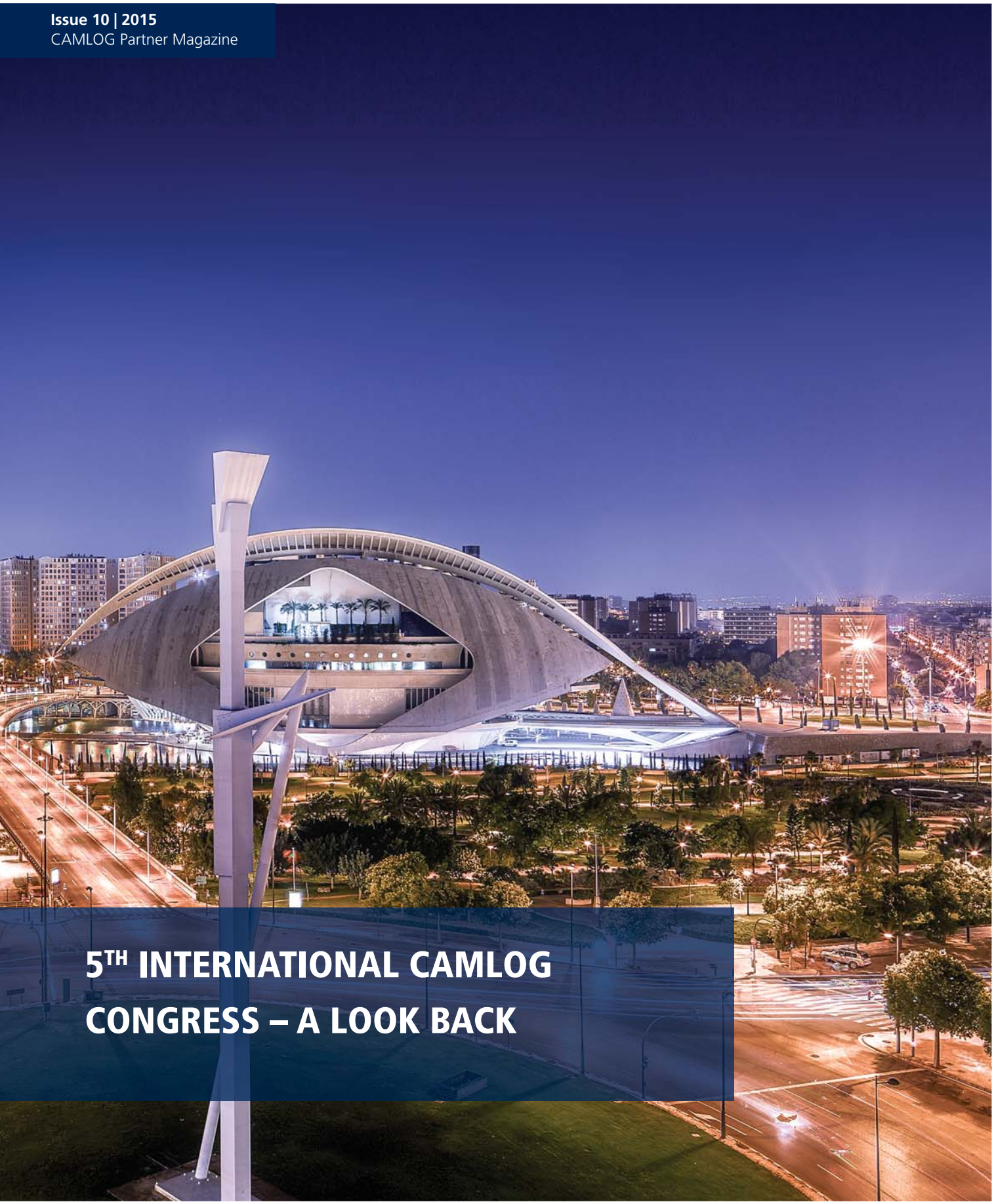

5TH INTERNATIONAL CAMLOG CONGRESS – A LOOK BACK

Experts adopting the consensus papers

Prof. Fernando Guerra

Prof. Mariano Sanz

ESTABLISHED IMPLANTOLOGY MEETS BOLD ARCHITECTURE

5TH INTERNATIONAL CAMLOG CONGRESS PROVIDES RECOMMENDATIONS FOR DAILY CLINICAL ROUTINE

The magnificent congress center and the structured professional program created a fascinating contrast for the International CAMLOG Congress in Valencia. The topics, implant positioning and restoration of edentulous jaws, were the main focus, with top-ranking experts presenting evidence-based consensus recommendations. For example, a sub-crestally placed implant shoulder can promote the esthetic outcome and in many cases a higher number of implants can improve the prognosis of restorations in the edentulous jaw.

Successful implantology, with reproducible results day after day, is always based on a sound professional footing. On the one hand, this includes the experience of the treating team, coupled with clinical judgement. On the other hand, current science, which is constantly updated and expanded, needs to be taken into account. Systematic reviews of the literature form the top level of evidence from which consensus-based recommendations are to be derived wherever possible. These should be oriented towards daily clinical routine work and be implementable in practice.

Four such systematic reviews, sponsored by the CAMLOG Foundation, were presented in Valencia. In addition to this, two consensus papers on the topics implant positioning and restoration of edentulous jaws, each of which was elaborated by up to 82 experts from 16 countries in accordance with the highest standards of quality. The congress presidents, **Professor Fernando Guerra** (University Coimbra, Portugal) and **Professor Mariano Sanz** (University Complutense Madrid, Spain), emphasized that the publications represent important milestones for the CAMLOG Foundation.

Optimal positioning of the implant shoulder

For years, experts from academia and practice have seriously debated how to design implant-abutment connections and how to position the implant shoulder with regard to the surrounding tissue. A consensus paper published from the fall of 2013 now makes clear recommendations on the the insertion depth in relation to the crestal bone level – corresponding to the selected implant design [1].

Professor Frank Schwarz from the University of Düsseldorf, Germany, explained why implants with a machined shoulder section (for example, CAMLOG® SCREW-LINE Promote®/Promote® plus) should be inserted at the level of the transition to the micro-rough surface. A systematic review of the literature by his working group showed that this can preserve the approximal bone level better than with sub-crestal placement of machined shoulder sections [2].

In the case of two-piece implants, the always existing micro-gap should be positioned at bone level (epi-crestal) or slightly above (supra-crestal) [1]. This also applies as a matter of principle to implants with structured surfaces up to the shoulder (for example, CONELOG® SCREW-LINE). However, if esthetics are the overriding factor, a slightly sub-crestal position may prove to be advantageous [1]. As Schwarz explained in detail, the chances increase in this case that the deeper placed implant shoulder still remains below the crestal bone level after remodeling.

Recommendations on the proper positioning for immediate implantation were given by **Dr. Arndt Happe** (Münster, Germany) based on the literature and his own clinical experience. Ideally, the shoulder of immediately placed implants should be 3 – 4 mm apical to the soft tissue margin. According to Happe, the enamel-cement boundary should not be used as clinical reference point, as the soft tissue level may still change during the course of treatment or may even be planned this way.

In addition, Happe prefers an approximately 1 mm sub-crestal position of the implant shoulder, at a slightly lingual position [3]. The distance to the buccal lamella should be 2 mm and the resulting cavity filled with slow-absorbing bone graft substitute [4]. And finally, Happe

Prof. Frank Schwarz


Dr. Arndt Happe


University lecturer Dr. Frank Strietzel

builds up the buccal soft tissue with a connective tissue graft in immediate implantation. This stabilizes the bone and improves the esthetic outcome. Giving clinical examples, Happe was able to demonstrate that the better sealing of the alveoli through the transplant plays an important role. By observing all these factors, it was possible to preserve the marginal soft tissue level with these measures [5].

In contrast, the type of connection between the implant and the abutment, whether parallel or tapered, has no effect on crestal bone degeneration according to the above mentioned systematic review of the literature [2]. Professor Schwarz had already formulated this thesis two years ago at the 4. International CAMLOG Congress in Lucerne on the basis of pre-clinical studies. However, a stable connection as, for example, given by the CAMLOG implant lines is to be recommended [1].

Platform Switching preserves bone

The bone level, and as a consequence, soft tissue stability, also play a role in the horizontal stage between implant shoulder and abutment (Platform Switching). However, no clear recommendations could yet be made in the consensus paper on this issue [1]. According to the university lecturer **Dr. Frank Strietzel** (Charité Berlin, Germany) the present studies were too inconsistent. A published systematic review of the literature with Strietzel as lead author showed that the dimensions of horizontal shift and the type of connection are not standardized due to the large number of investigated implant systems [6]. In addition, the majority of implants studied were in the posterior range, so that only limited conclusions could be drawn for anterior teeth.

However, the Platform Switching concept appears to offer advantages in principle and can be used as an alternative to flush outer connections according to the consensus. This is also supported by new studies and clinical observations presented in Valencia. For example, a randomized study presented by Professor Fernando Guerra for individual crowns on CAMLOG® SCREW-LINE Promote® plus implants (Tube-in-Tube™) with Platform Switching, showed a higher ratio of stable bone level or bone growth (67.1%) after one year versus a flush outer comparison group (49.2%) [7]. Measurements were taken from the time of prosthetic restoration.

An analog study in terms of indications and timelines is presently being conducted with CONELOG® SCREW-LINE implants (tapered connection). The preliminary results presented are comparable to those achieved with CAMLOG® SCREW-LINE implants with Platform Switching, with a slight average increase in bone growth after the time point of prosthetic restoration.

New data on Platform Switching

According to the systematic review of the literature initially mentioned, there is still insufficient data to document a possible relationship between soft tissue thickness and osseous restructuring as a function of vertical implant position [2]. On the topic of soft tissue and Platform Switching, **Professor Wilfried Wagner** (University of Mainz, Germany) quoted a newly published clinical study. This study showed that the bone level remains largely stable (0.21 mm degeneration 1 year after restoration) in the case of thick soft tissue types (> 2.0 mm) in conjunction with Platform Switching, whereas degeneration is greater for soft tissue thicknesses less than 2.0 mm (1.17 mm) [8].


Prof. Wilfried Wagner

Dr. Claudio Cacaci, oral surgeon from Munich, has many years of experience with sub-crestally placed implants with tapered connections. In Valencia he


Dr. Claudio Cacaci


Prof. Jürgen Becker

Dr. Erhan Çömlekoğlu


Dr. Paul Sipos

presented numerous X-ray images which demonstrated impressive consistency of bone level. A clear indication for the effect of Platform Switching is also given in a study in which the use of eccentrically placed abutments demonstrates less bone degeneration on the side with a higher horizontal shift than on the opposite side [9]. According to Cacaci, Platform Switching with CONELOG® SCREW-LINE implants works best from a tissue thickness of 3.5 to 4.0 mm upwards. However, it should be noted that, according to the systematic review of the literature, the effects of numerous, also soft-tissue-related factors, are not yet known [2].

A study in animals submitted for publication by the Düsseldorf study team of **Professor Jürgen Becker** (University Düsseldorf, Germany) with CONELOG® SCREW-LINE implants supports the above mentioned recommendations on insertion depth [10]. As a rule, the President of the CAMLOG Foundation therefore recommends an epi- or slightly supra-crestal position. The same as Dr. Cacaci, he views existing bone dehiscences as an indication for the sub-crestal placement of CONELOG® SCREW-LINE implants. Becker reasons that this minimizes the bone area coming into contact with the oral environment in case of soft tissue inflammation.

Avoiding abutment changes

A number of animal studies and clinical findings support avoiding repeated abutment changes. In the above study, Professor Becker was also able to demonstrate that an experimental titanium abutment with micro-structured surface improves soft tissue adhesion in comparison with machined surfaces [10]. At the same time, bone degeneration is reduced when refraining from changing abutments. Abutment changes – as well as repeated probing with detachment of the connective tissue and epithelial attachment during the healing phase [11] – should therefore be avoided if possible.

This recommendation is put into context by a randomized study with single crowns or bridges on CONELOG® SCREW-LINE implants in conjunction with Vario SR abutments. **Professor Juan Blanco Carrión** (University of Santiago de Compostela, Spain) presented preliminary results where the use of a healing cap ("1 abutment change") showed no negative effects on bone preservation after one year compared with immediate final mounting of the abutment ("1 abutment 1 time"). Controls up to five years are to verify whether this observation applies long-term and whether a final immediate abutment has a preventive effect against peri-implant inflammation.

