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implants

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Team spirit in implantology

Dear colleagues and friends,

Today, increasing expectations in terms of shorter treatment times are a major demanding for dentists and dental technicians. The challenge for the practitioner is to obtain an immediate temporary restoration added to the implant placement with an ideal aesthetic result in the shortest possible treatment time. Also, for many years, practitioners and patients have been concerned about bone resorption, leading to reduced retention and, therefore, stability of conventional dentures. Full-arch implant-supported fixed dental prostheses may provide more comfort and substantial improvements in prosthetic function, adaptation, and stability compared to conventional treatment options. In this issue of implants—**international magazine of** oral implantology, you will find some interesting patient cases that address these very issues.

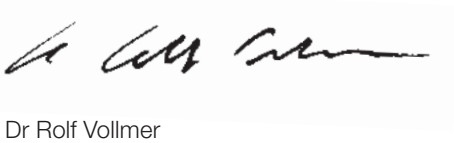
Furthermore, in our interview with Dr Dirk U. Duddeck, Managing Director and Head of Research at the CleanImplant Foundation, you will learn how the seal of quality, which underlines the first-class surface cleanliness of dental implants, is only awarded after a rigorous, peer-reviewed analysis and testing procedure.

Despite the high temperatures, let us take a glimpse at what lies ahead in the busy autumn: The DGZI, German Association of Dental Implantology, is pleased to welcome you to a top event under the motto “Implantology in the team” in the beautiful city of Hamburg. On 6 and 7 October, the 52nd International Annual Meeting will take place, once again hold with a modified concept. Attendees will experience a dental convention that sets the course for the future, raises new questions, and provides answers, but also shows new ways in the interaction between participants, speakers, and industry. This content-related claim is also reflected in the congress programme and the innovative organisational concept.

Participants and speakers from Japan, Georgia, Egypt, Kuwait, and the USA (just to name a few countries) will have the opportunity to network, to receive first-class practical training and to build a bridge from the latest scientific findings in the academic field to the implementation of innovations in daily practice. During the congress, the DGZI “Implant Dentistry Award” will be awarded in the categories “Dental Implantology”, “Implantological Assistance” and “Dental Implant Prosthetics”.

Enjoy two content-rich and instructive training days and get to know the historic Hanseatic city of Hamburg!

Yours,



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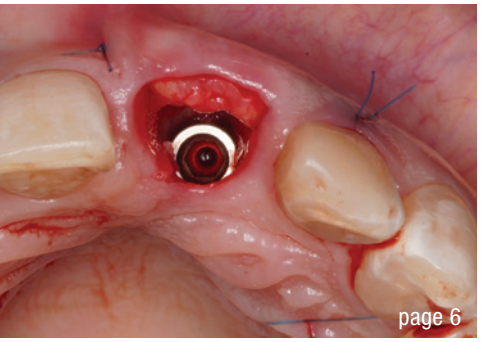
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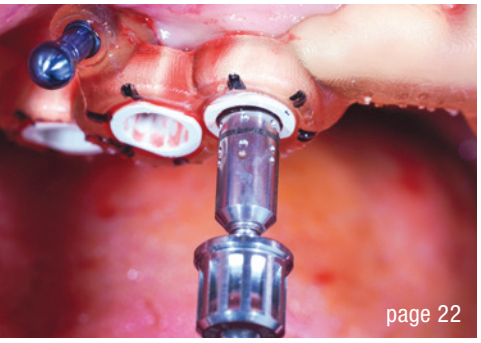
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Soft tissue augmentation

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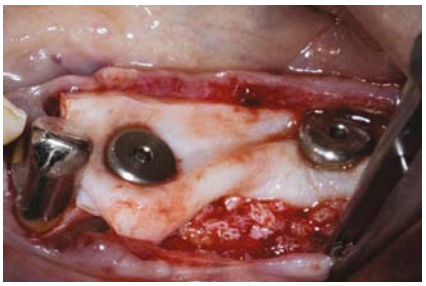
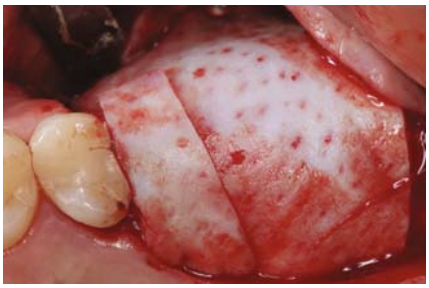


Ridge reconstruction



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Immediate aesthetic single-unit anterior restoration using a Grand Morse implant

Dr Luis Honorato Schmied, Chile

Patients' increasing expectations in terms of shorter treatment times are a major challenge for dentists and dental technicians. To support dental professionals in providing quality care faster, the Neodent Grand Morse implant system offers three implant designs, including Helix GM, all featuring the innovative hydrophilic Acqua surface. This maximises primary stability and predictability in immediate restoration protocols.

Case report

The 40-year-old female patient presented with a medical history of cerebral venous thrombosis, suffered in 2016, and epilepsy, diagnosed in 2018. The patient initially presented to the office complaining of spontaneous pain in tooth #21 and, on examination, had an enlarged periodontal ligament and a negative response to the pulp vitality test (Figs. 1 & 2). An emergency assess cavity and endodontic treatment were performed.

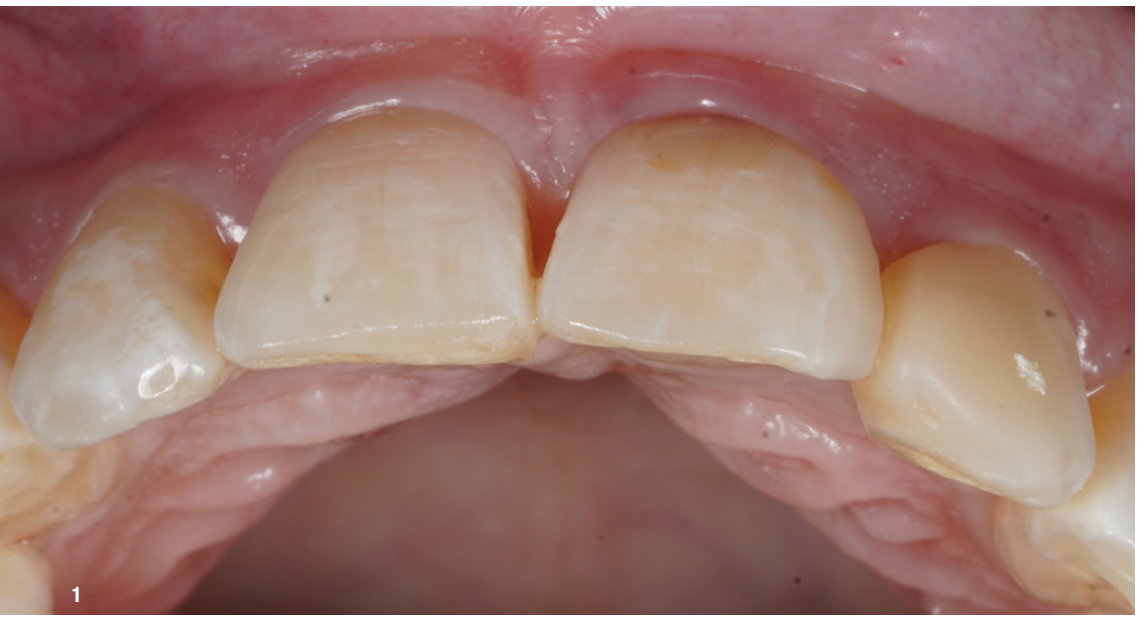
Three months after treatment, the patient returned complaining of spontaneous pain. The root canal was treated again and the patient medicated until the pain subsided. However, three months after retreatment, the patient had pain, mobility and suppuration. The root canal was again retreated, and the patient was medicated, but the mobility, pain and suppuration did not resolve.

Planning

A CBCT scan was requested, and tooth extraction was indicated (Fig. 3). Preoperative antibiotic treatment was prescribed for five days before surgery. It was planned to extract tooth #21 and immediately place and restore an implant to replace it.

Treatment and provisional restoration

Tooth extraction and careful alveolar conditioning were performed, taking care not to damage the alveolar bone.



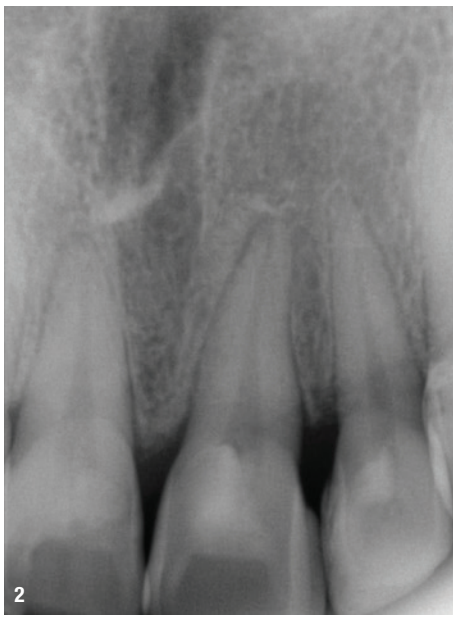


Fig. 1: Initial clinical aspect. **Fig. 2:** Initial periapical radiograph.

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The drilling protocol was then performed following the instructions of the manufacturer, and a Helix GM 4.0 × 13.0 mm implant was placed to an insertion torque of 60 Ncm. A connective tissue graft was harvested from the lateral area of the palate and the wound sutured (Fig. 4). This graft was then placed in a previously prepared vestibular gap and secured with sutures. A biomaterial was also inserted in the gap, and the abutment and screw-retained provisional crown, created from the crown of tooth #21, were placed. Postoperative control was performed three days, one week and two weeks after surgery.

Final restoration

Three months after surgery, the provisional crown was removed, and the buccogingival margin was observed to be in the desired position with an adequate emergence profile and healthy periodontal parameters (Fig. 5).

A GM 3.5 × 4.0 × 1.5 mm titanium base abutment was selected. A personalised zirconia coping was milled to which it was possible to transfer the emergence profile created from the day the implant was placed. A week later, the impression was taken using a custom open tray of acrylic resin and a Scan Regular addition-cured silicone (Yller Biomateriais). The colour of the final prosthesis was then selected. For the conditioning of the prosthetic solution, the Yzap primer and Sylano bonding agent (Yller Biomateriais) were used. The final prosthesis was then tried in and cemented (Fig. 6). Excess cement was removed before polymerisation.

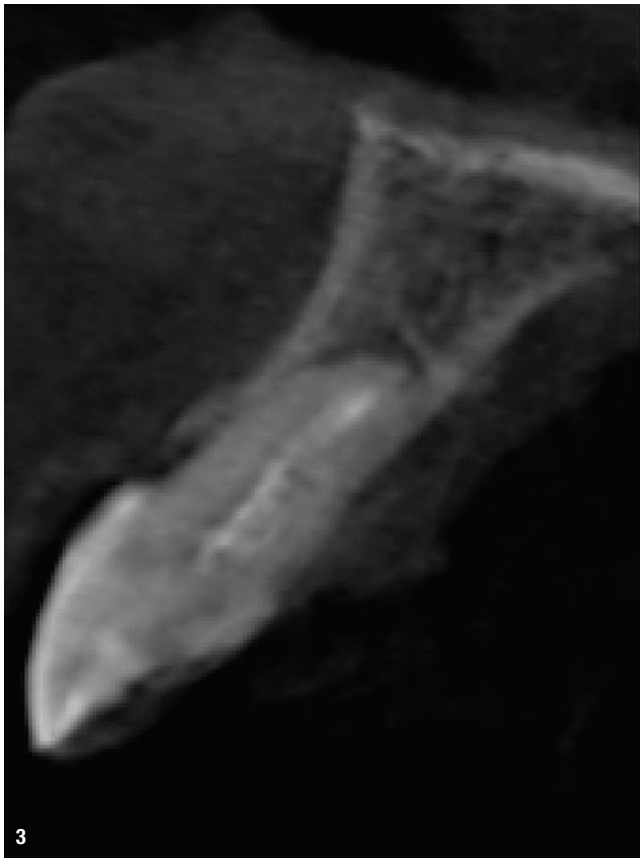
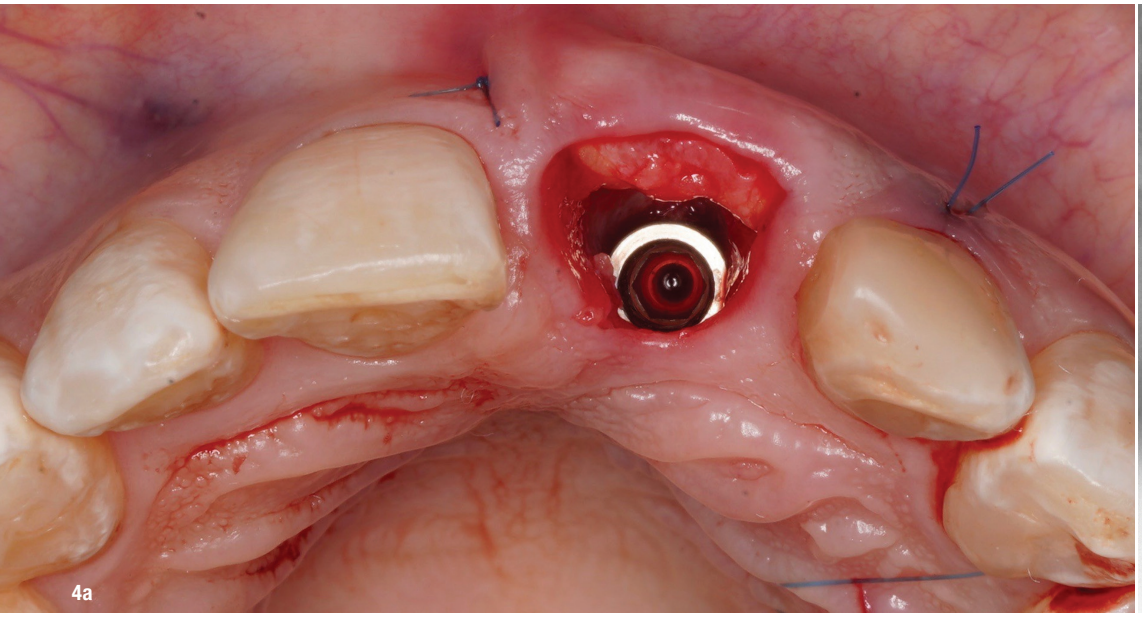
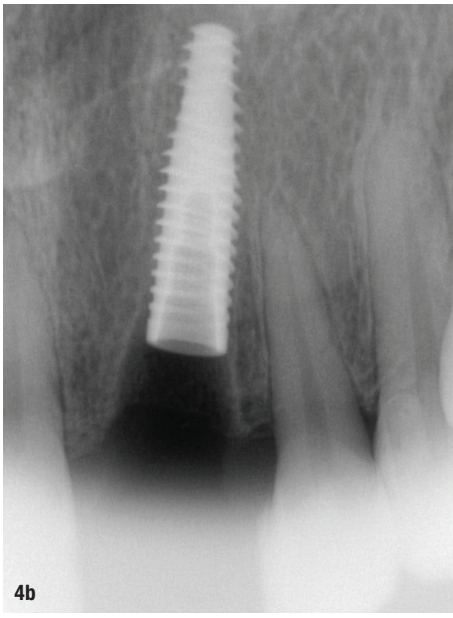


Fig. 3: CBCT scan after canal medication of tooth #21.





Figs. 4a & b: Occlusal and radiographic view of the implant and connective tissue placed.

