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2/18

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Dental implantology—the “third” chance for patients

In dentistry, implantology and oral surgery are one of the few disciplines dealing with the presumably hopeless cases. Patients have insufficient oral health due to their own neglect or serious illnesses. The daily quality of life is reduced as a result of unstable prosthetics, insufficiently treated bounded saddles and a general functional insufficiency. These health issues place an excessive psychosocial burden on many affected patients. Dentists dedicated to dental implantology are, in fact, the last hope to provide help in such cases.

Modern implantology and its individually adaptable implant prosthetics offer patients a “third” chance to integrate a fixed dentition. The restoration of single teeth, fixed complete prostheses on either four or six implants in the fully edentulous maxilla or mandible and guided bone regeneration plus soft-tissue management are just some examples of the implantological repertoire.

In addition, thorough backward planning by digital workflows and navigated surgery—may it be dynamic/virtual or by drilling template—expands this repertoire. You will find some examples how these techniques are applied in this issue.

We owe it to our patients to implement the best available solution and methods. Thus, further education is a must—either at the implantological meetings and/or by thoroughly studying specialist magazines likes this one. The research articles, case reports and congress reviews of this issue of *implants—international magazine of oral implantology* shall present you more ideas and solutions enabling you to treat your patient even better.

In addition, I would like to invite you to our **48th DGZI annual congress on the 28 and 29 September in Düsseldorf, Germany**. For the first time the meeting is taking place as “Future Congress for Dental Implantology”. According to its theme “Visions in Implantology” we will focus on future developments in dental implantology expected for the next ten coming years.

We, the DGZI, will once again set new standards in quality and latest topics of implantological education. Live streams of surgeries from chosen competence centres in Germany will be presented. The future podium and interactive table clinics are highlights of the main programme on Friday and a highly scientific presentation programme will wait for you on Saturday.

Register now and provide your patients with the best “third” chance. We look forward to welcoming you in Düsseldorf.

With best wishes for the upcoming semester,

Yours,

Dr Rolf Vollmer


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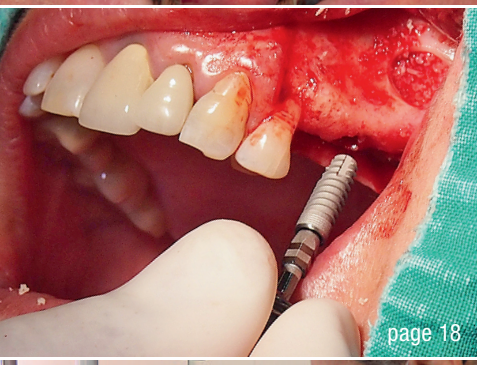
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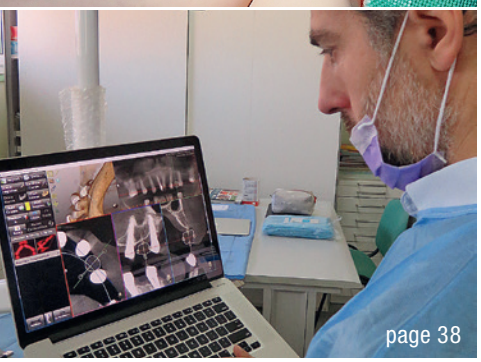
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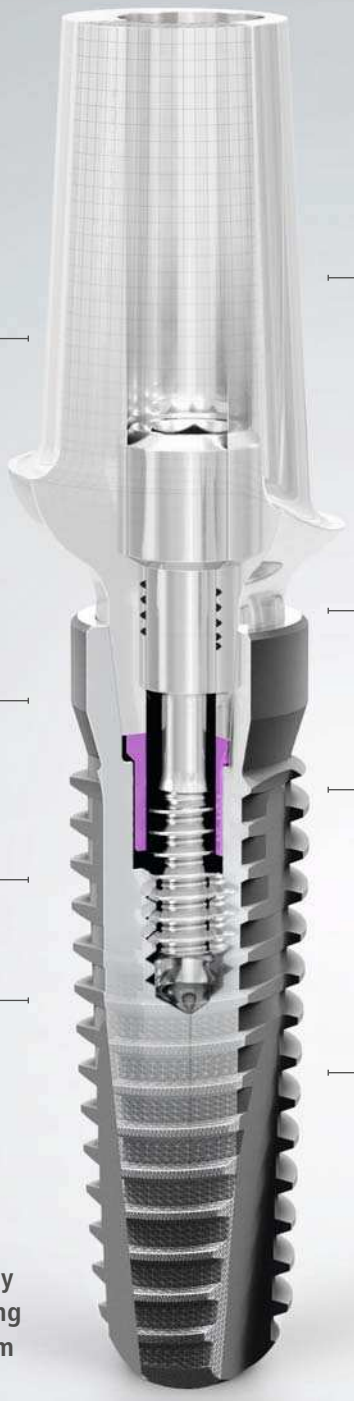

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L-PRF in different intraoral applications

Part II: Open-flap debridement & ridge preservation

Prof. Nelson R. Pinto[1], Dr Andy Temmerman[2], Ana B. Castro[2], Simone Cortellini[2], Prof. Dr Wim Teughels[2] & Prof. Dr Marc Quirynen[2]

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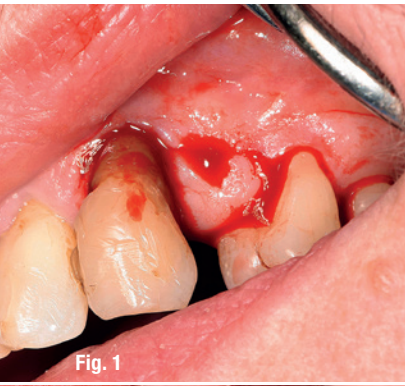


Fig. 1

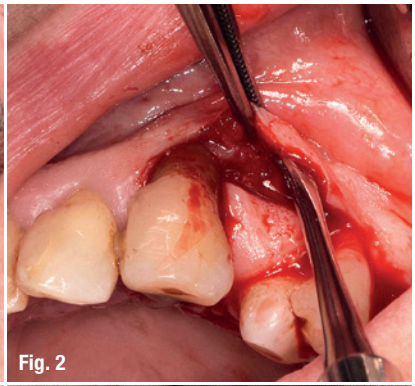
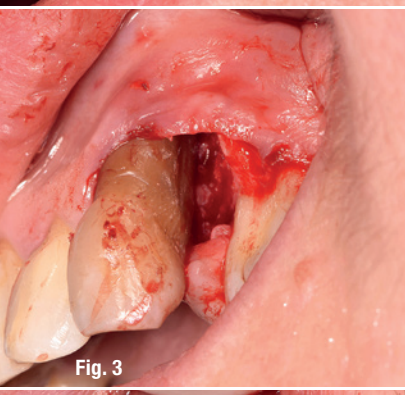


Fig. 2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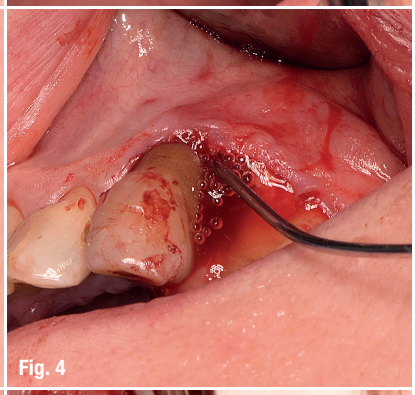


Fig. 4

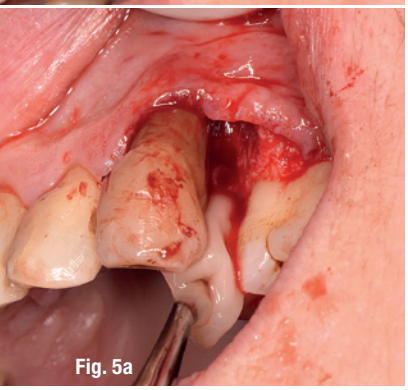


Fig. 5a

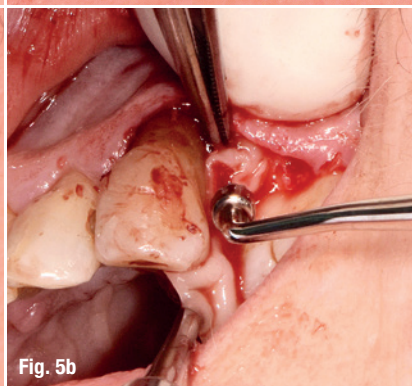


Fig. 5b

Fig. 1: Intrasulcular incision with papilla preservation. **Fig. 2:** Minimal flap elevation (palatally pediculated). **Fig. 3:** Defect after root planing. **Fig. 4:** Rinsing intrabony defect with L-PRF exudate. **Figs. 5a & b:** Application of chopped L-PRF membranes into the defect (preferably face side towards the bone).

Recent research clearly indicates that wound healing in both soft and hard tissue can be significantly enhanced by L-PRF (leukocyte- and platelet-rich fibrin). This second generation of platelet concentrates may even have the potential to replace substitutes like growth factors and biomaterials in many situations. A further benefit is its easy and inexpensive preparation, lowering the treatment cost also for the patient.

Major indications for the use of L-PRF and the step-by-step preparation of L-PRF clots, membranes and plugs were introduced in the first part of this article series in *implants 1/18*.

In this second part, two treatment approaches for platelet concentrate protocols will be presented. The focus will be on L-PRF application in the regeneration of intrabony defects during open-flap debridement and in ridge preservation.

L-PRF in treatment of periodontal and/or bone defects

The use of L-PRF in the treatment of periodontal and/or bone defects can be described as natural tissue regeneration and natural bone regeneration, by analogy to guided tissue regeneration and guided bone regeneration. With natural tissue regeneration and natural bone regeneration the defect is filled with L-PRF—optionally combined with a biomaterial, to prevent collapse—and sealed with L-PRF membranes. These membranes have a protective function (induction of the periosteum) and serve as a competitive barrier. Epithelium and connective tissue are kept away from the intrabony crater so that the cells of the periodontal ligament or periosteum have the time to regenerate cementum, bone and ligament. These cells can also migrate through the membranes, which results in rapid neo-angiogenesis. L-PRF also promotes the proliferation and differentiation of osteoblasts and bone marrow stromal cells *in vitro*.

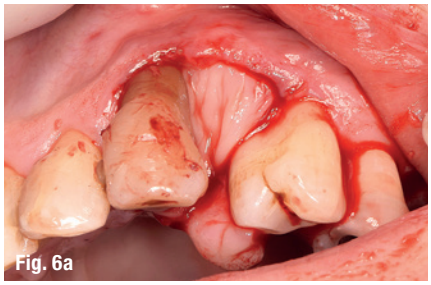


Fig. 6a

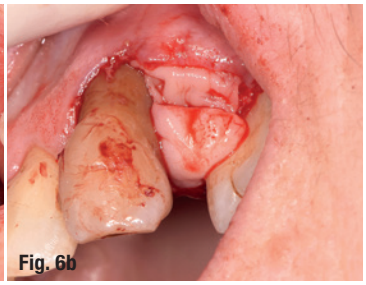


Fig. 6b

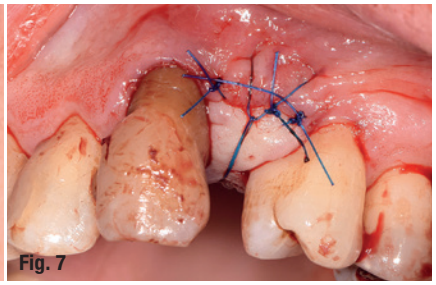


Fig. 7

Figs. 6a & b: Coverage of bony defect with two or more layers of L-PRF membranes. **Fig. 7:** Tension-free flap suturing, preferably with primary closure of the interdental papilla.

This stimulation appears to be dose-dependent with leucocytes playing a key role.[1]

A series of clinical studies has evaluated the benefits of applying L-PRF alone during open-flap debridement.[2] They all reported an adjunctive improvement when L-PRF was used, on parameters like probing pocket depth reduction (1.1 ± 0.5 mm extra reduction), clinical attachment gain (1.2 ± 0.6 mm extra gain) and bone defect fill (1.5 ± 0.3 mm or 46 ± 12.8 % extra bone fill).[2]

In some studies, L-PRF was combined with a bone substitute, and even here an additional benefit could be observed.[2] When L-PRF was compared with enamel matrix proteins, similar improvements were reported.[2]

Step-by-step approach for regenerative treatment of intrabony defects with L-PRF

Protocol for L-PRF as sole biomaterial for intrabony defect regeneration during open-flap debridement

- Intrasulcular incision with maximal preservation of gingival complex (Fig. 1).
- Minimal flap elevation and degranulation of intrabony defects (Fig. 2).
- Optimal root planing (Fig. 3).

- Rinsing defect with L-PRF exudate (collected at the bottom of the Xpression box [Intra-Lock International] after compressing the clot; Fig. 4).
- Application of an L-PRF membrane (or only a part of it) into the defect (preferably with the face part of the membrane pointing towards the bone; Figs. 5a & b).
- Coverage of the bone defect with approximately two layers of L-PRF membranes, running ≥ 2 mm over the bony borders underneath the periosteum in order to seal the socket and to force the soft tissue to grow over instead of underneath the membranes (Figs. 6a & b).
- Tension-free flap suturing in seeking to provide primary closure of the interdental papilla (Figs. 7 & 8).

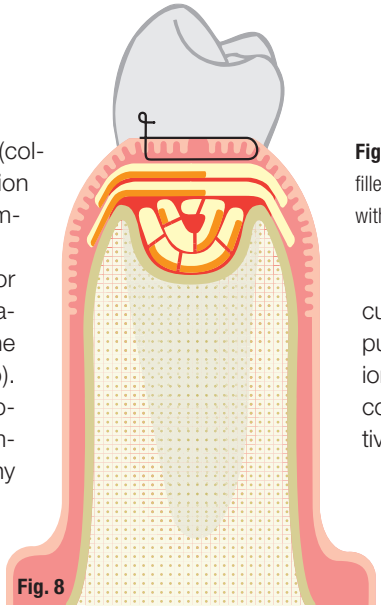


Fig. 8: Graphic representation of an intrabony defect filled with chopped L-PRF membrane parts and covered with L-PRF membranes. Primary closure is not required.

Postoperative care
- Soft food intake, no biting/chewing in treated area, no mechanical cleaning of the treated area,
- 0.12 % chlorhexidine twice a day for one minute for at least three weeks,
- medication with painkillers, as necessary.

L-PRF for ridge preservation

After tooth extraction and loss of the bundle bone, the alveolar ridge undergoes a remodelling process in both vertical and horizontal directions. This process often complicates the placement of implants in an ideal position. In recent years, many surgical techniques have been developed to prevent, or at least minimise, this bone resorption.

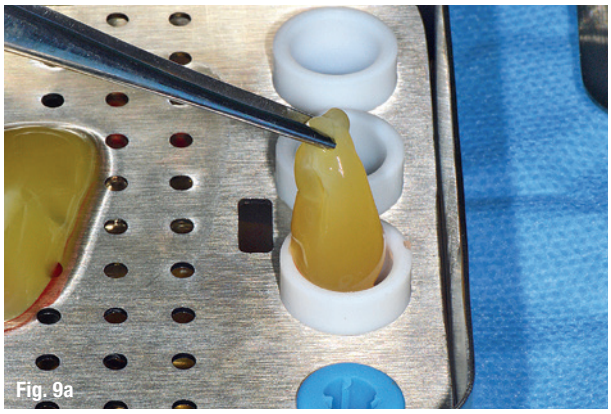
Different bone grafts or bone substitutes have been developed to be used in extraction sockets, with or without the addition of a soft-tissue graft or soft-tissue substitute to seal the alveolus. A recent systematic review by Vignoletti et al., however, concluded that there is no clear guideline currently on which technique to use for this purpose.[3] According to the authors' opinion the use of L-PRF in extraction sockets could be a less costly, simplified and effective treatment alternative.

A recent split-mouth comparison between natural healing of extraction sockets and sockets filled with L-PRF in 22 patients confirmed the above mentioned benefits with significant less horizontal and vertical resorption, increased socket fill, higher bone quality and faster soft-tissue and bone healing.[4] This was reported even at sites with bone dehiscences.[4] The observed reduction in bone resorption was comparable to the best-performing clinical procedures using bone substitutes in combination with connective tissue grafting and/or the placement of a membrane.[4]

Step-by-step approach for ridge preservation with L-PRF

In this approach, L-PRF is used as a filling material for a tooth socket, aiming at maintaining the alveolar bone dimensions (Figs. 9a & b).

Protocol for ridge preservation with L-PRF
- Atraumatic tooth extraction with maximal preservation of the alveolar bone.
- Accurate removal of inflamed and granulation tissue (if needed with a bur; Fig. 10).
- Preparation of envelope (approx. 2 mm in width) between bony borders of the socket and surrounding soft tissue needed to slide in the L-PRF membranes at the end in order to prevent the fast ingrowth of connec-



Figs. 9a & b: Preparation of L-PRF plugs with Xpression kit.

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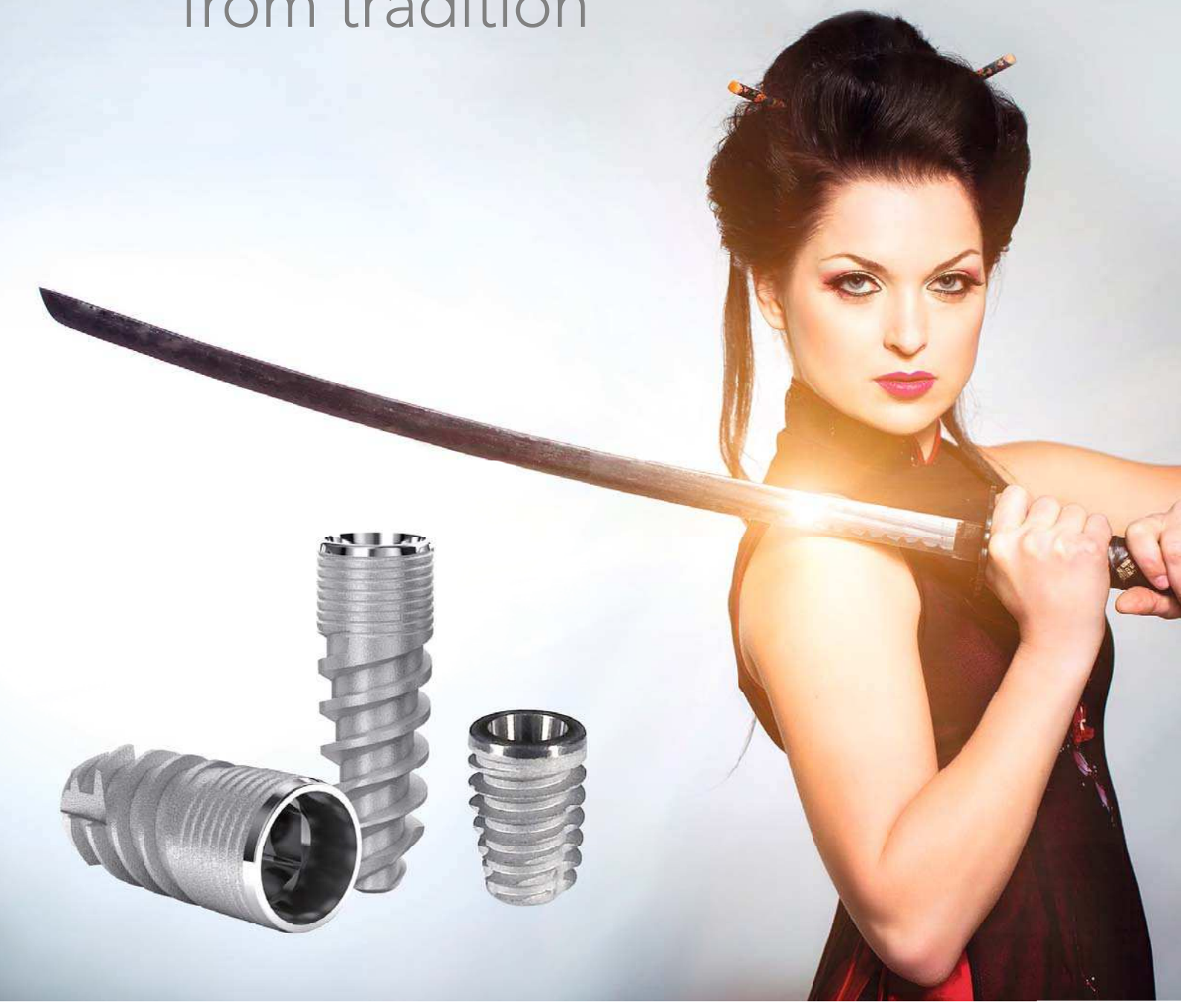

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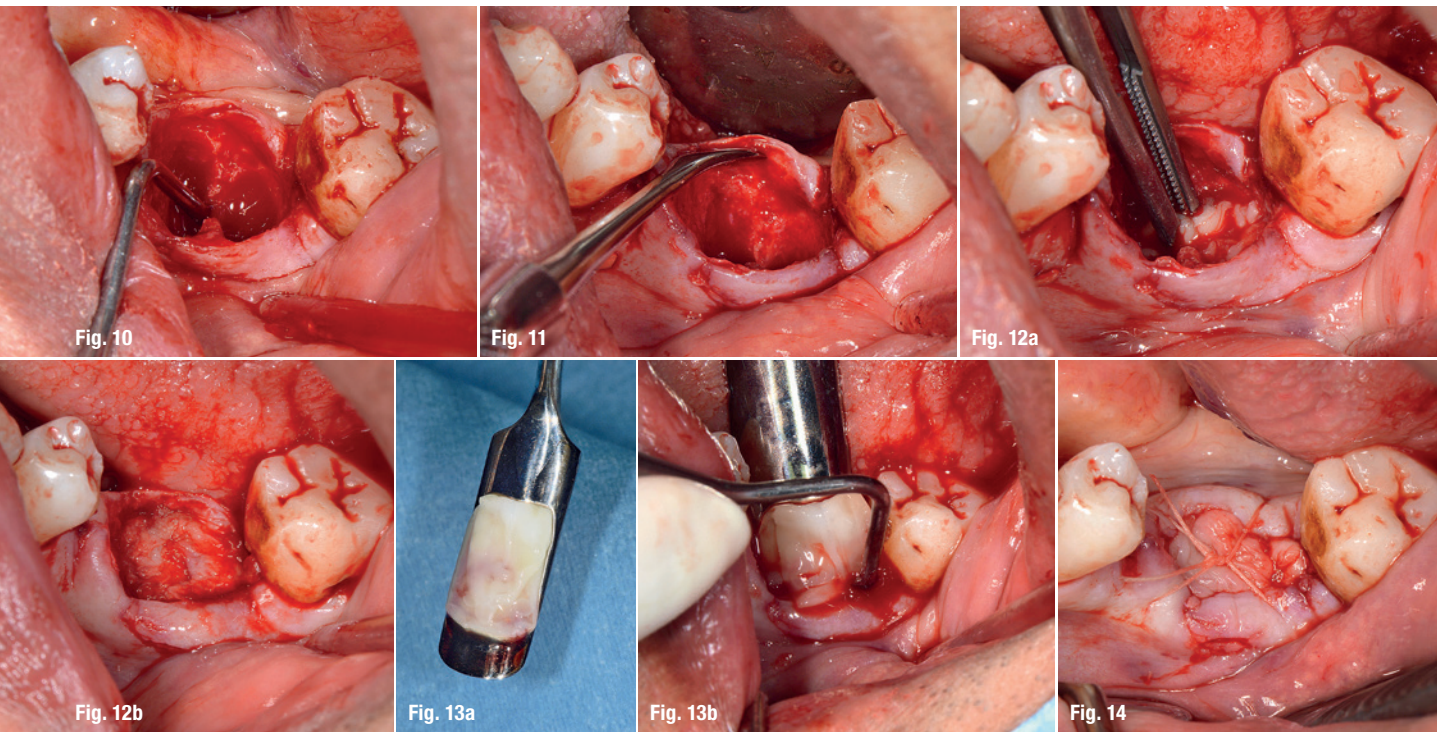

Fig. 10: Accurate removal of all inflamed and granulation tissue. **Fig. 11:** Envelope preparation (approx. 2 mm in width) between bony borders of the socket and surrounding soft tissue. **Figs. 12a & b:** One-by-one placement of L-PRF plugs/membranes into the socket and vigorous compression. **Figs. 13a & b:** Coverage of socket with at least a double layer of L-PRF membranes (sliding borders of membranes into prepared envelope). **Fig. 14:** Tension-free suturing with, for example, a modified internal or external mattress technique, primary closure is not required.

tive tissue and to force the epithelium to grow over the membranes (Fig. 11).