A comparison of the two methods, supported by the CAMLOG Foundation and using CONELOG® SCREW-LINE implants, was presented by **Dr. Erhan Çömlekoğlu**, lecturer at the Ege University Izmir (Turkey). Using the split-mouth design, he replaced the posterior maxillary incisors in ten patients and observed a slight gain in bone growth for the method without abutment change, whereas he observed slight bone loss for implants with repeated abutment changes (in contrast to the single change in the study by Blanco Carrión). It could prove to be clinically relevant that bone growth with the final immediate abutment in the area of the buccal bone lamella was especially pronounced (measured with DVT).

With the aid of a video, Çömlekoğlu demonstrated that the connective tissue appeared to be very firmly attached to the abutment for the described method. Same as the findings for Platform Switching, this supports the idea that a suitable clinical protocol may reduce the risk of peri-implantitis (author's conclusion).

Update timing

A study on immediate implantations cited by **Dr. Paul Sipos** (Amstelveen, Netherlands), can also be regarded as a

Dr. Pascal Valentini

Prof. Stefan Wolfart


Dr. Thomas J. Balshi

further indication for the importance of soft tissue thickness. According to the study, the buccal gingival margin retracts apically by 1.5 mm long-term (2 to 8 years) after immediate implantation and thin tissue, whereas the values for thick tissue are only approximately 0.6 mm [12]. Sipos strongly suggests extremely careful techniques in immediate implantation. The buccal papilla should be preserved as best possible by suitable incision or by dispensing with incision altogether, so that the fragile blood supply is restored as fast as possible. In the case of buccal bone dehiscences, one can expect a worsening of the esthetic outcome for all techniques [13].

For the first time, a systematic review sponsored by the CAMLOG Foundation analyzed the prognosis for immediate loading in relation to the type of restoration [14]. **Professor Mariano Sanz** concluded that immediately loaded implants under overdentures in the lower jaw and as support for permanent total restorations in both jaws had the same risk of loss as implants with delayed loading. However, the prognosis for implants in individual tooth gaps or partially edentulous jaw sections was somewhat poorer. Next to savings in time, Sanz mentioned better bone stability as advantages of immediate loading. Differences in marginal soft tissue levels or clinical inflammation parameters between immediate and delayed loading could not be demonstrated.

The clinical aspects were rounded off by **Dr. Mario Beretta** (University of Milan, Italy), with a critical appraisal of immediate loading. In addition to the overall higher risk, augmentation and soft tissue management are more difficult to perform than for delayed loading. In the case of individual implants, Beretta recommends a stepwise approach with simultaneous implantation and augmentation, followed by connective tissue grafting (after approximately 4 months), exposure (4 weeks later) and impression taking (3 weeks later). Using temporary restorations, the soft tissue can then be shaped as desired.

Consensus on the restoration of edentulous jaws

A systematic review submitted for publication on the topic of implant-supported restorations in edentulous jaws, was presented by **Professor Stefan Wolfart**, lecturer at the University of Aachen, Germany [15]. According to the study, permanent restorations in the upper jaw with more than four implants show the best prognosis, with six implants being regarded as the standard. Four implants are promising for overdentures in the upper jaw. In the lower jaw, removable restorations are as successful as permanent restorations. Four implants can be regarded as optimal for overdentures, but two implants have also proven successful. Using more than four implants improves the prognosis for permanent restorations.

Wolfart added that bars have proven themselves as anchors in the upper jaw, and there is also limited positive evidence for telescopes and locators. Ball attachments can be added for the lower jaw. Overall, the systematic review concludes that there is a lack of data in the literature on patient-related factors such as quality of life, ease of cleaning and costs [15].

There is also limited data on the permanent All-on-4 concept, which allows dispensing with sinus floor augmentation in the upper jaw and nerve lateralization in the lower jaw. A further advantage mentioned by **Dr. Thomas J. Balshi** (Fort Washington, USA) was the optimal relationship between the number of implants and the support area, and thus lower costs. However, according to the systematic review by Wolfart et al. there is only a single usable study which demonstrates very good results with regard to the survival rates of implants [15]. Balshi presented an ongoing study

Dr. Ilaria Franchini

Prof. Hans-Peter Weber

Prof. Hendrik Terheyden

on the All-on-4 concept in Valencia using CAMLOG® Vario SR abutments. According to the preliminary results, the implant survival rate is very good, but according to Balshi, a smaller abutment height could simplify clinical handling depending on the initial situation.
Prior to the restoration of edentulous jaws, **Dr. Ilaria Franchini** (Stuttgart, Germany and Milan, Italy) carefully analyzes the anatomical, functional, esthetic and general clinical factors. Under favorable conditions, restorations with up to 8 permanent implants are performed, in the case of reduced bone availability or unfavorable medical conditions, Franchini prefers concepts with angled or short implants.

Canadian dentist **Dr. Marcus Fecteau** (Jonquiere, Canada) lives in a region with a high number of edentulous patients. According to his extensive experience, long-term edentulous patients used to removable dentures are generally satisfied with simple restorations in terms of implants. In contrast, patients with late tooth loss due to periodontal problems, prefer permanent solutions. Fecteau showed a patient example he solved with CAMLOG® Guide and CAMLOG® Vario SR abutments. Surgery lasted three hours and the patient already had a functioning and esthetic restoration four months after starting treatment. In Fecteau's estimation, the protocol will be used very frequently in future in the dental practice.

In line with the topic, **Professor Carlo Maiorana** (Milan, Italy) presented the results of a clinical on the guided restoration of edentulous jaws with CAMLOG® Guide. The average deviations between the actual positions and those planned, were approximately 0.6 mm (coronal and apical) and 2.4 degrees in terms of angle deviation, and thus around 50 percent lower than the values quoted in the literature. Maiorana emphasized, that computer-supported immediate restorations with flapless implantation mainly provide relief for patients, and to a lesser degree for the clinician. He mentioned dentist phobia, gag reflex or lack of time as important indications.

Dr. Sebastian Kühl (University of Basel, Switzerland) compared the position-related accuracy of printed and lab-based templates in vitro. The printed templates prepared from matched data sets from DVT and surface scans showed significantly greater precision for mesial-distal, apical and vertical positions than the lab-based templates. This could possibly be due to the higher number of reference points on the computer image and the high precision of industrially manufactured templates. According to Kühl, the results still need to be confirmed in clinical studies.

Do short implants replace augmentation?

The current status of research into short implants was summarized by the expert on prosthetics, **Professor Hans-Peter Weber** (Tufts University, Boston, USA), who originates from Switzerland. Numerous current studies and systematic reviews of the literature show that implants of less than 8 mm in length have a good prognosis [16], also in augmented bone [17]. However, as prosthetic factors are as yet insufficiently documented, current thinking is to splint short implants.

Oral and maxillofacial surgeon, **Professor Robert Sader** (University of Frankfurt, Germany) also sees good prospects for success for short implants. When using 7 mm implants, he refrains from performing a sinus lift up to a bone height of 7 mm. In a current study, Sader's study group is examining the chances for success with short implants in the posterior maxilla. Biomechanical findings appear to favor the concept, particularly with bicortical anchorage. Nonetheless, Sader stresses careful observation of the prosthetic parameters.

In a further study, **Professor Yasemin Özkan** (Marmara University, Istanbul, Turkey) compared bone changes when using short (7 mm) CONELOG® SCREW-LINE implants without augmentation or longer implants in conjunction with a sinus lift. According to the preliminary results, there are no significant differences in bone level between the protocols. Özkan also observed no significant differences in terms of prosthetic parameters, such as optimal distribution and the number of short implants. These factors should be investigated in further studies.

Alveolar bone loss can be regarded as a disease according to **Professor Hendrik Terheyden** (Red Cross Hospital Kassel, Germany). Consequences include esthetic and functional impairment which can only be treated with augmentation methods, especially in the case of sagittal or transversal disproportionate relationships between the two jaws. Terheyden recommends interpositions osteoplastiques, which have been proven to recreate the original condition. In his opinion, a consensus is urgently required as basis for dentists and surgeons to choose the optimal method of treatment.

Peri-implantitis and data ownership

A current overview on the topic of peri-implantitis was presented by **Professor Daniel Wismeijer** (ACTA University Clinic Amsterdam, Netherlands). He strongly emphasized the need for a meticulous risk analysis prior to implantation. No pockets greater than 5 mm or bleeding on probing should be present. In addition, attention should be paid to ease of cleaning in the design of prosthetic restorations – and not only for periodontally prone patients. The fundamental question to be asked right at the beginning, is whether implants have a better prognosis than one's own teeth.

Periodontist **Dr. Mario Roccuzzo** (University of Turin, Italy) added clinical practical aspects. It is not always clear why, in the same patient, individual implants are lost and others are not. Adjacent teeth should always be examined carefully. If an implant cannot be retained, it is best to remove it as early as possible. As Wismeijer before, Roccuzzo emphasized the need for dentists to already learn how to treat complications during their training.

Relationships between skeletal types and functional aspects according to Professor Rudolf Slavicek were explained by **Dr. Ken Tajima** (Tokyo, Japan). **Professor Monika Daubländer** from Mainz, Germany, provided details on the topic of nerve damage. Based on the literature, she recommended terminal anesthesia in place of block anesthesia and strongly suggested removing implants misplaced into nerve tissue within 30 hours. In addition, high doses of steroids are indicated as treatment.

An outlook on the digital future was presented by **Professor Irena Sailer** (University of Geneva, Switzerland). The 3D printing of zircon is already being developed in the laboratory and data fusion of DVT, facial scan and articulator is progressing at a fast pace. Despite all the euphoria, one should bear in mind that the resulting data sets cannot be regarded as being safe. Although Sailer has not experienced any concrete problems with data protection, every patient in her institute is given an analog number in the patient file for reasons of safety. This is used as a digital code to ensure that no patient names can appear on the Internet and that linking is not possible.

Conclusion

Yet again, the 5th International CAMLOG Congress provided a successful combination of top-level science and relevance to dental practice. The broad spectrum of topics provided an update on the numerous aspects of modern implantology and the corresponding benefits for the more than 1,300 delegates. Together with the workshops and a panel discussion on daily clinical routine, the motto of the CAMLOG Foundation was brought to life in a fascinating way: Science in the service of patients!

Dr. Jan H. Koch (DDS)

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IMPLANTOLOGICAL REHABILITATION OF A PRONOUNCED HARD AND SOFT TISSUE DEFECT IN THE ESTHETIC ZONE

Dr. Jörg-Martin Ruppin, Penzberg, Germany, MDT Stefan Picha, Fürth, Germany

Abstract

Ever since the pioneering days of dental implantology, the definition of treatment success has further developed from purely achieving reliable osseointegration. Today, successful implantological rehabilitation is unimaginable without esthetics, phonetics and function. Quite rightly, the patient's expectations have risen significantly over recent years. This emphasizes the importance of a strict "backward planning protocol" – the definition of an implant position selected according to prosthetic and esthetic aspects. Without correct surgical implant positioning, prosthetic success is often impossible to achieve. This underlines the importance of dependable augmentation techniques in order to be in a position to also surgically implement a prosthetically defined implant position.

For many years now, autologous bone has been the unrivalled "gold standard" augmentation material. With regard to safety, long-term stability and the biological quality of an implant site, it is superior to all other augmentation techniques. It also offers the best long-term prognosis and the shortest healing time for the patient.

To achieve prosthetic success, alongside correct hard tissue management, the relevant soft tissue management is just as important in the esthetic zone. Starting with the creation of sufficient soft tissue thickness, continuing with or without long-term temporaries, through to the selection of suitable abutment shapes and materials – many individual factors play a role, which only in correct interaction ensure long-term stable esthetic success.

Introduction

Dental implantology has continuously developed over the past twenty years. Thanks to advanced implant surfaces and surgical techniques, success rates of 95 – 99% are standard today [15, 18]. With reliable osseointegration presumed to be the "conditio sine qua non", alongside functionality and long-term stability, the special focus is shifted to esthetics. Prosthetically oriented preoperative planning is decisive here. The catchword for this preoperative planning is backward planning. From the dental lab perspective, it is a matter of reconstructing the original positioning of the lost teeth on the basis of a wax-up or a logopedic set-up and to communicate this to the practitioner for precise planning of the implant position.