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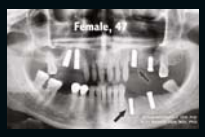

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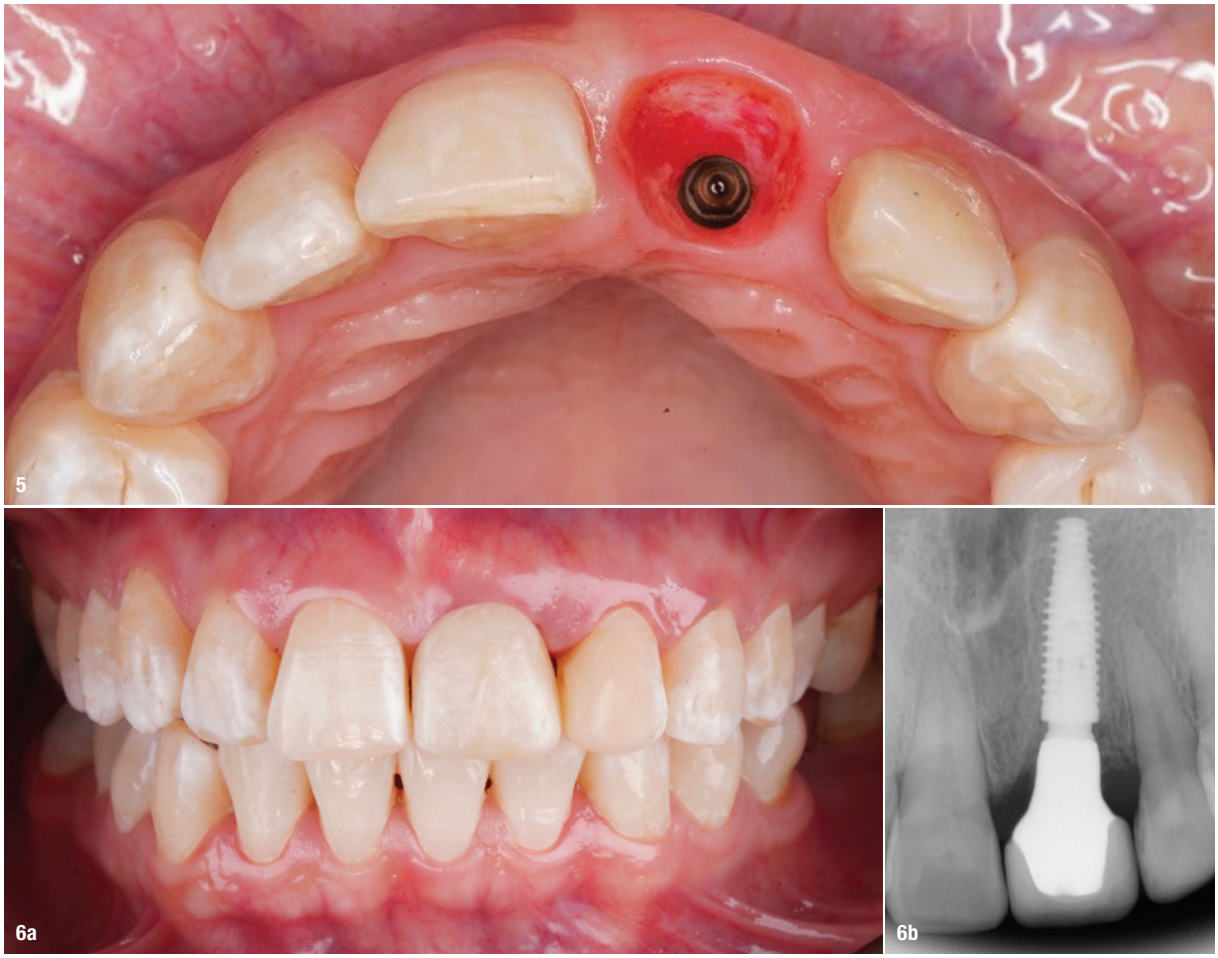

Fig. 5: Clinical gingival aspect three months after surgery. **Figs. 6a & b:** Final clinical aspect.

Conclusion

The macro-design of the Helix GM implant has differential features that enable achievement of progressive torque, adding to the stability of the connection that allowed the maintenance of peri-implant tissue in this case. Another treatment option could have been late placement because of the presence of infection at the extraction site, but the literature is not conclusive in this regard, so we opted for the correct debridement of the site and the use of antibiotics. The challenge in this case was to achieve immediate implant placement and provisionalisation with an ideal aesthetic result in the shortest possible treatment time. The macro-design of the Helix GM implant made it possible to obtain adequate insertion torque so that we could immediately restore the implant using the crown of the extracted tooth, and the Acqua surface allowed us less implant integration time than if we had used another implant surface.

about the author

Dr Luis Honorato Schmied is a surgeon and dentist in Santiago, Santiago Metropolitan, Chile. He has a degree in dentistry from the Universidad Mayor and works as a specialist in implant dentistry. He is the head of Clinic specialisation in Osseointegrated Implantology (Andrés Bello University) and is highly qualified as a maxillofacial surgery professor (Andrés Bello University), dental surgeon (Universidad Mayor) and a specialist in buccomaxillofacial implantology (Universidad de Chile).

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The transparent gingiva project

Non-invasive measurement of the height and width of the peri-implant soft tissue using an enhanced digital merging methodology

Drs Ariel Savion, Serge Szmukler-Moncler & Roni Kolerman, Israel

Introduction

Digitalisation has penetrated the dental implantology field extensively, considerably changing how patients are treated. Widespread access to digital tools has expedited clinical research focused on peri-implant soft tissue.[1–4] CBCT uses a digitalisation process to provide a 3D visualisation of the bone and soft tissue;[2, 5] however, the radiation emitted drastically limits its use in clinical research. Intra-oral scanning generates an accurate image of the external envelope of the gingiva, and the absence of emitted radiation and its user friendliness make it a valuable tool in clinical research. The efficacy of soft-tissue augmentation protocols can be observed by comparing intra-oral scans (IOSs) taken before and after treatment and following changes over time.[6–9] IOSs are easily superimposed and matched on dedicated software with the help of a specific digital feature. It is then possible to follow locally the evolution of the external envelope of the gingiva and translate it into gained or lost tissue dimensions and volumes. However, these merging protocols can only convey the relative changes of the soft-tissue dimensions. For example, Lilet et al. showed that implementation of a custom-made sealing socket abutment, combined with peri-implant socket filling, led after one year to a –0.66 ± 0.79 mm change in the buccal gingival envelope 1 mm below the gingival margin. With this methodology, however, they were unable to determine whether the lost buccal width was due to a loss of 1, 2 or 3 mm of the soft-tissue substrate.[10]

Determination of the absolute horizontal and vertical dimensions of the *in situ* peri-implant soft tissue can be obtained by probing with endodontic files,[11] by histology[12–14] or by CBCT scans;[5,15] none of them can be used extensively and without limitation. The dental implant scientific community is still looking for an affordable methodology that gives direct access to these critical dimensions. Recently, a group of authors described a straightforward methodology that leads to a direct reading of the dimensions of the gingiva at the level of the healing or prosthetic abutment.[16–18] They found that introducing the STL files of the implant-related components, that is, the healing abutment, the prosthetic abutment and the prosthesis, into the merged IOSs rendered the gingiva transparent. It was then possible to read the height and width of the peri-implant gingiva at every step of the treatment. The aim of the present report is to illustrate, using a case study of an edentulous site in the posterior maxilla, some of the possibilities that this enhanced digital merging workflow creates for clinical research.

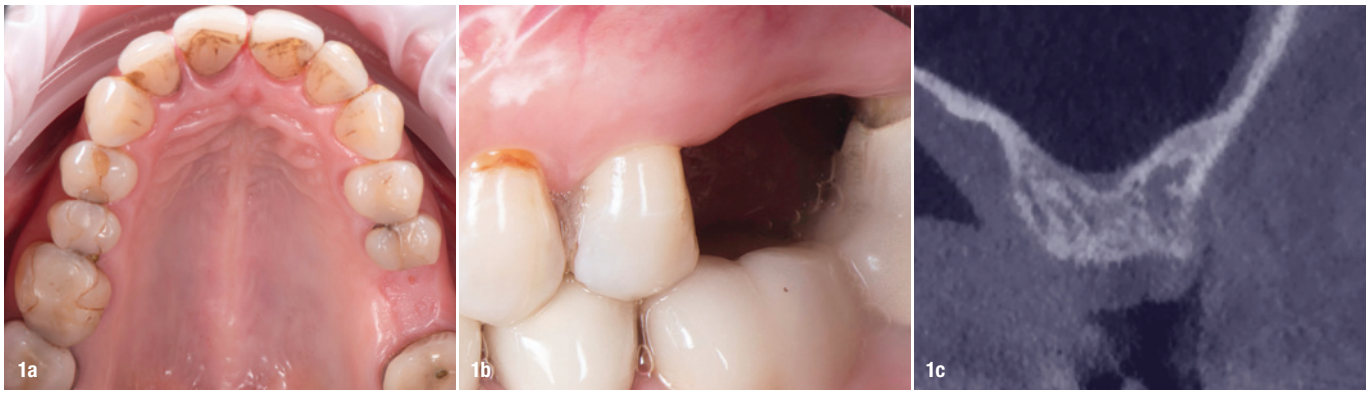

Fig. 1: Pre-op situation. Occlusal view of the edentulous first left molar site of the maxilla **(a)**. Buccal view of the edentulous site **(b)**. Sagittal section of the site taken from the CBCT examination **(c)**.

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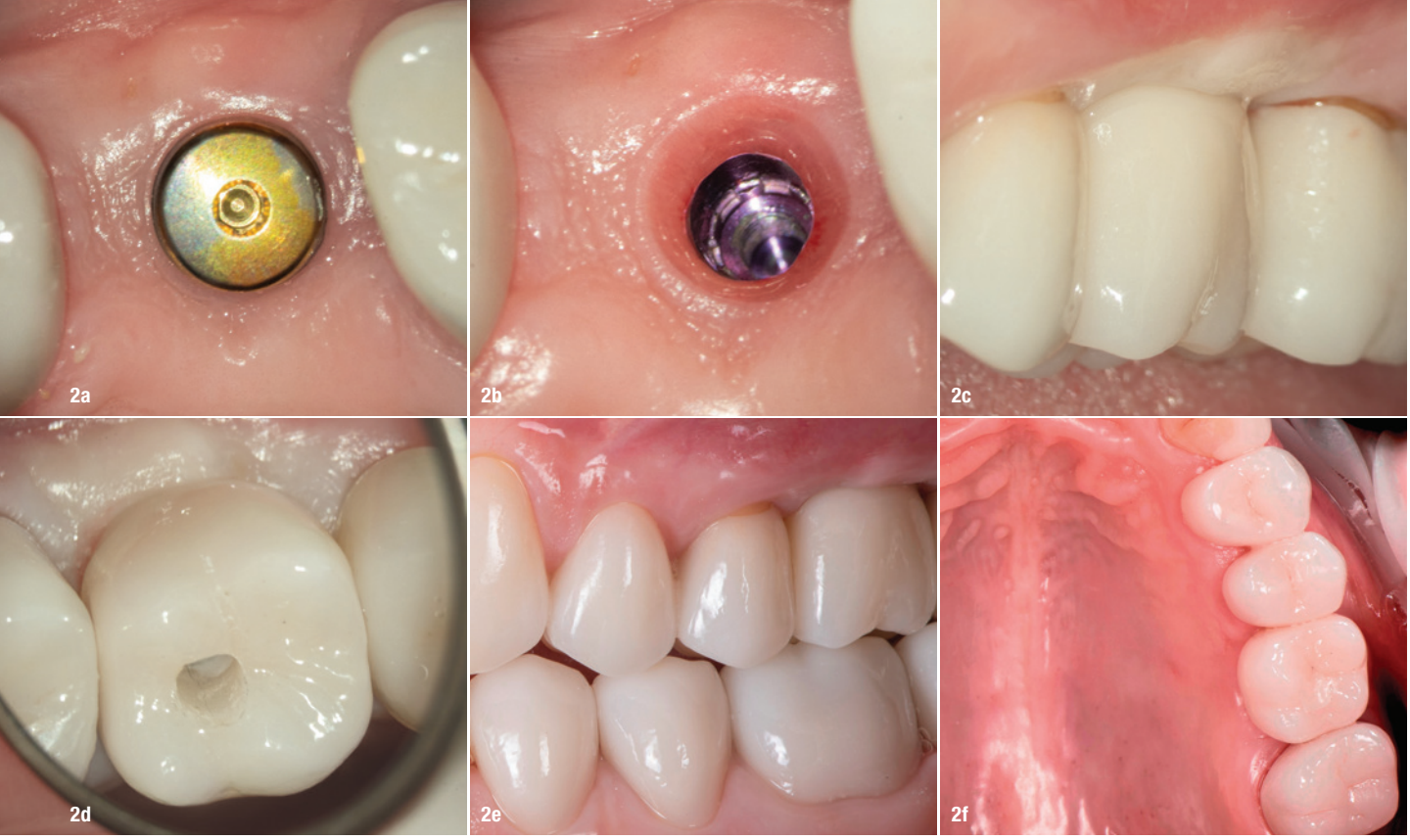

Fig. 2: Restoration of the edentulous site. Occlusal view of the implant site with the healing abutment in place at the end of the healing period **(a)**. Health of the soft tissue after removal of the healing abutment **(b)**. Buccal **(c)** and palatal view **(d)** of the marginal gingiva at prosthesis delivery. Note the gingival bleaching due to compression by the crown. Buccal **(e)** and palatal view **(f)** of the gingiva after relaxation of the bleaching.

Description of the case

A 45-year-old female patient attended for restoration of her missing left first molar in the maxilla (Fig. 1a). The patient had no history of smoking or alcohol consumption at the time of treatment and did not have any medical conditions that would affect implant therapy. Clinical examination showed a moderate loss of the local buccal convexity and height of the gingival margin (Fig. 1b). The radiographic examination revealed a residual bone height of 5.25–7.10 mm below the maxillary sinus (Fig. 1c). These conditions allowed placement of an 8 mm long implant after crestal sinus lift involving osseodensification burs.[19]

The treatment plan called for restoration of the edentulous site with an implant-supported crown after a one-stage surgery and a transmucosal healing period of ten weeks. The patient signed an informed consent allowing her data to be used for research purposes.

Surgical steps

After extra-oral disinfection of the surgical site, the patient was instructed to rinse with a 0.12% chlorhexidine solution for 1 minute. Antibiotics were not prescribed either before surgery or afterwards because of the use of laser for local decontamination.[20]

The osteotomy was prepared according to an osseodensification crestal sinus lift protocol.[19] A 4.2 × 8.0 mm internal connection implant (C1, MIS Implants Technologies) was placed in a slightly subcrestal position to a 60 Ncm insertion torque. A modified palatal roll flap technique with two intrasulcular incisions involving the adjacent mesial and distal teeth was performed[21] with the aim of increasing the width of the soft tissue and improving the buccal tissue volume. De-epithelialisation was realised with a 2,780 nm Er,Cr:YSGG laser (Waterlase iPlus, BIOLASE) and a gold handpiece with the new Z-type glass MZ6 tip (0.6 × 17.0 mm) using the following parameters: an average output power of 2.5 W, a pulse duration of 60 µs (H-mode), a pulse repetition rate of 50 Hz and a water spray (air: 20%; water: 40%). The graft was rolled under the buccal flap. It was allowed to heal standing against a 4.8 × 4.0 mm anodised concave healing abutment affixed to the implant. The flap was repositioned buccally and sutured with two simple interrupted sutures (5/0 GLYCOLON, Resorba Medical) on the mesial and distal sides. Primary closure of the occlusal gingiva was not intended. The monofilament sutures were removed after five days to promote a secondary healing process.

Ten weeks after surgery, the patient returned for an osseointegration check of the implant (Fig. 2a). The usual clinical and radiographic examinations were performed, and it was found that the graft had healed uneventfully and provided a satisfactory contour to the peri-implant soft tissue. In addition, the implant was biomechanically tested, as recommended by several authors,[22–25] with a 30 Ncm reverse torque.[23] The manufacturer recommends a 30 Ncm torque for attachment of the prosthetic components.