- If applicable, L-PRF exudate (aspirated into a sterile syringe), obtained after compression of clots, is used to irrigate and clean the socket.
- Placement of three to five L-PRF plugs/membranes into the socket one by one, compressing vigorously with the amalgam condenser and absorption of superfluous serum with a gauze (Figs. 12a & b).
- Coverage of the socket with at least a double layer of L-PRF membranes with their margins slid between soft and hard tissue around the socket (envelope) to seal the socket and to prevent epithelial infiltration (Figs. 13a & b).
  - Suturing with, for example, a modified internal or external mattress technique, not with the intention to close the wound, but to keep the membranes in place without tension. Sutures have to be supported by alveolar bone in order to prevent the L-PRF from being pushed out (Figs. 14 & 15).

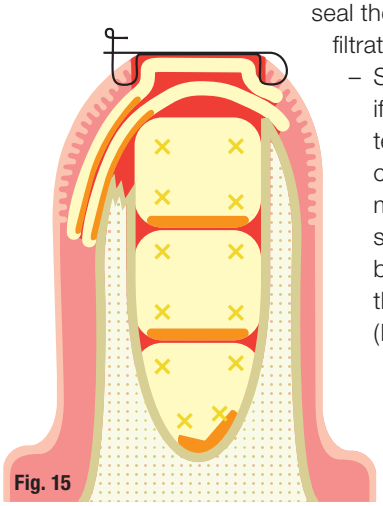

Fig. 15: Graphic representation of an extraction socket filled with L-PRF plugs/membranes and sealed with two layers of L-PRF membranes.

Postoperative care

- No use of chlorhexidine during the first two days, in order not to disturb initial soft-tissue healing.

Editorial note: The third part of this article will be published in implants 3/18 and cover application approaches for sinus floor elevation.

Further information on the topic can be obtained during the 2nd European Meeting on Enhanced Natural Healing in Dentistry in Leuven, Belgium, from 7 to 9 September. Further details can be found at: www.enhd2018.be.

Literature

contact

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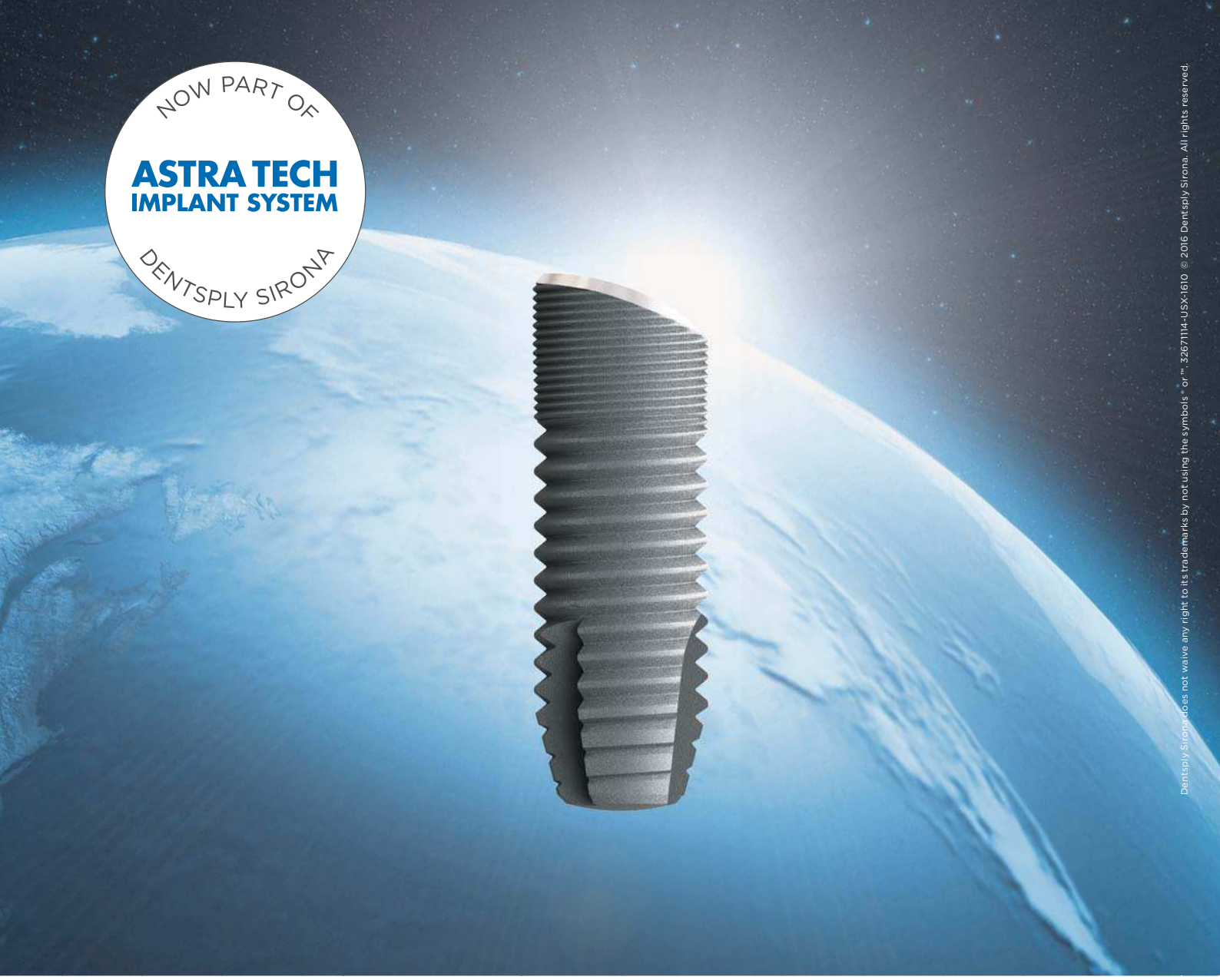

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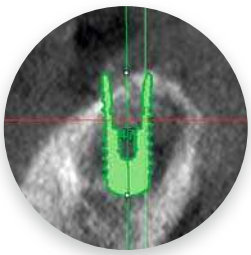

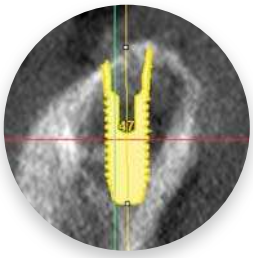

Conventional vs innovative approach

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New restoration concept using LOCATOR F-Tx®

Dr Karl-Ludwig Ackermann, Gerhard Neuendorff & Janez Fiderschek, Germany

The fifth German oral health study (Deutsche Mundgesundheitsstudie) showed that the population in many countries are ageing and the desire for better quality of life related to the preservation of teeth and their functionality, among other things is constantly increasing. Periodontal disease is a major cause of tooth loss, as tooth loss results in a decreased ability to maintain physiological masticatory function, as well as a decreased general quality of life. Edentulous people exhibit a lower self-esteem by being excluded from normal masticatory function. The following article describes the fabrication of a fixed superstructure for the edentulous mandible that uses an innovative attachment system.

Dental implants as support for a removable dental prosthesis were introduced many years ago as a treatment option and as an alternative to a conventional complete denture. In the past ten years, considerable efforts have been made to develop new fixed treatment concepts. Attempts have even been made to implement treatment without bone augmentation procedures (e.g. Dr Paulo Maló's All-on-4 concept). Most restorations are cement- or screw-retained solutions. For the past year, an innovative attachment system has been available that combines the clinical comfort and structured laboratory techniques of a fixed complete prosthesis without the need for it to be cemented or screw-retained.

The LOCATOR F-Tx system (Zest Dental Solutions, USA) makes it possible to produce an aesthetic dental restoration. The prosthesis is attached to the implants by means of a snap-in attachment system. This new attachment gives the patient greater assurance of function and quality of life. It also allows the practitioner to remove the prosthesis and make corrections at any time. Furthermore, complex laboratory procedures, that require channels and screw retention, are not required.

Case presentation

The treatment plan consisted of a removable overdenture on four implants in the maxilla and a fixed prosthesis on four implants for the edentulous mandible with the aid of the LOCATOR F-Tx attachment system (Figs. 1–3). This treatment procedure, managed by means of prefabricated system components, will be presented in the following section step by step.

Surgical measures

The surgical procedure was performed after clinical and osseous diagnostics and by using surgical templates (Figs. 4 & 5). Both arches were planned with a minimum of four implants in a cross arch placement and symmetrical distribution which is advantageous in order to guarantee optimised support and load distribution.

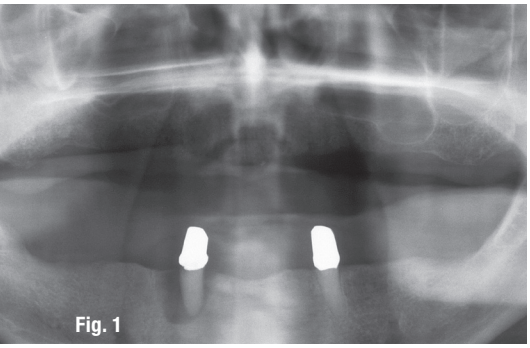
Fig. 1

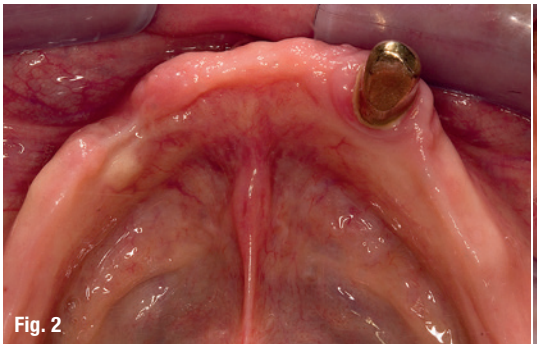
Fig. 2


Fig. 3

Figs. 1–3: Initial situation: an 83-year-old patient for whom the retention of the maxillary and mandibular prostheses was severely impaired resulting in successive tooth loss and the associated bone loss, making a conventional removable complete prosthesis virtually impossible.

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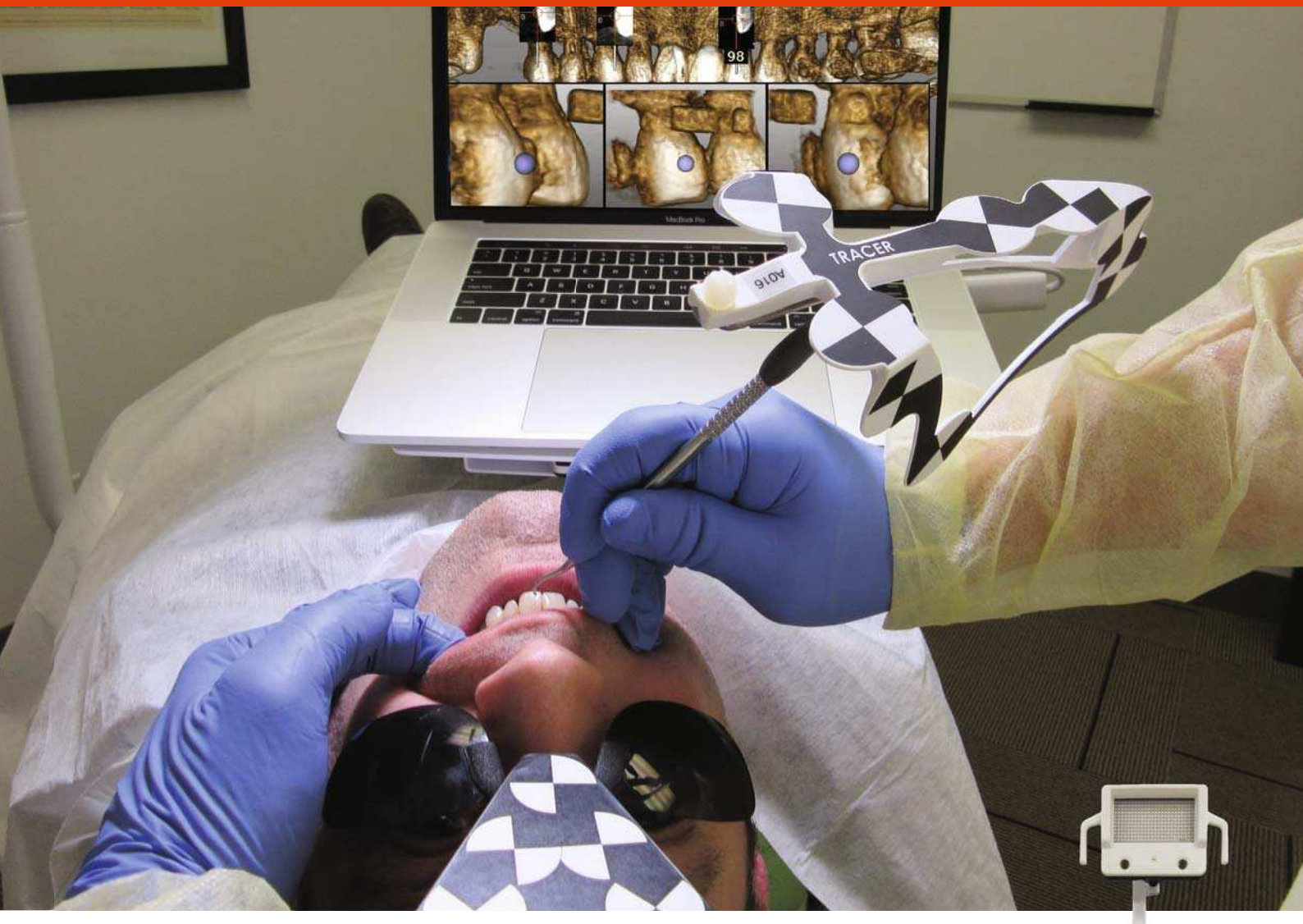

"Trace and Place is one of the most astounding pieces of technology I have ever seen. It is a revolution in guided surgery. Much faster to use than static guides and you have the ability to easily make changes during surgery if needed.

The workflow for static guided surgery involves dental scans, intraoral scans and STL files, merging them, designing the case, printing, curing, washing and sterilizing the guide. With trace and place the work flow is much simpler: take a scan, plan the case, trace the teeth to align the scan with the patient's anatomy and place the implant. It gives the best of both worlds. The minimal time of an unguided case and the accuracy of a guided case. It's a game changer."

David R. Scharf, DMD, Periodontist, New York

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Fig. 4

Fig. 4: Implant placement with backward planning.

Prosthetic measures

Initially, complete prosthetic planning and laboratory procedures to re-establish the proper vertical and occlusal dimensions was completed. This required the positioning of teeth in the patient's mouth in order to meet the functional, phonetic and aesthetic demands of the patient (Figs. 6–8). Of course, the focus was also on the spatial orientation of the attachments (LOCATOR F-Tx abutments and denture attachment housings), the prosthetic teeth and the prosthetic restorative material.

The LOCATOR F-Tx attachment system is delivered from the manufacturer in an all-in-one package. The spherical geometry interface between the abutment and denture attachment housings allows the correct positioning of the housing in the proper angulation for the best prosthetic outcome of the prosthesis. This spherical feature also makes it possible to use the attachment system with implants with up to 20 degrees of divergence from a common vertical.

An indirect technique was used to transfer the position of the implants to a working model using laboratory analogs. The use of digital impression techniques to transfer implant positions is also possible. A metal framework was milled to fit over the denture attachment housings (Figs. 9 & 10). The selected abutment cuff heights matched the sulcus depth. This decision is preferably determined by the clinician intraorally (Figs. 11–14). It is recommended that the denture attachment housing be placed supra-gingival for maximum adhesion to the prosthesis. Also, the denture attachment housings with the processing balls must be seated on the abutments before the pick-up procedure of the metal framework. The framework should always be designed and milled in such a way that a small (max. 0.2 mm) cement gap exists between the framework and denture attachment housings.

In order to ensure a passive fitting framework, final pick-up of all the denture attachment housings in the framework must be done chairside, all at the same time, and before any further laboratory adjustment steps are performed. The denture attachment housings were aligned as parallel as possible within the aesthetic contour of the prosthesis and block-out spacers were placed on the abutments below the denture attachment housings to block out all undercuts. The framework was cemented on using a metal-to-metal cement (Figs. 15–17). The setting time of the cement is ten minutes.

Final adjustments of the framework were performed (Fig. 18). In order to maximise aesthetics, the metal

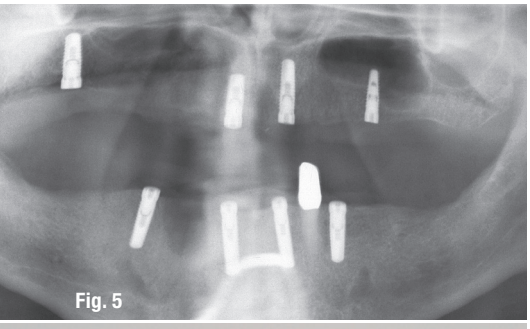
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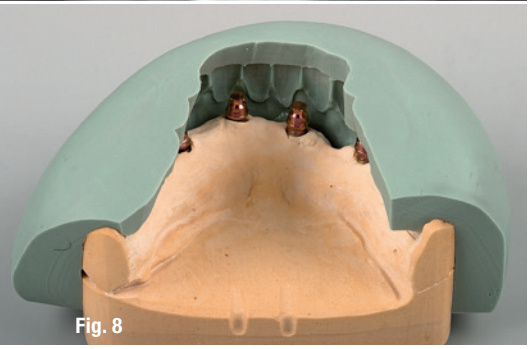
Fig. 6


Fig. 7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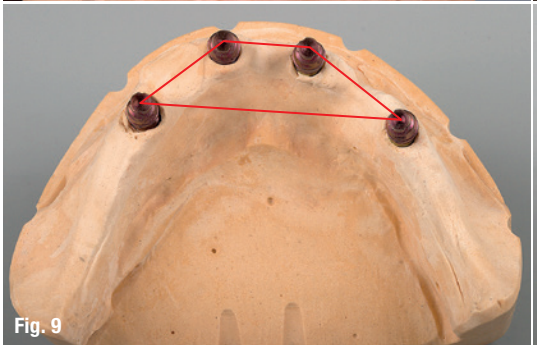
Fig. 9


Fig. 10

Fig. 5: Post-op control radiograph. **Fig. 6:** Completed set-up and wax-up of the maxilla and mandible. **Fig. 7:** Sufficient inter-arch distance between the opposing dentition and the retentive elements must be assured. **Fig. 8:** The framework dimension is defined by the available space between the anterior and posterior walls of the alveolar bone. **Fig. 9:** Trapezoidal and symmetrical distribution of implant placement across the midline for a balanced load distribution. **Fig. 10:** Preparation of the metal framework.

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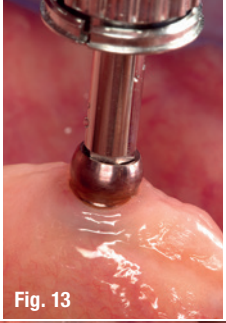
Fig. 11


Fig. 12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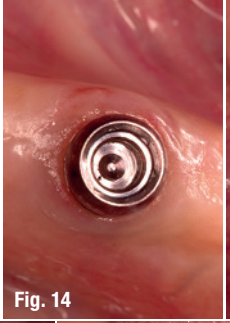
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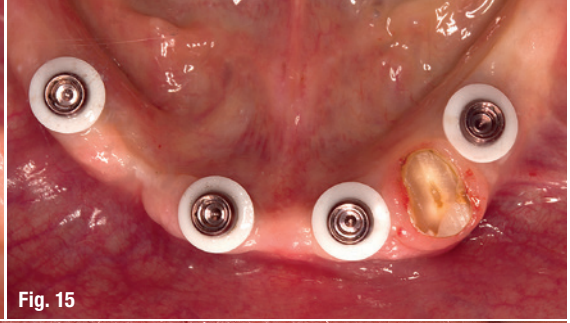
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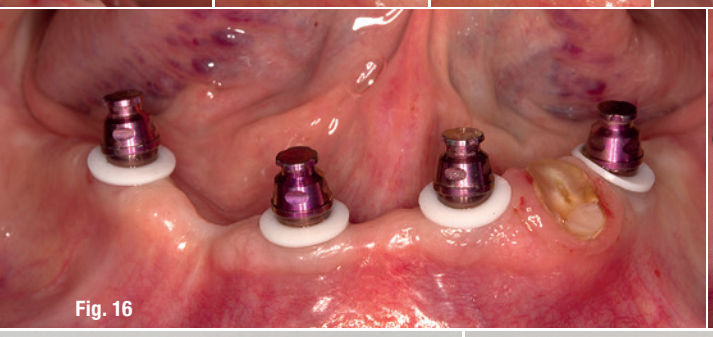
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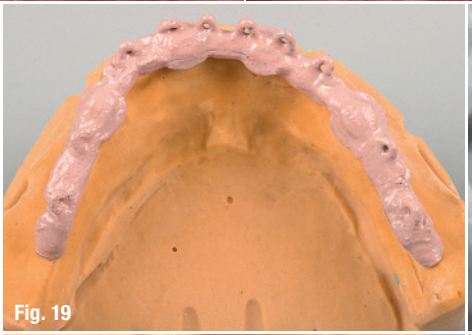
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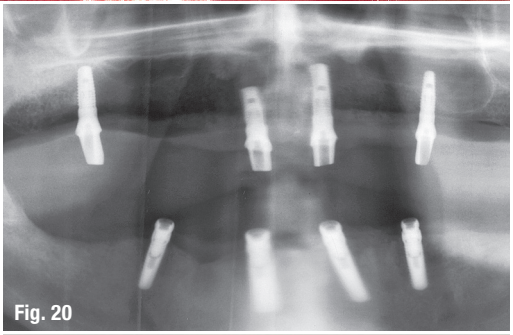
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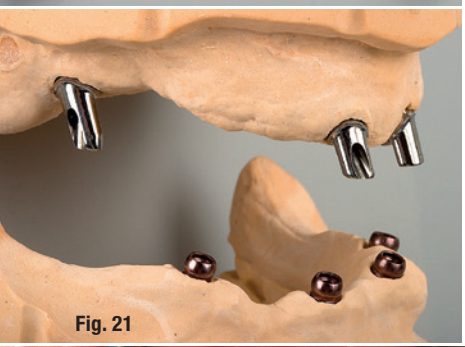
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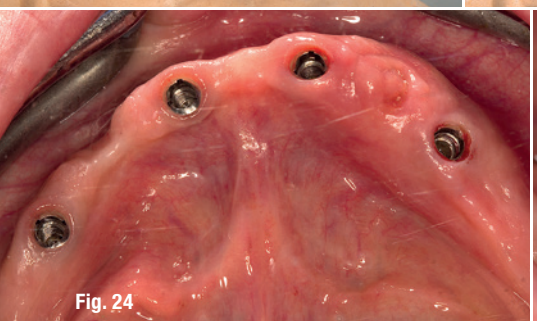
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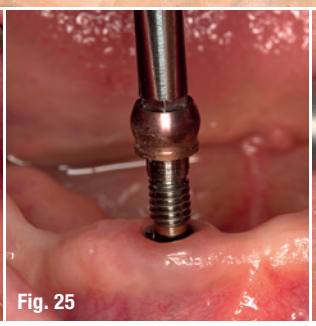
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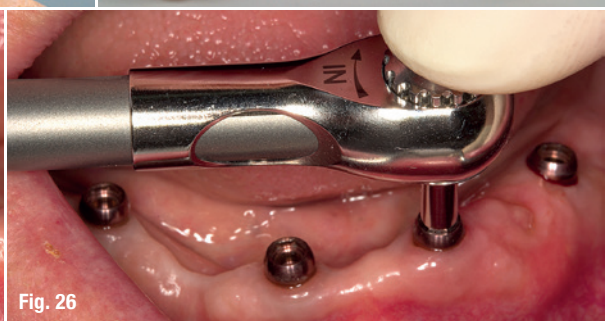


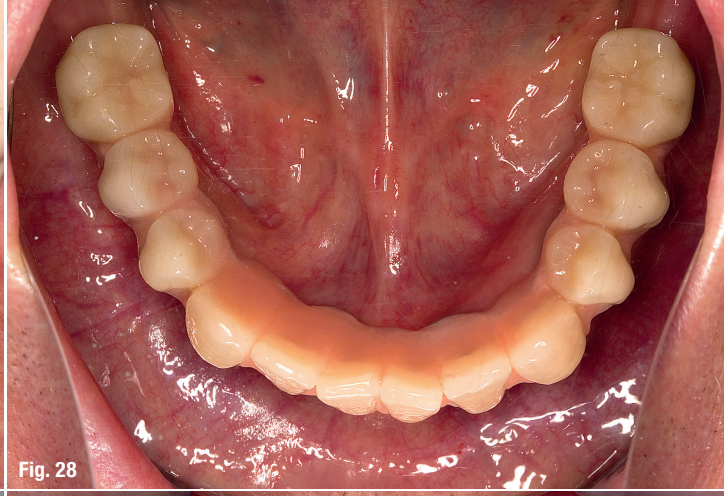
Fig. 26

Figs. 11–14: Insertion of the abutments. **Figs. 15 & 16:** Placement of block-out spacers at the point of transition between the denture attachment housings and the abutments. **Fig. 17:** Passive try-in of metal framework without pressure. **Fig. 18:** Further adjustments of the framework were performed in the laboratory. **Fig. 19:** For maximum aesthetics, coating the metal framework with an opaque material is recommended. **Fig. 20:** The panoramic radiograph demonstrated the abutments seated gap-free on the four implants in the mandible. **Figs. 21 & 22:** Inter-maxillary adjusted occlusion and shaping. **Figs. 23–26:** Tightening of the processing balls and inspection of abutments for a secure fit.

framework was coated with an opaque material (Fig. 19). In the meantime, a panoramic radiograph was taken to confirm that the abutments were seated gap-free on the four implants in the mandible (Fig. 20). In the maxilla, four telescopic abutments were screwed into the maxillary implants (Fig. 21).