With an eye on the prosthetically defined goal, the surgeon's task is to realize the planned implant position. Inflammatory processes prior to extraction of teeth not considered worth preserving can compromise the prospective implant site just the same as bone resorption due to inactivity atrophy with edentulism. Here the most common preoperative procedure is transversal widening of the alveolar ridge. Several techniques are described for this in the literature. The technique of bone spreading, also known as bone splitting, whereby the alveolar ridge is expanded buccally, is especially suitable for the upper jaw on account of the spongy bone structure [12]. However, with this method there is the inherent risk of uncontrolled postoperative re-sorption of the expanded bone of up to 40% and therefore certainly has to be viewed critically [8]. Lateral deposition techniques are superior in this regard. These may be performed as Guided Bone Regeneration (GBR) with membranes or titanium mesh. These techniques are best suited for small peri-implant bone defects and are described both with autologous bone, as well as bone bone replacement materials [2, 3, 18]. The augmentation material must always be covered with a barrier towards the soft tissue. Either non-resorbable barriers are used, such as GoreTex membranes or titanium mesh, or resorbable membranes, e.g. made of collagen of animal origin. Non-resorbable materials display sufficient resorption protection, but besides morbidity arising from the necessary surgical harvesting in a second procedure, there is also a considerable risk of wound dehiscence that can lead to infections and loss of the augmentation material [10]. Resorbable membranes reduce this risk, but it is yet to be clarified whether they offer sufficient resorption protection over time [5].

The use of autologous, corticocancellous bone grafts represents the safest method with the fewest complications. Bone grafts of this kind can be obtained intraorally or extraorally. Extraction in the region of the mandibular angle or the external iliac crest is most common. Given the correct surgical technique, the mandibular angle offers good bone availability, combined with only low risks and morbidity [11]. The sometimes pronounced cortical structure of the bone has to be viewed as a disadvantage, however. While intraoral harvesting is the gold standard for augmentation [11], if a very large amount of augmentation material is necessary, the iliac crest may also be used. The very good bone quality, vitality and availability is seen as an advantage. The increased extraction morbidity for the patient and the low resorption stability of the graft are

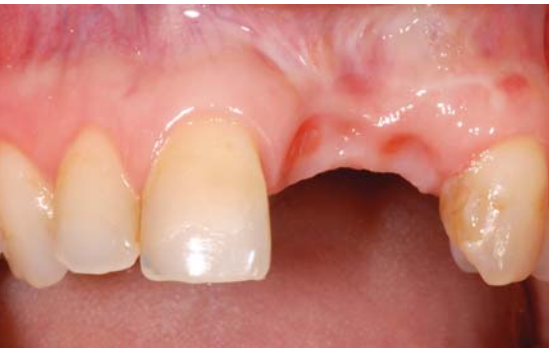


Fig. 1: The scarred vestibulum results from the multiple prior operations elsewhere.

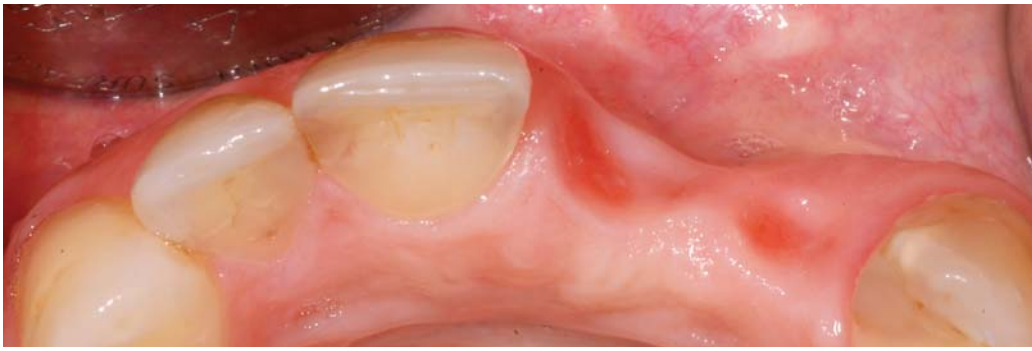


Fig. 2: The occlusal view shows the substantial loss of hard and soft tissue in region 21 and 22.

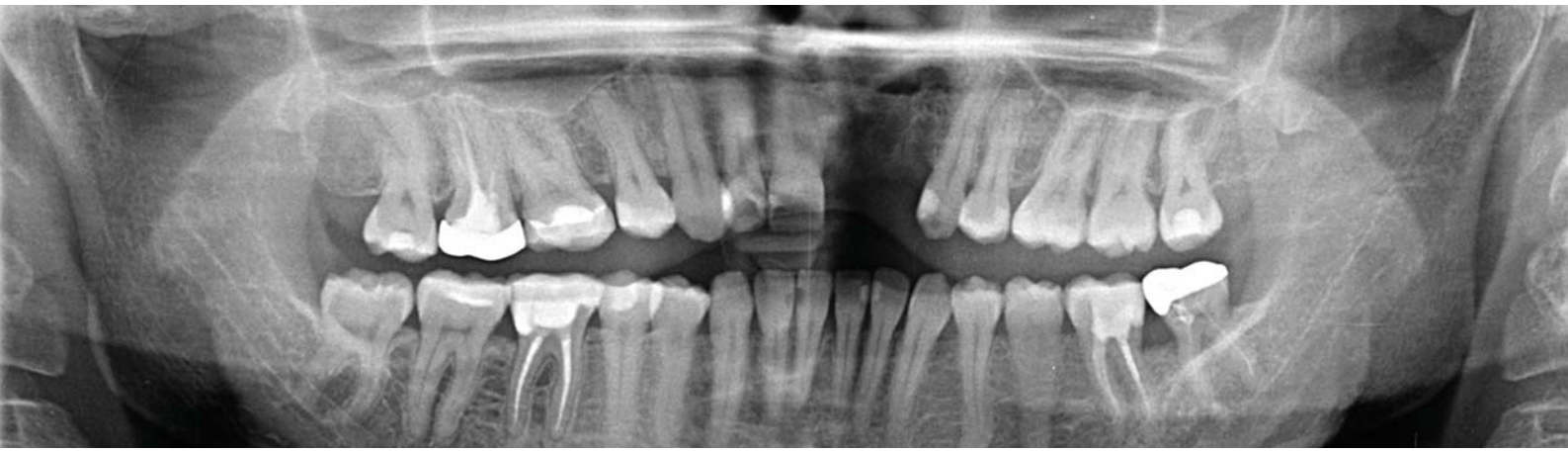


Fig. 3: At the time of the initial examination the neighboring teeth were vital, clinically stable and free of inflammation. Apart from the tissue deficit, the X-ray showed no irregularities.

considered unfavorable. In order to address this problem, several years ago Khoury and coworkers [7] described a new "shell technique". Here the aim is to combine the excellent vitality of an iliac crest graft with the high resorption stability of a mandibular angle graft. For this purpose, a corticocancellous bone chip is harvested from the mandibular angle from which a thin, purely cortical "shell" is obtained. This is fixated with micro osteosynthesis screws, so that the outline of the area to be augmented is defined. The region augmented is then filled with the remaining bone component, which is particulated. This ensures rapid and safe bony fusion with outstanding vitality of the augmentation material, while the cortical shell protects the augmentation material from excessive resorption during the healing phase.

The following article shows how a patient case with a complex hard and soft tissue problem was resolved predictably and with long-term stability in a multi-stage procedure.

Case history and finding

The 36-year-old female patient presented with the request for implantological rehabilitation of an interdental gap in region 21-22. She was a non-smoker, there was nothing of note in her case history. Concerning the special anamnesis, the patient stated that her teeth 21, 22 had been treated with root fillings following a front tooth trauma in her childhood. Over the years, recurrent problems had arisen with pain, swelling and fistulization. As a result, several surgical treatments of the teeth had been conducted elsewhere, which only ever led to relief of symptoms for a limited period. Finally the teeth were extracted elsewhere and an interim prosthesis was placed. At the time the patient presented to us for the first time, the intraoral finding showed a considerable loss of hard and soft tissue with a scarred vestibulum due to the multiple prior operations. **(Figs. 1 and 2)**.The neighboring teeth had composite restorations and were vital, clinically stable and free of inflammation. The further intraoral and X-ray findings were inconspicuous **(Fig. 3)**.

Planning

Even complex cases are less daunting if a precise evaluation of the overall situation is initially performed. A detailed analysis was presented by Dawson et al. [4] with the SAC (straight forward – advanced – complex) classification. He divided the risk and the anticipated treatment severity into general, esthetic, surgical and restorative influencing factors and presents an overall evaluation based on these criteria. Accordingly, the following questions were raised before commencing therapy: How is the anticipated hard and soft tissue availability in the region of the planned implants? What number of implants and position is expedient? Especially against the backdrop of multiple prior operations, what is the healing potential with regard to perfusion, scarring in the soft tissue etc.? How is the gingiva type to be evaluated? Where is the patient's laugh line?

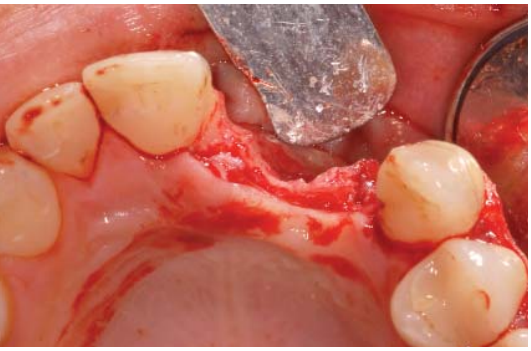


Fig. 4: On exposure, the almost fully destroyed alveolar process is apparent.

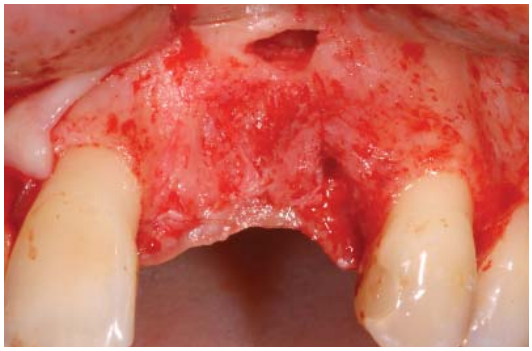


Fig. 5: A defect tunneled palatinal apical in region 22 was interpreted as a residual cyst.

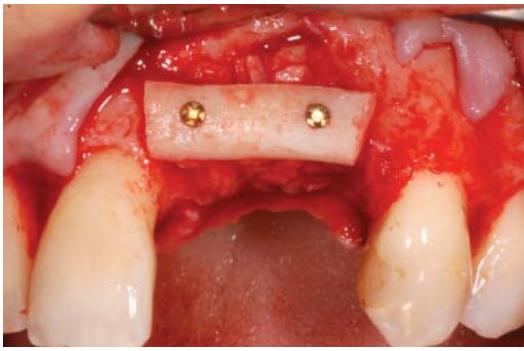


Fig. 6: A corticocancellous bone chip from the right mandibular angle was split and fixated using two micro osteosynthesis screws.

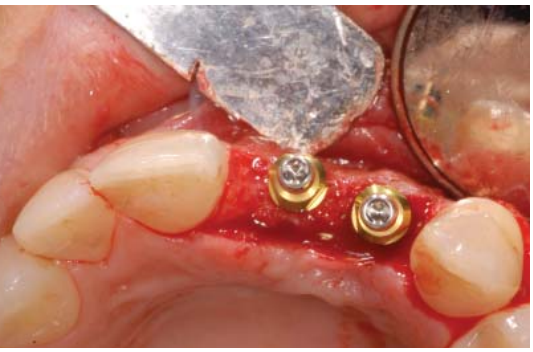


Fig. 10: The implant axes in the occlusal view.

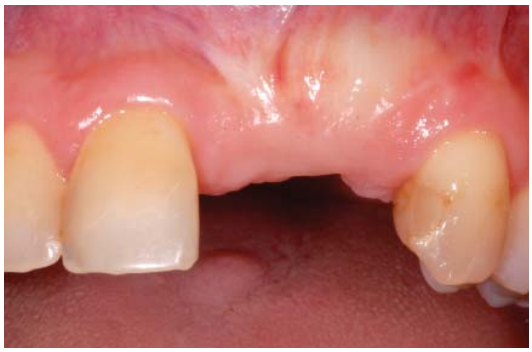


Fig. 11: As a result of the connective tissue graft, the soft tissue had sufficient volume and stable keratinized gingiva.

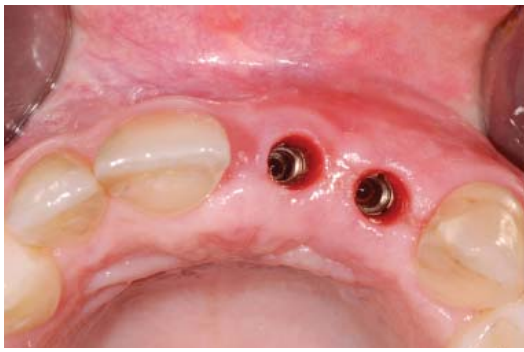


Fig. 12: After opening, firstly "bottlenecks" and after a week cylindrical healing caps were inserted for shaping the soft tissue.

How high are the patient's individual esthetic expectations?