Prosthetic steps

The healing abutment was removed to check the health of the gingiva (Fig. 2b) and start the prosthetic steps. An

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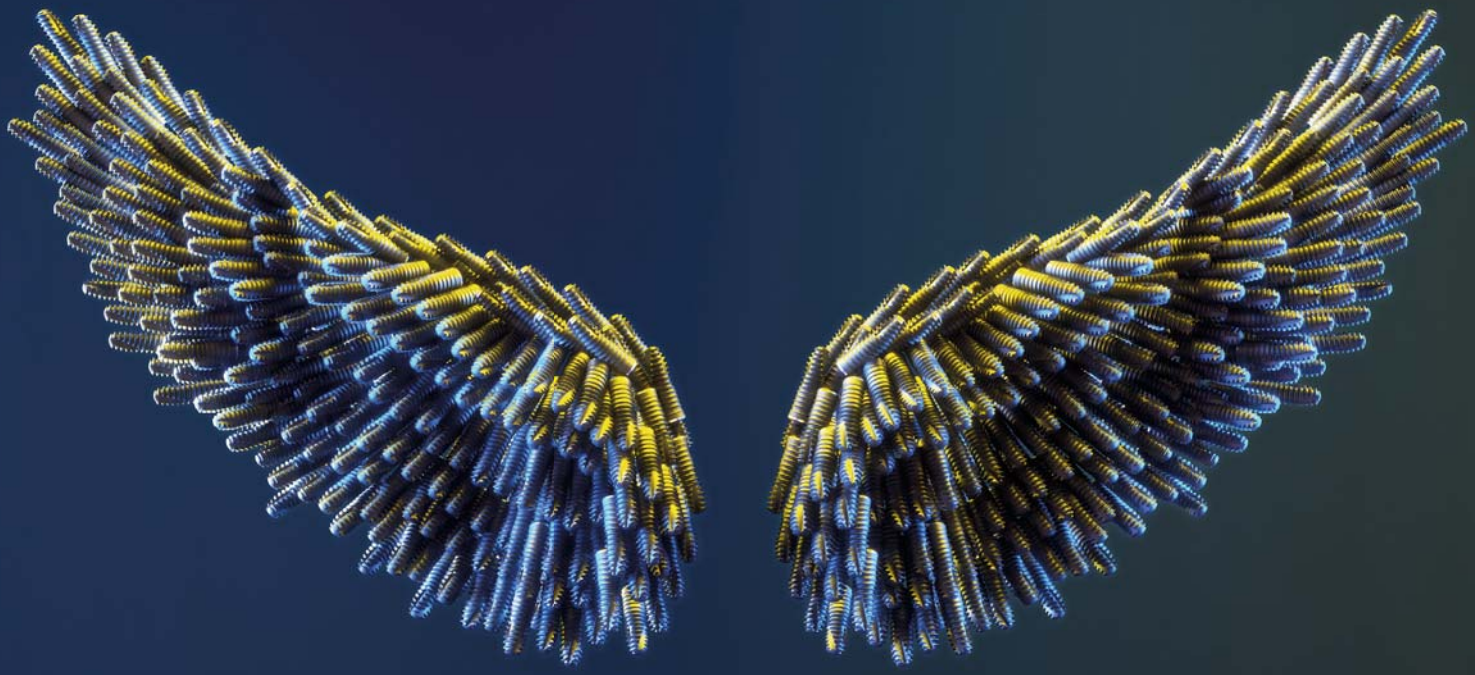

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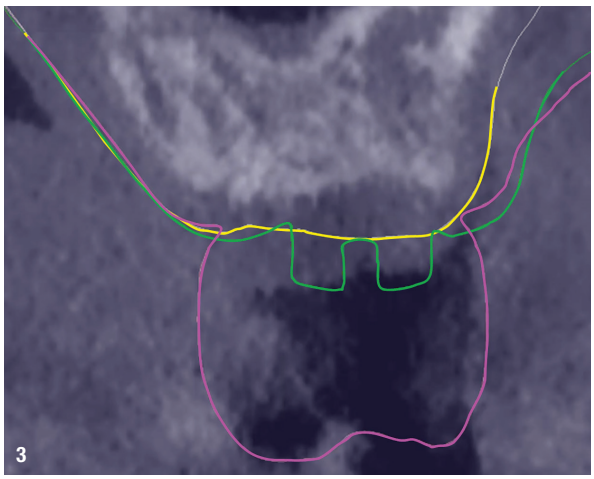

Fig. 3: Standard superimposition of the intra-oral scans taken before surgery (yellow line), at soft-tissue healing (green line) and at prosthesis delivery (purple line) on the pre-op CBCT scan (the right side is the buccal side).

IOS (TRIOS 4, 3Shape) was taken with a scan body affixed to the neck of the implant. The STL file was sent to the dental laboratory for CAD/CAM processing. A monolithic zirconia crown was milled (Roland DGA) and prepared based on the digital design. The crown was cemented on a 1.5 mm high titanium base (Ti-Base; MIS Implants Technologies). The crown with the Ti-Base was screwed on by applying the 30 Ncm torque recommended by the manufacturer. Pressure of the crown on the gingival margin provoked transient buccal and palatal bleaching (Figs. 2c–f).

Merging procedures

Before surgery, a CBCT scan was obtained to analyse the local bone features and determine the various anatomical obstacles to be aware of. IOSs were subsequently taken at the various milestones:

- before surgery (IOS #0);
- at the end of the healing period with the healing abutment in place (IOS #1); and
- at prosthesis delivery, after pressure on the gingival margin had resolved (IOS #2).

The digital merging involved the STL files of the healing abutment, the prosthetic abutment and the crown. These were provided by the manufacturer and the dental laboratory, respectively. The digital superimposition sequence was performed with exoplan software (exocad). The mere merging of IOSs, as reported by other authors,[6, 7] does not enable measurement of the dimensions of the peri-implant soft tissue (Fig. 3). It is only after merging the IOSs with the STL file of each implant-related component that the height and width dimensions of the gingiva can be read.[16–18]

First, IOS #0 was merged with the CBCT scan and then with IOS #1 (Fig. 4a). At this stage, the STL file of the healing abutment was then merged with these (Fig. 4b). The implant was then added to the file, and the shape of the gingival margin, including the gingival seal, was identified (Fig. 4c). The superimposition enabled measurement of the height and width of the gingiva at the end of the healing period.

After prosthesis delivery, IOS #2 was superimposed on the previous set of IOSs. The STL files of the crown, of the Ti-Base and of the implant were then merged sequentially. This superimposition enables measurement of the dimensions of the peri-implant soft tissue at the time of prosthesis delivery (Fig. 5).

Reading of the vertical and horizontal dimensions of the gingiva

Before surgery

Reading the height of the gingiva at the crest and on the buccal and palatal sides of the abutment was made possible by superimposing IOS #0 and IOS #1 on top of the CBCT scan (Fig. 6a). This helped determine the height of the gingiva at the implant site.

At the end of the healing period

Merging of the STL file of the healing abutment and of the implant with the IOS superimposition set provided ac-

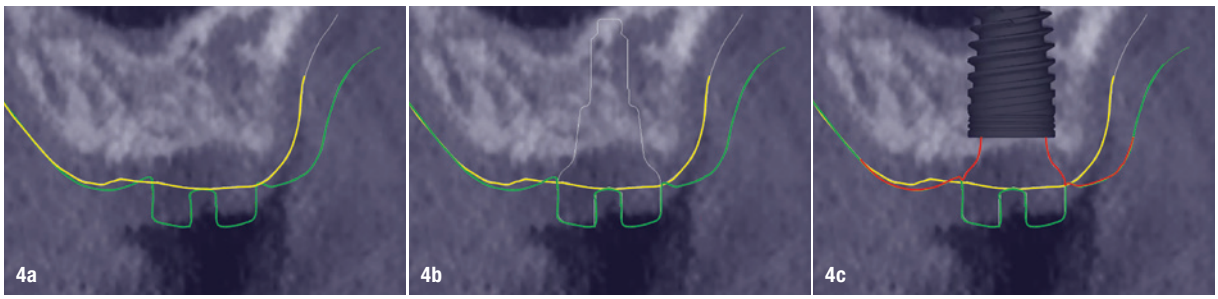

Fig. 4: Implementation of the enhanced merging methodology at the end of the soft-tissue healing. Superimposition of the intra-oral scan taken before surgery (yellow line) and the one taken at soft-tissue healing (green line) on the pre-op CBCT scan (the right side is the buccal side) **(a)**. Merging of the STL file of the healing abutment (white line) in addition **(b)**. Drawing of the shape of the peri-implant gingiva around the healing abutment (red lines) after merging of the STL file of the implant in addition **(c)**.

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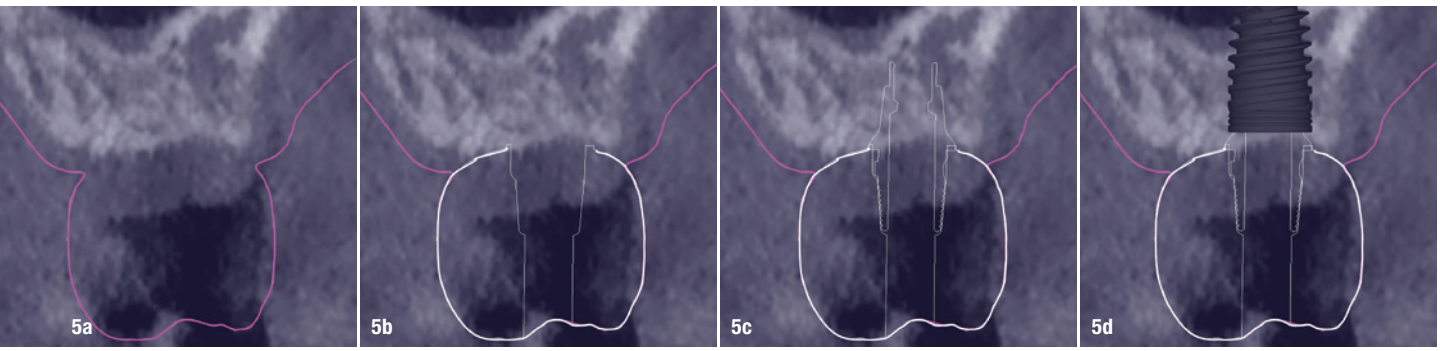

Fig. 5: Implementation of the enhanced merging methodology at prosthesis delivery. Superimposition of the intra-oral scan taken at prosthesis delivery (purple line) on the pre-op CBCT scan (the right side is the buccal side) **(a)**. Merging of the STL file of the crown (white line) in addition **(b)**. Merging of the STL file of the prosthetic abutment (thin white line) with the previous superimposition **(c)**. Merging of the STL file of the implant according to its height in addition **(d)**.

cess to the gingival height (Fig. 6b) and width (Fig. 6c) at the end of the healing period. The changes in gingival height induced by the flap surgery on the buccal and palatal sides were measured by comparing IOS #0 and IOS #1. The gingival height down to the implant neck was also measured on both sides. Similarly, changes in the gingival width at the end of the healing period were followed at various levels of the healing abutment. In addition, the entire thickness of the gingiva resulting from the modified palatal roll flap technique could be determined. The gingival width at the level of the implant neck was 4.87 mm.

At prosthesis delivery

The addition of IOS #2 and the STL file of the crown and of the Ti-Base to IOS #1 showed precisely to what extent the gingiva was compressed apically at crown delivery (Fig. 7a) and how much gingival height remained up to the level of the neck of the implant (Fig. 7b). It was then possible to visualise the changes induced by the fastened crown at the level of the gingival margin and the biological seal (Fig. 7c). Both the shape and the dimensions of the gingival seal had changed. On the buccal side, 0.34 mm of the external slope of the sulcus was compressed to under the crown. On the palatal side, it was 0.95 mm of the keratinised epithelium that would undergo histological modification in order to form the sulcus and the soft-tissue sealing structure. The final gingival width and its changes from the previous stages could also be determined (Figs. 7d–f).

Discussion

The aim of this report was to describe, through a clinical case, the type of dimensional data that it is possible to obtain from the peri-implant soft tissue with an innovative digital protocol that was very recently published[16–18] and that cannot be obtained otherwise. The additional clinical effort to gain this data is minor: it requires performing three IOSs and obtaining the STL files of the various items from the manufacturer and the dental laboratory.

The preoperative gingival height can be read by merging IOS #0 with the CBCT scan.[1–3] Determining gingival height during implant planning is important because this variable can affect how far the implant should be placed subcrestally without risking the implant neck being insufficiently surrounded by bone.[26, 27] The routine way to measure the thickness of the gingiva is with a periodontal probe on the crest of the ridge after flap elevation;[26] however, the actual place to determine the thickness requires

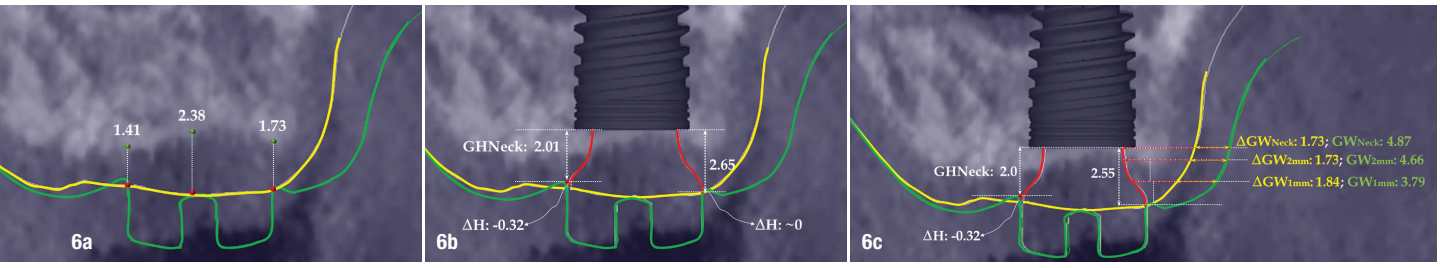

Fig. 6: Dimensions (mm) of the gingiva at the end of the healing period. Comparison, before surgery (yellow line) and at the end of healing (green line), of the gingival height (GH) measured at the middle of the crest and on the buccal and palatal sides of the healing abutment **(a)**. Measurement of the GH variables—change in GH (ΔH) and GH at the level of the implant neck (GHNeck) on the buccal and palatal sides by the end of the soft-tissue healing. The surgical technique did not increase the GH on the buccal side, and GH on the palatal side decreased slightly. Red lines = the limits of the healing abutment **(b)**. Measurement of GW by the end of healing and of the change in gingival width (ΔGW) on the buccal side from before surgery until the end of the healing period. GW was measured at 1 mm (GW1mm) and 2 mm (GW2mm) from the gingival margin and at the level of the implant neck (GWNeck) **(c)**.

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the application of the biological width concept, that is, at the emergence of the gingival margin in contact with the healing abutment. Szmukler-Moncler et al. showed that determination of the thickness at the crest does not provide an accurate estimate of the gingival thickness measured at the buccal and palatal sides of the healing abutment.[28]

In the present case, the 2.38 mm measured at the crest suggests that the gingiva is thicker than 2 mm and might be classified as thick.[26,29] However, at the place it should be measured, taking into account the biological width concept, the initial gingival heights on the buccal and palatal sides of the abutment are 1.73 mm and 1.41 mm, and therefore the gingiva should be characterised as thin. Consequently, it makes sense to anticipate crestal bone loss down to at least the implant neck in order to achieve acceptable dimensions of the biological width.

At the end of the healing period, it appeared that the modified roll technique did not affect the gingival height; however, it did increase the width of the buccal gingiva significantly. The gain in width was 1.84 mm and 1.73 mm at 1.0 mm and 2.0 mm below the gingival margin, respectively, and the overall width reached 4.66 mm and 4.87 mm. Today, this digital protocol is the only way to access these clinical variables in a non-invasive way.

Placement of the crown instantly and substantially modified the gingival height by 0.70–1.33 mm on the buccal side and by 0.54–1.44 mm on the palatal side. Pressure on the gingiva was clinically evidenced by bleaching of the buccal and palatal gingiva. Again, only this digital methodology is able to provide such a precise insight into the resulting dimensional changes. One can legitimately assume that this compression of the gingiva might lead to a subsequent rearrangement between the compressed soft tissue and the underlying crestal bone and in turn to bone resorption. After delivery of the crown, the digital superimposition showed that part of the width gained by the end of soft-tissue healing by the time-consuming surgical technique had vanished.