The teeth were attached to the metal framework using denture acrylic. In addition to the aesthetic requirement of the case, it is important to design the shape of the prosthesis' intaglio surface to be functional, aesthetic and offer better oral hygiene, which allows the patient easy access for self-cleaning (Figs. 22 & 23). A symmet-


Fig. 27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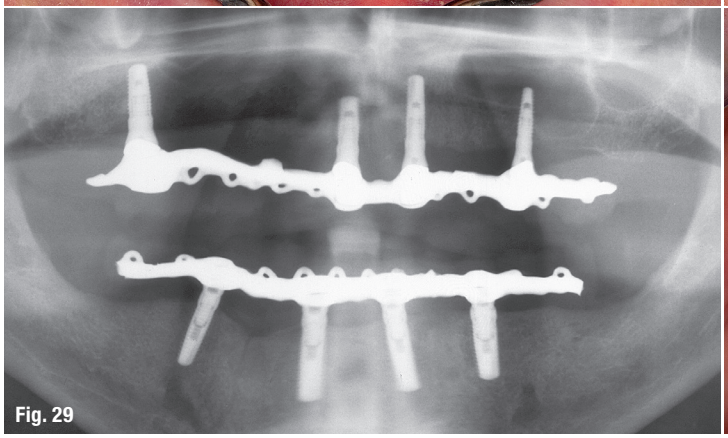
Fig. 29


Fig. 30

Figs. 27 & 28: A posterior/anterior seating of the superstructure is necessary for the LOCATOR F-Tx system to be effective. **Fig. 29:** Final control radiograph. **Fig. 30:** Final situation.

rical implant-placement distribution in the mandible and maxilla guaranteed a stable centric relation and articulation with no aesthetic compromise.

Integration

After removal of the processing balls, the appropriate retention balls were screwed into the denture attachment housings (Fig. 23). It is always advisable to inspect the abutments for a secure fit at the end of all treatment steps (Figs. 24–26). Seating the prosthesis should start in posterior, moving anteriorly, one attachment at a time. This is necessary for the LOCATOR F-Tx attachment system to be effective, as it is the only way to stabilise the fixed prosthesis (Figs. 27–29).

Anatomically correct final prosthetic designs of the prostheses must be done similar to screw-retained restorations in the edentulous maxilla and mandible. This is most evident from the frontal view (Fig. 30). The edge of the mandibular prosthesis is given a scalloped shape to allow self-cleaning through salivary flow, use of a water pick and accurate intraoral cleaning.

In addition, it should be mentioned that the LOCATOR F-Tx prosthesis can easily be removed by the clinician at any time. A user-friendly metal bar and loop tool allows easy removal of the prosthesis by leveraging off the retention balls. However, it also must be emphasised that the retention balls are single use only, so new unused retention balls must be used when reseating the prosthesis.

Conclusion

The attachment system presented here is a valuable addition to the prosthetic therapy options for fixed restorative procedures in the edentulous mandible and maxilla. The cost-benefit ratio is also favourable when compared to other options. The principle of a stable occlusion with symmetrical lateral distribution of implants and a limited posterior extension/cantilever ensures the secure retention of the prosthesis and contributes to the optimisation of speech and the recovery of unrestricted masticatory function. If required, alternative measures such as the fabrication of a removable prosthesis are quite possible.

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Biomechanical considerations in solving demanding cases

Dr Juraj Brozović & Barbara Mikulić, Croatia

The predictability of dental implant osseointegration has enabled clinicians and researchers to focus on additional success criteria in the overall treatment.[1] Initial assessments of implant therapy considered survival rates, restoration stability, detectable bone loss and presence of soft-tissue infection.[1,2] As implant dentistry advanced, it was necessary to introduce new assessment points in order to broaden the understanding of favourable outcomes and pending failures. These included aesthetics, evaluated by both patients subjectively and clinicians objectively. A more patient-centred approach has led to a better insight into patient satisfaction, which was often overlooked in the past.

It was intriguing to discover that studies including a higher number of success parameters consistently reported lower success rates.[3] However, regardless of failure-indicating parameters being either subjective or objective, their culprits often lie in bacterial colonisation and detrimental force distribution.[4] Their interdependence becomes apparent when the biofilm-induced inflammation is further aggravated by high stresses and strains in the surrounding bone, leading to peri-implant tissue breakdown.

Taking into consideration the refined success outcomes, a greater need for clinicians to revise and upgrade their core implant knowledge exists. Therefore, in order to minimise functional complications in a loaded implant-borne restoration, a thorough understanding of both the pathological processes (peri-implant mucositis and peri-implantitis) and implant biomechanics is needed.

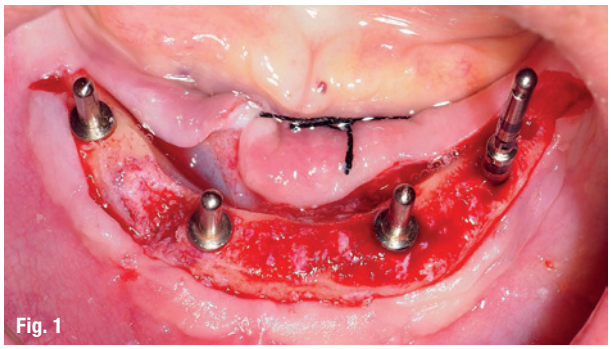
This article will review the core biomechanical considerations for implant placement in demanding conditions and demonstrate these principles on GC Aadva Standard implants (GC Tech.Europe, Germany).

Implant biomechanics

Load distribution of natural teeth depends on the periodontal ligament-dependent micro-movements. As opposed to this, osseointegrated implants behave differently, owing to their rigid connection with the surrounding bone.[5] The lack of periodontal ligament on an implant means the absence of an interposed absorbing layer that would normally diminish the occlusal impact to the bone and adapt to different types of loading.

Upon axial loading of a natural tooth, an apical movement of approximately 25–100 µm is possible, whereas in an integrated implant, the movement is no greater than 3–5 µm, and for the most part depends on bone elasticity.[6] In natural teeth, lateral forces are dissipated quickly at a region further away from the alveolar crest, towards the root apex. This happens owing to the sudden movement of approximately 56–108 µm while rotating around the apical third of the root.[7,8]

With implants that is not the case. The implant movements occur gradually, reaching a maximum of 10–50 µm when loaded with a similar lateral force. The rotation does not take place in the apical third of the implant;



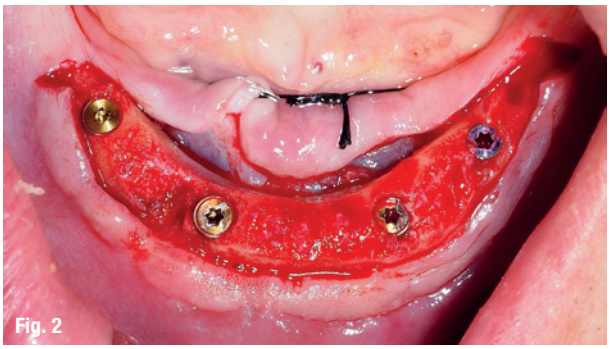
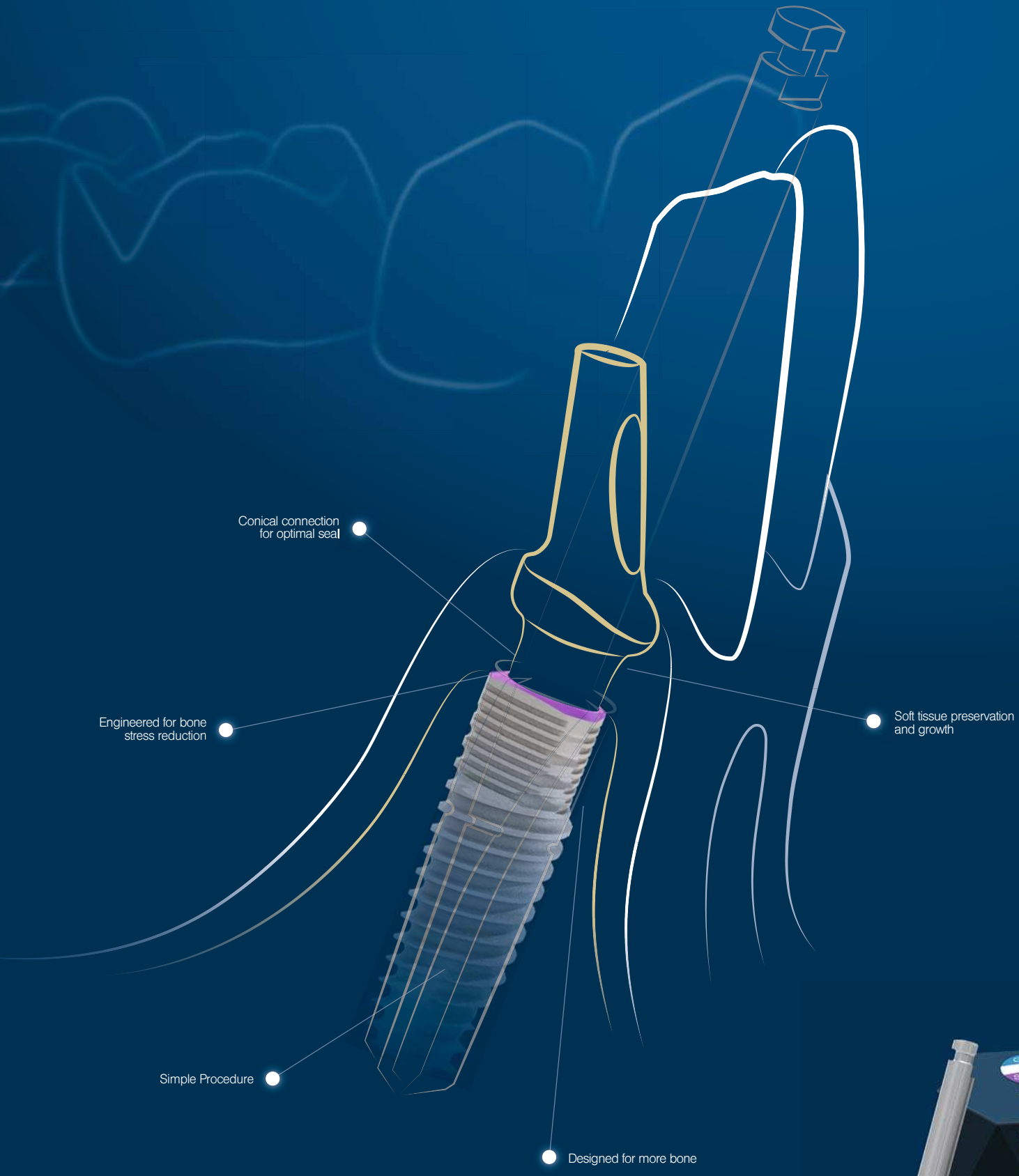


Fig. 1: Implant positioning should be as parallel as possible with regard to the future occlusal plane. **Fig. 2:** Placement of four GC Aadva implants in the interforaminal region.



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rather, it happens around the very tip of the alveolar crest. Therefore, the highest stress and strain in a loaded implant occurs in the crestal part of the peri-implant bone.[9] When the implant-to-bone interface is overloaded, a micro-strain-induced crestal bone resorption can occur.[10] This may add to a pre-existing implant pathology or facilitate the occurrence of a peri-implant disease. Load transfer management depends on the nature of the force applied and the contact surface distributing the forces to the bone. The bone is the most resilient to pressure and the least resilient to shear forces.[11]

Both macroscopic and microscopic properties of an implant body are important in their clinical performance. The microscopic component is very important in the initial healing phase and early loading period. Surface treatment (e. g. sandblasting and acid-etching) increases the bone-to-implant contact by multiple times and facilitates healing.[12] The macroscopic design is responsible for both early and delayed loading. Smooth surfaces on implant bodies increase the risk of bone loss because of non-adequate force transfer. These surfaces easily cause shear forces when loaded with masticatory forces.[13]

Contemporary threaded implants have the capability to transform non-axial loading into a more favourable axial pressure force to the bone. When comparing implant designs, cylindrical implants have a greater functional surface for the load transfer to the bone than conical ones do. In such tapered implants, greater stresses are exhibited in the crestal bone. Biomechanical stress can be diminished with the correct choice of implant design, diameter, length and abutment and by thorough patient assessment.[14–16]

Studies on implant biomechanics have established numerous important facts for clinicians and manufacturers. Load distribution has been shown to be directly related to implant size and shape.[17, 18] Implant width has a significant impact on bone-to-implant contact surface. For each millimetre of increase in implant diameter, the contact surface becomes larger by 30 to 200 per cent, depending on implant design.[17]

Since the functional surface is considered the most important of all the design factors, one can conclude that the diameter of a loaded implant can greatly influence alveolar crest remodelling. Wide-diameter implants (up to 6.0 mm) have three and a half times greater bone stress reduction compared with narrow-diameter implants (3.5 mm). The greatest stress reduction is noted when increasing the implant diameter from 3.6 to 4.2 mm. The next stress reduction, between 4.2 and 5.0 mm is half the previous amount. Furthermore, implant length, contrary to common belief, influences the functional surface less. A 10-mm cylindrical implant has about a 30 per cent greater surface than a 7-mm implant does and a 20 per cent smaller surface than a 13-mm implant.[19] Analyses have shown that a loaded implant has the highest stress exhibited in the coronal 40 per cent of the implant-to-bone interface.[17, 20, 21]

Maintaining a favourable load distribution is not only beneficial for the implant-to-bone interface. Implant design plays a major role in the deformations occurring in the implant-to-abutment assembly itself.[22] The mechanical complications include abutment screw loosening, screw fractures, abutment fractures and, rarely, implant body fractures.[23, 24]

Regarding the occlusion-related factors, it is important to note that the implant placement should be precise and prosthodontically driven, bearing in mind the biomechanics of the final restoration. This means minimising the adverse leverage loads by centring implants in the mesiodistal plane, placing them perpendicular to the occlusal plane, choosing key implant positions and avoiding cantilevers (Figs. 1 & 2).[24] Moreover, the occlusion must be well-balanced with particular regard to patients with high masticatory forces and parafunctional habits.

Implant applied biomechanics

The aforementioned biomechanically significant properties can be demonstrated on the basis of a GC Aadva Standard implant. This implant is made from Grade 5 titanium alloy (Ti-6Al-4V). The properties of the Grade 5 alloy have been proven mechanically advantageous, with its strength being significantly higher than in commercially pure titanium implants.[25] *In vitro* results suggest that this implant is less prone to implant body fractures and could sustain higher masticatory forces.

This could be the reason that the manufacturer does not contra-indicate the use of a narrow-diameter (3.3 mm) implant in premolar sites. However, the authors advise exercising caution in such applications and splinting the final restoration to another regular-platform implant. Although the narrow implant itself may withstand higher masticatory forces than usual, the loading of narrow implants in general can cause less than ideal force distribution to the surrounding bone, as has already been mentioned. If placed as a single-implant restoration, a 4 mm diameter implant would be preferred for the premolar region. Available diameters are 3.3, 4.0 and 5.0 mm, with lengths ranging from 6.0 to 14.0 mm.

Another design trait of the regular GC Tech implant is the cylindrical implant body with slightly tapered threads towards the apex. The threaded cylindrical body is shaped to re-route and resist non-axial forces, while the discrete taper enables clinicians aiming for a more pronounced primary stability to achieve higher insertion torques. The surface is treated by sandblasting and acid-etching in an unconventional manner—there are three different surface regions, each with its own roughness, which may

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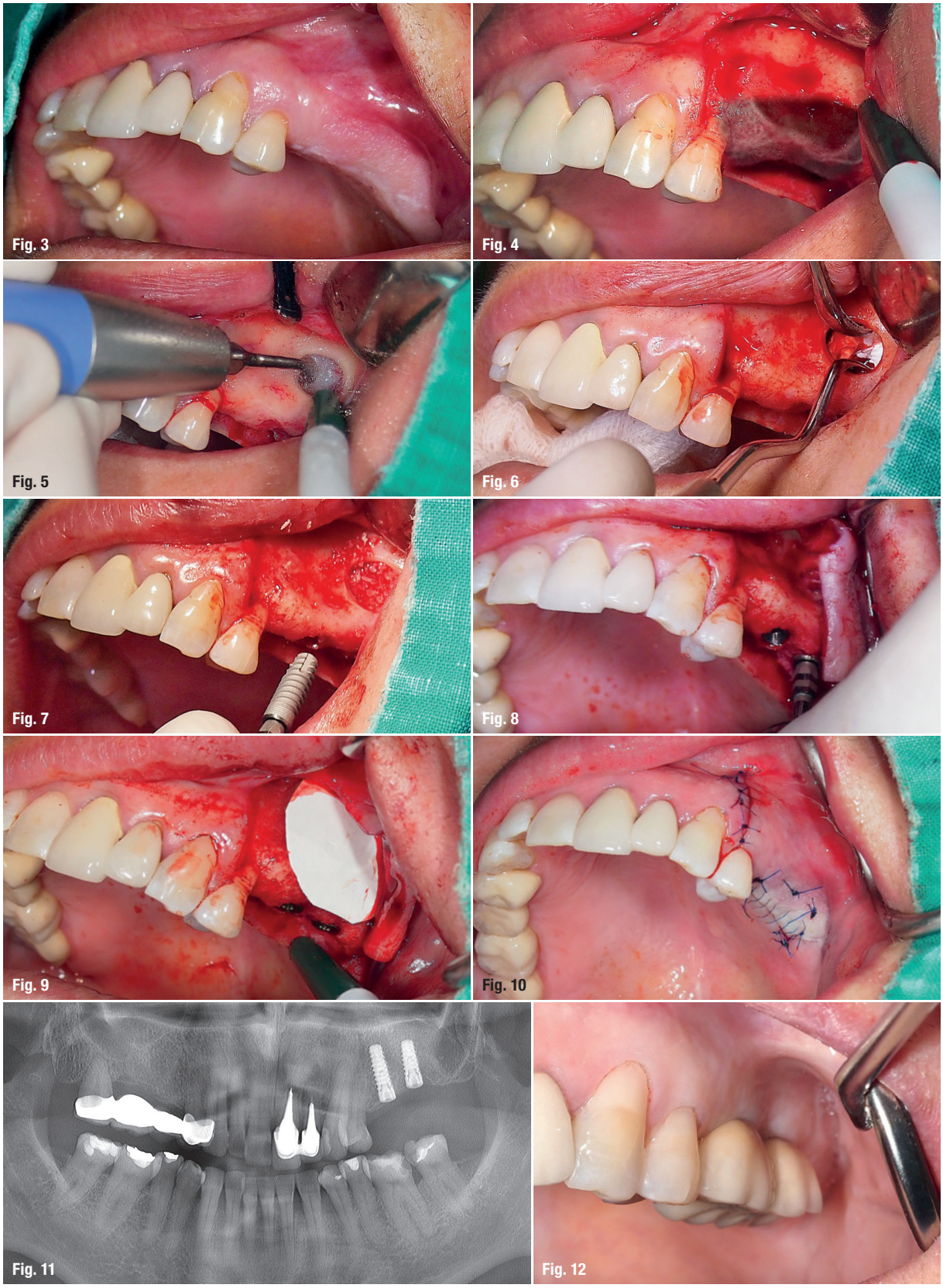

Fig. 3: Preoperative finding in a pneumatised lateral maxilla. **Fig. 4:** Superimposing the pneumatised sinus floor CBCT scan over the surgical area. **Fig. 5:** Lateral window access to the maxillary sinus. **Fig. 6:** Facilitation of Schneiderian membrane elevation with a collagenous fleece. **Fig. 7:** Placement of a GC Aadva Standard 3.3 x 12.0 mm implant in the premolar region after the sinus graft. **Fig. 8:** Placement of a GC Aadva Standard 4.0 x 10.0 mm implant in the molar region. **Fig. 9:** Covering the access window with an absorbable collagenous membrane. **Fig. 10:** Wound closure with monofilament sutures. **Fig. 11:** Panoramic finding after six months of uneventful healing. **Fig. 12:** Splinted, screw-retained metal-ceramic restoration for better load transfer.

facilitate osseointegration in the respective bone compartments. Micro-threading in the neck area is beneficial for load transfer in the cortical part of the crest.

Furthermore, this implant has a conical connection and an internal hex as an anti-rotational feature. The two are commonly used by implant manufacturers to diminish the micro-movements and micro-gaps at the implant-to-abutment interface. These detrimental occurrences can lead to bacterial colonisation with a "pumping effect"[26], screw loosening and breakages, as well as abutment fractures.

Implants with conical abutment connections seal well and provide better abutment fit and stability.[27] Zipprich et al. investigated the dynamics of micro-gaps and micro-movements of numerous brands and implant designs.[28] The results showed that the implants with precision conical connections (Ankylos and Astra Tech, Dentsply Sirona) performed superiorly to others and exhibited no measurable micro-movements and micro-gaps. A follow-up of that research indicated that the GC Aadva Standard implant also belonged to that group, showing no relevant micro-gap upon loading under the same conditions.[29]

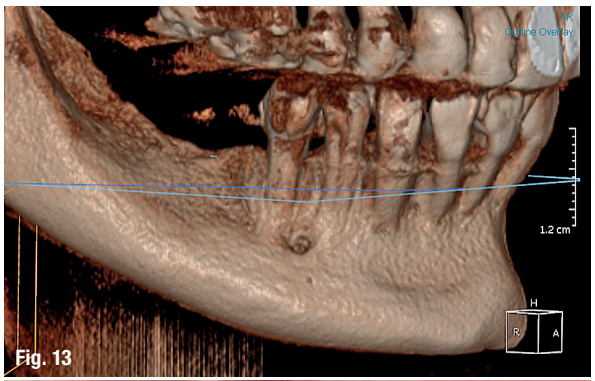

Fig. 13: CBCT reconstruction of a deficient ridge in the lateral mandible.
Fig. 14: Preoperative intraoral finding in the atrophic posterior mandible.

Application in demanding cases

In the following cases, we will demonstrate the use of GC Aadva Standard implants in biomechanically unfavourable conditions.

The highest load-bearing positions are posterior regions of the jaws. Posterior maxillary bone presents the highest risk for implant longevity. Owing to its spongious structure, the bone-to-implant contact in that region is the lowest in the mouth. Moreover, as it is prone to resorptive processes on the oral side, it is also prone to pneumatisation from the maxillary sinus side. In our clinical work, we often see maxillary sinuses reaching the alveolar crests, leaving little subantral bone for implant placement. The standard clinical approach in such cases is performing subantral grafts—sinus lifts.

Case 1

An example of the solving of such a case is shown in Figures 3 to 12. This case reports a middle-aged woman who had lost her natural teeth in the lateral maxilla owing to dental caries many years before. She was a non-smoker, performed good oral hygiene and had no history of periodontal disease or health-related issues. The atrophic posterior maxilla was further weakened from the inner side by sinus pneumatisation, which prevented conventional implant placement.

Therefore, we decided to perform a sinus lift by a lateral-wall approach. The Schneiderian membrane was elevated and protected with a collagenous high-density fleece (PARASORB Fleece Genta HD, RESORBA) to allow the placement of a xenogeneic bone graft in the subantral area (Figs. 3–6). Two GC Aadva Standard implants, one of 3.3 mm in diameter and 12.0 mm in length and the other of 4.0 mm in diameter and 10.0 mm in length, were respectively placed in the premolar and molar regions (Figs. 7 & 8). The access window was covered with an absorbable collagenous membrane (PARASORB RESODONT Forte, RESORBA) and the flap was sutured with a polyvinylidene fluoride (PVDF) monofilament suture (RESOPREN 6/0, RESORBA; Figs. 9 & 10).

After the uneventful integration period of six months, the implants were restored with a splinted, screw-retained metal-ceramic restoration (Figs. 11 & 12). This was done to minimise the stress in both the peri-implant bone area and on the implants themselves, all according to the previously discussed biomechanical facts.

Case 2

The lateral mandible is also a region of special biomechanical concern. While its structure is often beneficial for good implant stability and bone-to-implant contact surface, the anatomical landmarks and resorptive processes often impede conventional implant insertion. The inferior alveolar nerve, mental nerve and lingual notches are just some of the anatomical concerns.

