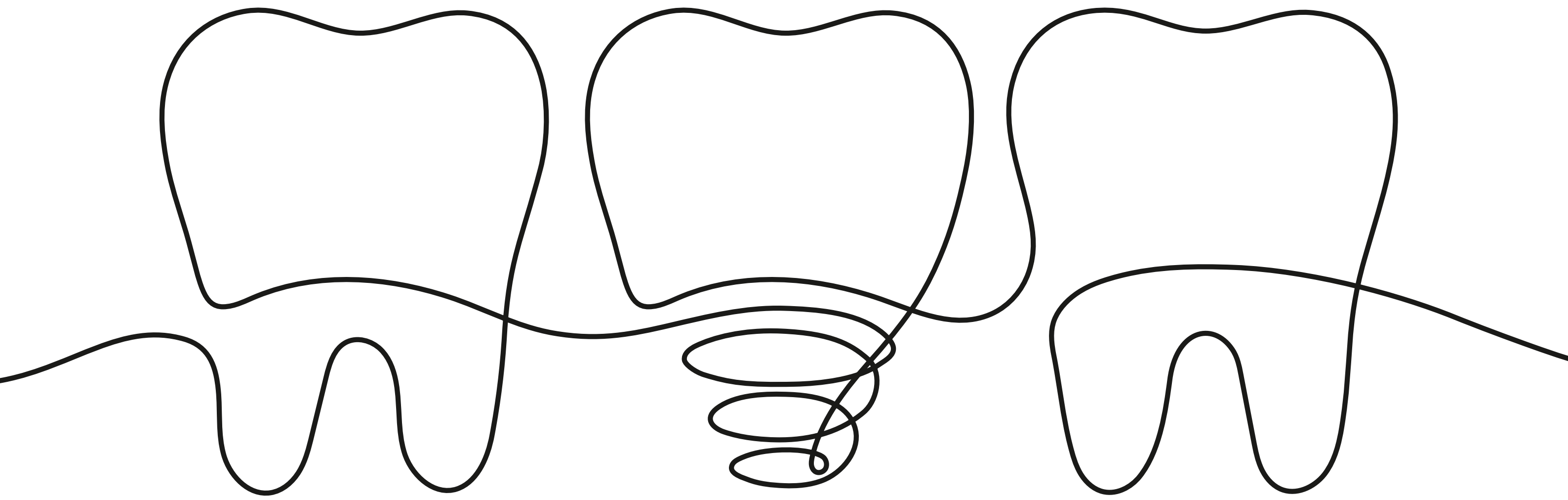
issn 1868-3207 • Vol. 26 • Issue 3/2025

3/25

implants

international magazine of oral implantology



case report
Regenerative treatment of peri-implantitis

interview
Transition to ceramic materials in implant dentistry

event
"Zero Peri-Implantitis" Session at the EAO Congress in Monaco

Dr Georg Bach

President of the DGZI

Building the future, one implant at a time

Dear colleagues,

Implant dentistry continues to thrive at the intersection of science and clinical experience, and this issue reflects the questions that matter most for our daily practice. One theme stands out strongly: the long-term preservation of implants in function.

Peri implantitis remains a central challenge. Despite decades of progress, we know that even the most carefully placed implants can encounter biological complications. The case reports presented here show how far we have come in tackling these problems through regenerative concepts, electrolytic decontamination, and evidence-based maintenance strategies. What was once considered almost hopeless, saving both implant and prosthesis, can today be managed with precision and predictability.

Equally, the management of late implant failure demands a shift in thinking. Digital workflows and biologically driven treatment plans now enable us to turn compromised situations into stable, aesthetic outcomes. Guided bone regeneration refined soft-tissue techniques, and advanced implant surfaces are not isolated tools but parts of a comprehensive philosophy: prevention first, intervention second, and always with the long view in mind.

Precision also defines the future. Whether through guided surgery in the aesthetic zone or resonance frequency analysis as the only longitudinal measure of implant stability, we see how technology provides clarity where once there was uncertainty. These methods empower clinicians to time their interventions not by intuition alone but by objective biological data.