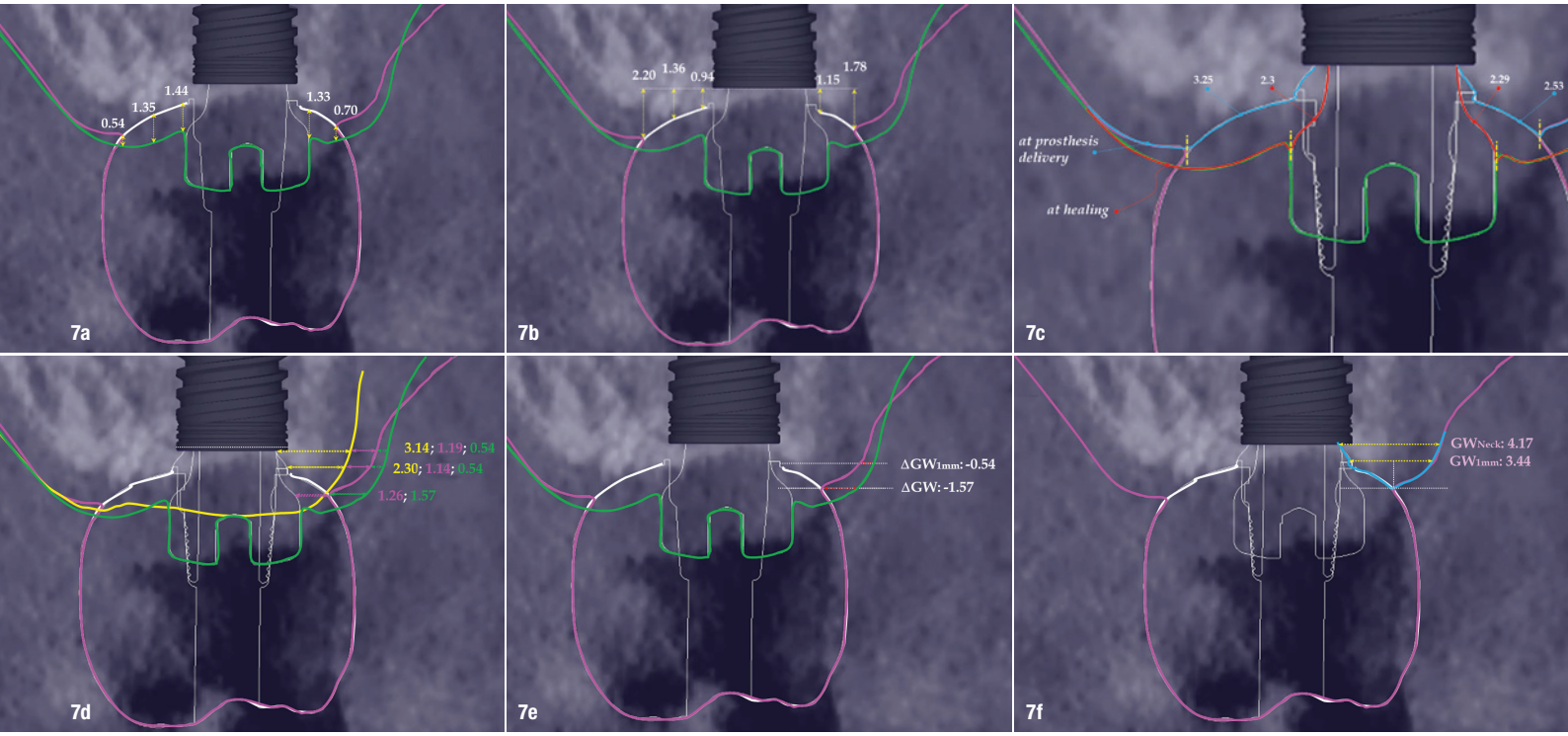

Fig. 7: Dimensions (mm) of the gingiva at prosthesis delivery. The prosthesis (white line) compressed the soft tissue as evident from the changes in the gingival height between the end of the healing (green line) and prosthesis delivery (purple line) **(a)**. Height available for the gingiva down to the level of the neck of the implant. Blue line = internal and external portion of the gingiva **(b)**. Comparison of the shape and estimated length of the gingival seal at the end of healing (red line) and at prosthesis delivery (blue line). On the palatal side (left side of the image), the gingival seal at prosthesis delivery under the crown is larger by 0.95 mm than the one obtained at the end of the healing. Yellow dotted lines = top of the gingival margin and beginning of the sulcus **(c)**. Measurement of the gingival width (GW) at various levels of the abutment, according to the various steps of implant therapy. Yellow line = pre-op. Green line = at the end of the healing period. Purple line = at prosthesis delivery. The numbers for each step are shown in the respective line colours **(d)**. Measurement of the negative change in GW on the buccal side between the end of the healing period and prosthesis delivery at the level of the sulcus (ΔGW) and the most apical level of the crown (ΔGW1mm). GW lost 1.57 mm at the level of the sulcus **(e)**. GW at prosthesis delivery measured at 1 mm from where the sulcus begins (GW1mm) and at the level of the implant neck (GWNeck). Despite a loss of thickness, GW was still above 3 mm **(f)**.

Conclusion

The inventive step of the present digital methodology consists of merely merging the IOSs that are typically obtained[6,7] with the STL files of the various implant-related items.[17,19] This single addition brings about an illuminating difference, as it renders the gingiva transparent, enabling reading of the vertical and horizontal dimensions of the peri-implant gingiva and their changes at every level of the abutment and at every stage of the treatment. This is otherwise unattainable in clinical research. Implementation of this digital workflow in clinical research will help refine the data acquired from protocols and techniques of soft-tissue thickening, providing information on not only the tissue thickness gained but also the entire thickness of the gingiva.

References

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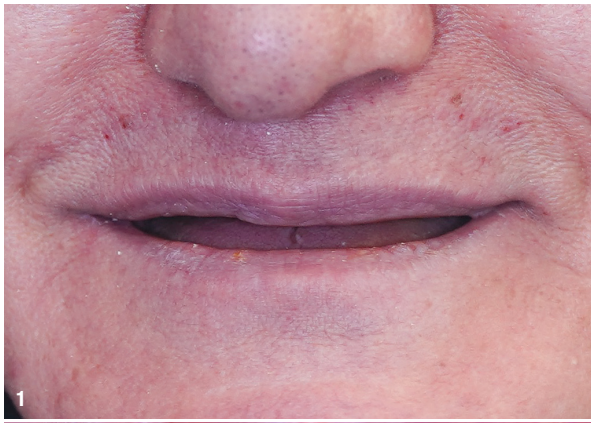
Immediate loading of a final fixed prosthesis in the edentulous maxilla on Straumann BLX implants

Drs Kerem Kilic, PhD & Erdem Kilic, PhD, Turkey

Introduction

For many years, practitioners and patients have been concerned about bone resorption leading to reduced retention and therefore stability of conventional dentures.[1] Full-arch implant-supported fixed dental prostheses may provide more comfort and substantial improvements in prosthetic function, adaptation and stability compared with conventional treatment options.[2]

The rise and spread of digital dentistry have significantly influenced clinicians specialising in implant dentistry and full-arch restorations.[3] The continued development of CAD/CAM technology and 3D printing has revolutionised the manufacture of tooth-borne and implant-supported fixed dental prostheses.[4] Using digital technologies for fabricating full-arch fixed dental prostheses supported on implants can result in less expensive laboratory and clinical chairside time and lower overall cost.[5] Furthermore, owing to an excellent survival rate, implants immediately loaded with a fixed prosthesis have become a feasible choice in the rehabilitation of edentulous patients.[6]



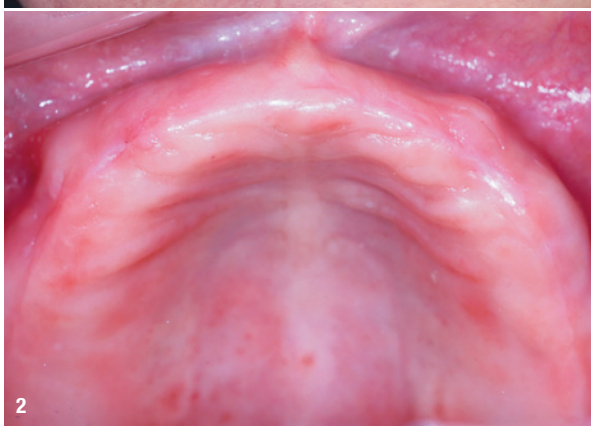


Fig. 1: Medium smile line and loss of the vertical dimension of occlusion. **Fig. 2:** Loss in width and height of the maxillary alveolar ridge.

The following case report aims to show a successful treatment involving immediate loading of a final fixed prosthesis in the edentulous maxilla on Straumann BLX implants.

Initial situation

A systemically healthy 59-year-old female non-smoker on no medication and with no allergies presented to our clinic with the chief complaint of her complete dentures lacking retention, preventing her from eating and speaking normally. She had worn complete dentures for a number of years and desired a solution that would improve her situation without requiring complex surgeries or a long treatment time.

Extra-oral examination with the patient wearing her dentures found a medium smile line and loss of the vertical dimension of occlusion due to the wearing of dentures. Without the dentures, inadequate soft-tissue support was evident, affecting the facial aesthetics (Fig. 1).

Intra-oral examination showed that the supporting soft tissue was slightly inflamed. The alveolar ridge of the maxilla and mandible showed a loss in width and height, although it had sufficient width and was covered by relatively healthy keratinised mucosa (Fig. 2).

The initial radiographic evaluation included dental panoramic tomogram (Fig. 3) and a CBCT scan. The CBCT

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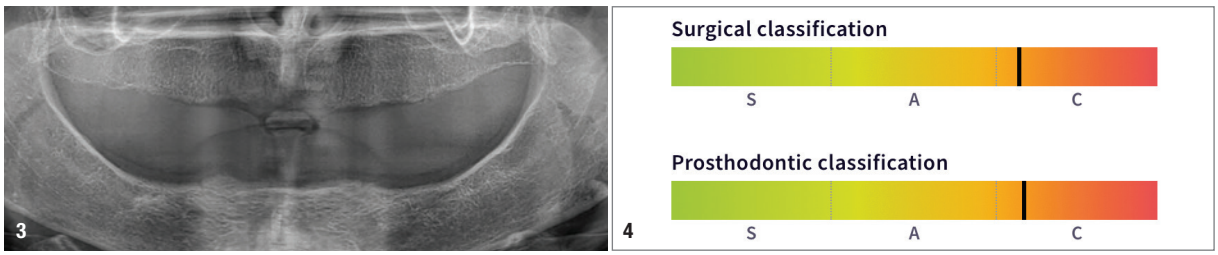

Fig. 3: Initial radiographic evaluation by dental panoramic tomogram. **Fig. 4:** The SAC classification of the treatment.

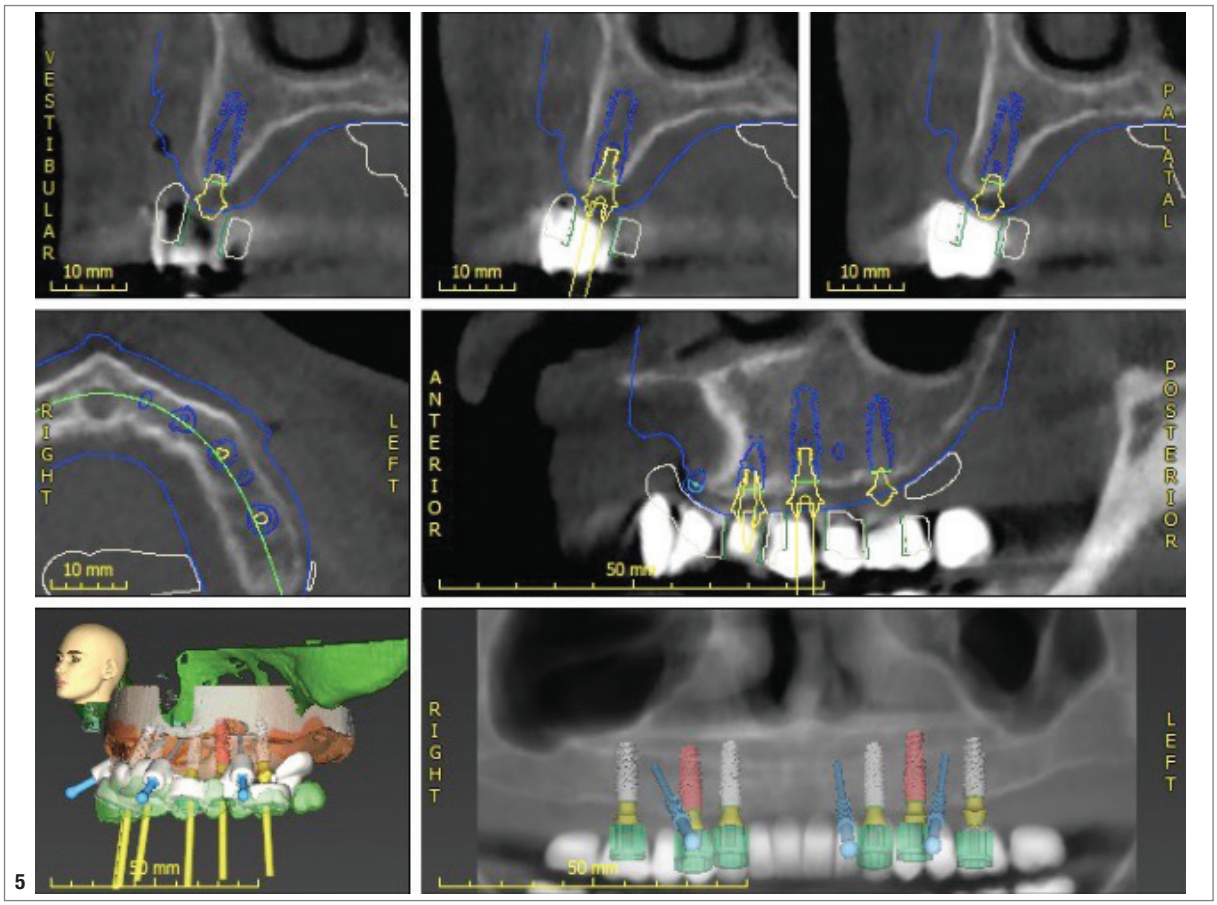

Fig. 5: Digital planning with coDiagnostiX.

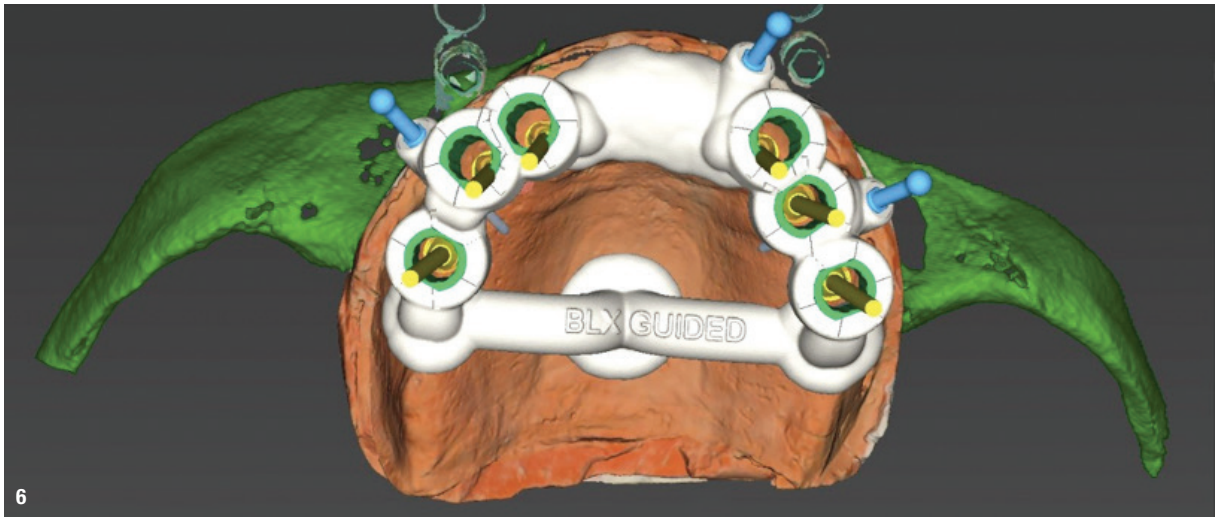

Fig. 6: Mucosa-supported guide design and planning.