It is not rarely seen that extensive horizontal and vertical resorption dictate augmentative procedures in this

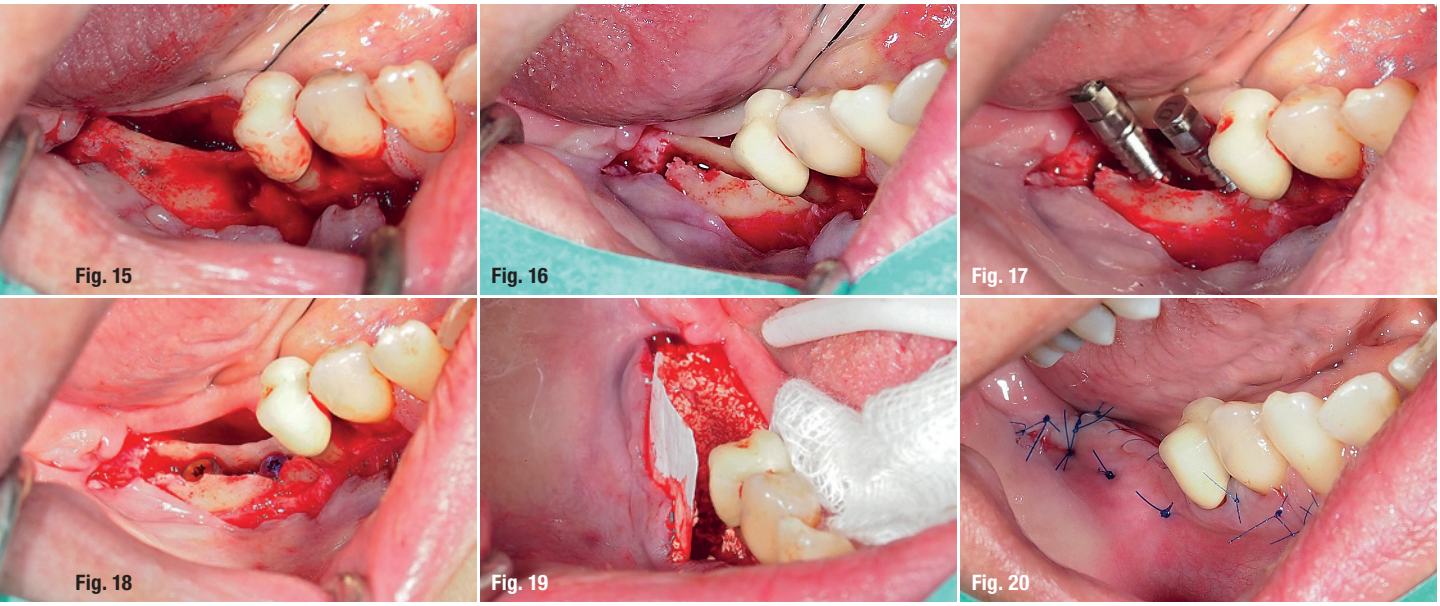

Fig. 15: Combination of full- and partial-thickness flap elevation. **Fig. 16:** Mandibular ridge splitting with vertical cuts. **Fig. 17:** Creation of space in between the buccal and lingual lamina with the intact attached periosteum on the buccal. **Fig. 18:** Placement of two GC Aadva Standard implants with regard to the future restorative margins. **Fig. 19:** Bone defect filled with xenograft and covered with an absorbable collagenous membrane. **Fig. 20:** Wound closure with monofilament sutures.

area. If the vertical bone dimension proves adequate and the future restorative margins lie in a favourable position with regard to the remaining crest, it is possible to predictably augment the bone and place the implants simultaneously by utilising ridge-splitting techniques. Otherwise, the use of guided bone regeneration, cortical shells, block grafts and other approaches is advisable to gain additional bone volume.

A demonstration of this technique is shown in Figures 13 to 20. This case presents an elderly woman who had lost her teeth in the lateral mandible decades ago. Being a healthy non-smoker with good oral hygiene, no history of periodontal disease and low masticatory forces, she was an adequate candidate for bone grafting together with implant placement. The future restorative margins allowed the usage of ridge splitting (Figs. 13 & 14). Therefore, we opted for a ridge split with vertical releases carried out utilising a partial-thickness flap. The periosteum was left attached in order not to impede the perfusion of the buccal plate (Fig. 15). After ridge splitting, the buccal and lingual plates were separated with the use of bone spreaders (Split-Control Plus, Meisinger) to allow the placement of two GC Aadva Standard implants, one of 3.3 mm in diameter and 8.0 mm in length and the other measuring 4.0 mm in diameter and 8.0 mm in length (Figs. 16–18).

The bone void was filled with a xenogeneic bone graft and covered with an absorbable collagenous membrane (Fig. 19). Closure was obtained by the use of a PVDF monofilament suture (RESOPREN 6/0; Fig. 20). Healing was uneventful and the final prosthodontic restoration was a premolar and molar splinted together for a more beneficial load transfer to the surrounding bone.

Conclusion

Understanding biomechanical concepts in implant dentistry is essential for the longevity of implants and their respective restorations. Patient-related factors, implant and restoration design, and implant placement itself influence the load transfer of the future assembly.

A quality implant selection will add to the long-term predictability of demanding procedures, as the implant-to-abutment interface is a highly dynamic point subjected to repetitive stress and strain. Contemporary implant design incorporating advantageous material and design traits lowers the detrimental effects of occlusal load.

Literature

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Mandibular dental reconstruction

Dr Lyndon Cooper, Dr Ghadeer Thalji, Dr Carly Park & Lee Culp, USA

The mandibular reconstruction described in the following case report was performed using the Astra Tech Implant System® EV and the SmartFix® concept (Dentsply Sirona Implants).

The patient selected to have her mandibular dentition comprehensively rehabilitated with an implant-supported fixed prosthesis utilising four implants. The remaining five teeth demonstrated a suitable vertical dimension of occlusion in centric relation with the occlusal plane providing acceptable phonetics and aesthetics (Fig. 1). A panoramic radiographic image was taken to record the dentoalveolar status at the time when the patient initially presented (Fig. 2). The previous, failed posterior fixed dental prosthesis was removed prior to definitive treatment planning.

Following cone beam computed tomography (CBCT) based planning, the patient's remaining mandibular teeth were extracted. Implant treatment planning was performed in the SimPlant software (Dentsply Sirona Implants) revealing the proposed position of the teeth in occlusion and the estimated position of anterior implants (OsseoSpeed EV) and posterior implants (OsseoSpeed Profile EV) within the confines of the proposed final prosthesis (Fig. 3).

After surgical placement of the four implants, an alveolectomy was performed using a pilot guide approach. In the next step the appropriate abutments were placed in a tilted anterioposterior configuration to increase distribution according to the "Rules of 10" by Cooper et al.[1] Thus the abutments were torqued to 25 Ncm. Anteriorly, straight abutments were used. Owing to its flexibility the polyether ether keton (PEEK) abutment holder was used to avoid the tongue and cheek and to confirm parallel alignment with the other three abutments (Fig. 4). Cylinders were then placed onto the abutments using the appropriate screws. According to the clinician's choice of opaque material the cylinders were filled with vinyl polysiloxane (VPS) impression material to protect the screws. Polymerisation sleeves were consequently placed on each abutment below the designated finishing line in order to protect the freshly sutured incision line (Fig. 5).

A CAD/CAM milled provisional was provided at the time of implant placement (Fig. 6). After attaching the prosthesis to the temporary cylinders using a closed mouth technique to assure its position in centric relation, the prosthesis was veneered with pink composite material to replicate mucosal and alveolar architecture. It was then attached to the abutments using Multibase EV Bridge Screws torqued to 15 Ncm (Fig. 7). Following this combined surgical and restorative treatment session a panoramic radiograph was taken revealing the alveolectomy, the relative implant positions, the angular correction using the posterior 17 degree multibase abutment and the general position of the radiolucent prosthesis (Fig. 8).

After eight weeks of uneventful healing, the relative health of the peri-implant mucosa was checked. The patient was extremely satisfied with the fit, function and aesthetics of the interim prosthesis (Fig. 9). The relatively immature nature of the mucosa and modest inflammation was observed on the alveolar ridge crest. The peri-implant mucosa adjacent to the abutments however proved to be well adapted to the cylinder margins and free of inflammation (Fig. 10).

In the next step a prosthetic guide was printed from the previously taken CAD/CAM files in order to design the milled poly(methyl methacrylate) (PMMA) prosthesis. The guide was used during surgery to assess the position of the implants and to help align the non-indexed 17 degree multibase abutments (Fig. 11). The occlusal view of the prosthetic guide demonstrated the orientation of the cylinders to the proposed prosthesis' occlusal table and incisal edges (Fig. 12).

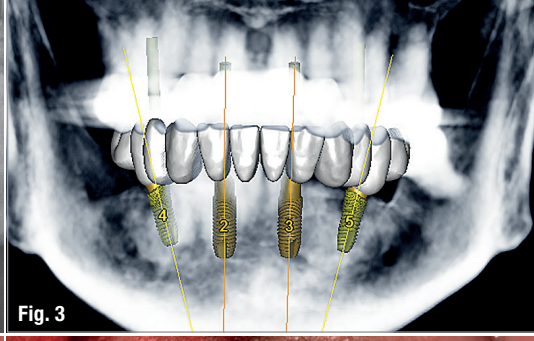
A final impression was taken within the prosthetic guide by attaching the cylinders to the prosthetic guide using flowable composite. The mucosa/prosthesis interface was subsequently impressed by washing the impression with low viscosity VPS impression material (Fig. 13).

After completing the impression step, the prosthetic guide was used to record centric relation, thus the position of the implants, the vertical dimension of occlusion and the centric relation could be accurately transferred to the laboratory. The incorporated tooth position and morphology provided the technician with all information regarding the planned (and desired) tooth position, phonetics and aesthetics (Figs. 14 & 15).

The final monolithic zirconia prosthesis was delivered and detailed supportive therapy instructions were provided. The practitioner should note that when proper alveolectomy is performed, the prosthesis will measure at least 10 mm in height. Further gingival ceramic should


Fig. 1


Fig. 2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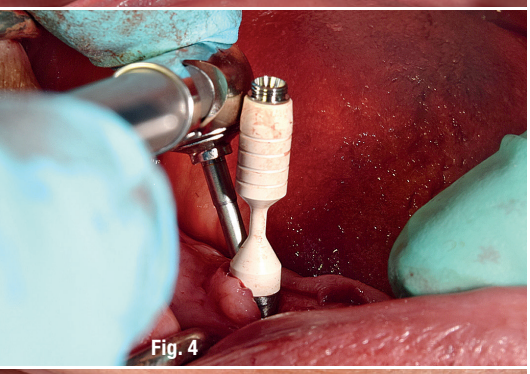
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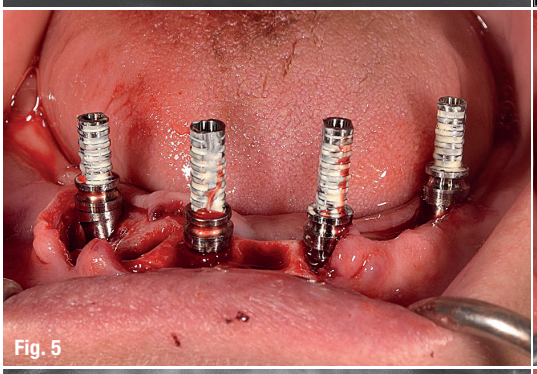
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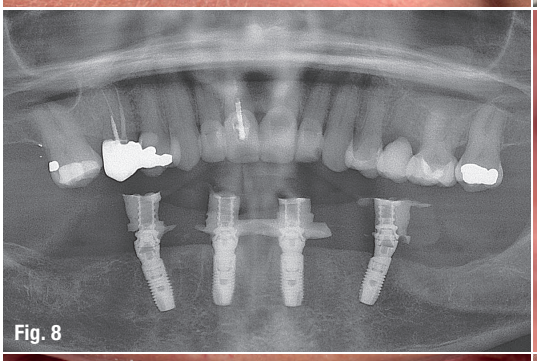
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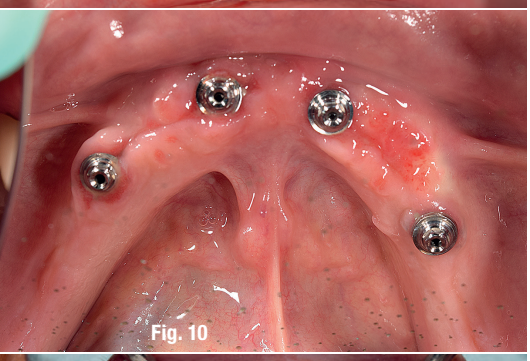
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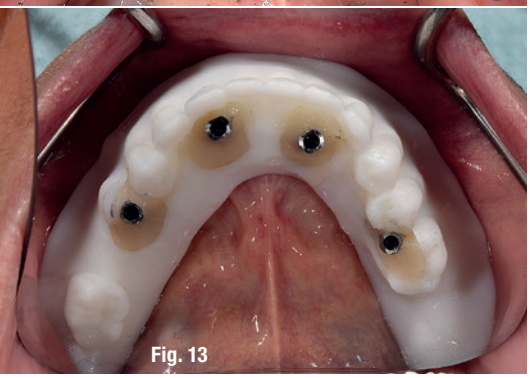
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Fig. 14

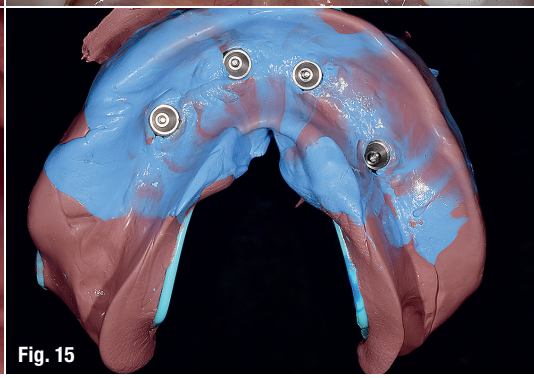
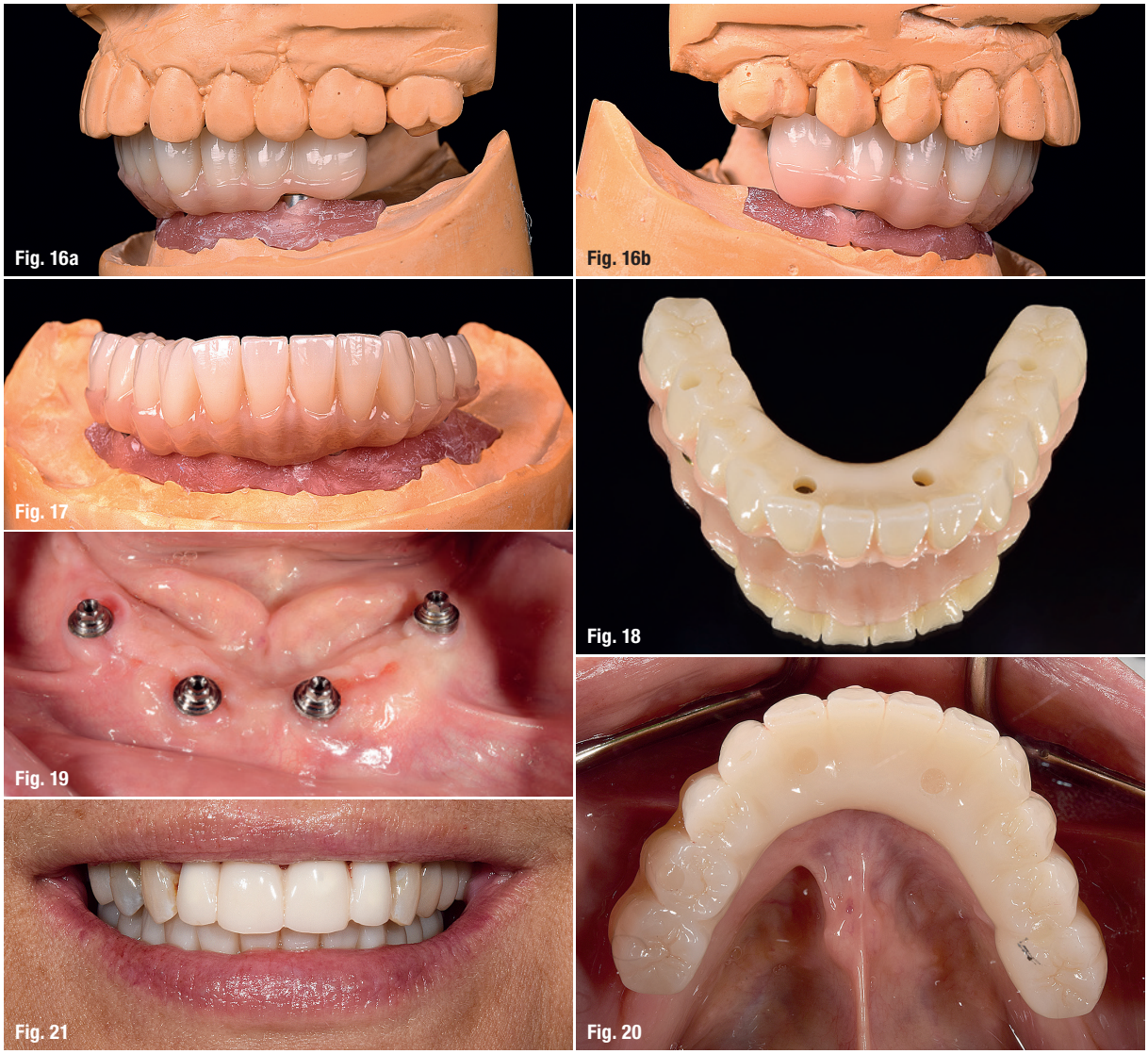


Fig. 15

Fig. 1: Intraoral appearance of the pre-treatment dental condition. **Fig. 2:** Panoramic radiographic image demonstrating the initial dentoalveolar status. **Fig. 3:** Implant treatment planning performed with SimPlant software (Dentsply Sirona Implants). **Fig. 4:** Multibase Abutment EV (Dentsply Sirona Implants) placed at a torqued of 25 Ncm. **Fig. 5:** Multibase EV Temporary Cylinders (Dentsply Sirona Implants) filled with VPS material placed onto the abutments. **Fig. 6:** Polymerisation sleeves placed on each abutment to protect the incision line. CAD/CAM milled PMMA provisional sitting loosely over the abutments demonstrating the correct alignment of abutment and cylinders. **Fig. 7:** Prosthesis attached to the temporary cylinders. **Fig. 8:** Postsurgical panoramic radiograph. **Figs. 9 & 10:** Eight-week postsurgical check-up: Peri-implant mucosa is well adapted to the cylinder margins and free of inflammation, modest inflammation on the alveolar ridge crest. **Fig. 11:** Prosthetic guide used during surgery for assessment of implant position and to help align the abutments. **Fig. 12:** Occlusal view of the prosthetic guide. **Fig. 13:** The prosthetic guide being used for final impressions. **Fig. 14:** Prosthetic guide used for recording centric relation. **Fig. 15:** Intaglio surface view of the copings picked up in an open-tray impression using a stock dentate impression tray.



Figs. 16a & b: Buccal view of the final monolithic zirconia implant-supported fixed prosthesis with veneered gingival ceramic (Lee Culp, Sculpture Studios). **Fig. 17:** Facial view of final prosthesis. **Fig. 18:** Occlusal view revealing bulk of material designed to assure long-term function. **Fig. 19:** Progressed oral mucosal healing and keratinized tissue surrounding the abutment–cylinder interface upon final prosthesis delivery. **Fig. 20:** Intraoral occlusal view of the final prosthesis following delivery. **Fig. 21:** Facial view of the patient's smile upon delivery of the mandibular prosthesis.

be displayed beneath the cervical contours of the mandibular teeth (Figs. 16 & 17). The bonded titanium cylinders within the monolithic zirconia prosthesis are a critical bonding step that must be performed with care (Fig. 18).

At the time of final prosthesis delivery, the oral mucosal healing had progressed. The patient's hygiene efforts had improved and the peri-implant mucosal architecture included the presence of keratinized tissue surrounding the abutment–cylinder interface (Fig. 19). The occlusion demonstrated bilateral symmetric contacts with the maxillary natural dentition as verified using shim stock. Only minor polishing was required to achieve this result. The screw access holes were filled with Teflon tape and colour-matching flowable composite resin in order to achieve a maximum aesthetic result (Figs. 20–22).

Literature

1 Cooper, L., Limmer, B. et al. "Rules of 10" – Guidelines for Successful Planning and Treatment of Mandibular Edentulism Using Dental Implants. Compendium May 2012; 33(5):328–34.

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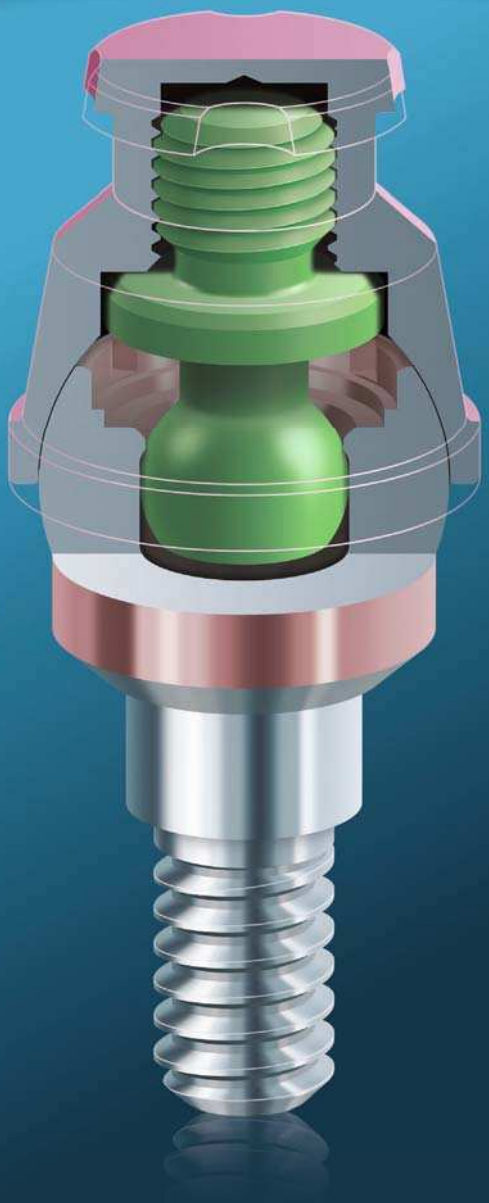

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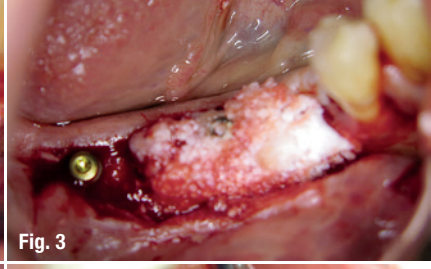
Fig. 1


Fig. 2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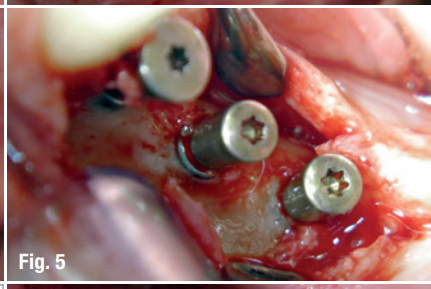
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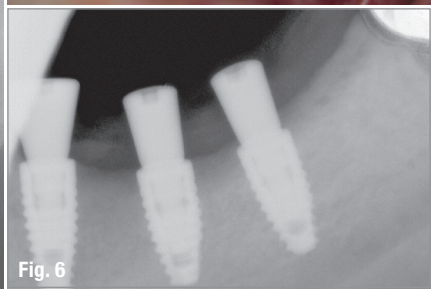


Fig. 6


Fig. 8

Case 1 – Fig. 1: Initial situation: severe bone defects and implant *in situ*. **Fig. 2:** Micro-osteoperforation in order to enhance bone formation. **Fig. 3:** 3-D modelling of NanoBone. **Fig. 4:** Application of pericard membrane. **Fig. 5:** New bone around implants. **Fig. 6:** Detail of new bone formation. **Fig. 7:** Situation after treatment. **Fig. 8:** Final situation.

Guided bone regeneration in smokers

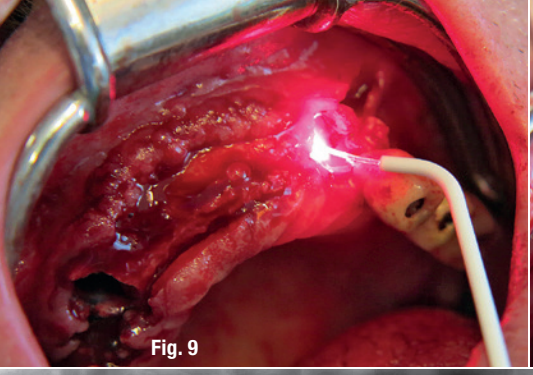
Use of synthetic bone blocks

Dr Dr Branislav Fatori & Dr Inge Schmitz, Germany

Bone grafts are used as a filler and scaffold to facilitate bone formation and promote wound healing if necessary. Bone grafting is possible because bone tissue has the ability to regenerate completely if the space into which it has to grow is provided.