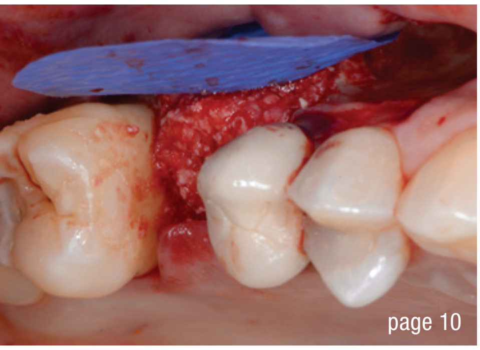
Finally, innovation does not flourish in isolation. Events such as the EAO Congress in Monaco, with its focus on "The impact of time in implant dentistry" remind us that collaboration, dialogue, and shared standards are vital. Together, we are building not only better treatment outcomes but also the professional identity of implantology as a discipline grounded in science, prevention, and responsibility to our patients.

I invite you to explore this issue with curiosity and with confidence in the direction our field is heading. Each contribution offers a perspective on how we can continue to strengthen the foundation of long-term implant success.

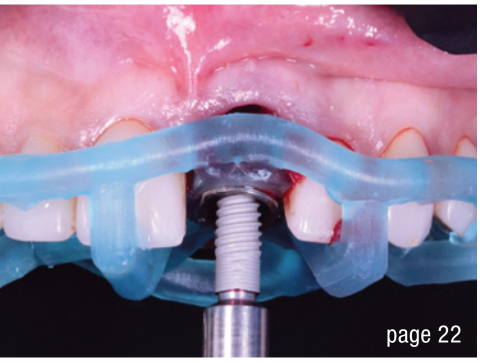
Sincerely,

Dr Georg Bach
President of the German Association
of Dental Implantology DGZI

Dr Georg Bach


page 10


page 18


page 22

editorial

research

case report

interview

events

news

about the publisher

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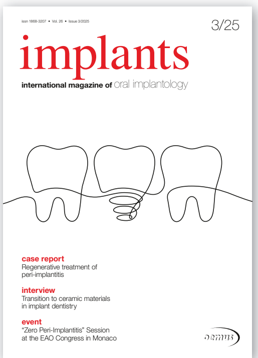


Supporting the osseointegration of ceramic implants

Dr Dominik Nischwitz, Germany

In traditional oral surgery and implantology, the focus is on implant healing and on the local prerequisites for maintaining or building bone and soft tissue. But our prevailing perspective rarely transcends the oral cavity. Traditionally, we distinguish four potential mechanisms of bone formation: osteoinduction (growth factors), osteoconduction (bone replacement materials as “placeholders”), distraction osteogenesis and guided tissue regeneration (membranes, shell technique, etc.).[1]

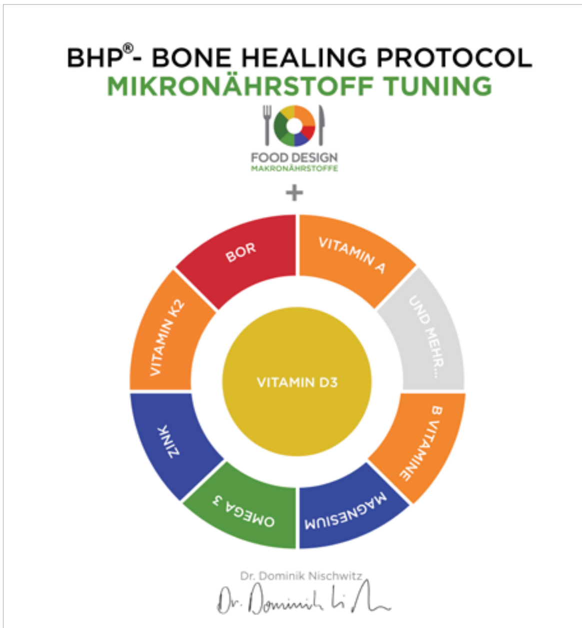
In biological dentistry, we draw on our experience and knowledge from functional medicine and nutritional science and employ targeted micronutrient therapies to support the systemic requirements ahead of planned surgery and for subsequent bone and tissue regeneration.

Local preconditions

Local preconditions for smart bone and soft-tissue regeneration include the decontamination of the surgical site (breath, saliva) and the activation of local growth factors (IGF-1, osteoblasts, plasma proteins, etc.) by drilling and by providing bleeding spots for bone stimulation, as well as the use of smart biomaterials such as platelet-rich fibrin (PRF) membranes to improve the extracellular matrix and optimise the bone and soft-tissue situation.