The analysis in the case under investigation revealed:

- a relatively thin, high scalloped gingiva type
- considerable hard and soft tissue deficit
- compromised perfusion and difficult soft tissue management due to the presence of scarring of the vestibulum
- a gap between the central and lateral incisors (esthetically the most difficult implantological situation in the entire jaw)

For this reason, according to the SAC classification, this case has to be allocated to the most difficult: type C. On the basis of this analysis, the following procedure was chosen:

1. Autologous augmentation with a corticocancellous bone chip from the mandibular angle using a shell technique described by Khoury and coworkers [7], at the same time a subepithelial connective tissue graft from the palate to improve the soft tissue situation

2. After a healing time of three months, the insertion of two CAMLOG® SCREW-LINE implants and possibly further soft tissues augmentation to obtain sufficient volume for prosthetic shaping of the soft tissue

3. Exposure of the implant after three months

4. After a healing time of four weeks, commencement of the prosthetic phase with a long-term temporary for successive shaping of the soft tissue

5. After a soft tissue shaping and maturation phase lasting six months in total, transfer of the situation achieved to the final prosthetic

Pre-prosthetic phase

The shell technique introduced by Khoury [7] was used to augment the defect in the anterior alveolar process. After forming a mucoperiosteal flap without recourse to releasing incisions in the visible region and removal of all granulation tissue, the alveolar process was shown to be almost fully destroyed in the transversal direction. In addition, a defect tunneled palatinal apical **(Figs. 4 and 5)** was apparent in region 22 was most likely to be interpreted as a residual cyst. A corticocancellous chip was taken for augmentation from the right mandibular angle. Using a diamond cutting disc and cooling with physiological saline solution, this was cut into a purely cortical shell with a thickness of around 2 millimeters and a spongy remainder. The cortical shell was fixated with two osteosynthesis screws. The remaining space was filled out fully in three dimensions with the particulate, spongy remainder of the augmentation material **(Figs. 6 and 7)**. Augmentation of the soft tissue with a subepithelial connective tissue graft from the palate followed, and then the tension-free, multi-layer suture. A conscious decision was made not to use bone replacement material or a membrane, so only purely autologous augmentation technique was applied.

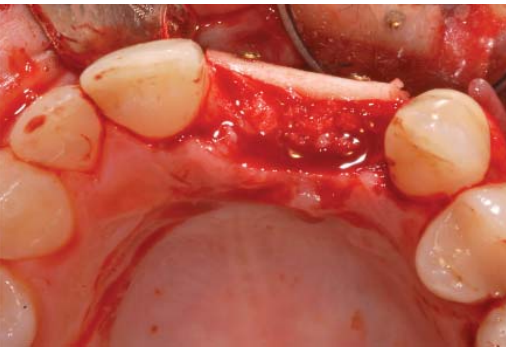


Fig. 7: The remaining space between the alveolar bone and cortical shell was filled with particulate, autologous bone.

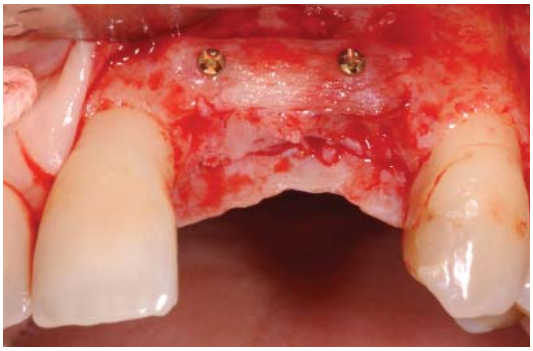


Fig. 8: After three months, the bone bed was shown to be fully healed and well vascularized.

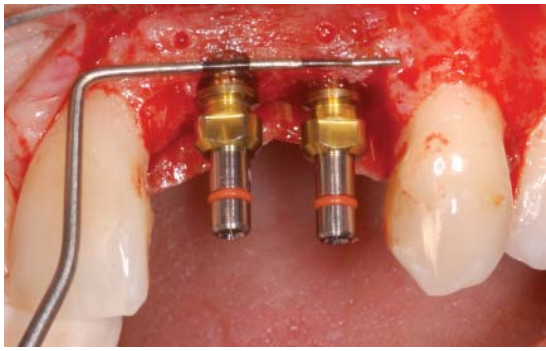


Fig. 9: Two CAMLOG® SCREW-LINE implants (Ø 3.8 mm) were inserted in the correct prosthetic position.

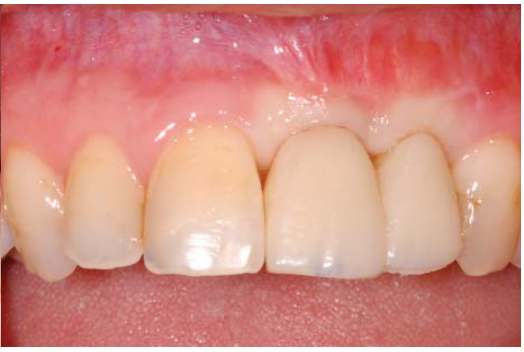
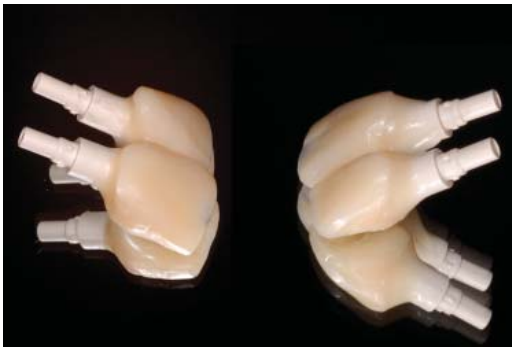


Fig. 13: Temporary veneers were prefabricated in the laboratory and polymerized chairside onto two PEEK abutments.



Figs. 14 and 15: The soft tissue was anatomically shaped by successively building up the long-term temporaries (on the left at the start, on the right at the end of the shaping phase).

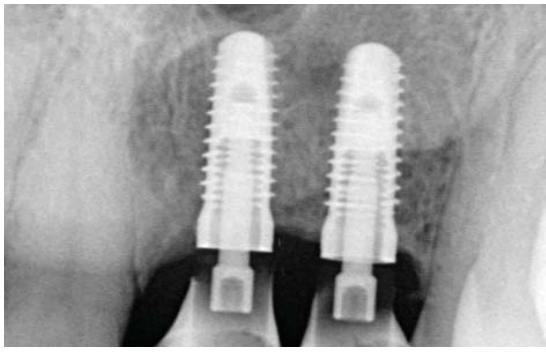


Fig. 16: The radio-opaque flow composite to shape the emergence profile is clearly identifiable in the X-ray.

The postoperative period proceeded without complications. Surgical reentry and removal of the two osteosynthesis screws took place after three months. The bone bed was shown to be fully healed and well vascularized **(Fig. 8)**. Two CAMLOG® SCREW-LINE implants with a diameter of 3.8 millimeters and a length of 11 millimeters were inserted **(Figs. 9 and 10)**. At this time, another subepithelial conductive tissue graft was harvested from the palate and inserted in order to have sufficient volume available for shaping the soft tissue as planned in the prosthetic phase. After healing again for three months without complications, the soft tissue had sufficient volume and stable keratinized gingiva **(Fig. 11)**.

Prosthetic phase

The implants could then be exposed. A crestal incision with a full flap was chosen and firstly "bottleneck" healing caps were used to ensure good adaption of the flap margins in the papilla area. The sutures were removed after a week. Cylindrical healing caps were now used to shape the tissue further. After a healing phase of around two weeks, the gingiva was sufficiently developed to start with the prosthetic phase **(Fig. 12)**. A temporary veneer was prefabricated in the laboratory and was polymerized chairside onto two temporary PEEK abutments. The soft tissue was now shaped in several treatment sessions by successively building up the emergence profile on the long-term temporaries with flow composite **(Figs. 13 – 16)**. A period of six months was planned for the full maturation of the soft tissue.

Figure 17 shows the gingival situation at the beginning of the final prosthetic phase. The keratinized gingiva was stable and free of inflammation. It was now essential to transfer the shaped emergence profile precisely to the model situation. This is not possible with conventional impression posts, as the gingiva collapses within minutes i.e. during the curing time of the impression material, due to the pull of elastic fibers in the sulcus. There are two techniques for transferring the emergence profile to the model: either a pick-up impression of the temporary in the sense of a closed impression or an open impression technique with individualized impression posts.

Figures 18 – 22 show the fabrication of such individualized impression posts. The emergence profile was transferred to the impression posts using self-curing resin and then impression-taking with the open technique **(Fig. 23)**. After pouring the impression and fabrication of a removable gingival mask, the master model was finished as an exact replica of the intraoral situation **(Fig. 24)**.

The final restoration was all-ceramic with individual zirconium dioxide abutments and individually veneered zirconium dioxide crowns. As various studies [13,14] show, zirconium dioxide excels by virtue of its outstanding biocompatibility and tremendous strength. In order to guarantee the maximum assurance in the implant-abutment connection, the individual zirconium dioxide abutment was bonded with a CAMLOG® Titanium base CAD/CAM.

To ensure the correct anatomical design of the individual abutment, firstly a precise wax-up is created on the master

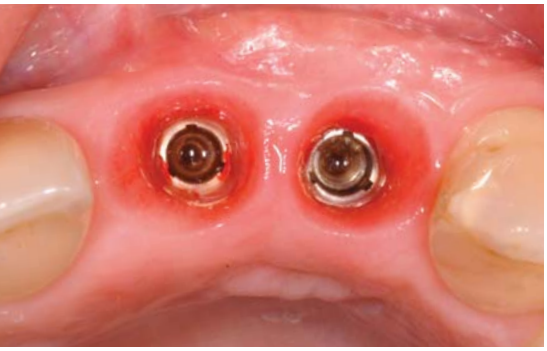


Fig. 17: At the start of the definitive restoration, there was a stable and precisely shaped gingival situation.

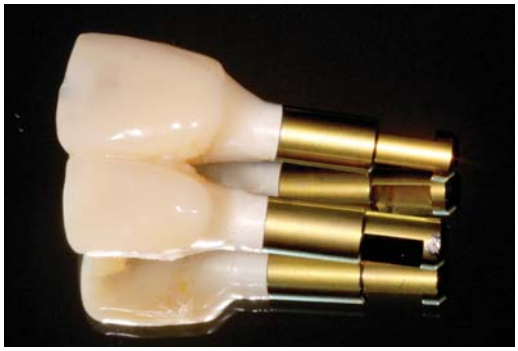


Fig. 18: Individualized impression posts were produced for transferring the shape of the contoured soft tissue situation. The temporaries were screwed onto the lab analogs for this purpose.

Fig. 19: The lab analogs were fixated in a silicone index and subgingival parts of the temporaries were prepared.

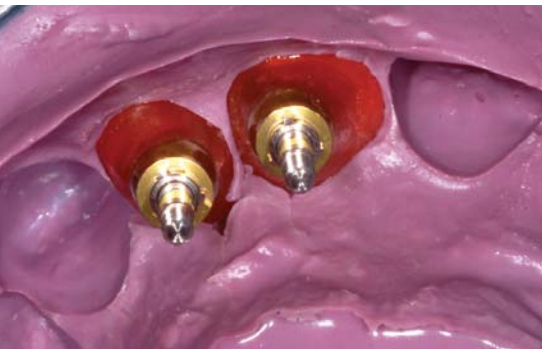


Fig. 23: Impression-taking with polyester with the aid of an individual tray.

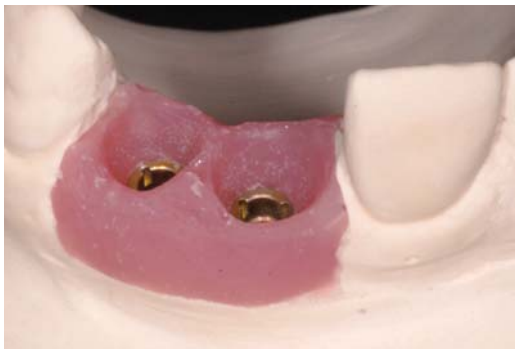


Fig. 24: A removable gingival mask reproduces the emergence profile perfectly shaped intraorally.