Today, guided bone regeneration (GBR) has become more predictable owing to advanced augmentation techniques and is a standard in dental implantology. Success depends on the defect morphology, but the importance of ridge morphology must not be underestimated. An adequate therapy has to be used in every individual case, and critical factors must be assessed and controlled. Primary wound closure, clot stability and angiogenesis are important factors that influence implant healing. Complications can occur in late and early stages of treatment and may be based on biomechanical, prosthetic and biological reasons. Even contaminations found on implants increase the risk of implant failure.

GBR is in general critical for use in smokers owing to reduced wound healing and vascularisation. Three case reports in which we used GBR in heavy smokers are presented here. Additionally, vertical, horizontal or 3-D mandibular augmentation in the posterior mandible was done, and this required particular experience and increased the risk of failure. The rate of implant failure is greater among smokers than in non-smokers and there is a tendency to a higher failure rate with the increasing number of cigarettes per day. One of the authors has substantial experience in treating smokers and has well-founded knowledge of placing dental implants for more than 30 years with a low rate of implant failure.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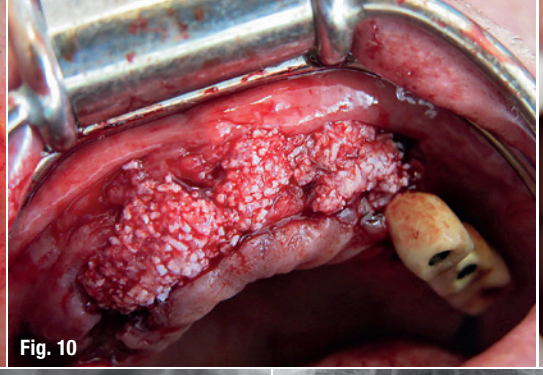


Fig. 10


Fig. 12


Fig. 11


Fig. 13

Case 2 – Fig. 9: HELBO laser therapy in order to reduce bacteria. **Fig. 10:** 3-D augmentation using NanoBone. **Fig. 11:** Post-op dental panoramic tomogram. **Fig. 12:** Screwed on superstructure. **Fig. 13:** Dental panoramic tomogram showing superstructure.

Smoking

Reports in the literature show lower survivability of dental implants in smokers.[1,2] One possible mechanism by which smoking might affect osseointegration is a lower blood flow rate owing to increased peripheral resistance and platelet aggregation. Tobacco directly affects osteoblast function. In general, smoking is a main risk factor for failure. If smokers are treated with implants, good bone quality is necessary. Excellent primary stability was gained in all the cases reported on here.

Case presentation

Three patient cases are presented here in detail. The patients were treated according to our new protocol that we developed especially for extreme smokers between August 2015 and July 2017. In total, 12 implants were inserted. The patients were all heavy smokers, but were in good physical condition and had very good oral hygiene.

The first was a 51-year-old patient who smoked 30 cigarettes per day and suffered from diabetes and stress (Figs. 1–8). The second was a 76-year-old male patient in good physical condition who smoked 40 cigarettes per day. He underwent reconstruction of the premaxilla (Figs. 9–13). The third was a healthy female patient of 24 years of age who smoked 20 cigarettes per day. She required a sinus lift in region #25 (Figs. 14–21). The patients were informed of the intended process in detail and signed the surgical protocol containing information concerning possible risks of failure and complications, as well as information on the alloplastic and synthetic materials to be used.

Patient diagnostics

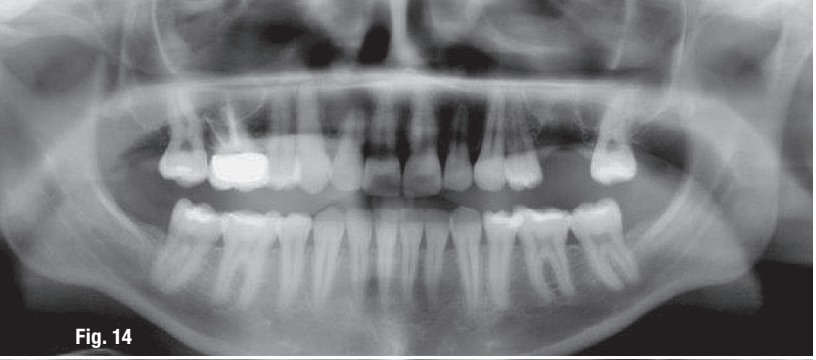
The smokers were treated owing to atraumatic age-related root fractures, advanced caries, periodontitis, trauma or failed endodontic treatment. The patients were treated in our private practice by the same surgeon. None of the patients had uncontrolled severe diabetes, drug addiction or alcoholism. Pre-implantation diagnostics was performed in all three cases.

Surgical phase

Implant placement was performed under local anaesthesia after pre-medication with antibiotics. The osteotomy was extended gradually, according to the intended implant diameter. After the incision, the site was cleaned and necrotic or inflammatory tissue was removed. Osteotomy sites were prepared with a sequential order of drills as recommended by the manufacturer. Implants were inserted into the prepared osteotomy sites at an insertion torque of 45 Ncm and adequate primary stability was obtained. Suturing was performed with a 4/0 thread (RESORBA Medical).

After four weeks, a site-specific full-thickness flap was raised buccally in Case 3 by vertical releasing incisions without including the papillae of the adjacent teeth (Figs. 16–19). In the aesthetic zones, no vertical incisions were made. In order to optimise the situation of the soft tissue, we placed a pedicle flap (connective tissue graft from the palate). After atraumatic flap elevation, the granulation tissue was removed.

The patients were treated with HELBO light laser therapy (bredent medical) in order to minimise bacteria (Fig. 9). The tapered implants (Hager & Meisinger) were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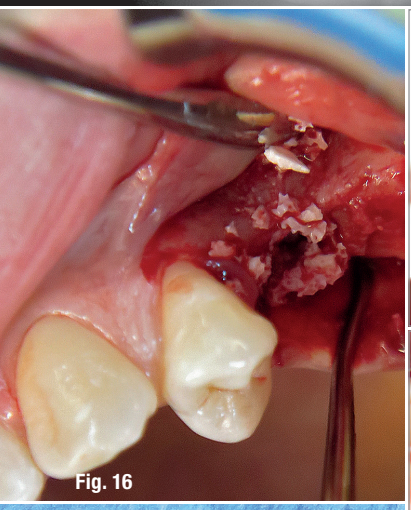
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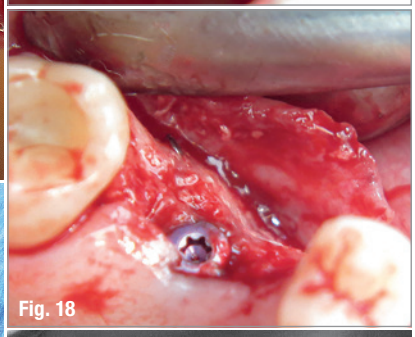
Fig. 17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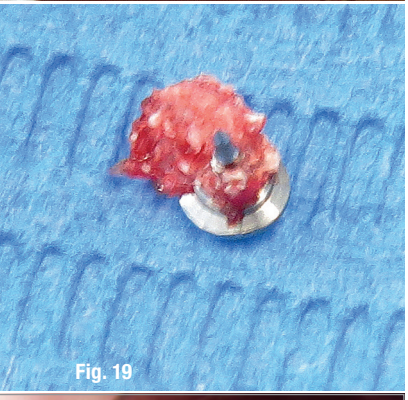
Fig. 19


Fig. 21

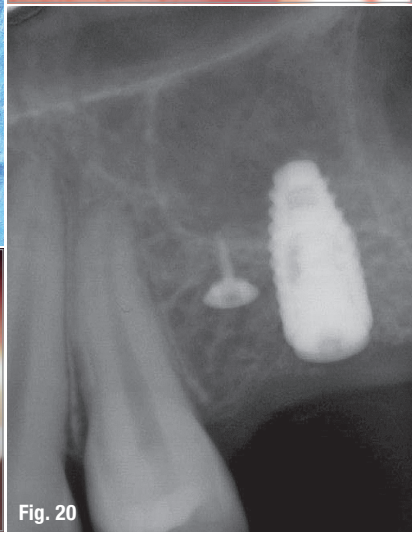
Fig. 20

Case 3 – Fig. 14: Dental panoramic tomogram of initial situation. **Fig. 15:** Implant fixed with pins. **Fig. 16:** Augmentation and sinus elevation. **Fig. 17:** Use of membrane. Pins visible. **Fig. 18:** New bone around implant. **Fig. 19:** Pin embedded in new bone. **Fig. 20:** Integrated implant. **Fig. 21:** Final situation.

placed in the optimal positions. After placing the cover screws, augmentation was performed using resorbable alloplastic material.

In two cases, a thickness flap was raised after 12 weeks in order to access the cover screw. In 85 % of cases implant stability was evaluated using resonance frequency analysis (Osstell ISQ). A healing abutment was placed and the flap was sutured using 4/0 sutures (RESORBA Medical). Finally, after nearly two weeks, a titanium abutment was placed and a cemented metal-ceramic restoration was fabricated.

Medication

After microbiological examination, antibiotics (Clindamycin Aristo 600, Aristo Pharma) were given t.i.d. and later b.d. until surgery. Mouth rinsing with Chlorhexamed (GlaxoSmithKline) was performed.

Local anaesthesia was performed with Ultracain D-S forte (Hoechst). Each implant was wet with hyaluronic acid or the patient's own plasma. After completion of the surgery 40 mg of Dexa-ratiopharm (Ratiopharm, IM) was injected.

After surgery, 20 mg of Prednisolon (Jenapharm) was prescribed (one tablet t.i.d., then half a tablet t.i.d. and finally a quarter of a tablet t.i.d.). In order to minimise swelling five arnica globules were given.

Postoperative treatment

Postoperative intraoral periapical radiographs were taken, to confirm the accuracy of the implant placement. Postoperative medications included antibiotics.

Digital radiographic images were taken at the time of surgery, 24 hours postoperatively and one month later in order to evaluate implant success (Figs. 6, 7, 11, 13, 15 & 20). In none of the patients inflammatory processes were found and all implants remained stable.

Abstention from smoking should be extended at least eight weeks after the implantation in order to permit the healing phase of the osteoblasts to take place.

Follow-up examination

Follow-up examinations were performed according to the criteria of Albrektsson et al. and Buser et al.[3–5] These success criteria for implants are widely cited and generally accepted. A lack of osseointegration is commonly distinguished by implant mobility and radiolucency. The criteria used describe the absence of persistent subjective complaints, such as pain, foreign-body sensation and/or dysaesthesia; absence of recurrent peri-implant infection with suppuration, of mobility, of continuous radiolucency around the implant; and the possibility for restoration.

Bone grafting

Bone grafting is a surgical procedure that replaces missing bone with material from the patient's own body or an artificial, synthetic or natural substitute. The diverse options available are summarised as follows:

- *Autologous* or autogenous bone grafting involves utilising bone obtained from the individual receiving the graft. Autologous bone grafts are regarded as the gold standard.[6] Their use can, however, evoke many problems, such as painful wounds and operation risk if intraoral bone is not available.
- *Allograft* is derived from humans, and the use of allografts for bone repair often requires sterilisation and deactivation of proteins normally found in healthy bone. Allogeneic materials are rather expensive.
- *Xenografts* are bone grafts from a species other than human, such as bovine.
- *Alloplastic* grafts are synthetic and may be made from hydroxyapatite. Alloplasts like NanoBone (Artoss), CERASORB (curasan) and Gore-Tex (W. L. Gore & Associates, USA) can be used for small defects; for larger defects, membranes will additionally be necessary.
- *Growth factors* can enhance graft integration. Growth factors bind to receptors on cell surfaces and stimulate the intracellular environment to act. The addition of bone morphogenetic proteins 2, 4 and 7 to the culture media can also influence the stem cells towards osteogenic lineage.

GBR technique

In our cases NanoBone, pericard membrane (imperiOs) and autologous bone chips were used for augmentation. NanoBone is an efficient nano-structure nano-crystalline hydroxyapatite embedded in a highly porous silica gel matrix. NanoBone is a safe product and stimulates the formation of collagen and bone. As an effect, many osteoblasts are seen in the early stage of regeneration. NanoBone has been on the market three years in the form of putty. NanoBone putty has a high consistency and is optimal for use to rebuild vertical bone. In general, no additional membranes are necessary. Its special structure results in rapid bone formation. As the osteoclasts resorb the granules, NanoBone is completely substituted by bone and no foreign substances will influence natural biomechanics.

Alternatively, NanoBone block material is now on the market and is a safe and rapid solution for block augmentation. Animal studies have shown that it induces quick bone formation. It offers an alternative to autogenous bone blocks for improving the implant bed in the case of vertical and horizontal bone deficits. In two patients with defects of the lower jaw, NanoBone block was used to optimise horizontal defects. NanoBone material was fixed with CAMLOG screws and a collagen membrane was used (RESORBA Medical).

Results

Five of the 12 inserted implants were lost. In Case 1, implants were not osseointegrated owing to peri-implant infection. The patient was a heavy smoker with diabetes and stress as co-reasons for implant failure. In two of the cases, we saw new bone covering the screws. After 12 weeks, the defects were filled with new bone. In Case 1, GBR was again necessary around one implant.

Discussion

Final evaluation of the success of NanoBone (putty, granulate and blocks) can only be done after clinical and histological results have been completed. A mixture of 30 per cent of NanoBone putty and 70 per cent of autologous bone chips has shown good results and been described as the gold standard in the literature.[6]

We have experience of using NanoBone in the treatment of alveolar ridge defects (Cologne Classification of Alveolar Ridge Defects). It has still to be proven if our technique has the same positive results as other techniques.

Conclusion

NanoBone blocks and putty show a high success rate. From our point of view, the material can be evaluated as very good and comparable to other products on the market.

Literature

Editorial note: The authors disclosed that they have no conflict of interest and that the patients agreed to their data being published.

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Implant digital workflow opportunities

Dr Ross Cutts, UK

Whether we like it or not we are embracing the digital era in our brave new world. Many dental practices are now becoming paper free—a digital innovation—and even using tablet computers to record patient details and medical histories. We are continually surprised by the rising age of the technologically savvy patient, particularly those of a certain generation that perhaps we assume to be less "digital" than the perceived smartphone generation. This change in patient demographic and attitude towards technology is filtering through to us in the dental profession.

Fig. 1: Printed models.

Dental implantologists tend to lend themselves more readily to the digital revolution of dentistry in the UK and globally. Many practitioners opposed to or reluctant to embrace it, are actually being influenced by it from shifting workflows in dental laboratories even where more traditional clinical practices are followed chairside. Quite often wet impressions are poured, and stone models are scanned to produce digital stereolithography (STL) files for laboratories to process during crown and bridge unit manufacturing.

As an implant clinician you do not have to invest in a computer tomography (CT) scanner or chairside intraoral scanner—there are ways that other centres and laboratories can provide these services—however having these tools at your disposal greatly increases your efficiency and you are not relying on external services for your patients.

So how do we begin the implant digital workflow?

Treatment planning

Successful implant treatment begins with thorough case assessment and planning of the proposed restoration. This is important for all cases not just what we deem the complex ones, even the most experienced implant placer can miss a potential treatment planning hazard especially during a busy day.

Accurate study model casts are an essential part of this, however we can now use intraoral scans preoperatively to begin the digital workflow. We take a scan rather than impressions to form digital models. Our laboratory

can then use these to create digital wax-ups of proposed treatment outcomes (Fig. 1).

We are routinely used to 2-D radiograph imaging techniques within dentistry but with the availability and access to cone beam computed tomography (CBCT) scanning devices now we are able to assess bone quantity and quality of proposed implant surgical sites (Figs. 2 & 3). With ever reducing doses of 3-D imaging and improving accuracy we have the option to use CT

> "If you fail to plan—
> then you plan to fail."
> Benjamin Franklin

scans combined with clever software packages such as coDiagnostiX™ (Dental Wings) to plan safe and accurate implant placement and restoration. We are able to preoperatively plan precise implant placement with safe surgical margins away from important anatomical structures such as the inferior alveolar nerve or maxillary sinus. From this we are then able to design and either mill or print a surgical guide to use for precise implant placement (Figs. 4–6).

Surgical treatment phase

Even with assisted or guided surgery there are sometimes certain restrictions that prevent us from achieving the most ideal implant placement, such as in the case presented here, where posterior access in the second molar region is reduced, making it extremely difficult to achieve the perfect parallel (Figs. 7 & 8).

There are fully guided systems available which allow for absolutely precise implant placement, but these are fraught with complexities and should be reserved for experienced placers. The accuracy of surgical guides should not be used to make up for a lack of surgical competency.

There are many factors to be considered when using surgical guides, depending on whether the guide is tooth-, soft-tissue- or bone-supported. Tooth-supported allows the greatest degree of accuracy.

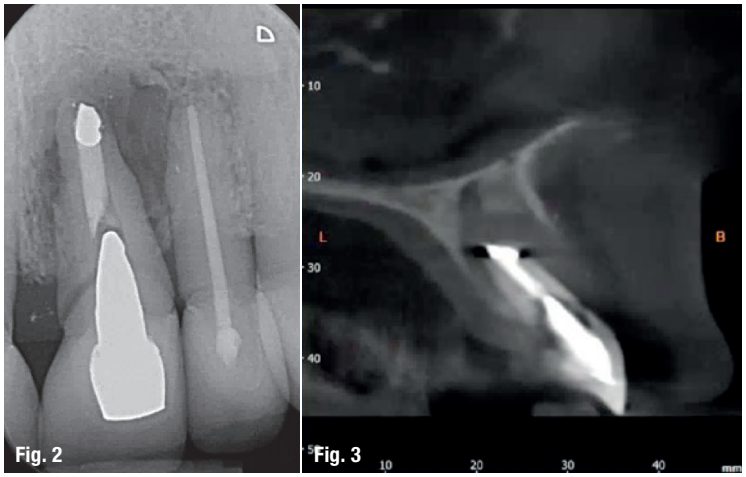

Fig. 2: 2-D radiograph. **Fig. 3:** 3-D radiograph.

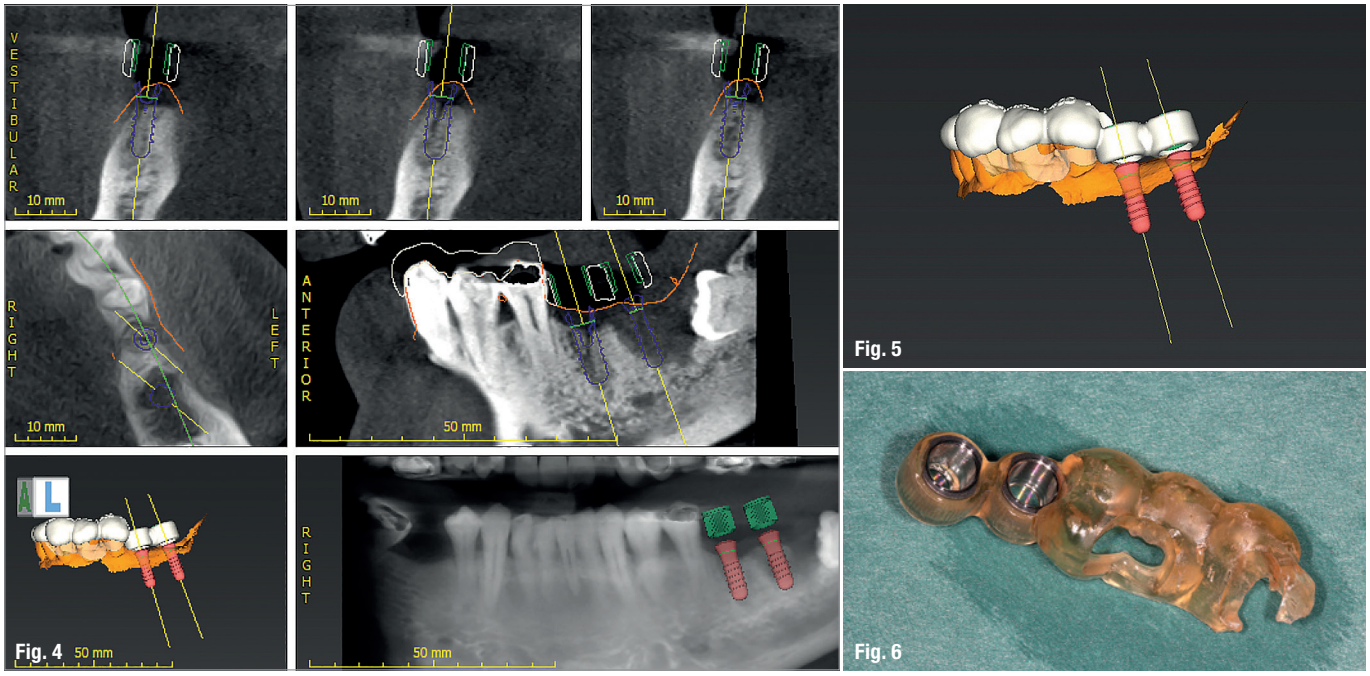

Fig. 4: coDiagnostiX™ screenshot. **Fig. 5:** coDiagnostiX™ screenshot of guide production. **Fig. 6:** Printed surgical guide.

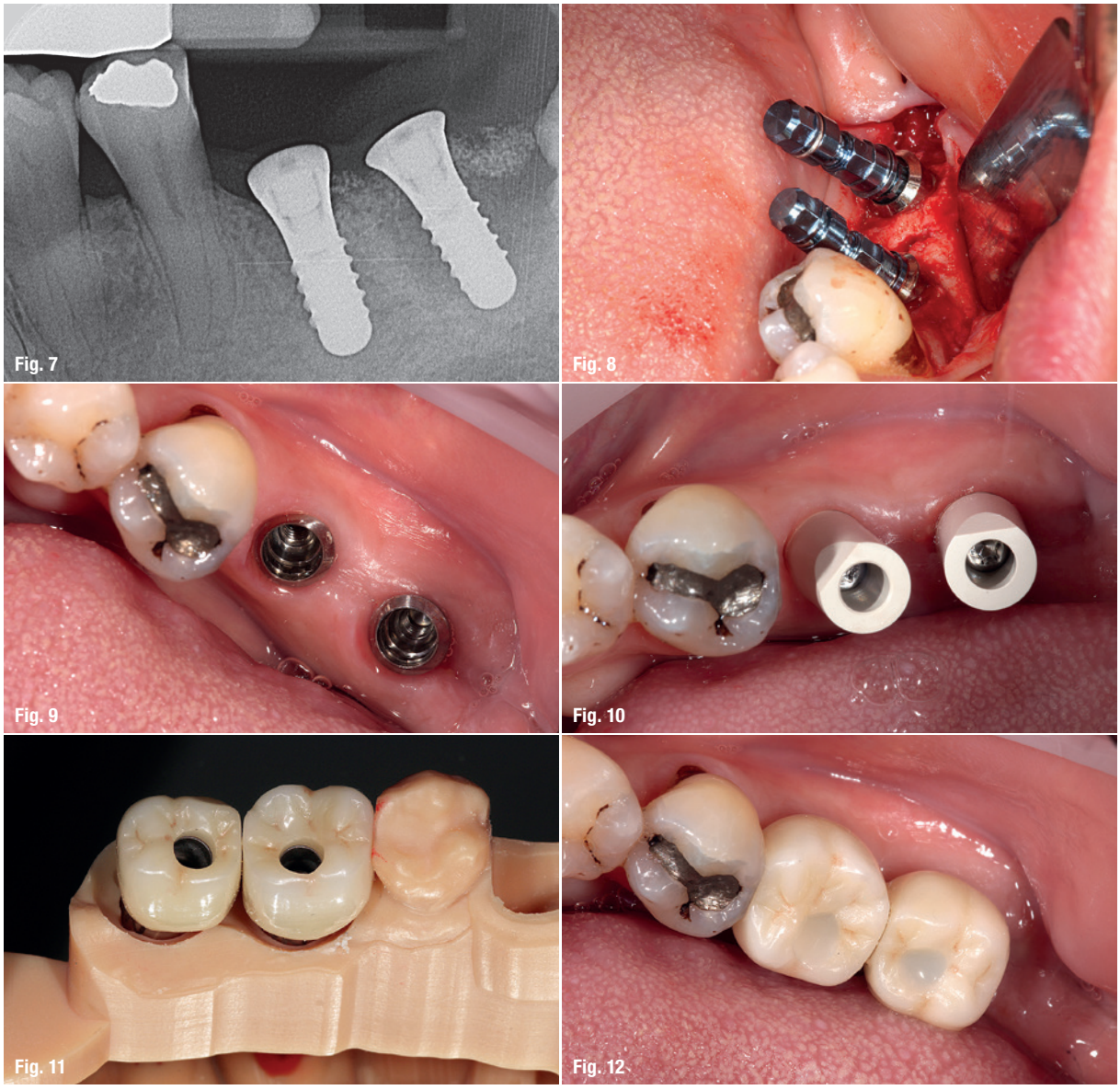

Fig. 7: Postoperative radiograph of implant placement. **Fig. 8:** Surgical placement of LL67 implants. **Fig. 9:** Tissue-level implants. **Fig. 10:** Scanbodies. **Fig. 11:** Crowns on printed model. **Fig. 12:** Crowns *in situ*.