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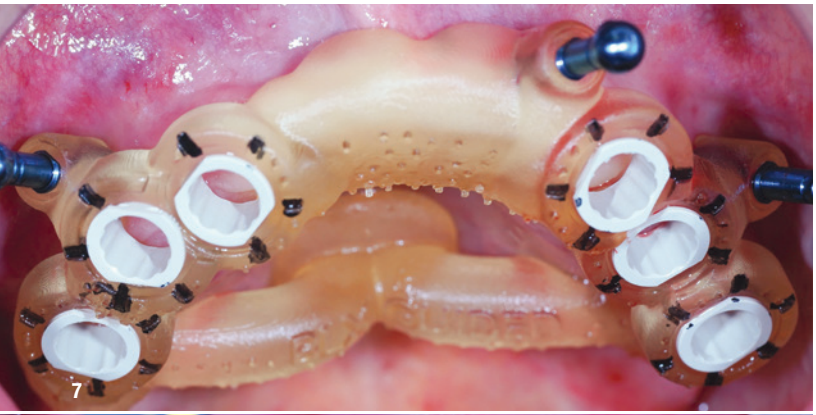


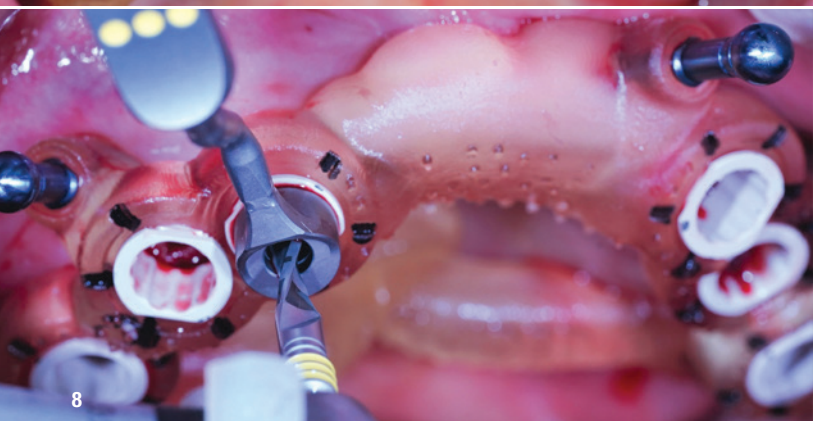


Fig. 7: Anchor pins inserted. **Fig. 8:** Implant bed being prepared with the Straumann Surgical Cassette.

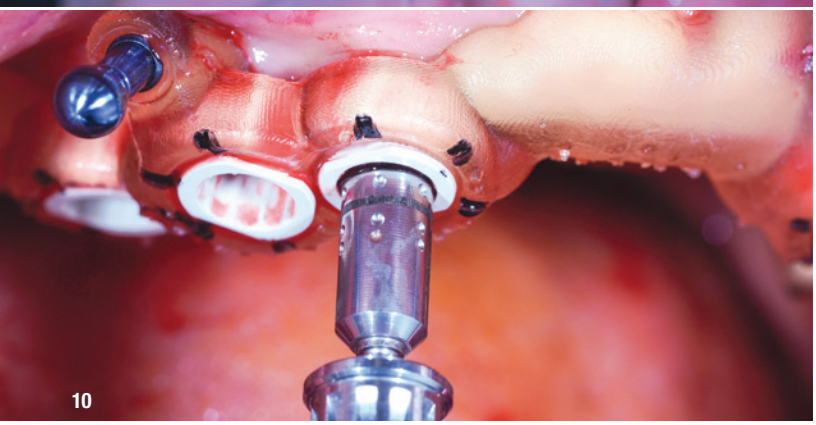


Fig. 9: Implant being placed with the ratchet. **Fig. 10:** Position indicators on the implant driver and surgical guide.

scan was used to determine the amount and density of bone for implant placement. Sagittal sectioning revealed sufficient bone availability for implant placement. However, medium bone quality (Class D3) was also identified.

The SAC classification was used to determine the grade of difficulty of implant treatment for the patient. The case was determined to be surgically and prosthodontically complex (Fig. 4).

After the clinical and radiographic examination, and considering the patient's wishes and health, it was decided to place six Straumann BLX implants using a mucosa-supported guide in a flapless surgical procedure owing to the improved morbidity and to provide a full-arch implant-supported prosthesis.

The treatment workflow involved:
1. prosthetic and aesthetic analysis;
2. digital planning (Fig. 5) and mucosa-supported guide design and preparation (Fig. 6) with coDiagnostiX (Dental Wings);
3. placement of six Straumann BLX implants using the mucosa-supported guide;
4. fabrication, using a Straumann 3D printer, of a prosthesis prototype in resin-based provisional material with Variobase copings fixed to it;
5. immediate loading of Straumann BLX implants; and
6. fabrication of the final monolithic zirconia screw-retained prosthesis.

Surgical procedure

The mucosa-supported guide was checked on the edentulous area for proper fit. The flapless surgery was performed under local anaesthesia with 2% lidocaine and 1:100,000 adrenaline. The holes for the anchor pins were then drilled and they were inserted (Fig. 7). The implant beds were prepared using the Straumann Surgical Cassette following the pilot drilling protocol (Fig. 8).

After the implant bed preparation, the six implants were inserted (Fig. 9). The implants were placed manually with a ratchet in a clockwise direction to a final torque of 35–50 Ncm (Fig. 10). Position indicators on the implant driver and surgical guide were aligned as anticipated to indicate implant depth and connection orientation as planned in coDiagnostix (Fig. 11). Primary stability was achieved in all implant sites, which allowed us to proceed to the planned immediate loading protocol.

Prosthetic procedure

Seventeen-degree angled Straumann screw-retained abutments (SRAs) with a rounded shape designed for emergence profiles were placed on the implants in posi-

tions #16, 24 and 26. In addition, straight SRAs were placed on the implants in positions #16, #24, and #26 (Fig. 12). The Straumann SRA connection ensures long-term mechanical stability and protection against rotation. The SRAs are intended to allow versatility, especially when treating edentulous patients with Straumann BLX implants.

Open-tray impression copings were splinted together using PTFE and light-polymerised pattern resin (Fig. 13). During the laboratory phase, protective caps were placed to protect the implants and maintain the soft-tissue shape (Fig. 14).

Thereafter, the laboratory technician made the prosthesis prototype design (Fig. 15), and the prototype was produced from a resin-based provisional material using a Straumann 3D printer (Fig. 16), increasing efficiency and shortening the workflow. Variobase copings were fixed to it.

Two days after the surgery, the prosthesis prototype was screwed on to the abutments. Passive fit, occlusion, vertical dimension, position of the teeth and relationship of the teeth to the soft tissue were evaluated intra-orally and extra-orally (Figs. 17 & 18).

The prosthesis was produced monolithically using Straumann fourth-generation zirconia discs from the STL file of the design of the prosthesis prototype via CAD/CAM technology (Fig. 19). After the sintering and glazing procedures, Variobase copings were cemented to the hybrid prosthesis with self-adhesive resin cement. The gingival part of the hybrid prosthesis was stained using OPTIGLAZE (GC; Fig. 20).

Six days after surgery, a follow-up visit took place, during which it was established that healing had been uneventful (Fig. 21) and the hybrid prosthesis was screwed on to the abutments in the patient's mouth (Fig. 22). Proper extension and the prescribed occlusal scheme were checked. Mutually protected articulation with anterior guidance had been achieved (Fig. 23).

Eight months after implant placement, the patient returned for a follow-up visit (Fig. 24), and a dental panoramic tomogram was taken (Fig. 25). Furthermore, the patient was involved in a yearly maintenance programme, in which oral hygiene instructions were reinforced and a complete clinical and radiographic assessment was performed.

Treatment outcomes

This clinical case report has described the successful management of and outstanding outcome for an edentulous patient who desired a fixed, fast and atraumatic

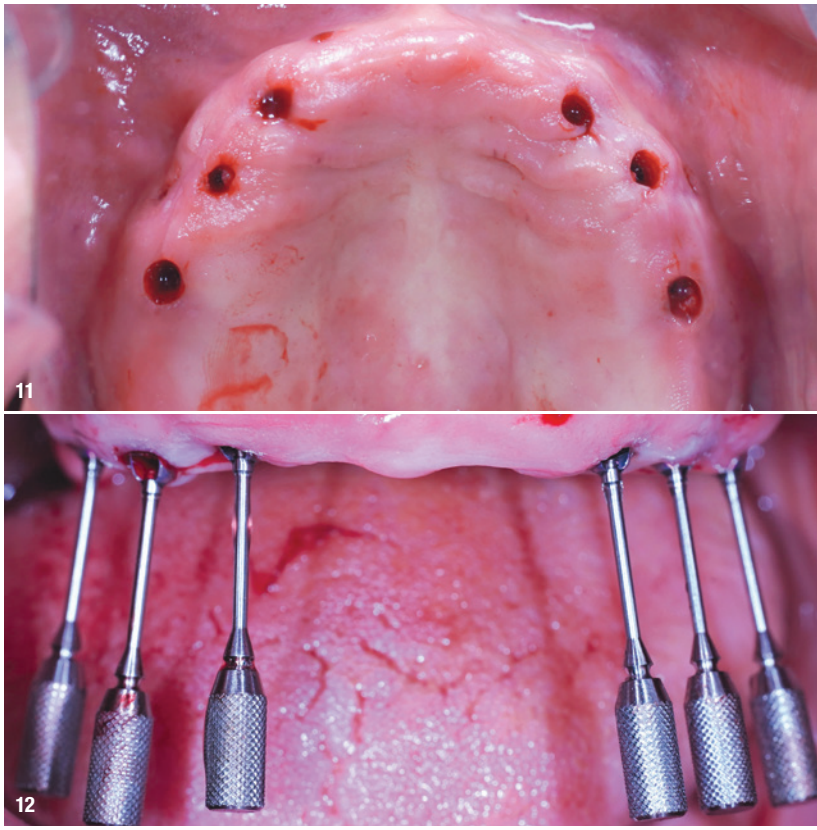


Fig. 11: Six Straumann BLX implants inserted using the flapless guided procedure. **Fig. 12:** Screw-retained abutments placed on the implants.

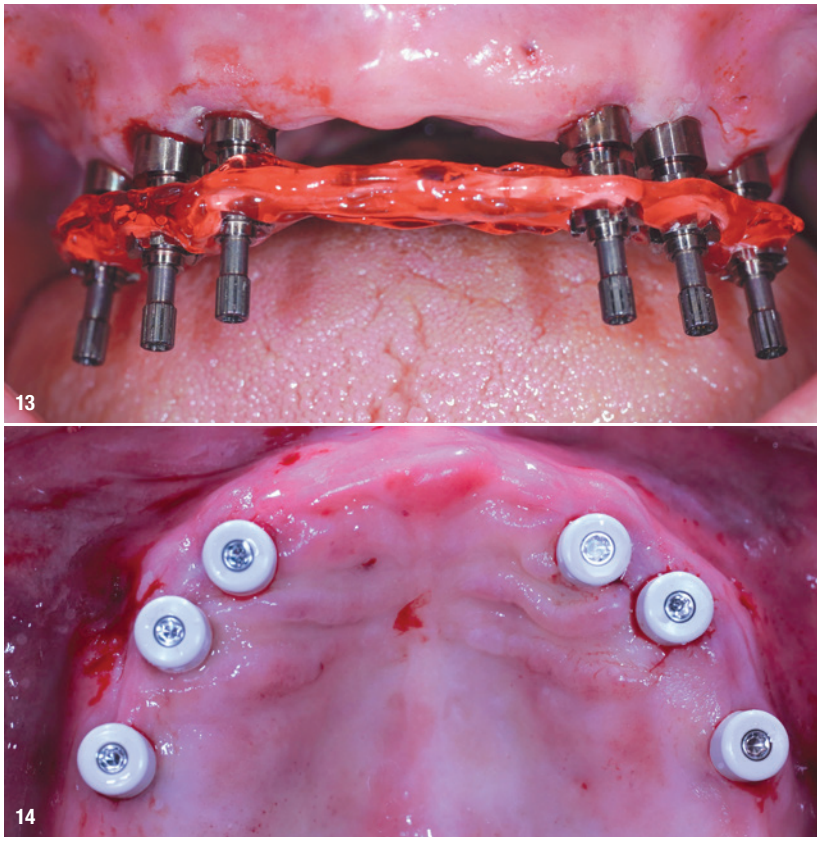
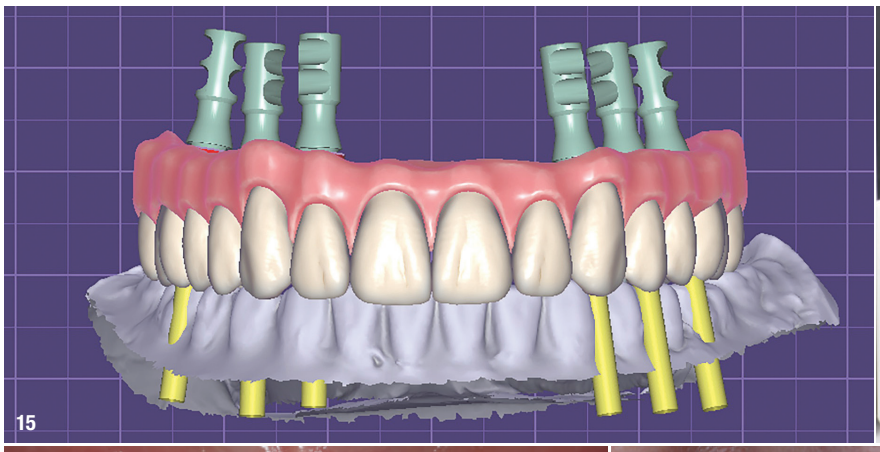
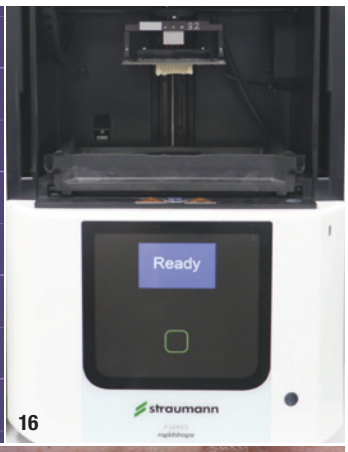


Fig. 13: Open-tray impression copings splinted together. **Fig. 14:** Protective caps placed.





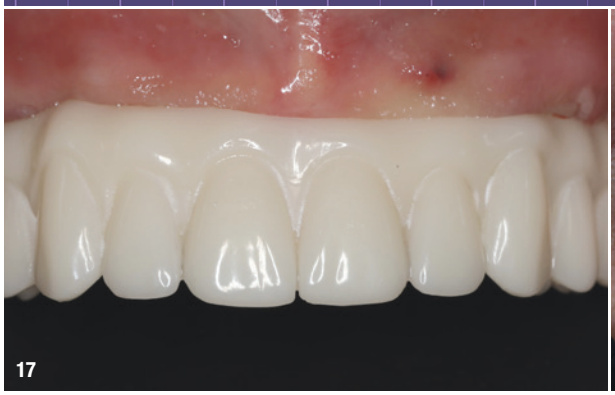
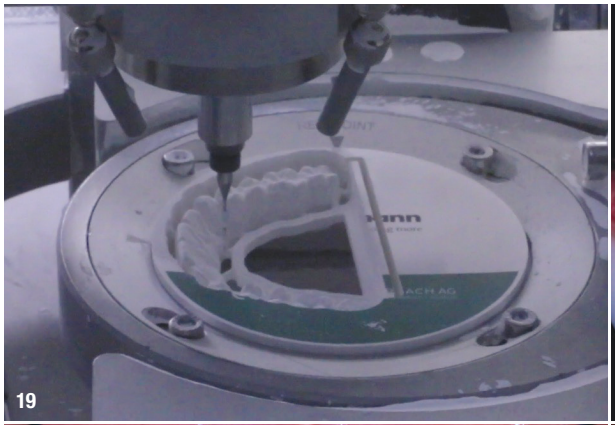
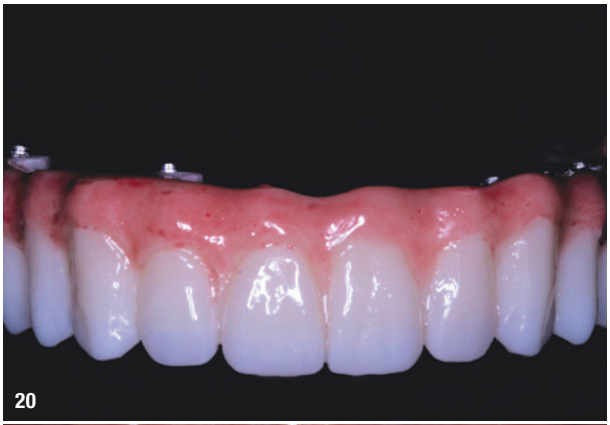
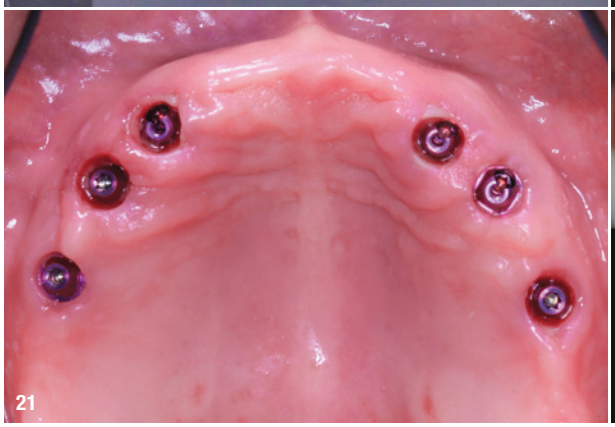


Fig. 15: Prosthesis prototype design. **Fig. 16:** Straumann 3D printer. **Fig. 17:** Intra-oral evaluation of the prosthesis prototype. **Fig. 18:** Extra-oral evaluation of the prosthesis prototype.