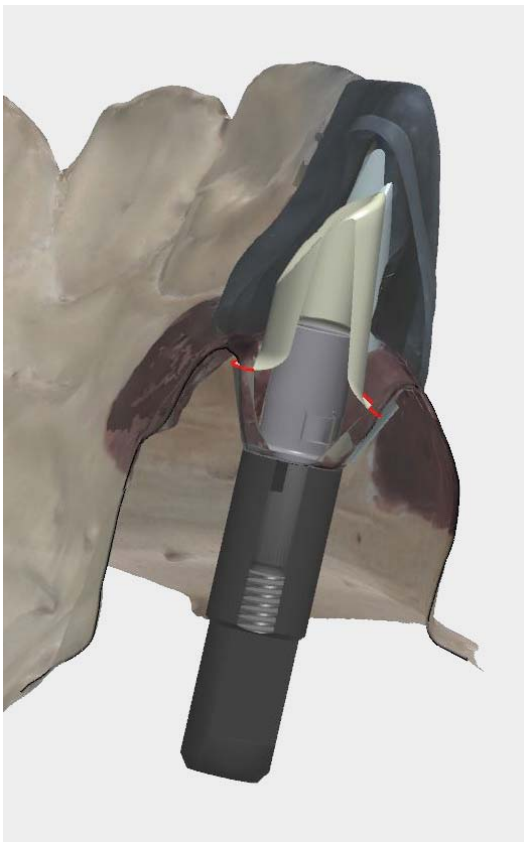


Fig. 25: The CAMLOG® Titanium bonding base CAD/CAM was imported from the library and the emergence profile and the previously waxed crown were scanned with a double scan.

model. The emergence profile transferred precisely from the mouth is then scanned using the double scan method and then the waxed anatomical crown shape is scanned. The abutment was then designed on the basis of this information and implemented in zirconium dioxide **(Fig. 25 – 28)**.

The zirconium dioxide abutment was then conditioned, bonded and processed with the Multilink implant from Ivoclar. In order to ensure that the emergence profile and preparation margins are configured such that they present no problems from either an esthetic or attachment perspective, the finished abutment is tried out in the mouth **(Fig. 29)**. Investigations from Agar et al. [1], as well as from Weibrich and El-Nawas [19] and Wilson [20], clearly show that with the preparation margin located more than 1.5 millimeters subgingival, it is no longer possible to fully remove the cement residues. Positioning of the preparation margin of maximum one millimeter subgingival is therefore aimed for with cemented reconstructions. After checking the abutment in the mouth, fabrication of the zirconium dioxide crowns is undertaken, also using the double scan method. For this purpose, the abutment is scanned and the data record obtained is applied to the existing virtual data record from the wax-up. For a durable zirconium dioxide restoration, it is necessary to adhere to the required material parameters of the zirconium dioxide framework, as well as those for the zirconium ceramic. It is therefore recommended not to exceed a framework thickness for zirconium dioxide of 0.5 millimeters and a veneer thickness of the zirconium ceramic of 1.5 millimeters.

After fitting, the ready milled and sintered zirconium crowns are individually veneered. The high-strength zirconium ceramic Creation CT from Willi Geller Creation are used for this purpose. This material offers the technician the possibility of fabricating a highly esthetic and stable restoration. The esthetic try-in allows assessment of the result of the dental laboratory work, the approximal sealing strip to be inspected and the functionality of the restoration to be checked. The crowns are then finished in the lab **(Figs. 30 and 31)**.

Even smaller shape and shade corrections are undertaken here and the surface enhanced. Durelon from 3M Espe was used for semi-permanently cementing the crowns in the mouth.

Figures 32 to 34 show that the final situation with the final prosthetics on implants 21, 22 in situ.

Fig. 20: The impression posts were screwed in for the open impression....

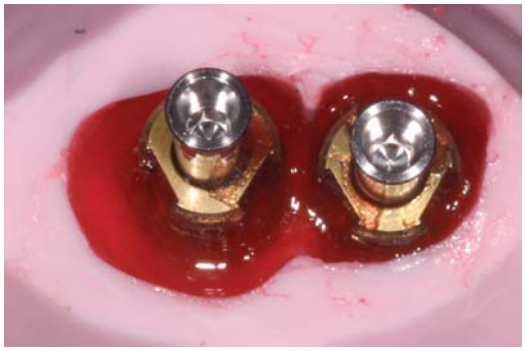


Fig. 21: ... and the emergence profile filled with self-curing resin.

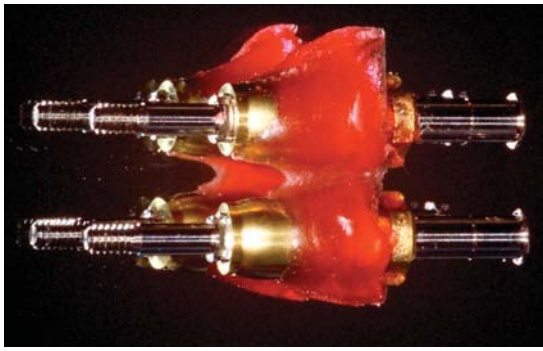


Fig. 22: The individualized impression posts ensure precise transfer of the soft tissue situation to the master model.

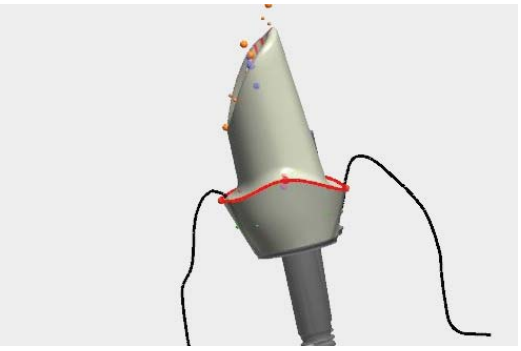


Fig. 26: The illustration shows the shaped emergence profile, the gingiva profile and the location of the cervical step.

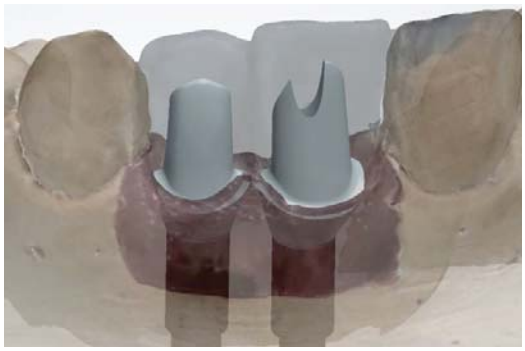


Fig. 27: The abutments were digitally designed. The scanned gingival mask and the wax-up serve for orientation.

Fig. 28: The abutments and the crown frameworks are implemented in zirconium dioxide.

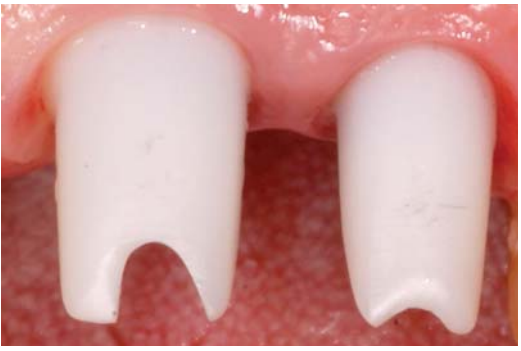


Fig. 29: The try-in of the abutments in the mouth assured that the profile and the position of the preparation margin was optimally located.

Fig. 30: After the functional and esthetic try-in, the dental technician finalized the zirconium crowns in the lab.

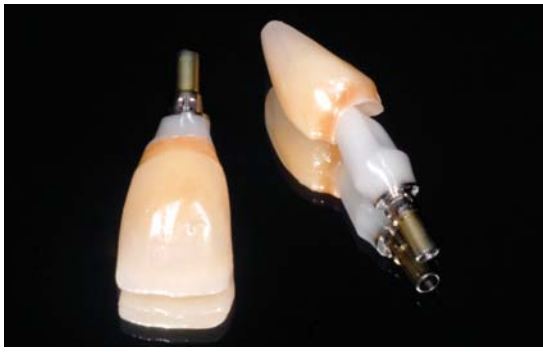


Fig. 31: Following slight shade corrections, the surface of the crowns was polished.

Discussion

Histologically, the soft tissue around implants has little in common with the periodontium of healthy teeth with their complex ligament apparatus. It tends to be more a crude scar tissue, which can be shaped in a purely mechanical way. The absence of periodontal supporting tissue between neighboring implants and the formation of the biological width around the implants usually leads to a flat line of bone and soft tissue. This means that the complete formation of interimplant papilla is hard to predict and usually esthetic compromises have to be made [16]. This makes the absence of the lateral and central incisors the most difficult esthetic situation in implantology [21]. As the soft tissue can be mechanically better supported by a bridge pontic, it is under discussion at present whether in such situations the placement of just one implant and the fabrication of an implant crown with one-sided free-end pontic is esthetically advantageous. Whether long-term problems, such as abutment loosening of the prosthetic or biomechanical overloading of the implant, are to be expected has yet to be finally clarified. In a prospective pilot study from Tymstra et al [17], given this gap situation, in half of cases an implant was placed for restoration with a free-end bridge, and in the other half two implants with individual crowns. After a study duration of one year the results were re-evaluated. No implant losses or problems were identified in either group, the patient satisfaction with regard to esthetics and function was the same in both groups. The authors came to the

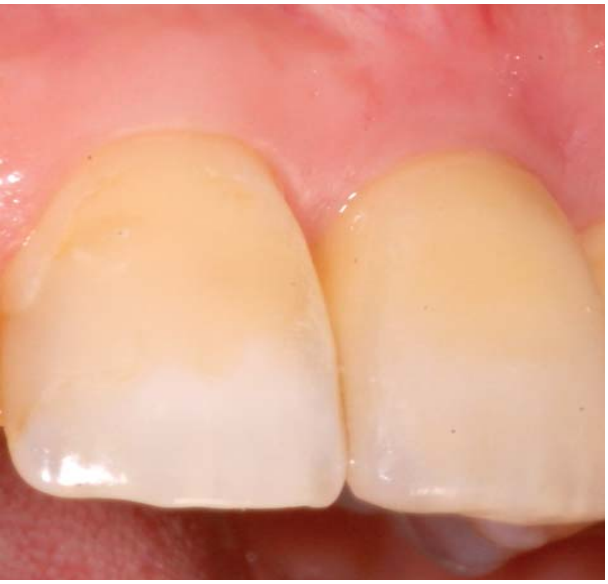


Fig. 32: The anatomical crown contour, the ceramic layering, the surface texture underline the esthetic outcome.

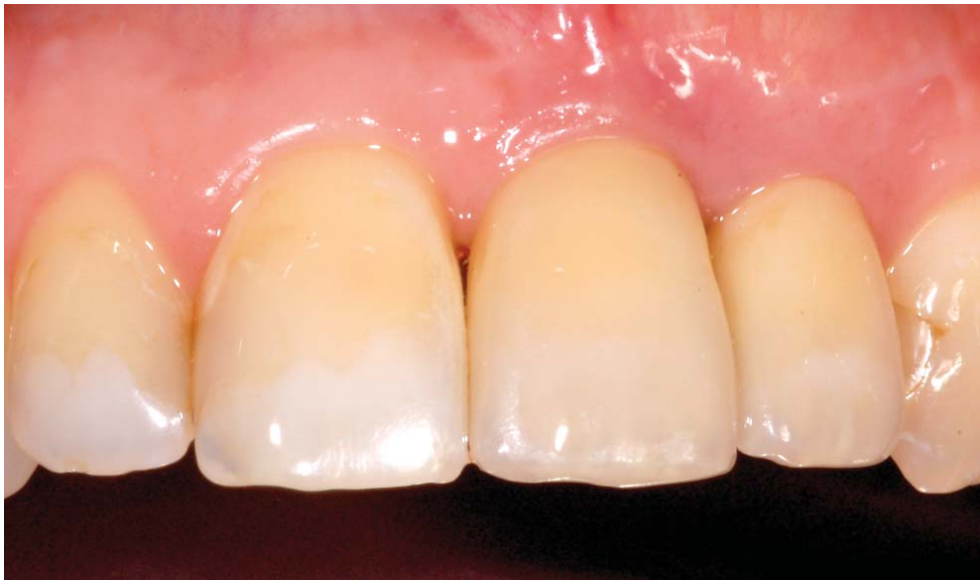


Fig. 33: The shaped emergence profiles support the harmonious line of soft tissue and a stable gingival cuff.

conclusion that no essential differences were identifiable with either form of restoration.

In this particular case, the decision in favor of maximum long-term stability was made for the insertion of two implants. Besides sufficient hard and soft tissue augmentation, the selection of a suitable implant diameter is crucial, because, according to the Tarnow rules, the separation between neighboring teeth and implants must be at least 1.5 millimeters and at least a 3.9 millimeter between implants [16].