If tooth-supported:
- Are there windows in the guide which demonstrate full seating of the guide?
- Are the teeth which support exact positioning of the guide mobile? Any mobility adds a degree of inaccuracy.
- Is the guide made from a direct intraoral scan or a scan of a study model? If scanning a study model, would this be an accurate stone model representation? Otherwise one could risk poor seating and inaccuracy of the guide.

If soft-tissue-supported:

Mobility completely negates any accuracy of the guide, so it should only be used for a pilot drill and then a more conventional surgical protocol should be adopted.

If bone-supported:
- Raising a very large surgical flap is likely.
- It is very difficult to get accurate full seating of a bone-supported guide in the precise planned position, thus one has to rely upon external fixation.

Prosthetic reconstruction

Once the implants are placed *in situ* and fully integrated we then have the option to choose between conventional wet-impression techniques and digital intraoral scanning devices. For the majority of cases intraoral scanning is extremely predictable and reliable—more so than conventional techniques—with milled (and lately printed) models having excellent properties and fewer accumulation of processing errors. However deeply placed

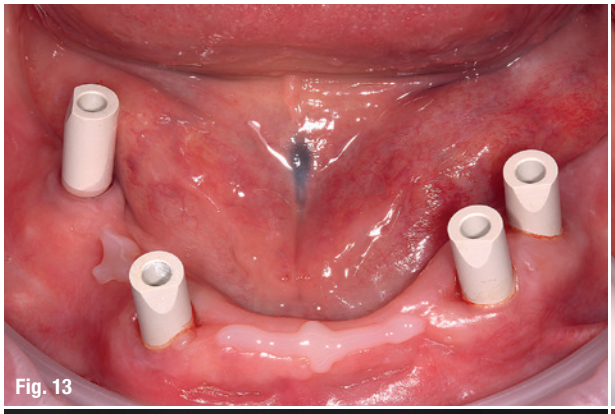
Fig. 13

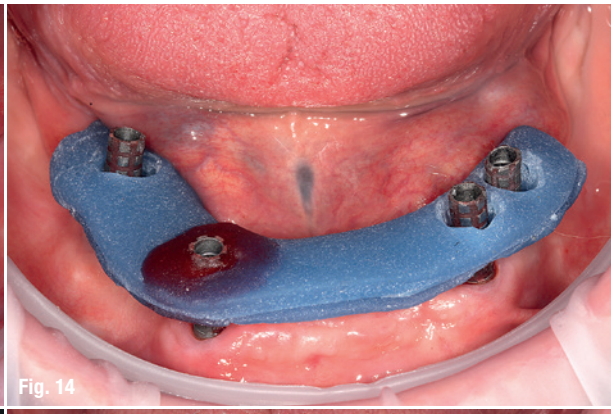
Fig. 14


Fig. 15


Fig. 16

Fig. 13: Composite flow material used to increase scanning reference points. **Fig. 14:** Verification jig locked *in situ* to verify passive implant positioning. **Fig. 15:** Createch framework showing the fit surface. **Fig. 16:** Final metal-ceramic bridge *in situ*.

implants, relative to adjacent teeth with deep contact points, are very difficult to scan and pick up. Straumann tissue-level implants offer a very straightforward restorative platform to scan from (Figs. 9–12).

With greater numbers of implants and fewer teeth to act as reference points intraoral scanning becomes less reliable, particularly across the arch. Therefore, we need to act with caution and be aware of its limitations. We have used composite flow stuck to the soft tissues to increase reference points for our scanners increasing their ability to stitch images more accurately together. With this in mind we cannot assume the scan to be accurate and any framework fabricated would be non-passive, we therefore are obliged to use other methods to verify the scans accuracy. We have found locking temporary abutments within a composite framework intraorally the easiest and most reproducible way to do so. It then allows us to design and mill a truly passive framework by Createch and a temporary acrylic bridge (Figs. 13–16).

Conclusion

There are many opportunities to opt in and out of using technology regarding the digital implant workflow. For anyone considering capital investment, the most important question to ask is, how will or can this improve the outcomes I provide to my patients and then determine whether that warrants the expenditure. Too often we are subjected to sales pitches of the next biggest thing by company sales representatives and gadgets and gizmos end up by the wayside.

Acknowledgements to Andy Morton and Ian Murch, the fantastic laboratory technicians at Borough Crown and Bridge, that I work closely with.

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Fig. 1

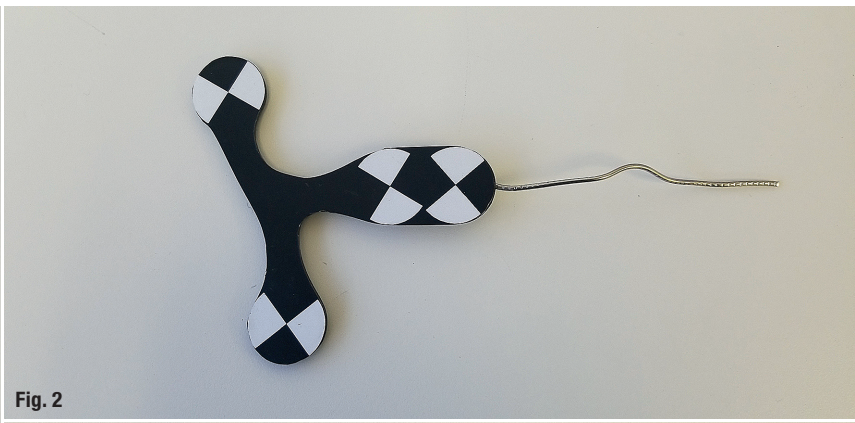


Fig. 2

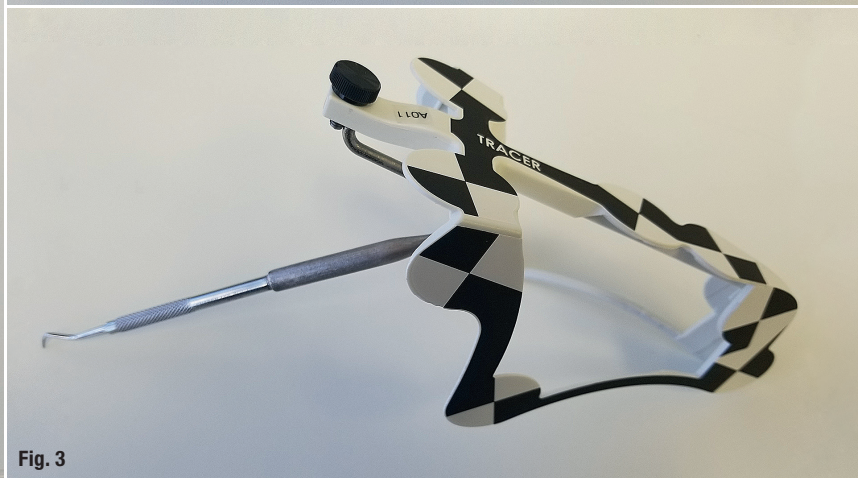


Fig. 3

Fig. 1: Trace registration Head-Tracker. **Fig. 2:** Trace registration Jaw-Tracker. **Fig. 3:** Trace registration tracer tool.

Dynamic navigation by innovative registration

Dr Ricardo Henriques, Portugal

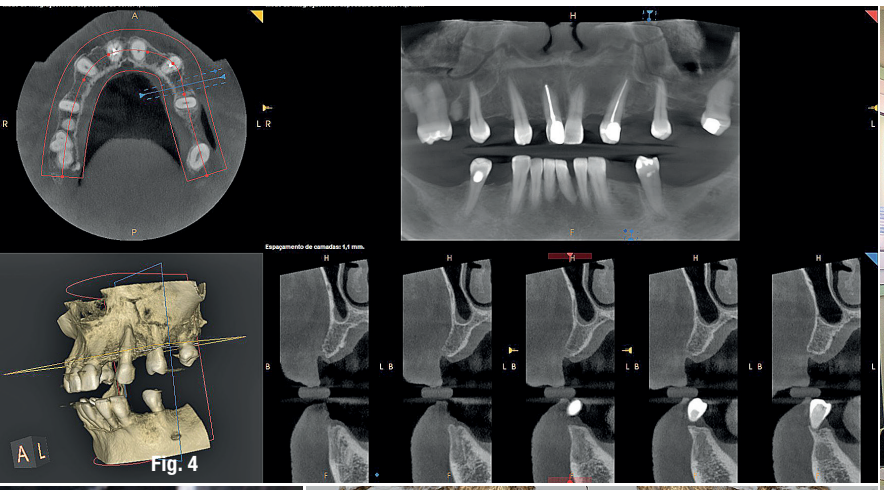
Background

3-D implant planning and mapping that plan to the real surgical environment are two important steps in implant rehabilitation.[1,2] Misplaced implants can create difficult aesthetics, functional and biological problems and can result in implant loss.[3–5]

There are three ways to transfer a planned implant's position into the real patient's jawbone:
1. mental navigation, so-called freehand navigation,
2. static navigation using surgical templates,[6] and
3. dynamic navigation using a stereoscopic camera.[7,8]

The freehand approach is totally dependent on the surgeons' experience, skills and mindset during treatment and creates the highest deviations compared to the other approaches.[2]

The usage of surgical templates provides a higher accuracy compared to freehand surgery, but has a few limitations, such as the inability to modify the plan once the surgical template has been manufactured. Surgical templates require longer drills which can make their use quite difficult or even impossible. Other concerns are irrigation issues and incompatibility with advanced surgical protocols.



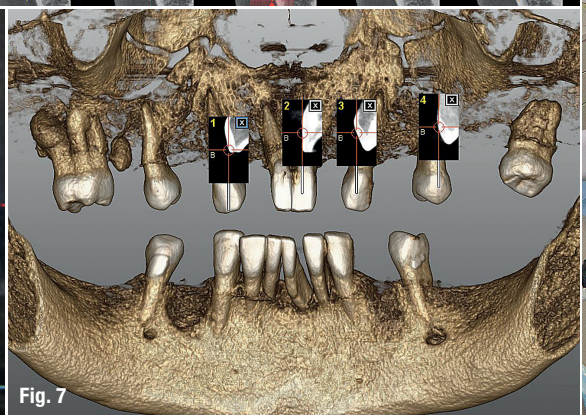


Fig. 4: CBCT image made using a standard protocol (without radiographic marker). **Fig. 5:** Prosthetic implant plan using the Navident software. **Fig. 6:** Modified implant plan with six-degree vestibular angulation. **Fig. 7:** Navident trace registration user interface.

Dynamic navigation is, at present, the most effective way to transfer the planned implant's position to the real patient as it guides the surgeons' motions using real-time feedback. It is especially useful to reduce flapped procedures with the advantage of improved soft-tissue healing, patient comfort and reduced bone resorption. Dynamic navigation allows planning modifications at any time, even during treatment, and can be used in cases with limited mouth opening or in combination with osseodensification drills.

The dynamic navigation concept using trace registration

In this approach, the patient's jaw and the surgical drill's location are being tracked by the navigation system's tracking camera, using special tags affixed to them. To correspond between the physical patient's jaw and its on-screen cone beam computed tomography (CBCT) scan representation, the tag installed on the patient's jaw must be mapped with the CBCT scan. The mapping of the trackable jaw tag to the CBCT scan is called registration. Traditionally, the patient would have to be CT-scanned with an artificial radiographic marker, also known as "fiducial", which has to be later identified in the CT images by the navigation system's software in order to enable the registration.[7]

The innovative trace registration method (Navident, ClaroNav) eliminates the need for this artificial fiducial body to be present in the image, by replacing it with natural high-contrast surfaces, such as tooth crowns or abutments already present in the image. Therefore, it eliminates the need for patient exposure to a new dedicated CT scan with a fiducial. The level of radiation is an important issue in diagnosis.[9,10] This new method also eliminates the need to have a special stent prepared to couple the fiducial or trackable tag to the jaw in a highly stable and repeatable manner, which was previously essential for the performance of accurate navigation.

To treat the maxilla, a pattern tag, or Head-Tracker, is positioned on the patient's head like glasses with contact points that don't move with patient muscle contractions or lower jaw movement (Fig. 1). This ensures that the Head-Tracker maintains a stable relationship with the skull, and thus the maxilla. For the mandible, another pattern tag, called Jaw-Tracker, is temporarily connected to one to two teeth using dual-cure composite resin (without etching the teeth to allow for easy removal; Fig. 2).

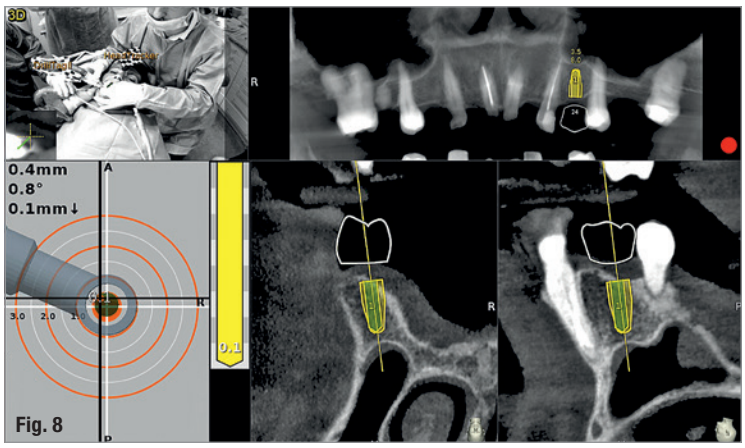


Fig. 8: Dynamic surgical guidance using Navident.

This Jaw-Tracker can also be used for the maxilla instead of the Head-Tracker.

The surgeon chooses four to six identifiable landmarks on structures which are rigidly attached to the jawbone (teeth, abutments) and are easily visible in the CBCT scan. In the next step, the surgeon traces a path on the surface of each one of the marked structures with a tracer tool, also tracked by the camera (Fig. 3). The system collects 100 points on each one of the traced structures, and optimally matches them to the CT image data to register the Head-Tracker or Jaw-Tracker, with the patient's maxillary or mandibular CBCT scan, respectively.

Advantages of trace registration

The most important advantages of the trace based over the fiducial/stent-based registration method are:

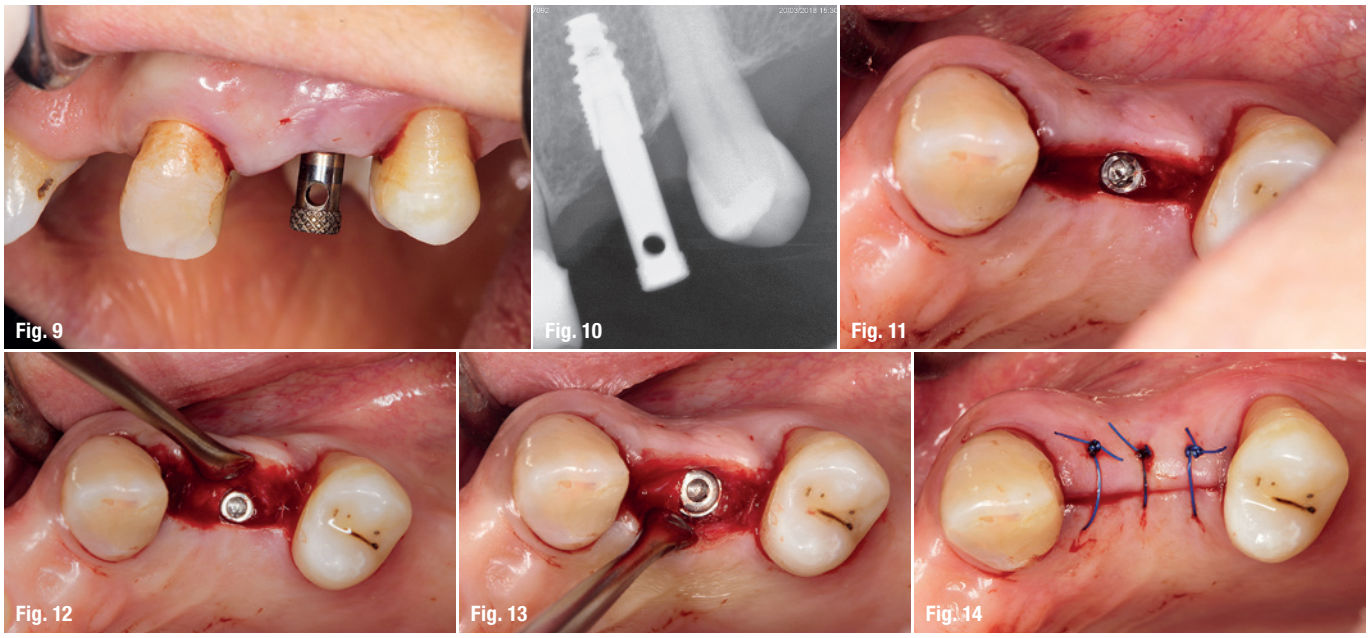
1. No need to design and fabricate a stent or guide in advance, eliminating the associated preparation time and effort, as well as the potential risk for inaccuracy due to improper seating of the stent during the scan or procedure.
2. An existing CBCT scan can be used, there is no need for a special scan with stent and fiducial(s). The scan may be taken in full occlusion resulting in easier digital prosthetic planning.
3. No stent or guide is in the patients' mouth during treatment, allowing the same access space in the oral cavity during surgery as with a freehand approach.

Possible limitations

1. At least four high-contrast structures fixed to the jaw bone must be available and accessible for tracing. These can be teeth, abutments, bone screws, orthodontic brackets and wires, or similar structures. With fully edentulous patients, regions of the jaw bone itself may be exposed and used as landmark regions.
2. Each of the traced regions should not have changed in appearance or location relative to the jaw bone since the scan was taken. If guidance is critical and changes to the jaw such as changes in teeth position are a concern, a fresh scan prior to surgery is advised.

Case presentation

The treated patient was a 54-year-old female with a removable prosthesis, who wished to have a fixed solution. The patient was a non-smoker without medical problems. Intraoral examination revealed the absence of tooth #24 and bone resorption where the teeth had been extracted.



Figs. 9–14: Surgical result as virtually planned.

Planning procedure

A CBCT scan was taken without any radiographic marker (Fig. 4). The images were taken with a Carestream 8100 3D (Henry Schein). The field of view used was 80 x 90 mm and a voxel size of 150 µm. The exposition parameters were 84 kV and 4 mA.

The images were analysed and converted into DICOM files and then converted into a 3-D virtual model by the Navident software. A virtual crown and implant were planned to have 2 mm of buccal bone and a restorative space at the centre of the crown (Fig. 5). The virtual implant planning was then modified creating an angulation of six degrees in vestibular direction, so the surgeon would be guided to initiate bone preparation with a six-degree vestibular angulation (Fig. 6).

Surgical procedure

Local anaesthesia was performed in region #24 and aseptic and sterile conditions were applied to prevent infections. The Head-Tracker was positioned and inspected for stability. Trace registration was performed by marking four landmarks on teeth using a panoramic 3-D presentation of the jaw, then tracing the landmark regions with the tracer tool while the camera and software collected 100 points on each tooth (Fig. 7). Navident automatically registered the Head-Tracker with the patient's maxillary CBCT scan based on the collected points.

In the next step, drill calibration and accuracy check were performed before the use of each drill. A small incision for a reduced flap was made. All osteotomies were performed at 800 rpm. The virtual implant angulation was pre-surgically modified six degrees in vestibular direction, so the osteotomy could be initiated on that angle.

Next, the virtual implant was repositioned intraoperatively on the Navident software and the rest of the site preparation was carried out according to the final angulation with osseodensification drills (Fig. 8). The osteotomies were made with two angulations and tracked in real time and the same procedure was applied for the implant insertion. A cover screw was attached before the surgical area was sutured. The patient reported no discomfort during the surgery.

Postoperative evaluation

The patient reported no pain or swelling. Radiographic and clinical images were taken with a direction indicator screwed onto the implant. The postoperative evaluation showed that the position of the implant exactly corresponded to the virtual planning made beforehand (Figs. 9–14).

Conclusion

The patient benefited from a treatment with a reduced flap and precise implant placement using dynamic navigation technology with an innovative trace registration method.

Trace registration in combination with dynamic navigation proved to be a valid technology for osteotomy preparations and implant placement. It does not require a dedicated CT with a radiographic marker nor the fabrication of a stent or clip.

When clips or stents are difficult or impossible to use, or even in every dental patient case, trace registration can be the best solution for dynamic navigation implant placement.

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Literature

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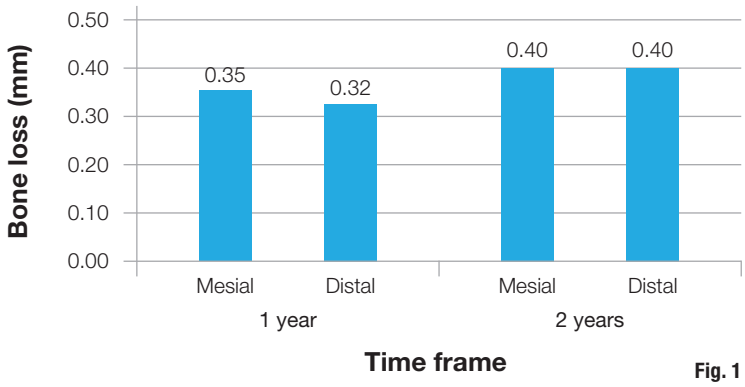
Bone loss around tapered implants with split coronal microthreads

Drs Jerry Kohen, Tal Bar, Sorin Moscovici & Prof. Ofer Moses, Israel



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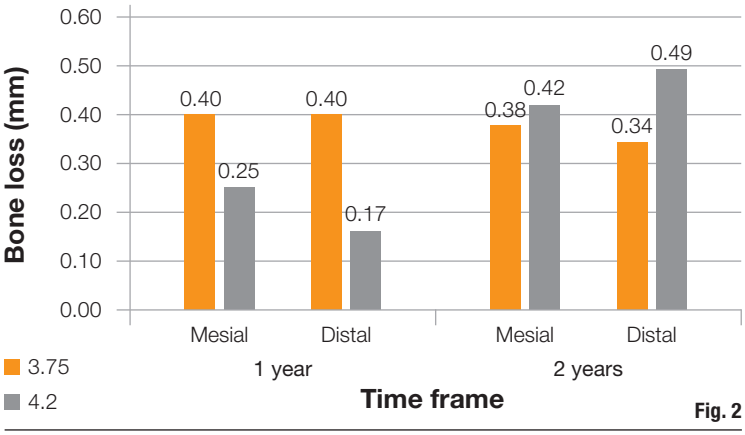

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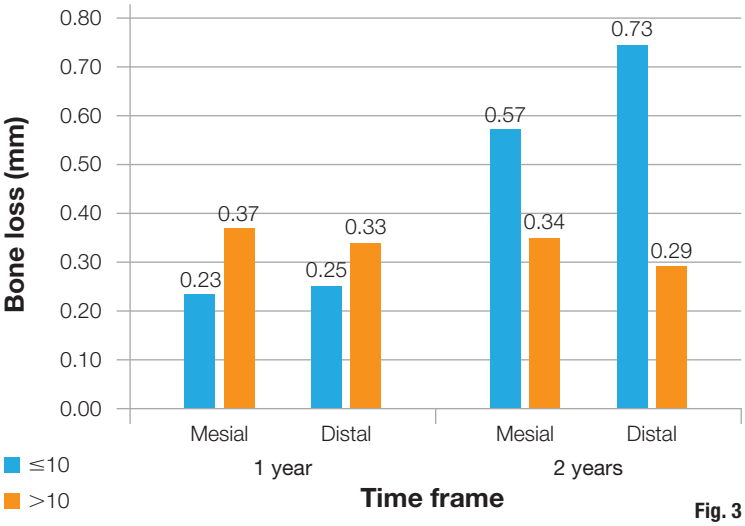

Fig. 3

Introduction

Dental implants are frequently used for the treatment of edentulism. However, marginal bone loss around implants during the first years after implantation varies between implant systems demanding an evaluation of implant performance over time.

The purpose of the here described retrospective field study was thus to examine the marginal bone loss rate around ICE implants (Alpha-Bio Tec, Israel) at one and two years of follow-up. First marketed in 2013, they are universal implants suitable for multi-clinical indications. The implants have an apical tapered design and a back tapered coronal part with split microthreads.

Materials and methods

The study was performed in three private clinics in Israel on 96 patients all older than 18 years of age and in good general and dental health who had been treated with the given type of implant within the last two years. In total 238 ICE implants were placed. Radiographic bone loss data was recorded and analysed immediately after insertion of the implant—serving as the baseline of the study—and retested after 12 and 24 months.

In the study, digital periapical radiographs and dental medical information were collected and summarised. Digital images were analysed by an independent examiner for marginal proximal bone loss using the ImageJ 1.33 open-source software (National Institute of Health, USA). The implant length served as a reference for bone loss calculations and the bone level was defined as the distance from the most coronal part of the implant shoulder to the first radiological bone-to-implant contact. Mesial and distal bone level changes in this region were recorded, and the mean of these two values was then used for further evaluation.