The use of microinvasive techniques such as piezosurgery, the use of ozone, navigated implant placement and improved imaging technologies (such as cone beam computed tomography, CBCT) have brought enormous advances in dental craftsmanship. The trend is clearly towards aesthetics and health. Far from remaining a taboo subject, ceramic implants are the future of oral implantology. Nevertheless, only about one per cent of surgeons insert ceramic implants. Based on his ten years of clinical experience (with over 4,000 ceramic implants placed), the author can safely assert that more surgical but especially systemic information is needed to achieve even better healing rates.

Ceramic implants heal without inflammation—but this is actually crux of the matter. Hardly any of us are truly familiar with the biochemistry of the entire human body.



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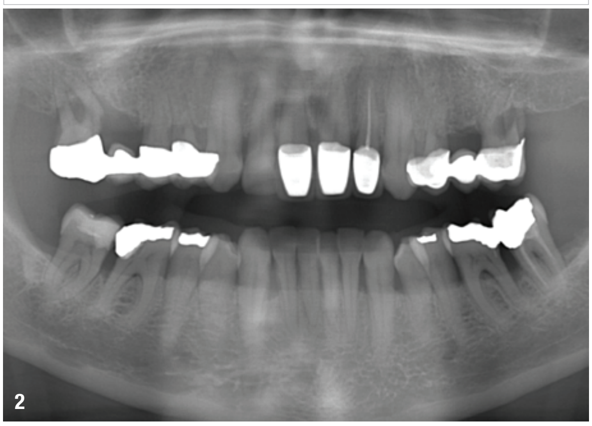

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Fig. 1: Overview of the Bone Healing Protocol. – **Fig. 2:** Orthopantomograph taken prior to surgery.

In ceramic implantology, it is important to incorporate insights from functional medicine, nutrition and micronutrients in order to prepare the body for a “remodelling phase”, and this is why much of our focus is on improving our patients’ lifestyles. Both systemic preparation for the surgical intervention and a targeted follow-up are of the utmost importance.

Smart bone and soft-tissue management

Systemic preconditions: Surgical preparations and dietary changes. An improper diet with sugar, wheat, refined cooking oils, conventional dairy products (“Core Four disease agents”)and other food intolerances promote the body’s general tendency to develop inflammatory reactions and macro- and micronutrient deficiencies, meaning that insufficient proteins and amino acids, the fat-soluble A, D3, E and K vitamins, the water-soluble B and C vitamins, and minerals such as zinc and magnesium as well as healthy omega-3 and omega-6 fatty acids will be available for building and regenerating tissue and bone.[2] Our goal is to prepare patients for surgery as effectively as possible. The focus is on providing the right macronutrients and avoiding as many stressors as possible. The “Core Four disease agents” should be strictly avoided. More than one hundred years ago, Dr Weston Price researched different peoples all over the world. He documented his research in his book *Nutrition and Physical Degeneration*[3]: People who ate a species-appropriate diet were virtually immune to tooth decay. Their descendants, who had already been exposed to industrially processed foods, were already suffering from the typical signs of degeneration due to a lack of nutrients. The most important macronutrient for building tissue (bone, soft tissue, muscles, etc.) is protein.

Proteins and amino acids—life’s building blocks

There are 20 proteinogenic amino acids, but only eight of them actually have to be ingested with the diet. These so-called essential amino acids are isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine. The body is capable of building any protein from these eight amino acids—provided it has enough raw material available.

Numerous studies have demonstrated a link between inadequate bone formation, reduced bone density and delayed fracture healing on one hand and deficiencies in proteins and amino acids on the other. The older the patients, the more significant the correlation. Dayer et al. (2006), in an animal study, found that titanium implants osseointegrated less readily in protein-deficient rats (< 1 g/kg body weight).[4,5] The torque required to explant an implant from a rat’s bone after six to eight weeks was around 43% lower in protein-deficient rats than in the animals with sufficient protein in their diet (= 1 g/kg body weight).[4] Hannan et al. found a clear association over four years between bone loss and insufficient animal protein in the diet, based on data from 391 women and 224 men participating in the Framingham Osteoporosis Study.[6] The greater the protein deficiency, the more pronounced the loss of bone mass at the femur and spine. No negative effect of excess protein on bone healing was observed.[6]

Fig. 3: Intra-oral situation prior to surgery. – **Fig. 4:** Preparing for implant placement. – **Figs. 5+6:** Status following delivery of the restoration.