The papilla between 21 and 22 is also flatter in the case presented than with natural teeth due to the effects described. This effect is accentuated by the triangular basic shape of the natural teeth. As the teeth partly display extended vestibular composite restorations, it would be worth considering the fabrication of a dual veneer, which, through slight change in the tooth shapes, would serve to enhance the overall esthetics. The patient rejected this, however, as she is very satisfied with the esthetics achieved. This is in line with the results of the study group headed by Tymstra [17], whereby both forms of restoration can lead to a high level of patient satisfaction, assuming correct surgical and prosthetic management.

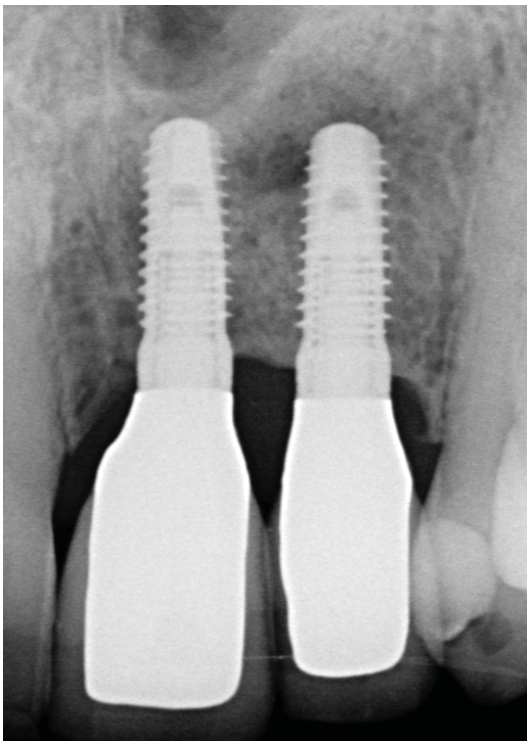


Fig. 34: The X-ray shows the ossified bone structure and the implants inserted according to the Tarnow rules.

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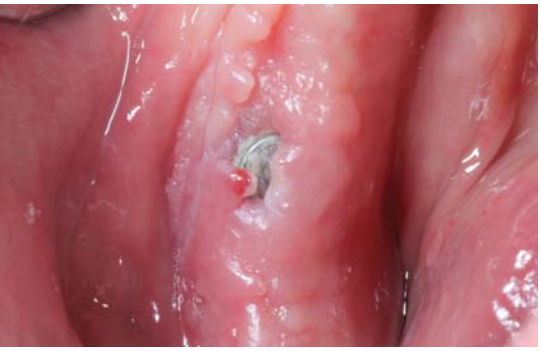

Fig. 1: The implant is exposed with horizontal and torsional movement of the temporary

Fig. 2: The very thinly finished vestibular clasp shell is made into a veneer.

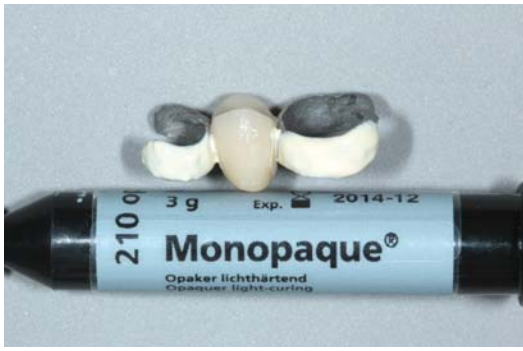

Fig. 3: The gray metal of the clasp shells is masked with metal opaquer.

THE TEMPORARY RESTORATION

AS AN IMPORTANT COMPONENT OF IMPLANTOLOGICAL REHABILITATION

Dr. Thorsten Wilde, Berlin

The strategies of modern implantology are technically mature and frequently clinically tested, both in the field of osseointegration, as well as in the preservation of mucogingival structures. However, the good results in the reconstruction of red and white esthetics have led to an increase in the patients' demands for a temporary restoration. Removable partial dentures, oftentimes the standard treatment, are considered to be unacceptable and also have many clinical drawbacks. Adhesive inserted single tooth, composite or Maryland bridges can significantly improve the patients' life quality and contribute to the perceived quality of therapy.

Introduction

For most people, the loss of one or more teeth has both a major emotional and at the same time a functional impact. This is all the more pronounced, the clearer the patient experiences the difference between before and after removal of the tooth. A sub-standard temporary restoration that is neither produced functionally nor esthetically has a sustained negative impact on day-to-day life quality. Patients frequently report a restriction in their social activity and a significant loss of weight. This inevitably leads to a negative impact on compliance and the willingness to recommend the selected therapy and the attending dental practice.

Modern implantology has a large number of sophisticated and clinically proven strategies at its disposal for the reconstruction of all anatomical structures. Patients take the prosthetic implant for granted as a perfect simulation of the natural tooth.

But this is not necessarily the case. The outcome is more the consequence of individual, carefully matched therapy steps extending from the selection of the implant system, the surgical procedure of bone management, the exposure, through to the construction of the abutment and denture. In each of these treatment steps the dentist or implantologist chooses the best and safest procedure for his/her patients from a wide range of options.

Nevertheless, even very experienced implantologists often neglect the phase of temporary restoration in the overall concept. The clasp prosthesis is usually used as the standard treatment following tooth extraction, sometimes even with hand-bent clasps. For the patient this is an unacceptable situation, which also has many clinical disadvantages. Due to both movement of the denture saddle overall, as well as localized deposition through to decubitus, the implantological bone bed is disturbed in its healing and maturation as a result of tissue stress. **(Fig. 1)**.

The basic requirement for an optimal implantological overall outcome is, however, precisely stress-free tissue maturation, which extends from the conversion phase of the bone tissue after tooth extraction, including any augmentations, implantation, gingival shaping through to the prosthetic restoration. Depending on the starting situation, these biologically necessary rest phases easily add up to therapy times of over a year. If the patient is reliant on a sub-optimal temporary during this period, the entire course of therapy is perceived as inacceptable and stressful.

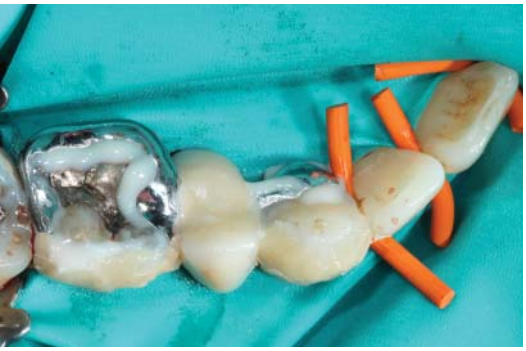

Fig. 4: With the aid of a rubber dam, the ideal conditions are created to keep the area dry to bond the bridges.

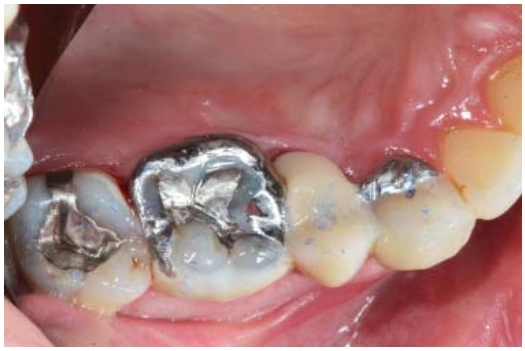

Fig. 5: The clasps bonded with compomer are fully coated with tooth-colored composite.

Fig. 6: The pontic is overextended towards the vestibular.

Bonded, fixed temporary dentures offer many advantages here:

- The greatest acceptance by the patients
- No functional impairment whatsoever
- Immediate loading after the surgical procedure
- Compliance-independent

But there are also disadvantages:

- Poor repairability and modifiability
- High risk of treatment for outside patients, as other dentists, especially inexperienced dentists are soon overstretched with a repair
- Risk of therapy delay due to very good esthetics and function

Material and method

Fixed temporaries can be used anywhere for small and medium bridge spans with up to four replaced teeth where there is no free-end situation. The construction as an extension bridge with one attached oral-occlusally reduced pontic is also quite possible. Alongside the bridge statics, the degree of loosening and particularly the surface of the potential bridge abutments are of importance. The ability to bond the surfaces and the bridge abutments available are decisive for the overall construction of the temporary.

Bonded temporaries are statically dependent on at least one, preferably two or more, bridge abutments. With the exception of interim implants or prosthetic immediate loading of final implants, fixed temporaries are bonded with remaining teeth or prosthetic restorations. The resilience of this bond to the natural teeth is greatest with intact dental enamel [1,3,8]. Technical surfaces can also be used for adhesive bonding, although with significant impairment to the resilience of this bond [2,5]. In our implantological practice, the construction of a fixed bonded Maryland bridge with a metal or more recently a zirconium framework has proven very successful. We have successfully applied newer materials, such as zirconium oxide or milled composite, but recognized various drawbacks. With the exception of zirconium oxide Maryland bridges in the anterior region, the cast Maryland bridge is our standard solution today for temporary gap closure.

The Maryland bridge

Statically more resilient constructions are necessary for large span temporary bridges, especially in the posterior region. Metal frameworks made of cobalt-chrome-molybdenum cast alloy have become established for this purpose. The design of the clasp elements on the bridge abutments is solely responsible for the resilience and esthetic acceptance by the patient. Dark gray metal must, under no circumstances, be visible, especially for front teeth bridges. For metal-reinforced bridges, this has led to the development of very thin, but, at the same time, extensive clasp elements or preferably clasp shells. After bonding with the abutment teeth, these clasp shells are completely coated with composite and are thus no longer identifiable as clasp elements. Further condition can be performed on both sides of the clasp shells [2,5,6], but both sides must be blasted in the lab and must not be polished. Following the try-in in the patient's mouth, the bonding elements are degreased on both sides and are prepared with a metal primer (GC). The vestibular clasp parts must also be coated with a metal opaquer (GC) in the visible area to mask the dark gray metal color. As these metal primers are only available in a very light ivory shade, we have latterly darkened the primer ourselves with brown or yellow composite paining color. This can either be prepared outside the mouth or simultaneous with bonding the whole Maryland bridge **(Figs. 2 and 3)**.

Bonding the clasps is performed with a tooth-colored compomer, e.g. RelyX Unicem from 3M/Espe [9,10]. This is applied to the inside of the clasps and the bridge is then brought into position. The natural dental enamel must never be conditioned with etching and/or a bonding system. The subsequent layering of the vestibular clasps with composite would be permanently bonded with the enamel and would have to be removed laboriously using a grinding technique **(Figs. 4 and 5)**.

The vestibular shaping of the composite pontic should be significantly overextended buccally by the dental lab **(Fig. 6).** Only then can a unified tooth inclination be achieved, together with coating of the anterior, vestibular clasp shells **(Fig. 7)**.

For technical surfaces, such as ceramic or metal, we also attempt to build up an adhesive bond here. A ceramic surface is etched for two minutes with hydrofluoric acid, degreased with alcohol, dried and then chemically prepared with silane (Monobond-S 2x), bonded and UV cured.

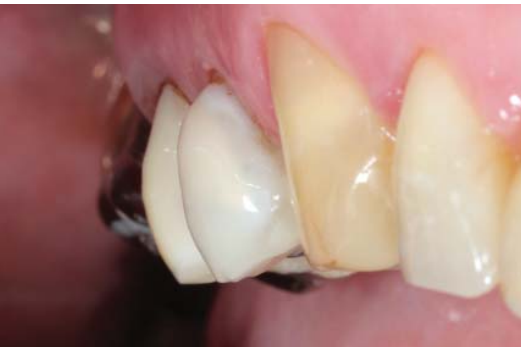

Fig. 7: The pontic and the coated clasps have the same tooth inclination.

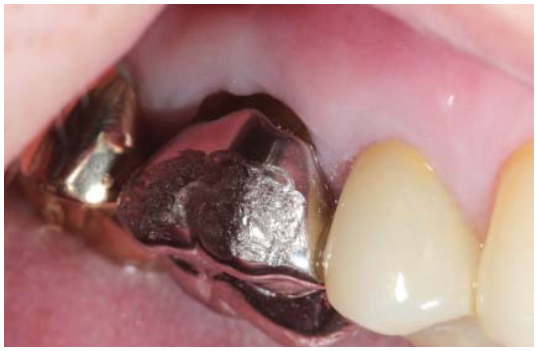

Fig. 8: Metal crowns are roughened with diamond burs and conditioned with metal primer.

Fig. 9: In case of low interocclusal space availability, the ring clasps are doubled or distally closed.

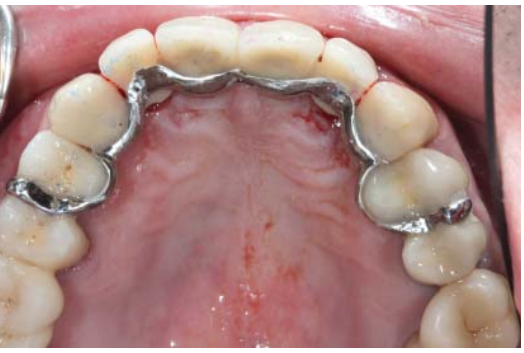

Fig. 13: ... and the temporary restoration is orally bonded. Interdental clasps are applied to counter balance.