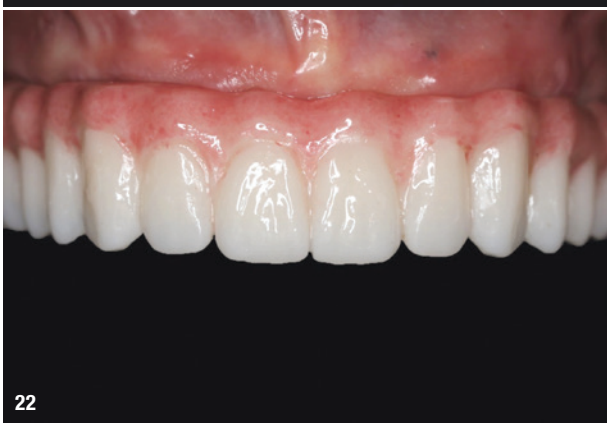
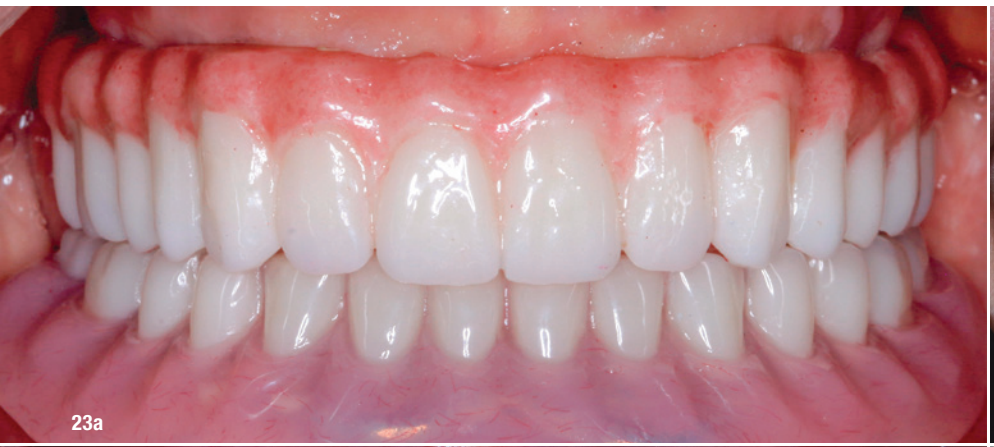
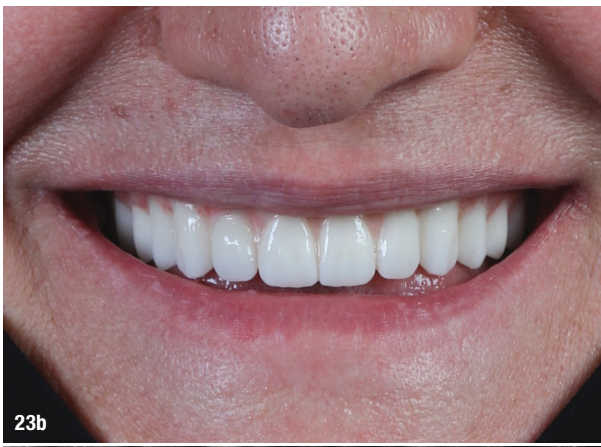
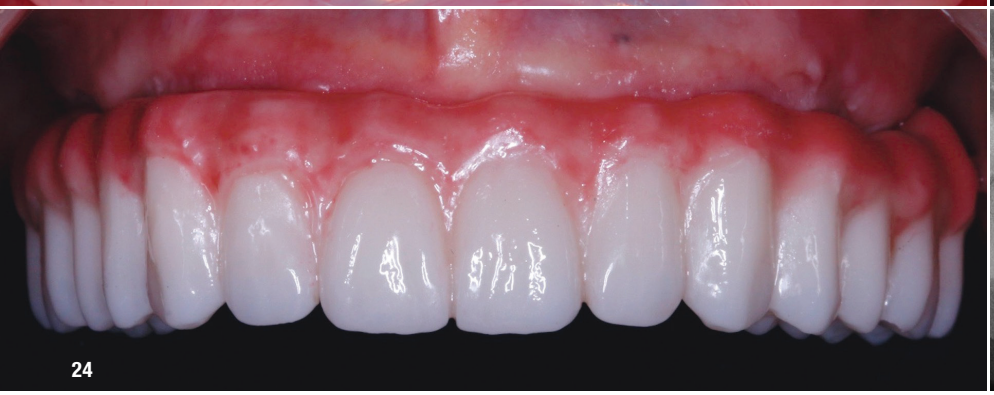
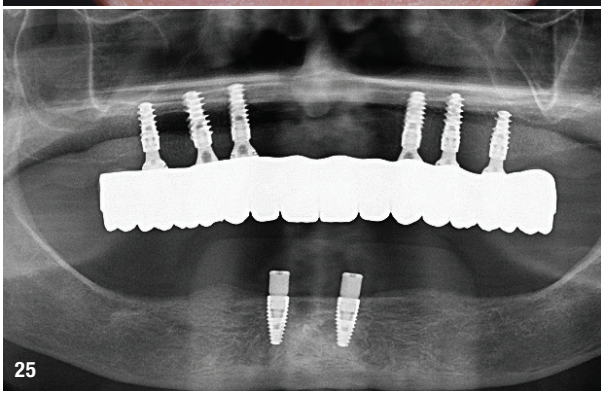


Fig. 19: Milling of the prosthesis monolithically from a Straumann zirconia disc. **Fig. 20:** Hybrid prosthesis with stained gingival area. **Fig. 21:** Excellent healing six days after surgery. **Fig. 22:** Hybrid prosthesis screwed on to the abutments.









Figs. 23a & b: Aesthetic final results. **Fig. 24:** Situation eight months after surgery. **Fig. 25:** Final radiographic evaluation by dental panoramic tomogram.

solution. The patient received six Straumann BLX implants and an immediately loaded final fixed prosthesis. The treatment was achieved in six days. The patient did not have to take any medication either, there being no morbidity. Finally, the facial aesthetics were improved owing to the adequate soft-tissue support.

Conclusion

Taking advantage of the digital workflow, dental implants can be placed with a flapless approach without disturbing the soft-tissue integrity. In that way, the final prosthesis can be loaded immediately, and the total treatment time is significantly shorter. In this case, the process of placing six Straumann BLX implants and immediately restoring them with a fixed prosthesis was completed in only six days.

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Immune sustainability on titanium implants?

Osteoimmunology and osseointegration as an interplay of dissolved titanium particles

Drs Johann Lechner, Fabian Schick & Florian Notter, Germany

Bone-to-implant contact (BIC) is considered an essential requisite for implant stability and clinical success. The death of local bone marrow cells due to chronic stimulation as a result of unfavourable factors such as inflammation of the jawbone leads possibly to chronic osteoimmune dysregulation. Bone marrow defects of the jaw (BMDJ) surrounding dental titanium implants (Ti-Impl), in combination with impaired BIC, are difficult to detect in X-rays and have thus been little researched. Recent research shows that Ti-Impl can induce inflammation in the surrounding bone over time.[1,2] Can alveolar bone decay possibly induce local osteoimmune reactions? In earlier publications we defined this chronic inflammatory process as fatty-degenerative osteonecrosis (FDOJ/BMDJ) connected to chronic overexpression of proinflammatory cytokine RANTES/CCL5.[3,4] FDOJ/BMDJ is a lesion also primarily defined as "bone marrow edema"[5,6] or as silent or subclinical inflammation without the typical signs of acute inflammation (Fig. 1). Is an undetected transition existing from diminished bone-to-implant contact (BIC) to hitherto neglected osteonecrosis? This opens up a new case in implantology:

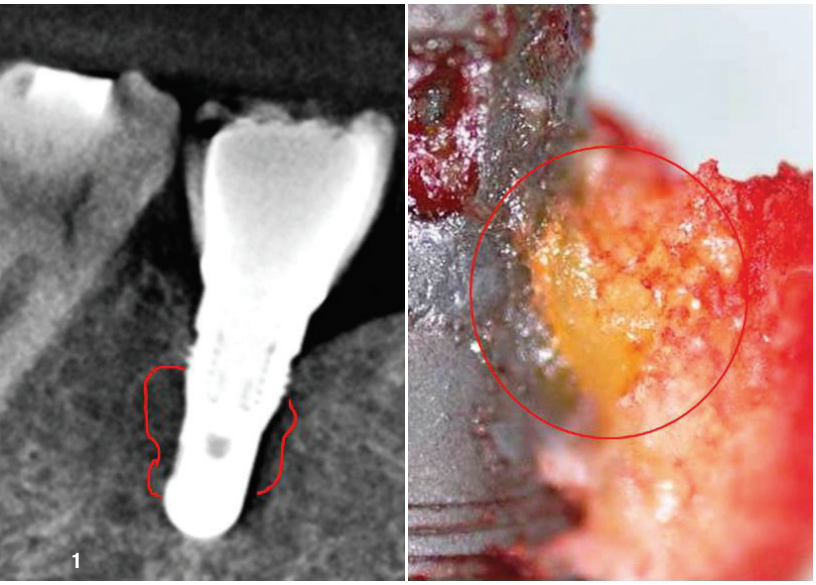

Fig. 1: Titanium implant as shown in CBCT; fatty-degenerated FDOJ/BMDJ attached directly to the Ti-Impl.

The long-term immune sustainability of dental implants

Osseointegration, defined as "functional ankylosis" between implant and jawbone, is the primary treatment objective in implantology. Osseointegration is the direct structural and functional connection between living bone and the surface of a load-bearing artificial implant.[10] Successful osseointegration occurs where new bone is deposited directly at the bone–implant interface and the implant exhibits mechanical stability.[11] Figure 2 explains a diminished osseointegration in three steps: ideal theory, the radiographic display and the actual reduced BIC, converted to FDOJ/BMDJ.

The connection of incomplete BIC to osteoimmune inflammation

However, what if this BIC does not take place over the entire surface of the implant? In those areas where osseointegration is impaired, chronic inflammation may occur to the immunological detriment of the patient.[12] Bone cells interact with immune cells under physiological and pathological conditions.[13] Researchers find that osteoimmunology is a core area of knowledge for interpreting implant outcome. The immune and healing responses are not only transient one-time reactions, but instead represent a temporal continuum of dynamic hard- and soft-tissue changes.[11] Following multiple reports in the literature concerning dissolved TI particles in the surrounding bone,[7,8] we analysed the osteoimmune dysregulation of 14 postoperative jawbone samples from patients with BMDJ around Ti-Impl.[9] The multiplex analysis of seven cytokines in 14 FDOJ/BMDJ samples showed a singular overexpression of chemokine RANTES/CCL5 (red columns), compared to the healthy jawbone group (n = 19; blue columns) in Figure 3.

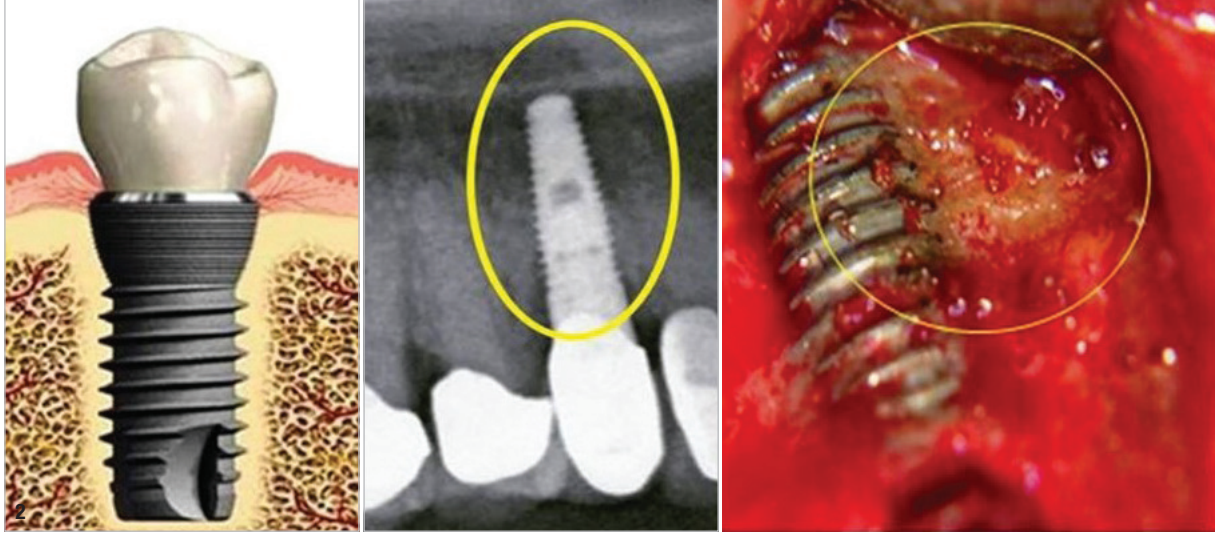

Fig. 2: Left: Ideal theory. Centre: Radiography. Right: The actual reduced BIC, converted to FDOJ/BMDJ. Attachment of fatty-degenerative bone (BMDJ) to Ti-Impl (area 13); X-ray does not indicate inflammatory bone loss or significant peri-implantitis.

How to diagnose the osteoimmune sustainability of the BIC?

Why is this FDOJ/BMDJ osteoimmune decay and connected RANTES/CCL5 overexpression at implant to bone interfaces not detectable in OPG/CBCT? The answer is well known as "X-ray artefacts".[15] The biological implant–bone boundary (BIC) cannot be correctly structurally reconstructed for these technical reasons.[16] Previous research demonstrated the non-visibility and lack of obvious radiographic signs of FDOJ/BMDJ.[17] As a result, the existence of FDOJ/BMDJ and its osteoimmune implications are largely neglected in implantology. However, no technique has yet been developed to visualise and verify whether bone or soft tissue is actually present around implants.[18] While conventional X-ray techniques are limited in their ability to reveal the actual extent and location of FDOJ/BMDJ, other means of identifying osteoimmune decay at implants are available.[19]

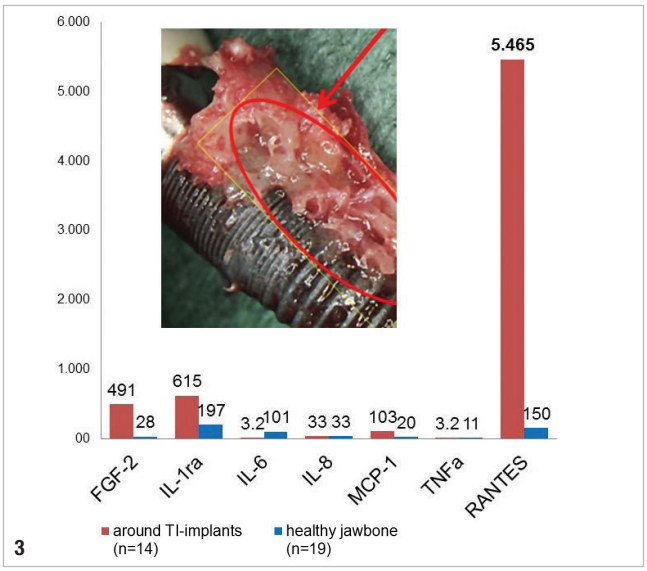

Fig. 3: Expression analysis of seven cytokines in 14 FDOJ/BMDJ samples (red columns), compared to the healthy jawbone group (n = 19; blue columns). Picture displays example of adjacent FDOJ/BMDJ sample at implant.