Fig. 1: Total bone loss over two years: Mesial teeth #1 and #2, distal teeth #3 to #6. **Fig. 2:** Effect of implant diameter on bone loss over two years. **Fig. 3:** Effect of implant length on bone loss.

Results

231 out of 238 implants survived the 24-month evaluation period. Seven implants were lost due to peri-implantitis, representing 2.9 per cent. The average change in the marginal bone level registered after 12 months was 0.35 mm mesial and 0.32 mm distal, and 0.4 mm both mesial and distal after 24 months (Fig. 1). The average increase in bone loss measured between the first and the second year of the study was calculated and found to be 0.065 mm.

The effect of the implant dimensions on bone loss was also analysed. After 12 months, wider implants with a diameter of 4.2 mm showed less bone loss than 3.75-mm implants. Whereas after 24 months, the 4.2-mm implants showed a higher bone loss rate than the once with a diameter of 3.75 mm (Fig. 2). In a further step the effect of implant length was also analysed. It was found that short implants of 10 mm and less showed higher bone loss after 24 months (Fig. 3).

Conclusion

Within the limitations of this study, the ICE implant system showed a high survival rate of 97 per cent 24 months after implantation with minimal bone loss levels of 0.4 mm. According to the literature these results exceed those recorded by other implant manufacturers.[1,2]

Acknowledgements to Dr Jerry Kohen, Dr Tal Bar & Dr Sorin Moscovici who performed the study in their private clinics in Israel.

Literature

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Planmeca

Successful digital implant workflow

Planmeca's software-driven solution for implant dentistry provides a kind of freedom and flexibility that is hard to match. Users can efficiently manage their entire implant workflow with the Planmeca Romexis® software: from CBCT imaging to intraoral scanning and from implant planning to guide design. As it is a truly open software, it allows users to utilise data from Planmeca or other equipment. There are no hidden or extra fees for importing and exporting files.

Taking an implant plan to actual surgery is now easier than ever, as the software's new Planmeca Romexis® Implant Guide module lets users design their own surgical implant guides. This elevates implant planning to another level, as virtual plans can accurately be brought to reality. Creating implant guides with the software requires few simple steps. Users can also flexibly select their preferred workflow, as completed guide designs can either be 3-D printed in-office or exported as STL files to a partner lab for 3-D printing.

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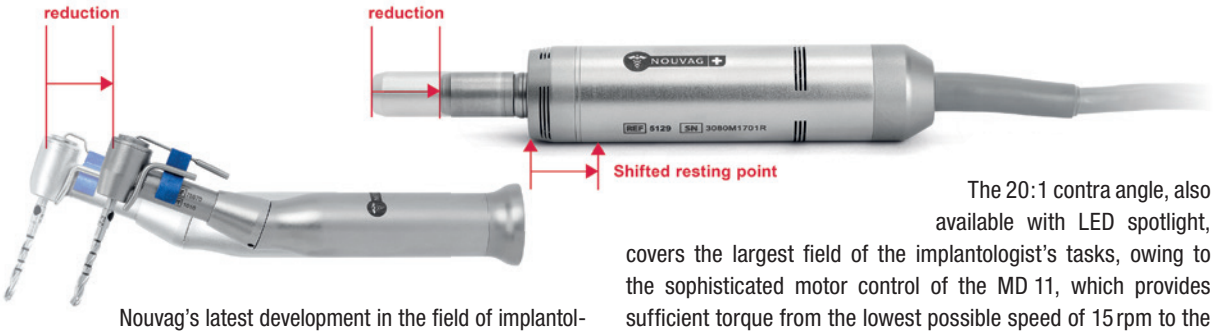
Nouvag

Introducing motor management 2.0



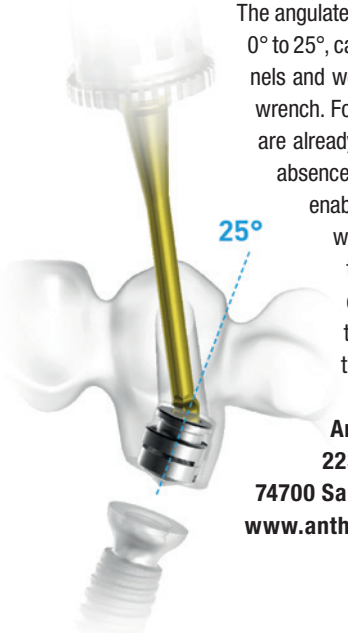
Nouvag's latest development in the field of implantology is the motor system MD 11 which is now available in version 2.0. The company has newly implemented the function of thread cutting and made the device handling even easier than it already was. During its development, much attention has been given to a quiet, low-vibration motor running, which is the feature most likely perceived by patient and surgeon alike. The insertion of the tubing set is done with very little effort due to the great visibility of the mounting bracket and easy to reach notches in the bracket.
To make the set of the MD 11 complete, Nouvag offers all required contra angles such as the 1:1, 16:1, 20:1, 32:1 and a 70:1. The 20:1 contra angle, also available with LED spotlight, covers the largest field of the implantologist's tasks, owing to the sophisticated motor control of the MD 11, which provides sufficient torque from the lowest possible speed of 15 rpm to the highest speed of 1,700 rpm.
With the new 20:1 mini E-type contra angle, in conjunction with the new electronic motor having a shorter handpiece carrier, the resting point lies between the surgeon's thumb and index finger allowing for better balance and force delivery to the drill.

Nouvag AG
St. Gallerstr. 23–25
9403 Goldach, Switzerland
www.nouvag.com

Anthogyr

Angulated access solutions

Anthogyr now offers the angulated access solution on customised screw-retained prostheses. It is available for Simeda® and Connect+® prostheses and offers more advantages to practitioners when associated with the new inLink® connection system. The angulated access contributes to the aesthetics of restorations thanks to staggered channels on the palatine or the lingual side. From a functional perspective, they can be placed outside the fragile areas of the prosthesis, e.g. the occlusal sides or the open edges. This involves less maintenance and saves precious time for the practitioner.



The angulated access offers an angulation from 0° to 25°, can be applied to all prosthesis channels and works with the same prosthetic ball wrench. For the inLink® connection, the locks are already integrated in the prosthesis. The absence of a screw passage in the channel enables a reduction of the space taken, with an emergence diameter reduced to only 2.0 mm. Hence, this solution can be widely applied: notably for teeth of low height in the back and thin teeth in the front.

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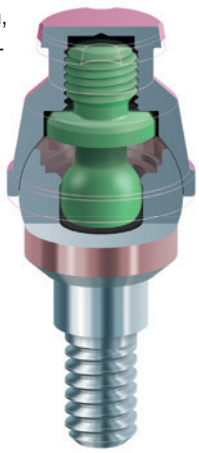
www.anthogyr.com

Zest Dental Solutions

Fixed full-arch restorations

Zest Dental Solutions has introduced a new way to think about fixed full-arch restorations that addresses the inherent limitations of conventional screw-retained and cemented solutions such as the need for screw access channels or the potential for sub-gingival cement when attaching the prosthesis to the abutments.
Fixed for the patient, yet easily removed by the clinician LOCATOR F-Tx is a simplified, time-saving fixed attachment system for full-arch restorations with no compromise to prosthesis strength or aesthetics. Optimised for efficiency and chair time savings compared to conventional screw-retained systems, it features a novel "snap-in" attachment that eliminates the potential for sub-gingival cement or the need for retaining screws.
Further adding to the flexibility of the system, LOCATOR F-Tx accommodates divergent/convergent scenarios with up to 20 degrees of divergence from a common vertical without the need for angled abutments. The prosthesis is easily removed by the clinician for hygiene and maintenance visits utilising a prosthesis removal system that quickly disengages the prosthesis in a matter of minutes—a patient-friendly solution.



Zest Dental Solutions
2875 Loker Avenue East,
92010 Carlsbad, CA, USA
www.zestdent.com/ftx

Dentsply Sirona

Customised solution with angulated screw access

The Atlantis CustomBase solution is a reliable and flexible option to deliver patient-specific, screw-retained single tooth restorations. The innovative concept consists of a patient-specific Atlantis abutment and crown with a screw access channel. The crown is cemented extraorally to the abutment.
A new feature is the angulated screw access. Angling the screw access channel allows the screw access hole to be optimally positioned, improving the aesthetics and the installation procedure of the customised solution.
The Atlantis crown is available in two versions: a cut-back crown for ceramic veneers and a full-contour crown. Both types can be ordered together with the abutment via the online portal “Atlantis WebOrder”.

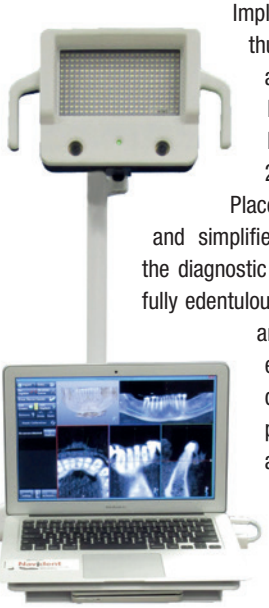
The Atlantis CustomBase solution can be completely integrated into the digital implant workflow and targets patients who wish for a fast but durable and aesthetic solution. Additionally, the concept is compatible with all major implant systems.

Dentsply Sirona –
The Dental Solutions Company™
Aminogatan 1
43121 Mölndal, Sweden
www.dentsplysirona.com/implants

ClaroNav

Guided dental surgery 2.0

Navident is a dynamic navigation system for dental implants developed by ClaroNav. It offers dental surgeons an affordable image-guided navigation system that provides real time access to information about the advance of the drill tip: its exact location, depth and angulation in the patient’s jaw relative to the dental implant plan. Implantation procedures can thus be safer, less invasive and more accurate.



In May 2018, ClaroNav has released Navident 2.0 featuring Trace and Place (TaP) which streamlines and simplifies the workflow in both the diagnostic and surgical phases. For fully edentulous jaws, or when the teeth are insufficiently stable or expected to be removed during the implantation procedure, Navident offers a unique bone anchoring solution.

In 2016, ClaroNav launched the Dynamic Navigation Society (DNS), its educational division that provides peer-to-peer education. Leading clinicians from around the world have joined DNS to be at the forefront of dynamic guided dental surgery.

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Toronto, Ontario
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bredent medical

A route to success

Since its development in 2002 by Star Group International and the subsequent cooperation with bredent medical in 2004, the SKY implant system has been consistently improved, particularly with regard to implant-supported prosthetics—redefining the prosthetic restoration workflow, e.g. with the one-time therapy and with the SKY elegance abutment, offering a hybrid component that no longer needs to be changed between the surgical and prosthetic phases enabling optimal gingiva management.
The launch of the sophisticated restoration concept for edentulous and prospectively edentulous jaws, called SKY fast & fixed, in 2007 was a milestone with regard to effective restoration in patients aged over 50—an ever growing patient group still too young for removable dental prostheses.
Today, implantologists and dental technicians trust a tried and tested, coordinated system that can be successfully integrated into dental practice. Well, over 50,000 satisfied restoration patients in the past 11 years are testament to the procedure’s success and safety. And, so, after 15 years the SKY implant system, in an ever more sustainable way, stands for simplicity, clarity and economic feasibility—which increases process safety in practices and boosts commercial success.

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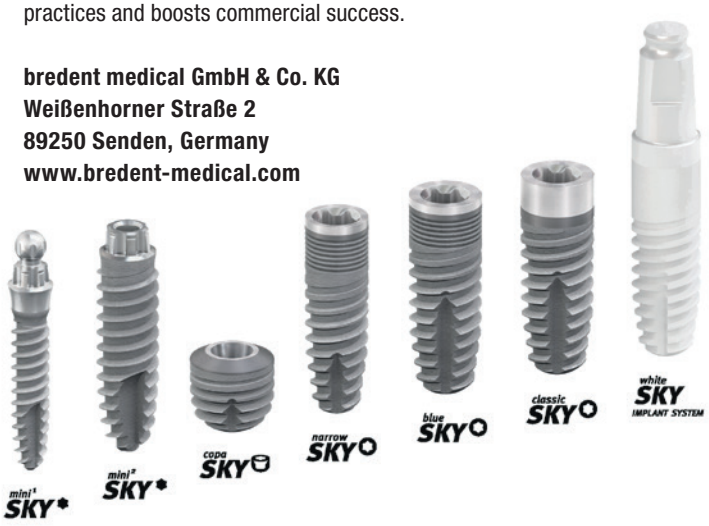
www.bredent-medical.com

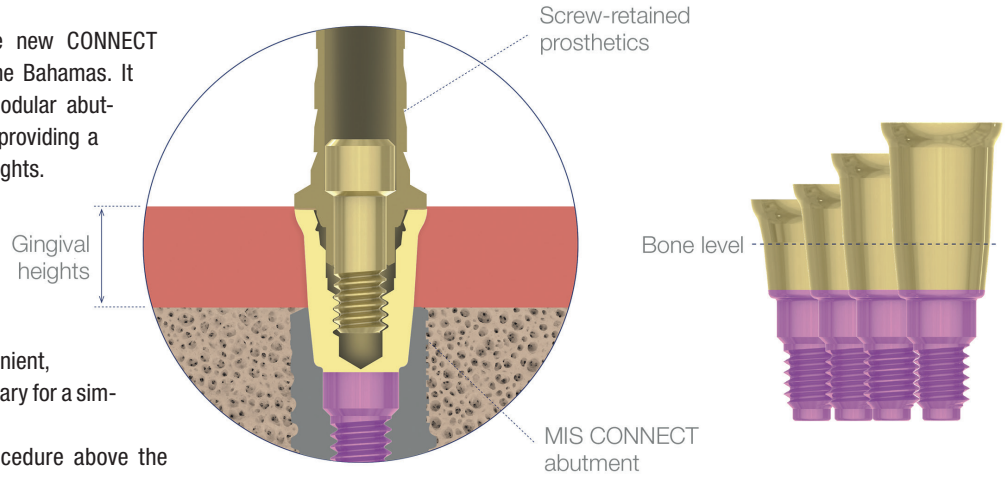


MIS

Introducing a new abutment system

This past February, MIS introduced the new CONNECT system at the 4th Global Conference in the Bahamas. It features an intra-gingival, narrow and modular abutment and is designed with a low profile, providing a tissue-level solution for various gingival heights. Because of its versatility the system may be applied in multiple or single-unit restorations, for both digital and traditional procedures. It can also be used for provisional or final prosthetic restorations. It is easy to handle and convenient, and is supplied sterile with the tools necessary for a simple procedure.

The CONNECT enables a prosthetic procedure above the connective tissue level. It allows for a broader range of screw-retained prosthetics in the aesthetic zone and may be used in one- or two-stage procedures. The system supports long-term biological stability by increasing the distance from the bone. Additionally, in CAD/CAM restoration planning, the abutment may be scanned and incorporated into a partially or fully digitally-guided procedure.



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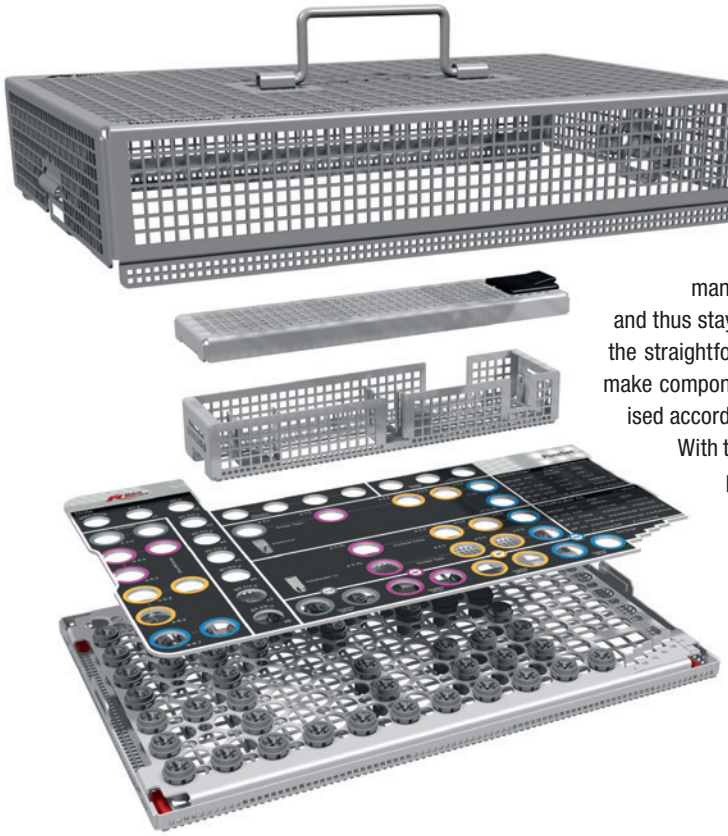
Nobel Biocare

All-in-one trays: A new way to save time



Discover an advancement in simplicity with PureSet surgical trays. Launched by Nobel Biocare, the brand-new high-grade stainless-steel trays* have been specially designed to save time and enable automated cleaning.

During the cleaning and sterilization workflow, hygiene should never be compromised. As such, PureSet trays have been designed for automated cleaning with few manual steps. Instruments are securely retained using metal springs and thus stay with the tray throughout the entire work process. For surgery, the straightforward, intuitive layout is designed to reflect the workflow and make components easy to identify, and instruments are conveniently organised according to the drilling protocol.

With this ease of use, small practices and large hospitals alike can experience efficiency and improved workflows for Nobel Biocare's conical connection and Trefoil implant systems. In essence, PureSet trays offer ease, efficiency and hygiene—all-in-one.

** PureSet trays are made of stainless steel except for the PureSet plates and grommets.*

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Fig. 1: Landmark of Rotterdam: The Erasmus Bridge also called the Swan at the Nieuwe Maas River.

Oral Reconstruction Global Symposium 2018

Katharina Rühling, Germany

1,200 participants of 39 countries attended the Oral Reconstruction Global Symposium 2018 in Rotterdam from 26 to 28 April. The three-day event organised by the Oral Reconstruction Foundation (formerly CAMLOG Foundation) chaired by Prof. Dr Irena Sailer (Switzerland) und Dr Ben Derksen (Netherlands) was dedicated to the theme "The Future of the Art of Implant Dentistry". 57 speakers and experts of 12 nations shared their experience and expertise in the workshop and presentation sessions. Further, all attendees had the possibility to get up to date with the newest product developments at the industry exposition with 21 exhibitors.

Internationality could be felt and heard in all elements of the symposium—while the symposium language was English, simultaneous translations into Japanese, German, Spanish, French and Italian were also available for the participants. The 12 offered workshops concerning topics like 3-D implant planning, the COMFOUR concept and CONELOG implant system (both CAMLOG), two-piece ceramic implants and soft-tissue augmentation were also tailored for an international audience—some even being offered in German and Spanish. Participants benefitted of hands-on practical experience and could also earn CE credits.

On Friday the presentation part of the symposium started with an atmospheric opening ceremony staging an illuminated dance performance followed by a warm welcome of the organising committee. A further cultural highlight of the programme was the King's Day party on Friday night inspired by the Dutch holiday in honour of the king.

According to the symposium theme the eight podium sessions combined diverse current topics of both latest scientific research findings and practical experience in the field of implantology. Each session included presentations of at least three specialists sharing their insights on issues like soft-tissue management around dental implants, treatment and restorative concepts, digital workflow in implant dentistry and ceramic implants. The presentations were supported by individual case experience visualised with picture and video sequences.

During the time for discussion following each session of expert presentations all participants had the opportunity to get more information and contribute their own input and experience in direct exchange with the specialists. This exchange was especially interactive thanks to the Insights Dental App—developed by Medical Insights and the Oral Reconstruction Foundation—which was used to submit all questions digitally in real time during the presentations, also enabling peer-to-peer knowledge exchange in the developing community. It further serves as a constantly updated database for "knowledge on demand" which can also be used for future congresses and educational events.

The usage of autologous tissue grafts as a successful alternative to GBR in order to achieve a patient-friendly minimally-invasive grafting was one of the main messages of the presentation session on soft-tissue management. The "Restorative concepts" session especially focused on the changing population structures with the growing senior generation and thus the necessity to adapt treatment concepts and methods to the changing needs. Dr Claudio Cacaci (Germany) especially highlighted the importance of a continuous dental hygienic specialist control and care following implantological reconstructive treatment of so-called older seniors as age-related health issues like e.g. glaucoma, arthritis or dementia decrease their ability of proper cleaning and thus endanger implant stability and preservation. Continuing digitalisation and the challenges and options it creates for the implantological practice was also one of the focal points of the programme. Dr Tabea Flügge (Germany) dedicated her presentation to the question "Full digital workflow in dentistry—is it ready for us?" and especially highlighted the importance of data acquisition as the basis for using digital workflows and CAD/CAM processes. Dr Luca Cordaro (Italy) further highlighted a challenge digitalisation generates for practitioners as today patients do not come to the dentist looking for a solution but instead have already found an idea or treatment solution on the internet assuming it to be the best option thus demanding its implementation.

One of the main topics of the event which stimulated a very lively interaction between the auditorium and the main podium was dedicated to the question "Are ceramic implants an alternative to titanium?". Moderator Prof. Dr Frank Schwarz further headlined the three following presentations by questioning if we are looking at a current hype or possibly a flop. The three international speakers PD Dr Daniel S. Thoma (Switzerland), Dr Vladimir Kokovic (United Arab Emirates) and Dr Frank Maier (Germany) emphasised new research findings and improved material characteristics compared to formerly known ceramic implants, and further presented their preferred treatment application especially in partial reconstructions as well as their experience with the CERALOG (CAMLOG) system. Titanium intolerance and aesthetic choices are among the main reasons for patients to choose ceramic implants.

The last session "Problems, complications and failures—what can we learn from them?" kept the attention level up until the last minute on Saturday afternoon. In this interactive presentation method three practitioners each presented an especially challenging case with its individual characteristics and diagnostics to an expert jury of seven international specialists who then had the opportunity to give their treatment advice. In the next step the speaker presented the treatment solution he applied and the expert jury again had the possibility to comment and advise—generally agreeing or even congratulating the colleague on his success.

Everybody can already be looking forward to the Oral Reconstruction Global Symposium 2020 in New York City. For more information visit: www.orfoundation.org.

Fig. 2: International expert jury during the "Problems, complications and failures—what can we learn from them?" session.

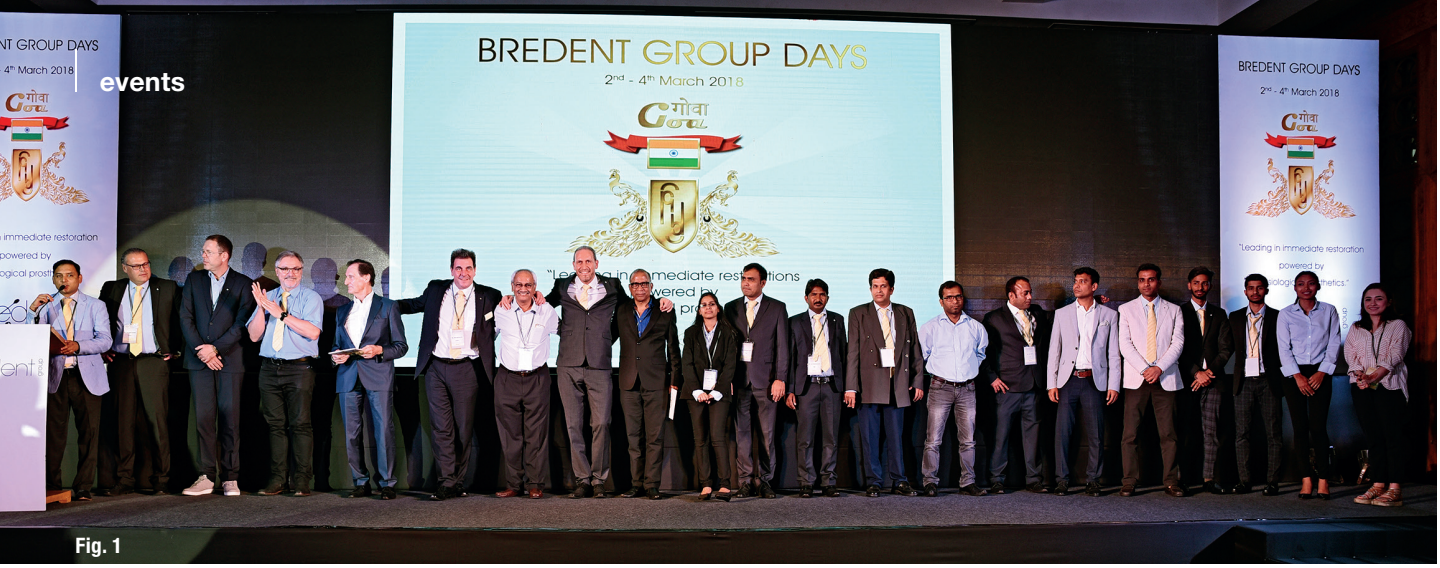

Fig. 1

Fig. 1: The bredent group's Team India thanking the speakers and participants for a memorable convention.