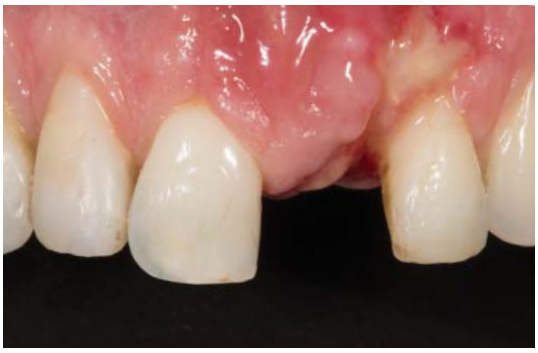

Fig. 14: Zirconium oxide bridges are used in highly esthetically demanding temporary restorations.

Fig. 15: In case of zirconium restorations, as with cast Maryland bridges, the clasp elements are designed as shells.

In case of metals, we take a similar approach, roughening the surface with a green diamond, not before impressions are taking, but only before bonding. Metal primer (GC) is then applied twice without applying another layer of bonding. Roughening the metal crowns should only remove a little material [2,5,10]. This removal is not considered in lab fabrication, as it is only performed immediately before bonding. The bonding layer thickens somewhat, which certainly has a positive effect as a mechanical stress breaker **(Fig. 8)**.

In the posterior region, a functional bridge is forgotten by the patients and is often loaded with very high chewing forces in everyday life. The only possibility of guaranteeing this over an extended period is to shape the distal clasp element as a frictionless ring clasp. If the ring is open at any point due to grinding, abrasion or overloading, the bridge loosens and can no longer be permanently stabilized by multiple bonding and overlayering. In such an instance, new fabrication should be considered, rather than the patient showing up in the practice every two or three weeks for recementing.

Especially when crossing the occlusal surfaces, space problems may arise along the ring clasps if occlusion is over a large area. Only the targeted removal of substance, possibly also from the antagonist, is successful here. As an alternative, the ring can also be placed around two teeth in order to remain closed **(Fig. 9)**.

Four "golden rules" have emerged as prerequisites for trouble-free use of temporary cast Maryland bridges:

- For a posterior bridge, the distal clasp element must be designed as a closed ring
- Visible parts of the clasp should if possible be broad and flat
- Blast visible vestibular clasps from both sides and inspect
- Natural tooth surfaces are not chemically pre-treated, as otherwise the bridge cannot be removed

In the case of front tooth bridges, we sometimes also omit the vestibular clasp shell for esthetic reasons. But here it is especially important to consider the statics of the pontics. As the effect of the load during chewing is strictly defined by physical rules, a model cast Maryland bridge without vestibular element must be extended more orally to balance the leverage forces arising **(Figs. 10 and 11)**.

Also if the vestibular clasp shells are excluded altogether, with such front tooth bridges, which are only orally bonded, the occlusion surface has to be crossed at the end to ensure greater lateral support. The solely chemical bonding strength of compomers is insufficient to fix the bridge for months **(Figs. 12 and 13)**.

The advancement of zirconium oxide as a dental material with a broad design scope in terms of shade has also opened up the indication of using bonded temporaries for esthetically highly discerning patients with a "gummy smile".

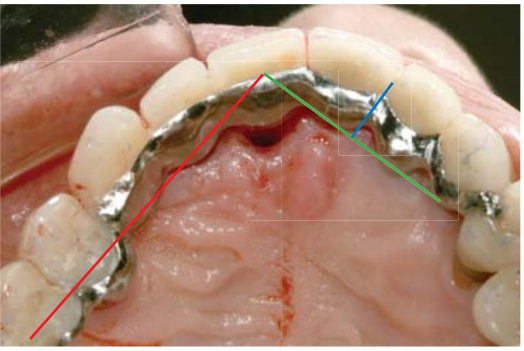

Fig. 10: As a vestibular clasp shell was not used for the front tooth bridge for esthetic reasons...

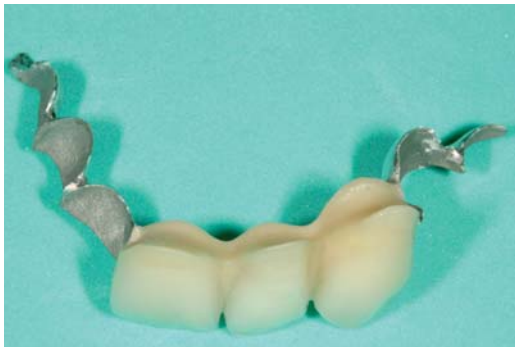

Fig. 11: ... the oral clasp shells were extended distally.

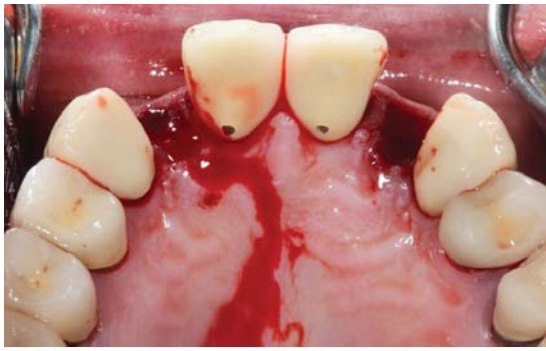

Fig. 12: Teeth 12 and 22 were extracted ...

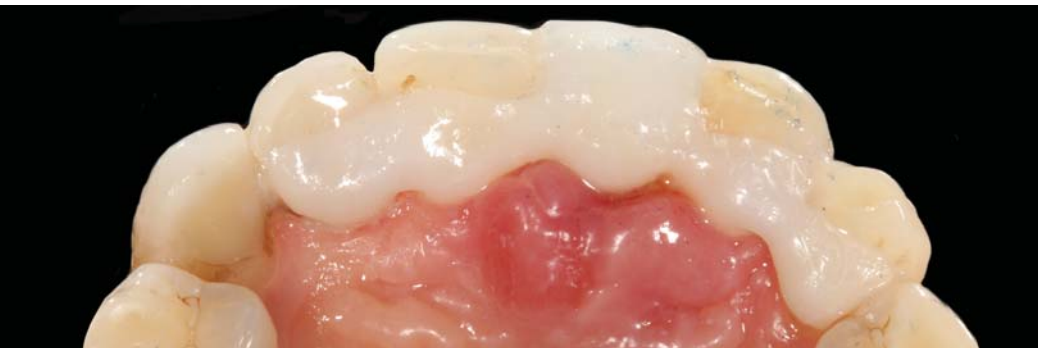

Fig. 16: To bond, the conventional conditioning is combined with a compomer.

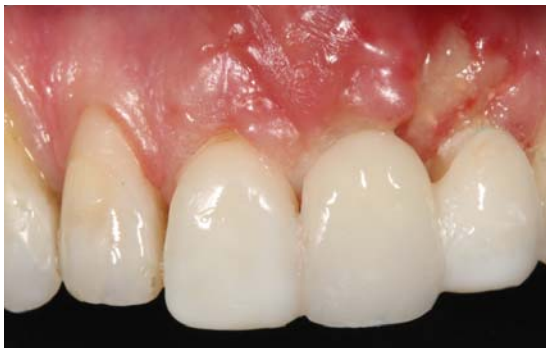

Fig. 17: The vestibular clasp shells are also coated with an opaque front tooth composite.

An important difference between the metal-reinforced model cast Maryland bridge described and zirconium bridges is in the esthetic effect of the enhanced light transmission of zirconium oxide. Because no dark gray clasp shell has to be masked, the light and shade effect is more similar to the natural tooth, especially in the frontal upper jaw. Very high esthetic requirements apply, especially in temporary replacement of a single, middle, upper front tooth **(Fig. 14)**.

In the use of zirconium oxide Maryland bridges, the clasp elements are designed as shells, as with model cast Maryland bridges **(Fig. 15)**. The strategy of continued processing in the mouth is also similar to that for metal bridges. The only difference is in the adhesive preparation of the natural tooth surface or of ceramic crowns. Here the conventional conditioning is combined with a compomer (RelyX Unicem) to establish adhesion [9,10]. The vestibular clasp shells also have to be coated with an opaque front tooth composite **(Fig. 16 and 17)**.

The patient case presented is of a patient four weeks pregnant with a very high laugh line. Following an acute front tooth trauma, tooth 21 had to be extracted. Implantation can be performed in one year at the earliest. The fabricated zirconium oxide temporary has the potential of surviving this period of use without damage.

Composite bridges milled using the CAD/CAM technique represent another special case with the fixed Maryland bridges. The indication for these temporary bridges lies in the combination with a therapeutic change in bite **(Fig. 18)**. The significantly lower tensile strength compared with metal or zirconium oxide leads to the necessity of a larger material cross-section. We have had good experience with this material used for extension bridges. A patient can be offered a fixed temporary restoration of this kind as an alternative to interim implants. For splint patients, the splint position can be adopted in this form of treatment and also checked and possibly changed within the wearing period.

These composite bridges are secured with phosphate cement **(Fig. 19 and 20)**.

Removal and reattachment

In order that construction of a temporary works out in the implantological day-to-day routine, it very much depends on whether the surgical site can be accessed without great effort and also frequently. Similarly, the uncomplicated, multiple reuse of the same temporary without technical backup from the dental lab is imperative.

Given extensive courses of implantological therapy, temporaries sometimes have to be removed and reattached several times for augmentation, implantation, exposure etc. But especially the most possible loss-free removal of bonded model cast Maryland bridges often leads to deformation of the clasp parts, to chipping of veneers or even to damage of the tooth surface **(Fig 21)**.

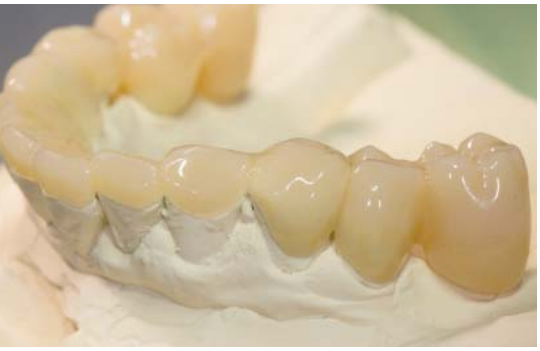

Fig. 18: A milled composite extension bridge serves to replace the posterior teeth 5 and 6.

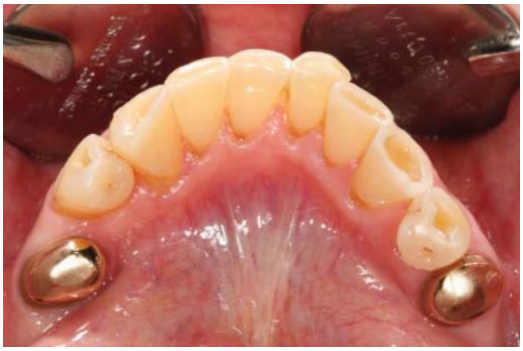

Fig. 19: The lower jaw is prepared to accept the therapeutic bridge for changing the bite.

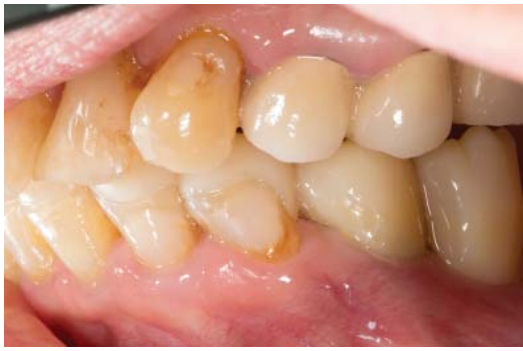

Fig. 20: The bonded bridge for bite raising and temporary restoration offers the patient sufficient comfort.

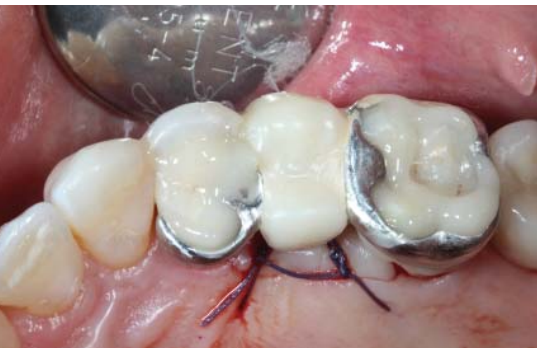

Fig. 24: After the surgical procedure the bridge is integrated again.