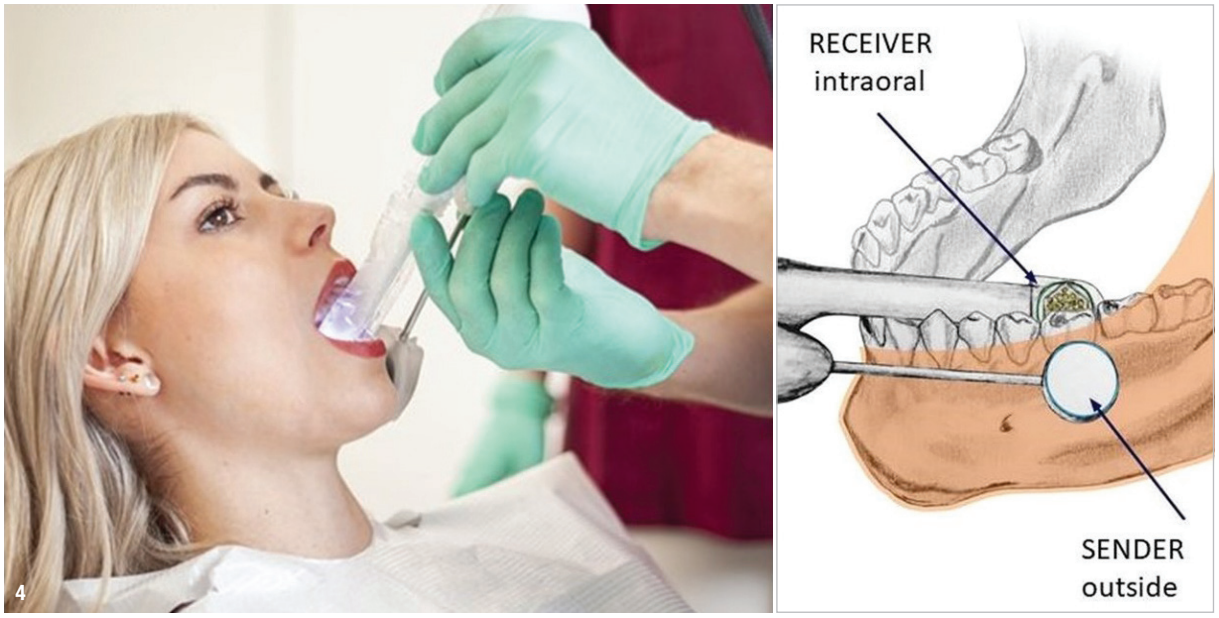

Fig. 4: Radiation-free measurement of jawbone density using a TAU device.

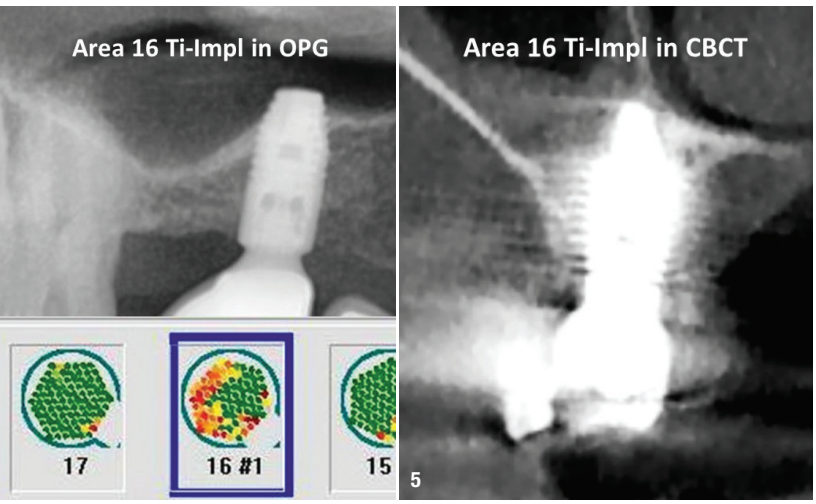

Fig. 5: Implant area 16 with no detectable FDOJ/BMDJ or osteoimmune dysfunction on BIC in OPG (left) and CBCT (right). Below OPG the sonographic displaying bone density in red (soft and inflammatory) and in green (healthy jawbone).

To aid the practitioner in diagnosing the osteoimmune FDOJ/BMDJ softening, a computer-assisted transalveolar ultrasound (TAU) device is available.[20,21] Due to these diagnostic difficulties FDOJ/BMDJ is underdiagnosed by dentists. For the research in Figure 3[9] all patients had a panoramic OPG, a CBCT and additional measurement of jawbone density using the new TAU device. TAU is to establish the presence of diminished BIC and connected FDOJ/BMDJ.[14] TAU measurements are based on ultrasonic principles where sound is best conducted through solid material and more weakly in aqueous environments. The device consists of an ultrasonic transmitter that is placed on the skin over the specific jaw area to be measured. A receiver of the size of a thumbnail is placed opposite intra-orally. Interference-free acoustic coupling is achieved with gel pads placed both intra-orally and extra-orally (Fig. 4).

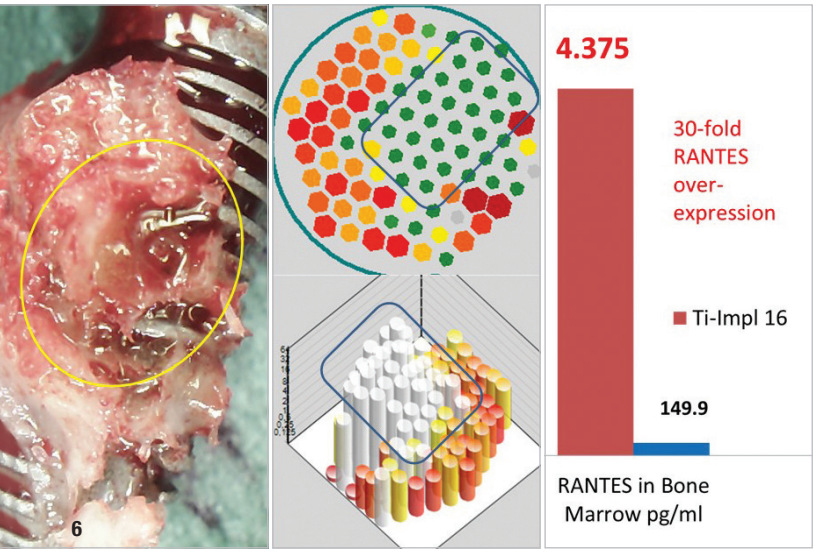

Fig. 6: Postoperative picture of Ti-Impl 16 with attached FDOJ/BMDJ osteoimmune decay and with multiplex analysis of inflammatory RANTES/CCL5 overexpression.

TAU bone density measurements

The ultrasound waves are converted into a coloured pulse via a computer unit whereby sound waves of varying attenuations are represented in red for diminished bone density and in green for solid cancellous bone (Figs. 5 & 6). Figure 5 and the clinical example of a Ti-Impl area 16 show the problem: Is there any detectable FDOJ/BMDJ or osteoimmune dysfunction on BIC? Figure 6 displays the postoperative FDOJ/BMDJ at implant (left), the TAU picture with implant in green and surrounding osteonecrosis in red (centre) and the multiplex analysis of overexpressed RANTES/CCL5 signaling (right).

The misleading problem for the clinician

The problem for the clinician in this context is:

a. the clinical stability of the Ti-Impl leads to the misdiagnosis of an apparently inflammation-free osseointegration;
b. the radiographic and clinical inconspicuousness and
c. the long term symptoms of an osteoimmune inflammation connected to diminished osseointegration are not directly related to the Ti-Impl as they occur only after a certain amount of time.[22]

As a result, an osteoimmunological scenario is conceivable, as shown in Figures 5 and 6. Accordingly, a purely clinical and symptom-focused assessment of Ti-Impl is insufficient and needs clinical support by TAU (see www.cavitau.de). X-rays also fail to indicate the derailed mediator process (cytokines, interleukins) triggered by FDOJ/BMDJ at implants. In failing to recognise this, detrimental local and systemic health consequences may occur in the host that are concealed by the apparent success of a “stable implant”. The challenge posed by these discoveries is the need to raise awareness of the potentially critical interplay between Ti-Impl and FDOJ/BMDJ.

Literature

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“We fight dirty”

How a simple quality assessment on dental implants became a grassroots movement

The CleanImplant Foundation performs tests on the quality of randomly selected, sterile-packaged dental implants in cooperation with accredited testing laboratories. We interviewed Dr Dirk U. Duddeck, Managing Director and Head of Research of the foundation.

Dr Duddeck, you founded the foundation in 2016. How well recognised is it today?
The foundation is proud to acknowledge the 150,000 Facebook followers who look to us for guidance. There are 40 ambassadors and key opinion leaders who present our findings at congresses and continuing education courses around the world. Through their efforts, the negative impact of factory-related contaminants on implant surfaces is now understood to be a key risk factor in implant failure.

Last year, the CleanImplant Foundation expanded its footprint by establishing an office for North America in New York City. This year, we will open a third office in Seoul, South Korea. As a result of our activities on three continents, the CleanImplant initiative has seen dramatic growth in its membership, well beyond our expectations. Our grassroots movement, carried forward by “CleanImplant Certified Dentists”, is delivering the strongest possible message to the implant manufacturers; they must do better.

What is the feedback from manufacturers?
To date, we have analysed well over 300 implant systems from all leading brands. Our mandate is to encourage manufacturers and suppliers to engage in a constructive dialogue. Implant manufacturers react very differently when we draw their attention to unexpected analysis results. Some companies are eager to listen to our suggestions and work with us to find solutions to optimise their quality management. In the past, this has often led to substantial and sustainable improvements in production. However, some companies have not yet cooperated with our efforts, as they have chosen not to believe that cell-toxic impurities on a sterile packaged implant are clinically relevant, despite evidence to the contrary.

What are these contaminants on implant surfaces?
SEM imaging has identified particulate contaminants of metallic origin, containing chromium, iron, nickel, or copper-tin compounds. Frequently, significant organic, i.e. carbonaceous impurities are found. Time-of-Flight Secondary Ion Mass Spectrometry (ToF-SIMS) demonstrates plastic particles made of polysiloxane, synthetic polymers, and thermoplastics. We have also discovered thin-film residues of dodecyl benzenesulfonic acid (DBSA), an aggressive and surface-active chemical cleaning agent, classified as a hazardous substance, or the quaternary ammonium compound didecyl-dimethylammonium chlo-

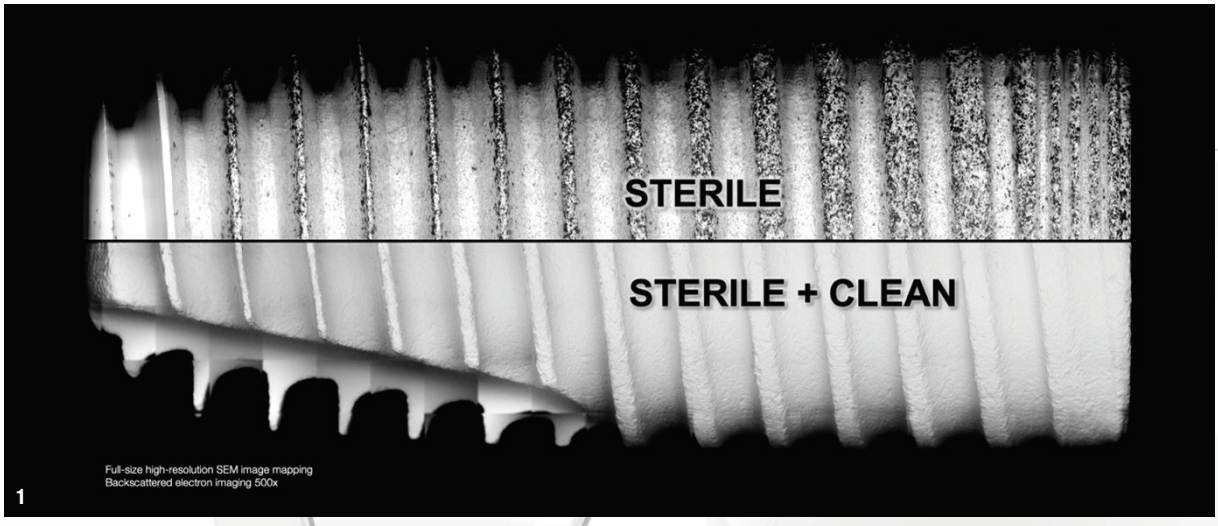

Fig. 1: SEM image mapping of two new, ready for use sterile-packaged implants after unboxing. Both implants carry the CE label and have FDA clearance.

Fig. 2: Dr Dirk U. Duddeck inspecting an implant mounted for SEM analysis in a particle-free cleanroom.

ride (DDAC), which is commonly used as a biocide or green algae remover. If appropriate manufacturing controls and packaging techniques are followed, none of these chemicals should be identifiable on sterile-packaged implants, not even in residual quantities.

What effects do these impurities possibly have on implant healing and long-term success?
Carbon-containing contaminants, mainly plastic particles with a size of 0.2 to 7.2 µm, are classified as pro-inflammatory. When these impurities detach from the surface during implant insertion, macrophages take up the particles by phagocytosis and release pro-inflammatory cytokines. The result is an expanding zone of soft-tissue damage and inflammation. In addition, TNF-α, IL-1β, and IL-6 secretion modulate osteoclast differentiation that can lead to early bone loss at the implant site. In summary, factory-related impurities are the most underrated risk factor for peri-implantitis, cortical bone loss, and implant failure. That's the reason for our catch phrase "We fight dirty".

Can you tell us more about implants that showed no significant impurities after unboxing and that have been awarded the Trusted Quality seal?
The seal of quality, which underlines the first-class surface purity of dental implants, is awarded by the CleanImplant Foundation's scientific advisory board only after a rigorous peer-reviewed analysis and testing process. The certification is valid for two years and then must be renewed. To date, the following implant systems carry the coveted "Trusted Quality" seal: Kontact S (Biotech Dental), whiteSKY (bredent group), UnicCa (BTI Biotechnology Institute), (R)evolution and Patent/BioWin! (Champions-Implants), SuperLine (Dentium), Astra Tech EV (Dentsply Sirona Implants), In-Kone (Global D), ICX-Premium (medentis medical), AnyRidge and BLUEDIAMOND (MegaGen), T6 (NucleOSS), Prama (Sweden & Martina), Inverta (Southern Implants) and SDS 1.2 and SDS 2.2 (Swiss Dental Solutions). Test results on other systems are pending. In addition, we tested the products of two contract manufacturers of ceramic implants, the CeramTec Group and Komet Custom Made. Both received CleanImplant's "Certified Production Quality" awards after thorough analyses.

CleanImplant will be an exhibitor at the joint EAO-DGI congress in Berlin in September. What is the foundation's focus at this event?
We will install a high-resolution scanning electron microscope (SEM) in the exhibition area at the CleanImplant booth C06, thanks to cooperation with Thermo Fisher Scientific, a world-leading supplier of analytical instruments. Dentists bringing sterile-packaged samples of their implant system can have them assessed on-site to determine the level of surface contaminants present. Visitors get information about all implant systems that have been previously tested to be free of impurities. As an example of transparency, implant providers will receive detailed information on the comprehensive testing procedure and the equipment used.

What is the take-home message you hope to deliver at the congress in Berlin?
We look forward to sharing our history, research, and passion for ethical standards of care with those who visit us at our booth. Many have joined us on this mission; many more are coming forward as they embrace the new normal of quality standards for the devices we use to care for our patients. Our calling is to ensure that all those involved in implant-centric dentistry are partners in excellence.

Many thanks for the interview and a successful time in Berlin.

More information:
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Digital dentistry—the sky is the limit

Dr Shivi Gupta (Fig. 1) graduated in dentistry from the University of Manitoba, Canada in 2002. She completed a one-year advanced education in general dentistry residency at the University of Texas Health Science Center in San Antonio before moving to San Diego in 2004. After joining her current practice partner as an associate in 2010 in a newly founded practice, she became a partner in 2015. Dr Gupta conducted team trainings, attended continuing education courses and brought new services to the practice. She has always been interested in teaching others and sharing her knowledge on digital dentistry.

During the first DS World in Dubai from 5 to 6 February 2023 our editorial team had the chance to interview Dr Shivi Gupta on the topic of digital dentistry regarding her experiences in daily practice, patient reactions as well as its challenges and opportunities. As a mother of two, Dr Gupta also advocates for more females in dentistry and the beneficial balance between a professional career and family.

Fig. 1: San Diego dentist and digital dentistry specialist Dr Shivi Gupta.