Discovering new horizons

bredent group days in Goa, India

The bredent group days in Goa, India, were held between 2 and 4 March 2018. For the first time the convention took place outside of Europe. In total 300 dentists and dental technicians from India, Nepal, Europe, Africa, England and Germany travelled to Goa to listen to presentations on the topics of immediate restoration and physiological prosthetics given under the bredent group's well-known motto of "Leading in immediate restoration—powered by physiological prosthetics".

Both Indian and international speakers presented their clinical cases and held countless expert discussions with interested participants during the breaks. Innovative solutions and restoration options to facilitate a natural and conservative but also a quick and cost-effective treatment of patients were presented.

Fig. 2

Fig. 2: The organisers, speakers and guests at the "Hollywood meets Bollywood" party after the official programme was finished.

The "SKY® Digital Summit" pre-convention, held the day before the main programme began, focused on the immediate restoration of edentulous jaws using bredent's "SKY® fast & fixed" therapy concept in conjunction with the physiological polymer "BioHPP" following a completely digital workflow.

The exotic backdrop of the former Portuguese colony of Goa and the atmosphere in the convention hotel, the Alila Diwa Goa, also gave guests the opportunity to immerse themselves in the Indian culture. The gala party themed "Hollywood meets Bollywood" as the highlight of the supporting programme offered the participants culinary specialities and a colourful music mix.

India has become an important strategic growth market for the dental sector. Following this development, the bredent group announced the formation of the "bredent group India" subsidiary at the event in Goa. The organiser, speakers and guests were united in their conclusion: interesting talks, fantastic people, great atmosphere—the bredent group days in Goa were a success.

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Academy of Osseointegration Annual Meeting 2018

Dr Mohamed Awwad, USA

The Academy of Osseointegration 2018 Annual Meeting was held in Downtown Los Angeles from 28 February to 3 March following the theme "Inspiring imagination —Enhancing health" (Fig. 1). The DGZI was represented by Dr Awwad from California and Dr Botrous from Michigan (both USA). The meeting taking place at the Los Angeles Convention Center welcomed attendees from all over the world. Participants benefited of enjoyable and productive meetings with global colleagues while staying on the cutting edge of technology and up to date with implant dentistry. As a highlight of the meeting Dr Michael Norton passed the torch to the new president Dr James Taylor who will now be leading the Academy of Osseointegration (AO) board of directors for one year. With over 6,000 members in 70 countries the AO is considered to be one of the premier US associations for professionals interested in the clinical part and the science of implant dentistry.

Dr Harold Slavkin and Dr Stephen T. Chen, two keynote speakers of the meeting kicked off the opening symposium (Fig. 2). The programme included corporate forums, pre-conference sessions and workshops in the areas of implant complications, digital workflow and dynamic navigation, among others. On Friday morning all attendees had the opportunity to learn about the latest research and science findings from leaders of the field during the "Morning with the Masters" sessions.

On Saturday a full-day team programme was offered for allied staff and dental laboratory technicians. Renowned speakers gave presentations in restorative and surgical sessions at the main podium on topics reaching from modular bone augmentation, peri-implantitis and All-on-4 to tissue regeneration and replication. In the closing symposium on implant aesthetics Drs Chu, Urbán and Zucchelli presented on GBR and soft-tissue graft techniques. Dr Kenji Higuchi was the recipient of the Noble Biocare Brånemark Osseointegration Award 2018. The president reception closing party at Microsoft Square was a vivid outdoors event with the Britishmania band. See you in Washington D.C. in 2019!

contact

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www.dgzi.de

Fig. 1: Meeting venue: Downtown Los Angeles, USA. **Fig. 2:** Keynote speaker Dr Harold Slavkin during the opening symposium.

DGZI Deutsche Gesellschaft für Zahnärztliche Implantologie e.V.

Senior Premium Partner: Ot medical

Premium Partner: camlog

Premium Partner: straumann simply doing more

Premium Partner: ACTEON

Programme for dentists and dental technicians

FRIDAY, 28 SEPTEMBER 2018

FUTURE PODIUM – Visions in Implantology

09:00 – 09:15 **Opening ceremony**
Dr Georg Bach/DE

09:15 – 09:45 **Assoc. Prof. Dr Christian R. Gernhardt/DE**
Tooth preservation and implantology—A future model—Structural, professional and demographic challenges

09:45 – 10:15 **MDT Ralph Riquier/DE**
Digital competence 4.0—Future prognosis for digital patients: How much know how does a complete digital dental technology require?

10:15 – 10:45 **Prof. Dr Wolfgang Henseler/DE**
Dentist 4.0—How one should be thinking in the age of digitalisation

10:45 – 11:00 **Speaker and podium discussion**
The future podium speakers and clinician Dr Kay Vietor are discussing the importance of the presented developments for the daily work of implantologically working dentists with the scientific director/moderator. Participants have the option to actively participate in the discussion via the interactive chat feature.

11:00 – 11:30 **Coffee break/Dental exhibition**

LIVE SURGERIES

11:30 – 12:30 camlog
Transmission of live surgery 1
Dr Thomas Barth/DE, Dr Stefan Ulrici/DE
Christian Barth, DDS/DE
The iSy solution—One click, one scan, one shift. With minimalisation to success

12:30 – 13:30 straumann simply doing more
Transmission of live surgery 2
Dr Michael Back/DE
Dr Dr Dr Oliver Blume/DE
maxgraft® bonebuilder—Safe application of patient individual bone blocks

TABLE CLINICS (TC) – Visions in Implantology

15:00 – 15:45 **Session 1, TC table 1–24**
15:45 – 16:00 **Change of table**
16:00 – 16:45 **Session 2, TC table 1–24**
16:45 – 17:00 **Change of table**
17:00 – 17:45 **Session 3, TC table 1–24**

Note: Please specify the numbers of your chosen table clinics (total of three) on the application form below.

TC 1 **Dr Arpad Alexander Toth/DE** — Ot medical
From clinician to clinician: Fully digital prosthetic workflow with ultra-short implants

TC 2 **Dr Kai Zwanzig/DE** — camlog
Guided surgery in implantology—The digital has to merge with the analog

TC 3 **Dr Kay Vietor/DE** — straumann simply doing more
Intraoral scanning in implantology—Temporary trend or new standard?

TC 4 **Prof. Dr Marcel Wainwright/SE** — ACTEON
The intra lift—A proven method for the internal sinus lift

TC 5 **Dipl.-Ing. Dipl.-Inf. Frank Hornung/DE** — DORNDENTAL / DORNMEDICAL
CranioPlan® 3-D procedure for determining the occlusal plane. Milled interim restoration

TC 6 **Dr Marc Hansen/DE** — SpiralTech
The external sinus lift—Update and long-term results

TC 7 **Axel Reimann/DE** — septodont
Update on local anaesthesia—Interesting facts for the dental practice

TC 8 **Prof. Dr Georg-H. Nentwig/DE** — SUNSTAR GUIDOR
Augmentation without membrane: When is it a sensible alternative?

TC 9 **Dr Sebastian Schmidt/DE, Co-speaker DT Bernhard Zierer/DE** — ARGON
3-D bone milling with fully guided simultaneous implantation

Programme for dentists and dental technicians

FRIDAY, 28 SEPTEMBER 2018

TABLE CLINICS (TC) – Visions in Implantology

TC 10
Dr Bergen Pak/DE
3-D navigated implantology—
From implant to crown

TC 11
Priv.-Doz. Dr Friedhelm Heinemann/DE
Implantological and implant-prosthetic planning with reduced-diameter implants

TC 12
Dirk-Rolf Gieselmann/DE
aMMP-8 chairside immuno diagnostics as basis for the successful peri-implantitis prevention

TC 13
Dr Elisabeth Jacobi-Gresser/DE
Co-speaker Prof. Dr Daniel Olmedo/AR
Successful, aesthetic, sustainable and more biologically compatible implantation with zirconium dioxide implants

TC 14
Dr Umut Baysal/DE
Function and aesthetics in implant prosthetics

TC 15
Dr Ralph Griesbach/DE
Everything my patients desire: Aesthetics—longevity—economic efficiency

TC 16
Dr Manuel Bras da Silva/DE
Newest techniques in implantology:
GBR, GTR and biological dentistry

TC 17
Dr Theodor Thiele, M.Sc., M.Sc./DE
Sinus lift and bone regeneration at the sinus floor: Comfortable and safe with sinus and GBR kits

TC 18
Dr Stefan Helka/DE
Augmentation in practical application—What does actually work and what is really necessary?

TC 19
Dr Ingmar Schau/DE
Larger number of cases and more success in implantology

TC 20
Achim Kettler/DE
Co-speaker Thomas Borrmann/DE
Getting to know the coDiagnostiX implant planning software with an easy case example

TC 21
Dipl.-Volksw. Christian Wünsch/DE
Nitrous oxide sedation—The concept of this well-known dental sedation method

TC 22
Prof. Dr Mauro Marincola/IT
360-degree application options of SHORT implants

TC 23
Dr Endre Varga, DMD, DDS, PhD/HU
Navigated surgery is the future—
but it also has to fit

TC 24
Dr Jan Erik Janson/DE
New paths in navigated surgery with BoneTrust® guide

18:00 – 21:00 **GET-TOGETHER AT THE CONGRESS/EXHIBITION AREA**

Evening event at the Hilton Hotel Düsseldorf, Germany
Free for congress participants and exhibitors.
Price per accompanying person (incl. drinks and snack) € 35 excl. VAT

SATURDAY, 29 SEPTEMBER 2018

SCIENTIFIC PRESENTATIONS – Visions in Implantology

08:45 – 09:00 **Dr Georg Bach – Scientific director**
Prof. Dr Herbert Deppe – DGZI president
Welcome and introduction of the speakers and scientific programme

PODIUM 1

09:00 – 09:30 **Elika Madani, DDS/DE**
Univ.-Prof. Dr Dr Ralf Smeets/DE
GTR/GBR techniques—Where do we stand? What is new? Where will this journey take us?

09:30 – 10:00 **Prof. Dr Dr Florian Draenert/DE**
Bone management in dental implantology: Biology and materials instead of biomaterials

10:00 – 10:30 **Prof. Dr Thorsten M. Auschill/DE**
Innovative concepts in the therapy of peri-implant diseases

10:30 – 11:00 **Prof. Dr Werner Götz/DE**
Bioengineering in regenerative dentistry—
Where will the journey take us?

11:00 – 11:15 **Speaker and podium discussion**

11:15 – 12:00 **Break/Dental exhibition**

PODIUM 2

12:00 – 12:30 **Prof. Dr Martin Lorenzoni/AT**
Digital planning, diagnostics and navigation in implant prosthetics

12:30 – 13:00 **Prof. Dr Dr habil. Andree Piwowarczyk/DE**
CAD/CAM in implantology—From the planning stage up until the final restoration

13:00 – 13:30 **Prof. Dr Dr Ralf Smeets/DE**
Implantology news—Increasingly thinner, shorter, whiter?

13:30 – 13:45 **Speaker and podium discussion**

13:45 – 14:40 **Break/Dental exhibition**

PODIUM 3

14:40 – 15:00 **Prof. Dr Daniel Olmedo/AR**
Biological effects of titanium particles: Factors to consider in implantology

15:00 – 15:20 **Dr Elisabeth Jacobi-Gresser/DE**
Evidence of patient specific risk factors in implantology

15:20 – 15:50 **Prof. Dr Andrea Mombelli/CH**
Ceramic vs titanium: Where will the journey take us?

15:50 – 16:20 **Prof. Dr Dr Knut A. Grötz/DE**
Extending the implant indication (systemic diseases, risk patients et al.)

16:20 – 17:00 **Speaker and final discussion**

Programme for dental assistants

FRIDAY & SATURDAY, 28 AND 29 SEPTEMBER 2018

Hygiene seminar

Further education and qualification as Office Hygiene Commissioner for the dental practice

Friday, 28/09/2018 12:00 – 19:00
Saturday, 29/09/2018 09:00 – 19:00

QMC seminar

Training as Quality Management Commissioner QMC

Friday, 28/09/2018 09:00 – 18:00

Scientific presentations

Saturday, 29/09/2018

09:10 – 09:50	**Prof. Dr Stefan Zimmer/DE** Electric or manual: What is the better cleaning method?
09:50 – 10:30	**Prof. Dr Stefan Zimmer/DE** Tooth paste—Balm for the teeth
10:30 – 11:15	**Break/Dental exhibition**
11:15 – 12:00	**Prof. Dr Mozhgan Bizhang/DE** Interdental space and tounge—What is still part of good oral hygiene?
12:00 – 12:45	**Prof. Dr Nicole B. Arweiler/DE** When normal oral hygiene is not enough—What do I recommend for patients with increased risk of disease?
12:45 – 13:15	**Priv.-Doz. Dr Gregor Petersilka/DE** Brushed properly and still periodontitis? Why oral hygiene is often not enough?
13:15 – 14:30	**Break/Dental exhibition**
14:30 – 15:15	**Prof. Dr Thorsten M. Auschill/DE** Systematic periodontal follow-up care
15:15 – 16:00	**Priv.-Doz. Dr Gregor Petersilka/DE** What are the benefits of oral irrigators and Co.?
16:00 – 16:15	**Final discussion**

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organisational matters

Visions in Implantology

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CONGRESS FEES

Friday, 28 September and Saturday, 29 September 2018

Dentist/dental technician DGZI-member	€ 275*
Dentist/dental technician non-member	€ 325*
Medical Assistant (with Proof) DGZI-member	€ 120*
Medical Assistant (with Proof) non-member	€ 135*
Students (with Proof)	only conference fee
Conference fee**	€ 118 excl. VAT

TEAM FEES

Friday, 28 September and Saturday, 29 September 2018

Dentist + dental technician DGZI-member	€ 375*
Dentist + dental technician non-member	€ 450*
Dentist + Assistant DGZI-member	€ 350*
Dentist + Assistant non-member	€ 380*
Conference fee** per person	€ 118 excl. VAT

* The reservation is made on behalf of and on the account of DGZI e.V. incl. 7 % VAT

Early bird discount for all reservations made before 30 June 2018: 5 % of the congress fee.
For daily tickets the congress fee and conference fee are reduced by half.

DENTAL ASSISTANTS

Hygiene seminar (Friday and Saturday)

Dentist	€ 275 excl. VAT
Dental Assistant	€ 224 excl. VAT
Team fee (Dentist + Dental Assistant)	€ 448 excl. VAT
Conference fee** for both days/per person	€ 118 excl. VAT
QMC seminar (Friday)	€ 109 excl. VAT
Conference fee** per person	€ 59 excl. VAT

Presentations (Saturday)

Dentist	€ 185 excl. VAT
Medical/Dental Assistant (with Proof)	€ 109 excl. VAT
Conference fee** per person	€ 59 excl. VAT

** Incl. coffee breaks, drinks and lunch. The conference fee has to be paid by every participant.

48TH DGZI International Annual Congress

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Online registration: www.dgzi-jahreskongress.de

Academic titel, last name, first name, profession	DGZI-member	Participation		Programme Dental Assistant
	❑ yes ❑ no	❑ Friday ❑ Saturday	❶___ ❷___ ❸___ (of chosen table clinics))	❑ Hygiene seminar (Fr./Sa.) ❑ QMB seminar (Sa.) ❑ Presentations (Sa.)
	❑ yes ❑ no	❑ Friday ❑ Saturday	❶___ ❷___ ❸___ (of chosen table clinics))	❑ Hygiene seminar (Fr./Sa.) ❑ QMB seminar (Sa.) ❑ Presentations (Sa.)

Evening event on Friday, 28 September 2018 ____ (# of persons)

Stamp

I am hereby agreeing to the general terms and conditions of the 48th DGZI International Annual Congress.

Date, Signature

E-mail address (Please declare, you will receive the invoice and certificate via e-mail.)

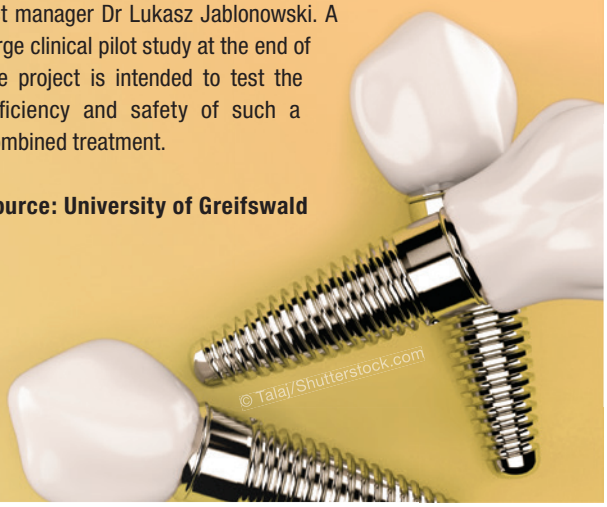
Plasma-based treatment shall improve

Peri-implantitis therapy

Scientists of the University of Greifswald are currently working on developing a plasma-supported method that can be used for the cleaning of infected implants. Implants, just like teeth, have to be properly maintained, regularly checked and professionally cleaned in order to prevent health issues like peri-implantitis. This disease, if untreated, can lead to tissue infection, bone reduction and ultimately implant loss. A three-year project funded by the Federal Ministry of Education and Research to explore new approaches for proper cleaning of infected implants was thus initiated. In a cooperation between scientists from Greifswald and two medical technology companies the PeriPLas project is aiming at establishing a basis for a safe and effective method for curing peri-implantitis that can eventually be used in daily clinical practice.

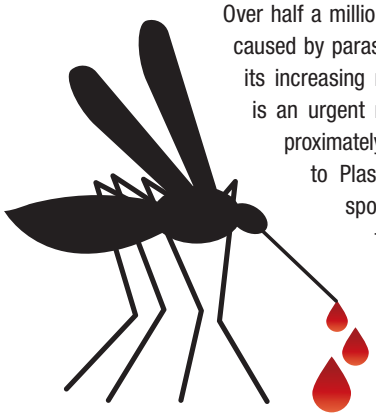
The advantages of efficient therapy methods like mechanical cleaning with abrasive systems, treatment with a diode laser and with an atmospheric-pressure plasma jet shall be analysed and most promisingly combined. "Mechanical cleaning is necessary to remove the biofilm. The reduction of living microorganisms can be supported with the diode laser. Cold plasma can eliminate remaining bacteria and activate the implant surface in order to favour osseointegration […]," stated project manager Dr Lukasz Jablonowski. A large clinical pilot study at the end of the project is intended to test the efficiency and safety of such a combined treatment.

Source: University of Greifswald



Toothpaste ingredient triclosan may help

Fight drug-resistant malaria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Over half a million deaths per year result from malaria, caused by parasites of the genus Plasmodium. Due to its increasing resistance to all existing drugs, there is an urgent need to develop new medication. Approximately 90 per cent of these deaths are due to Plasmodium falciparum, the parasite responsible for the most severe forms of the disease. Researchers from the University of Cambridge have now investigated triclosan as a potential antimalarial substance. As a simple antimicrobial agent commonly found in toothpastes, it prevents the build-up of plaque bacteria by preventing the action of an enzyme known as enoyl reductase (ENR).

The researchers now discovered that triclosan affects parasite growth by also specifically inhibiting an enzyme of the malaria parasite, called dihydrofolate reductase (DHFR). DHFR is the target of a well-established antimalarial drug, pyrimethamine; however, resistance to the drug among malaria parasites is common, particularly in Africa. The Cambridge team now showed that triclosan was able to target and act on this enzyme even in pyrimethamine-resistant parasites, offering hope that with its ability to target two stages in the malaria parasite's lifecycle it could be used for the development of a new medication.

Source: DTI

Cavitating jets improve

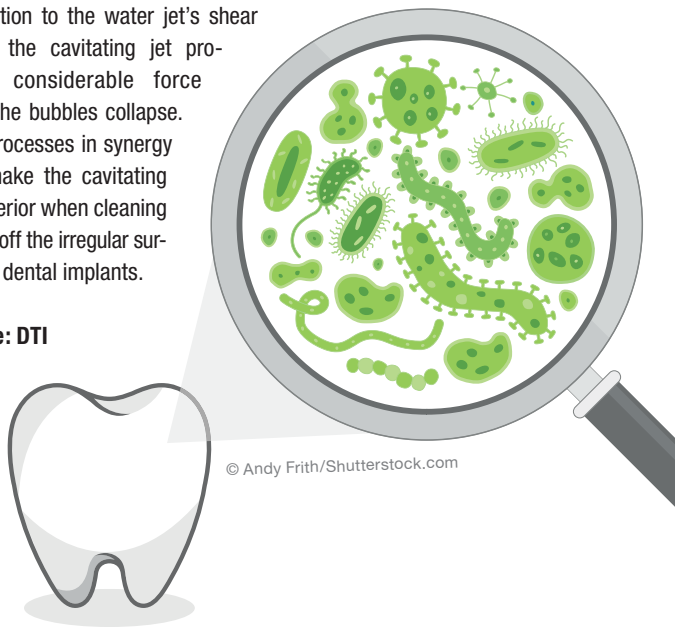
Removal of oral biofilm

In their recent study, "Removal of oral biofilm on an implant fixture by a cavitating jet", Prof. Hitoshi Soyama from Tohoku University and his team from Showa University searching for better ways for dentists to remove plaque from implant fixtures compared the effects of a cavitating jet to the standardly used water jet. With the cavitating jet, high-speed fluid is injected by a nozzle through water to create minuscule vapour bubbles, which in collapsing produce shock waves with sufficient force to remove surface contaminants.

To test the two jets, four volunteers performed no oral care for three days to allow biofilm to develop. Their fixtures were then cleaned using both methods, with the Japanese researchers measuring the amount of plaque remaining at several time intervals. They found the cavitating jet to be more effective in removing biofilm from the rough surface of an implant fixture.

In addition to the water jet's shear effect, the cavitating jet produces considerable force when the bubbles collapse. Both processes in synergy thus make the cavitating jet superior when cleaning plaque off the irregular surface of dental implants.

Source: DTI



Global congress in periodontology

EuroPerio9 in Amsterdam

EuroPerio9 as one of the leading congresses in periodontology and implant dentistry will be taking place from 20 to 23 June 2018 at the RAI convention centre in Amsterdam, the Netherlands.

As EuroPerio9 chair, Michèle Reners, stated: "This will be a truly international congress. Abstracts came from 85 countries and we expect up to 10,000 delegates from over 150 countries. The top quality of EuroPerio9 presentations and speakers attracts dental and other health professionals from all over the world, who are interested in the science, management and prevention of gum disease and in advances in implant dentistry."

Søren Jepsen, the scientific chair of EuroPerio9, highlighted studies on genetics, the microbiome, the role of artificial intelligence in disease modelling, trends in antibiotic resistance, new diagnostic tools and minimally invasive therapies as the hot topics of this year's congress. Additionally, studies about the links of gum disease to other medical conditions such as diabetes and cardiovascular disease will be presented. "Indeed, one of the key messages the EFP wants to stress is the importance of periodontal care for oral health as well as for general wellbeing," said Jepsen.

New interactive session formats like debate, treatment planning and live surgery sessions will complete the programme. The EFP Perio Contest where the cases to be examined will be decided via social media will be a further interactive highlight. Programme details are available at: www.efp.org/europerio9/programme.

Source: EFP

Possible link between family size and

Tooth loss in mothers revealed

Researchers of a recent study, titled "Gain a child, lose a tooth? Using natural experiments to distinguish between fact and fiction", found that having a larger family may be linked to higher tooth loss in mothers—suggesting the old saying might have more truth to it than first thought. To further investigate, they drew on data from Wave 5 of the Survey of Health, Ageing and Retirement in Europe (SHARE). SHARE contains information on the health, educational attainment and household income of more than 120,000 adults aged 50 years and over from 27 European countries and Israel. Wave 5, completed in 2013, surveyed the full reproductive history and number of natural teeth of 34,843 respondents, with an average age of 67.

The researchers also examined the potential impact of having twins or triplets rather than singletons. Further the sex of the first two children was taken into account assuming that if they were of the same sex, the parents might be tempted to have a third child. According to the results, women with three children had an average of four fewer teeth than women with two children, suggesting the addition of a third child may be detrimental to the oral health of mothers. However, tooth loss also increased with age, ranging from nearly seven fewer teeth for women between 50 and 60. Further higher levels of educational attainment were linked to lower risk of tooth loss among women.

The researchers thus suggested enhanced promotion of oral hygiene, tooth-friendly nutrition and regular preventative dental attendance specifically for expecting and parenting mothers.

Source: DTI

Congresses, courses and symposia

EuroPerio9

20–23 June 2018
Venue: Amsterdam, Netherlands
www.efp.org/europerio9

4th Annual Meeting of ISMI

22–23 June 2018
Venue: Hamburg, Germany
www.ismi-meeting.com

International Congress on Ankylos 2018

29–30 June 2018
Venue: Berlin, Germany
www.ankyloscongress.com

48th DGZI International Annual Congress— Visions in Implantology

28–29 September 2018
Venue: Düsseldorf, Germany
www.dgzi-jahreskongress.de

EAO Congress 2018

11–13 October 2018
Venue: Vienna, Austria
www.eao.org

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