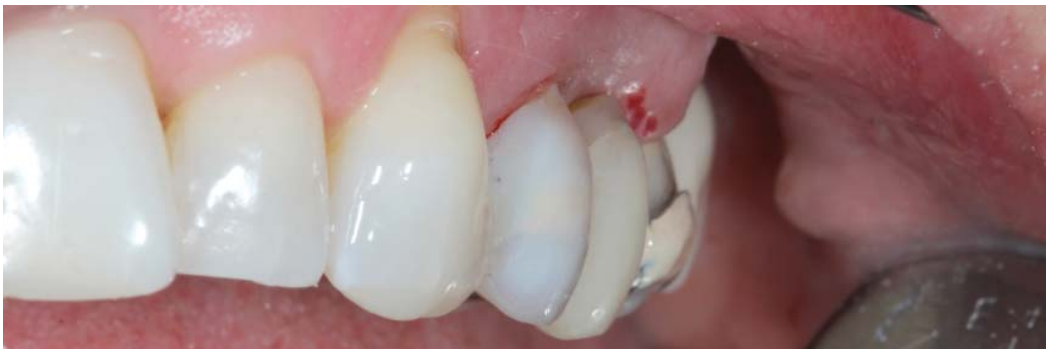

Fig. 25: The clasp arm of the temporary Maryland bridge is veneered and finished after UV curing.

With non-conditioned enamel surfaces, it is very easy that the plastic parts of the layerings are firstly levered out with a blunt instrument in the undercut area of the clasps. Then at least the mesial clasps can be easily levered from the tooth. Axial rotation of the bridge at the pontic using a Luer bone rongeur generally loosens the entire bridge **(Figs. 22, 23, 24 and 25)**.

After removing the Maryland bridge, the clasps are blasted, silanized (metal primer/ GC) and the bridge is brought into position again with a compomer. The labial composite tab is then esthetically completed and following UV curing finished

Summary

Fixed temporaries are a high grade restoration for the patient without functional impairment. Natural teeth, freely shaped composite teeth or metal-reinforced bonded bridges can be temporarily integrated with the use of little resources. The crucial factor in implantological practice is the possibility of fast, uncomplicated, multiple removal and reintegration of the same construction without time-consuming reworking. This is easy to achieve with the appropriate construction and procedure and leads to a high degree of satisfaction on behalf of patients and practitioners alike.

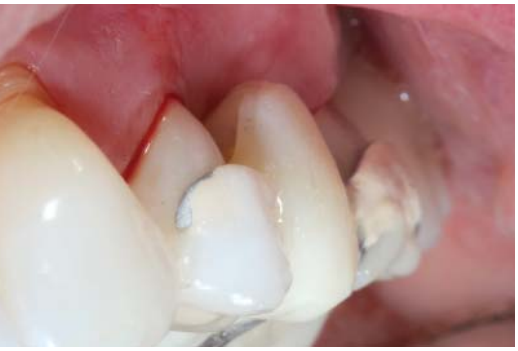

Fig. 21: The undercut parts of the veneer are levered out with a blunt instrument to remove the temporary restoration.

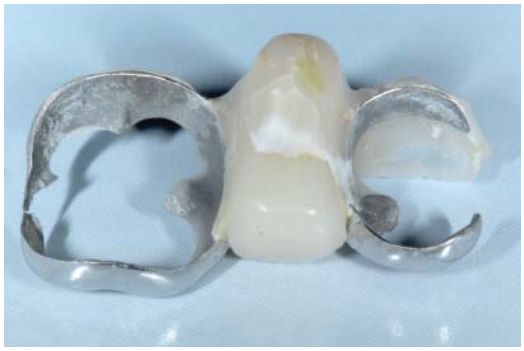

Fig. 22: The pontic is relined basally to shape the papilla.

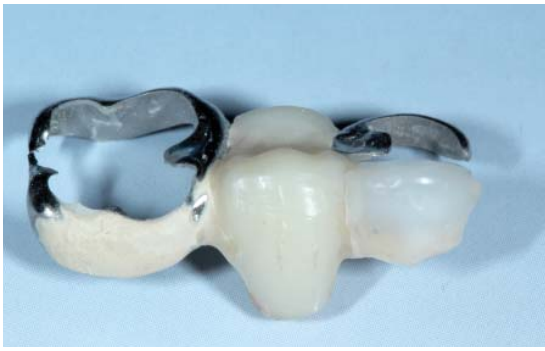

Fig. 23: As a result of the non-conditioned enamel surface, the Maryland bridge can be removed.

See the video here on the temporary restoration of a premolar.

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ROOT-LINE BECOMES ROOT-LINE 2

The CAMLOG® ROOT-LINE 2 implant has been available on the market since 1st October, 2014. The advancement of the root-shaped, self-tapping CAMLOG® ROOT-LINE screw implants now also offers the option of restoration with Platform Switching abutments. The implants are suitable for almost every indication in dental implantology. The combined implant geometry of cylinder and tapered apical part allows use with limited bone availability in the apical region.

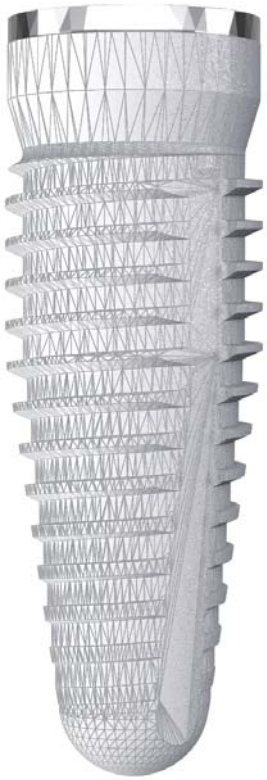
According to the market data and independent reports available, root-shaped, self-tapping implants have a large market share worldwide. Based on the wishes of our customers, mainly in other European countries, we modified the design of the root-shaped ROOT-LINE implants. They are equipped with the proven CAMLOG® Tube-in-Tube™ Implant-abutment connection and now feature three angular K-series grooves. This enables the optional use of ROOT-LINE 2 implants with Platform Switching abutments.

The implants are available in five diameters (3.3 mm, 3.8 mm, 4.3 mm, 5.0 mm and 6.0 mm) and in four lengths (9 mm – not for Ø 3.3 mm – 11 mm, 13 mm and 16 mm) and besides being used for late implantation, they can also be used for immediate and delayed immediate implantation. The 3.3 mm implants complement demanding restoration of narrow front tooth gaps; they are suitable for restricted alveolar ridge width of 5 – 6 mm. As a result of their mechanical strength as compared with implants of larger diameter, the may only be used for certain indications.

With the machined shoulder part of 0.4 millimeters and the flattening of the bioseal bevel, the neck area of the ROOT-LINE 2 implant has been adapted to the design of the SCREW-LINE implants, which have been placed millions of times up until now.

A lower implant shoulder is especially advantageous in esthetically demanding regions. The CAMLOG® ROOT-LINE 2 implants with the Promote® plus surface are inserted in the bone up to the machined implant neck part. New specific CAMLOG® ROOT-LINE 2 form drills and taps are used to prepare the implant bed for CAMLOG® ROOT-LINE 2 implants. The cutting groove on the implant body has been elongated for optimal implant insertion. The tapered apical part of the implant allows easy insertion with self-centering.

The Tube-in-Tube™ inner connection established for 15 years now and the rotation securing device above the grooves and cams renders the ROOT-LINE 2 implants compatible with the existing prosthetics of the CAMLOG® implants. This means that reliable prosthetic components have been available to the user for years now.



Important new design and changeover features:

- ☑ CAMLOG Tube-in-Tube™ implant-abutment connection now with angular grooves allows Platform Switching and enables expansion of the treatment spectrum.
- ☑ Promote® plus surface, machined 0.4 mm implant neck.
- ☑ New in the portfolio: the 3.3 mm diameter in lengths 11, 13 and 16 mm.
- ☑ Elongated cutting groove for optimized insertion in hard bone.
- ☑ New drills and taps, in accordance with directives without internal irrigation.
- ☑ New surgery set, as the outer configuration has been adapted in the neck area.

CONELOG® TITANIUM BASES CAD/CAM – CONELOG® SCANPOSTS

The CONELOG® Titanium bases CAD/CAM serve as the adhesive abutment for the individual fabrication of mesostructures and suprastructures made of suitable dental restoration materials. To expand the range of applications, the new CONELOG® Titanium bases CAD/CAM, the modeling aids and the abutment and lab screws, are adapted in their geometry to accept the Sirona inCoris meso blocks. Consequently, the CONELOG® modeling and bonding aids have also been modified.

For the CONELOG® Titanium bases CAD/CAM there are now dedicated special abutment and lab screws. To facilitate classification, the abutment screw that is supplied with the CONELOG® Titanium base CAD/CAM is dark purple anodized. The brown lab screw receives a titanium colored screw head.

Changes to the CONELOG® Titanium bases CAD/CAM

In order that the abutment and lab screws from the CONELOG® Titanium bases CAD/CAM pass through the pre-milled screw access channel of the sintered inCoris meso blocks, the diameter of the screw head is minimally reduced. The new CONELOG® Titanium bases CAD/CAM, available in two gingival heights, received new article numbers and are packaged with the new abutment screw and are delivered packaged in a bonding aid with reduced diameter.

Please note that the new abutment and lab screws are only used in association with the CONELOG® Titanium bases CAD/CAM.

CONELOG® Titanium base CAD/CAM (new article number)
Art. No.: C2242.3308; C2242.3808; C2242.4308; C2242.5008
Art. No.: C2242.3320; C2242.3820; C2242.4320; C2242.5020

CONELOG® ScanPost for Sirona
Art. No.: C2620.3306; C2620.3806; C2620.4306; C2620.5006

CONELOG® Abutment screw for titanium base CAD/CAM (packaged with the titanium base CAD/CAM)
Art. No.: C4015.1601; C4015.2001

As the screw channel of the model aids have also been tapered, these also received a new order number. The outer configuration of the titanium bases CAD/CAM and the modeling aids remain unaffected by the changes.

CONELOG® ScanPost for Sirona

The new CONELOG® ScanPosts were developed to optimize the intraoral impression with Sirona Scanbodies. They have been available since 2014. The ScanPosts are connecting elements for intraoral and extraoral use of CONELOG® Implants and lab analogs with the Scanbodies available from Sirona. To cater for individual soft tissue situations, the new CAMLOG ScanPosts offer approximately 5.5 mm intermediate clearance. The combination of the Sirona Scanbody and the CONELOG® ScanPost allows digital recording of the implant position in relation to the remaining teeth and the soft tissue. A ScanPost is only screwed to an implant or lab analog with the corresponding abutment screw for the purpose of optical image capture. The Scanbody is attached after screwing in the post. The precise positioning of the Scanbodies is both tactile via the nose on the base, as well as visually via a marking on the post.

The ScanPosts, including the abutment screws, can be sterilized and are available for all implant diameters of the CONELOG® Implant system.

With the CONELOG® Titanium bases CAD/CAM in combination with the Sirona Scanbodies, digital impressions and computer-supported fabrication of individual and high precision zirconium oxide ceramic abutments continue to be possible for CONELOG® Implants. Owing to the low gingival height of the titanium bases (0.3 mm) and an overall design height of five millimeters, a high gingiva may lead to overlap of the scan pyramid. With the aid of the new ScanPosts (intermediate clearance 5.5 mm) exact digital recording of the three-sided pyramid is possible.

The Scanbodies are available from the distribution partners of Sirona Dental Systems GmbH. They are available separately in corresponding connecting sizes for the current intraoral Sirona camera systems, CEREC Omnicam or CEREC Bluecam Scan.

CHANGES IN THE ISY TITANIUM BASE CAD/CAM –
GREATER COMPATIBILITY WITH SIRONA

Since September 2014 you obtain the iSy Titanium bases CAD/CAM in the gingival heights 0.8 mm and 2.0 mm. The titanium bases serve as the bonding base for the individual fabrication of mesostructures. As a result of the expansion of compatibility, both the iSy Screwdriver and the iSy Titanium bases CAD/CAM have been adapted to the requirements of the Sirona inCoris blocks. The shaft diameter of the iSy Screwdriver has been minimally reduced for this purpose and the screw channel of the titanium base tapered and the associated black bonding aid and the modeling aid adapted. The function and processing of the titanium bases remain unchanged.

As a result of the update undertaken, the iSy Screwdrivers now fit through the pre-milled screw access channel of the sintered inCoris meso blocks. They are labeled with "iSy" and "SCREW". As the screwdrivers are compatible with all iSy abutments, they should be integrated in the existing iSy Surgery and prosthetics set.