Dr Gupta, you are an expert in digital dentistry and CAD/CAM technology, what kind of difficulties did you encounter introducing digital dentistry in your practice?
I decided to dive right in after adopting the technology. I was having good success but wanted to expand from doing single crowns into larger comprehensive cases with a digital workflow. I was able to make the leap by attending education courses as well as online learning. I found the more I immersed myself into learning about the technology, the more I could offer expanded treatment modalities.

How do you see digital dentistry impacting the workflow between the dentist and the dental technician?
The processes between practice and laboratory benefit extremely from digital technology. Just think of the intraoral scan. There is no need for a cast model that has to be manually sent. By using DS Core the scans are automatically uploaded to the cloud and can be sent to any partner together with annotations. Everything is much more direct and faster. We can communicate better and quicker, allowing us to focus on what we do best. In addition, the same high-quality restorations can be repeated multiple times. This means that not only we in practices and labs benefit, but above all the patient.

How do you convince your patients to accept for example an intra-oral scan instead of an analogue method? And how does, in your opinion, the use of digital technology in dentistry improve the patient experience?
I honestly do not have to convince my patients because they come to me knowing exactly that they will be treated with state-of-the-art technology. Concerning the patient experience: You certainly do not go to the dentist to stay there for long. Everyone is happy when the needed things

are done quickly and in a high quality. And I can achieve that with digital dentistry. My patients know and appreciate that. And just in case, I can show them the imagery easily on the digital cloud platform.

How does computer-aided design and manufacturing technology play a role in guided dental implantology?
CAD/CAM technology has played an important role in guided implant dentistry for a very long time, just think of CEREC Guide, which was introduced ten years ago. Let us not forget that with today's technology, one can also print surgical guides for a patient's implant placement.

Fig. 2: Dr Shivi Gupta at the Dentsply Sirona World in Dubai.

In your opinion, why are there still relatively few women in this field of dental surgery? Could it be that they are expected to balance family and work responsibilities?
When we look at leadership positions and at training facilities, it is predominantly male leaders and mentors. But I believe a shift is coming. In the US, we have now more women graduating dental schools. I think it's the same in Europe, and perhaps in other parts of the world. Therefore, it's important to support this momentum and give female dentists a platform to show young dentists that living a balanced life is possible. When young women see that there are female dentists who are passionate about their profession and their families, and are successful in their dental careers, it does something to them. They should all have ambitious goals and be able to achieve them, but having relatable role models is also equally important. The sky is the limit—that is what I believe and tell young professionals.

How can mentorship and networking opportunities be made more accessible to women in surgical dentistry or can you discuss any current initiatives or programmes that promote gender diversity and inclusion within surgical dentistry?
In my opinion, we women in dentistry can do a lot for each other. As mentors, as role models, as friends. I encourage my peers to proactively join local organisations or associations, and fiercely advocate for programmes and opportunities that inspire, uplift, and support young female dentists and students within their community. If you find yourself thinking sometimes, "Oh, it would be great if we have something like this or that"—then turn that thought into action.

On a similar note, I am a proud partner of Dentsply Sirona and have been working with the company for many years. One of the main advantages is I am able to collaborate with the company on certain programmes specifically for women. An example is "FirstTo50", Dentsply Sirona's Global Women Speaker Development Program. It was launched in 2022 with the aim to help develop female dentists' public speaking and presentation skills. The programme includes online sessions with a professional coach, and I believe it was truly valuable when I prepared for my mainstage presentation in the previous DS World in Las Vegas. We need more women on the podium and FirstTo50 is a fantastic boost to make that happen (Fig. 2).

What development potential do you see in digitised dentistry, especially regarding CAD/CAM technology? What could become even better, simpler and more intelligent in the next years?
I think we are kind of moving towards more printing—and that can open a lot of possibilities! It is not about making the lab redundant; it is about having a quicker turnaround for our patients. I am a big SureSmile provider, and while having a digital lab already enables me to have an efficient turnaround, perhaps in the future by being able to print the first two aligners, then I could imagine a patient could start immediately! Moreover, it would be really nice if all of the different platforms could work on a universal platform. I think we are already on the path to make that happen and that makes dentistry such an exciting passion!

Thank you for the interview, Dr Gupta.

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Dr Shivi Gupta

Bringing new end-to-end digital workflows to dental practitioners

DEXIS IOS Solutions expands its portfolio

DEXIS IOS Solutions is pleased to announce the expansion of its portfolio and ecosystem through new digital end-to-end workflows. The new and enhanced workflows are designed to align with the objective of DEXIS IOS Solutions to support dental practitioners in accelerating their workflow, resulting in increased productivity and improved patient experience. To reinforce this objective, DEXIS IOS Solutions is focused on three crucial principles: ease of use, productivity and practice expansion. Practitioners can now easily expand their range of services through aligner and denture treatments as well as in-house printing, offering their patients personalised and innovative care.

The new prescriptive workflows are being developed concurrently with ongoing innovations in the broader Envista portfolio, beginning with a new orthodontic workflow in combination with Ormco Spark that enables practices to easily add aligner therapy to their treatment options. A new patient engagement application within IS ScanFlow enables practitioners to show patients a simulated outcome of their orthodontic treatment, enabling them to visualise the treatment outcome chairside. Integrated digital transfer of the datasets to Ormco Spark streamlines the process, enabling patients to promptly initiate treatment.

"By further integrating DEXIS IOS Solutions into the broader Envista offerings, we are providing dentists with the solutions they need to provide exceptional and personalised care for their patients. We are committed to helping dental practioners improve patient outcomes and grow their practice through digital innovation," said Amir Aghdaei, president and CEO at Envista Holdings Corporation.

DEXIS IOS Solutions has also collaborated with SprintRay 3D-printing ecosystem for definitive ceramic crowns, to simplify in-office printing and make same-day restorations a reality. SprintRay Cloud Design leverages artificial intelligence (AI) to streamline the design of crowns, appliances, and surgical guides within minutes. Practitioners can scan the patient with any DEXIS intra-oral scanner and upload the dataset directly from either DTX Studio Clinic or IS ScanFlow to the SprintRay portal, eliminating the need to manually select files, enter redundant patient information and design the restoration or appliance.

"By combining DEXIS intra-oral scanners with SprintRay's ecosystem, dental practitioners can offer same-day delivery of crowns and appliances, increasing their productivity by completing more procedures in a shorter amount of time," said Aghdaei. "Offering same-day restorations can give practitioners a distinct competitive advantage, as patients often prefer the convenience of single-visit appointments, enabling dental practitioners to expand their services and attract patients seeking fast and convenient dental treatment."

To further enhance the capabilities of the DEXIS IOS Solutions porfolio, IS ScanFlow v1.0.9 now includes a denture scanning workflow that streamlines the treatment planning process by combining the capture of the bite registration and prosthetic along with the edentulous and denture scans, eliminating the manual process of matching and aligning data sets by the lab. The software also provides embedded scan tips to optimise and simplify the edentulous data acquisition.

In addition, DEXIS IOS Solutions is introducing the IS 3800 wired scanner, which offers the same high-speed performance as the award-winning IS 3800W. The IS 3800 wired scanner is highly ergonomic and weighs just 190 g without the cable, making it one of the lightest intra-oral scanners available. It complements the IS 3800W wire-

less scanner, which weighs only 240 g, and is considered the lightest wireless intra-oral scanner in the industry.

The latest DEXIS IOS Solutions innovations provide dental practitioners with access to intuitive technology that simplifies and streamlines treatment, thereby boosting productivity. With an extended ecosystem and diverse range of new treatment options, practitioners can partner with Envista for access to prescriptive end-to-end workflows or opt for more open workflows, which enable collaboration with their preferred lab or manufacturer. The new workflows further align with the Envista intention to digitise, personalise, and democratise dental care, enabling productivity and predictability of dental practitioners to provide optimal patient treatment.

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This novel mouthwash protects your patients in three ways

Curaprox's Perio plus regenerate belongs to a new generation of chlorhexidine-based mouthwashes that employ a unique blend of additives. It supports tissue regeneration, but also prevents bacterial infection, making it ideal for use after surgery and for relieving treatment-related dry mouth. Here are three ways Perio plus regenerate protects your patients' health.

Stronger effect but fewer side effects

Two key components of Perio plus regenerate are chlorhexidine and Citrox. Chlorhexidine digluconate (0.09%) has been the gold standard of oral antiseptics for decades. Citrox is a novel organic antibacterial made from bioflavonoids and is sourced from bitter oranges. It is effective against bacteria, viruses and fungi.

Studies have shown that the combination of Citrox and chlorhexidine is more effective than using chlorhexidine alone. Citrox in Perio plus regenerate is combined with polylysine amino acids to create the Citrox/P formula, which offers a long-lasting antibacterial effect. Thanks to this unique blend of ingredients, it is possible to reduce the amount of chlorhexidine used and consequently its side effects.

An extra layer of protection

Hyaluronic acid is an important part of the Perio plus regenerate formula. Thanks to its water-binding properties, it humidifies the oral mucosa, supporting regrowth of cells. It also protects the regenerating mucosa by creating a protective biopolymer film over it. This acts against dry mouth, reduces the risk of infection by viruses and bacteria, and supports the formation of new mucosal cells.

Caries prevention

Xylitol not only contributes to Perio plus regenerate's pleasant taste without spiking blood sugar and insulin, but also helps keep the teeth healthy and helps prevent caries. Oral bacteria such as *Streptococcus mutans* cannot metabolise xylitol, resulting in the bacteria dying off.

Using Perio plus regenerate

The patient should rinse with 10 ml of Perio plus regenerate undiluted for 60 seconds, morning and night, for up to one month. Patients must be warned that Perio plus regenerate is for oral application only and must not be swallowed. It should also be kept out of reach of children.

contact

Curaden AG, Switzerland
www.perioplus.com

IADR Innovation in Implantology Research prize awarded to Dr Alberto Monje

By MIS Implants Technologies

Dr Alberto Monje was recently awarded the Innovation in Implantology Research prize for his contributions to research in implant dentistry. (Image: MIS Implants Technologies)

Dr Alberto Monje, who is an associate professor in the periodontics department at the International University of Catalonia in Barcelona in Spain, has been honoured with the prestigious Innovation in Implantology Research prize, sponsored by MIS Implants Technologies and awarded by the International Association for Dental, Oral, and Craniofacial Research (IADR). This recognition celebrates Dr Monje's remarkable achievements and scientific contributions as an independent researcher. Despite being in his mid-thirties, he has already participated in over 100 research publications.

The accolade acknowledges the exceptional work of researchers in the middle phase of their careers, that is, those with up to ten years of independent research experience. While IADR awards traditionally recognise students and distinguished researchers, there are limited opportunities for mid-career investigators to receive recognition. This award honours rising talents whose groundbreaking research holds great promise for advancing the field of implantology.

Dr Monje was selected as the winner by a scientific committee, and the award was presented by Prof. George Kotsakis, the president-elect of the IADR Implantology Research Group. The award was made during the 101st general session and exhibition of IADR held in Bogotá in Colombia in June.

Explaining the reasons behind MIS's support for this award, Dr Serge Szmukler-Moncler, the director of research at MIS, stated: "MIS specifically chose to endorse this innovation award to recognise a mid-career independent investigator who is a rising star in innovative research. This selection aligns perfectly with the mission and policies of MIS."

During the award presentation, Dr Samy Akerman, the representative of MIS in Colombia, emphasised the significant presence of MIS—which is known for its extensive prosthetic digital library—in the dental implant discipline. He highlighted that even highly experienced implantologists are switching to the MIS implant system owing to its comprehensiveness and flexibility.

"MIS stands for 'Make It Simple'," explained Dr Akerman. "The core value of MIS is simplifying the entire dental implant treatment process, from planning to surgery and prosthetic rehabilitation. The goal is to make implant treatment more affordable for a wide range of practitioners and patients. In research, there are occasions where in-depth investigations are necessary to develop simpler and user-friendly implants and protocols," he continued.

During the ceremony, Dr Monje graciously shared some insights about himself and his research accomplishments. He stated: "I was trained at the University of Michigan and the University of Bern under the mentorship of Profs. Hom-Lay Wang, William Giannobile and Daniel Buser. Currently, I am committed to serving as a role model for my students and colleagues. I run a private practice limited to periodontics and implant dentistry, with a particular emphasis on prevention and management of peri-implantitis."

When asked about his contribution to research, Dr Monje stressed that his work was aimed at establishing surgical strategies to prevent biological and aesthetic complications. Additionally, he has explored the potential and limitations of reconstructive and resective therapy and how the use of soft-tissue grafts can enhance the prevention and resolution of peri-implantitis.

More about this topic can be found in his first book, titled *Unfolding Peri-Implantitis: Diagnosis | Prevention | Management*. The book was edited by Prof. Wang and published by Quintessence Publishing last year.

contact

MIS Implants Technologies
www.mis-implants.com

“Ceramic Implants meets Aesthetics” successful in Munich

Photo gallery

The 7th Annual Meeting of the International Society of Metal Free Implantology (ISMI) took place in Munich on 5 and 6 May 2023 under the guiding theme “Ceramic Implants meets Aesthetics”. Under the scientific direction of Dr Karl Ulrich Volz/Kreuzlingen (CH) and Dr Dominik Nischwitz/Tübingen (DE), the congress offered participants an enormously multi-layered, varied and top-class programme on the topic of ceramic implants and also highlighted biological aspects of metal-free implantology.

The first day of the congress was opened under the motto “Zirconium dioxide in general dentistry and implantology—where do we stand and what are the prospects?” by ISMI President Dr Volz, Vice President Dr Nischwitz and Dr Martin Jörgens/Düsseldorf (DE). After Dr Alessandro Alan Porporati/Plochingen (DE) presented the basics, material and technology of zirconium vs metal-ceramics in his lecture, Priv.-Doz. Dr Kristian Kniha/Munich (DE) vividly explained the aesthetic potential of ceramic implants. Dr Johann Lechner/Munich (DE) then spoke about osteo-immunology and implant success with ceramics in comparison with titanium.

After the lunch break, which was used extensively for a visit to the accompanying industrial exhibition and collegial discussions, the pre-congress symposium including a surgical tutorial continued directly. Dr Volz explained in detail how the error rate in the use of ceramic implants can be reduced and gave an overview of what ceramics can do, where the limits lie and what good complication management looks like.

Afterwards, the participants had ample opportunity to discuss various special topics in implantology and aesthetic dentistry with proven experts and to look beyond their own horizons at the popular Table Clinics. At the same time, a workshop on the collection and preparation of autologous blood concentrates with Prof. Dr Dr Dr Shahram Ghanaati/Frankfurt am Main (DE) offered dental practice teams the opportunity to get fit for this increasingly important topic and to gain practical experience in the hands-on part.

The first day of the congress was brought to a successful close with a get-together in the industrial exhibition, where all participants were able to end the evening in a relaxed atmosphere with wine, music and, of course, lively discussions.

Prof. Ghanaati opened the main congress on Saturday with his lecture on biologisation in implantology and oral surgery and gave an overview of the current state of affairs. “1-piece versus 2-piece ceramic implants—which to choose?”—this question was addressed by Prof. Dr Curd Bollen/Roosteren (NL) and he explained their differences as well as advantages and disadvantages. Dr Alexander Sobiegalla/Hemsbach (DE) then showed how to design the digital workflow with both systems. The following lectures of the high-calibre podium with Prof. Dr Dr Ralf Smeets/Hamburg (DE), Dr Ralf Masur/Bad Wörishofen (DE) and Dr Tobias Wilck/Hamburg (DE) also dealt with various aspects of metal-free implantology and at the same time raised critical

(From left): Dr Dominik Nischwitz (Vice President), Dr Karl Ulrich Volz (President) and Dr Tobias Wilck (Member of the Board of Directors).

questions about the topic. In addition, Dr Nischwitz also spoke about the fusion of high-tech dentistry with functional medicine and health optimisation as “Biological Dentistry 2.0”. Basically, according to the tenor of Dr Wilck’s closing lecture, ceramic implants are an important building block for health optimisation in the case of tooth loss.

The 7th Annual Meeting of ISMI ended with a final discussion and sent the numerous enthusiastic participants off into the sunny Saturday afternoon. Once again, the professional society underlined its relevance in the world of implantology despite its comparatively young age.

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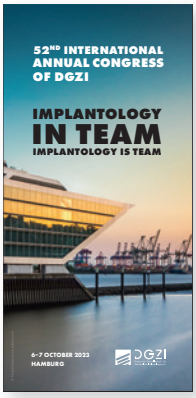

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