Consequently, our main focus is on an adequate protein supply. Since no deficiency of macro- and micronutrients should be present in the acute regeneration phase, we recommend a daily protein intake of 1.5 to 2 g/kg body weight. To alkalize the body, a serving of vegetables is recommended with every meal. Healthy fats such as omega-3 and a variation of monounsaturated and polyunsaturated fatty acids should also be present. Collagen powders, essential amino acids, bone broths and protein shakes make it easier for patients to meet their daily pro-

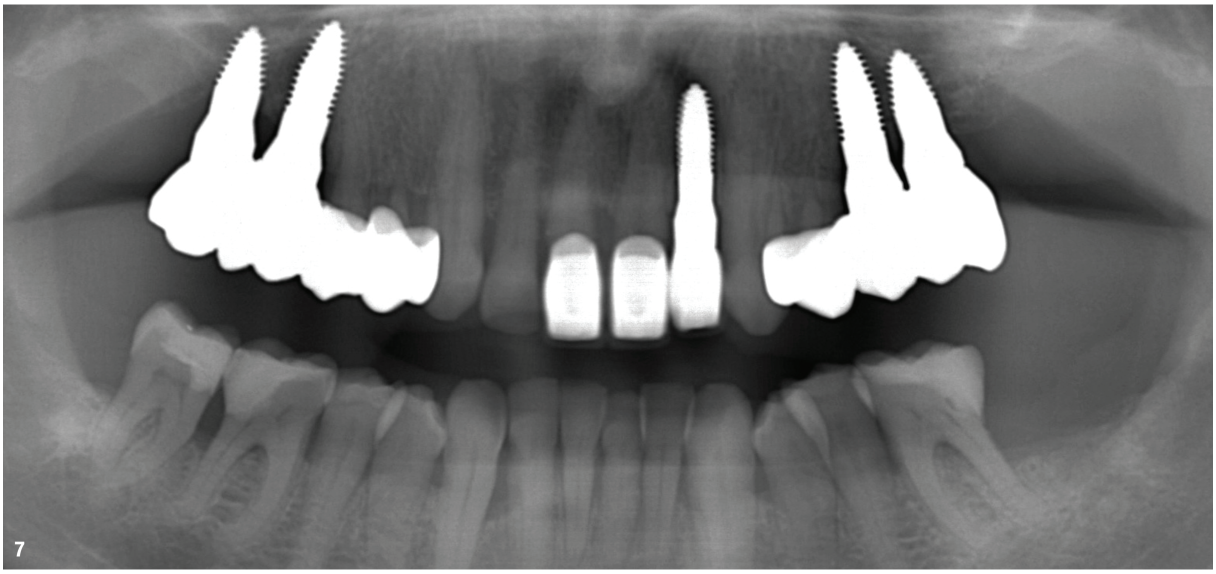


Fig. 7: Radiograph taken with the restoration in place.

tein requirements.[7–17] In our practice, systemic support for patients through targeted nutrition and supplying the appropriate nutrient supplements has become standard practice as a vital component of the surgery treatment.

Micronutrients

The foundation of the Bone Healing Protocol is high-dosage vitamin D3. Before surgery, we measure the patient's blood vitamin D3 levels. For optimal sustenance, we aim for a preoperative level of at least 60 ng/ml.[18] Numerous studies have shown that vitamin D3 is a critical factor in bone and tooth regeneration.[19–23] This vitamin activates two enzymes that are critical for bone mineralisation: osteocalcin (BGP) and matrix Gla protein (MGP). To prevent calcium from causing the calcification of arteries, these enzymes are activated by another important co-factor, vitamin K2 (MK-7).[24]

Another co-factor is magnesium, which is implicated in over 400 metabolic processes.[25] Zinc is involved both within the immune system and as a co-factor in the activation of the vitamin D3 receptor.[26] The trace element boron doubles the half-life of vitamin D3.[27] Since micronutrients work synergistically, there should be no shortage of B vitamins, vitamin C or digestive enzymes as well as omega-3 fatty acids in the postoperative period.

Conclusion

In addition to the precision of modern dental surgery, we integrate principles from functional medicine and nutrition. Our goal is to activate patients' innate healing capacities, support tissue and bone regeneration, and thereby significantly improve the integration success of ceramic implants.

The result: fewer complications, enhanced stability, and healthier, satisfied patients.

Yet, one of the greatest challenges in our specialty remains evident—biological dentistry currently lacks a universally recognised international standard.

To bridge this gap, the Institute of Biological Dentistry is pioneering a globally accepted quality framework: the Biodentistry Global Standard (BGS).

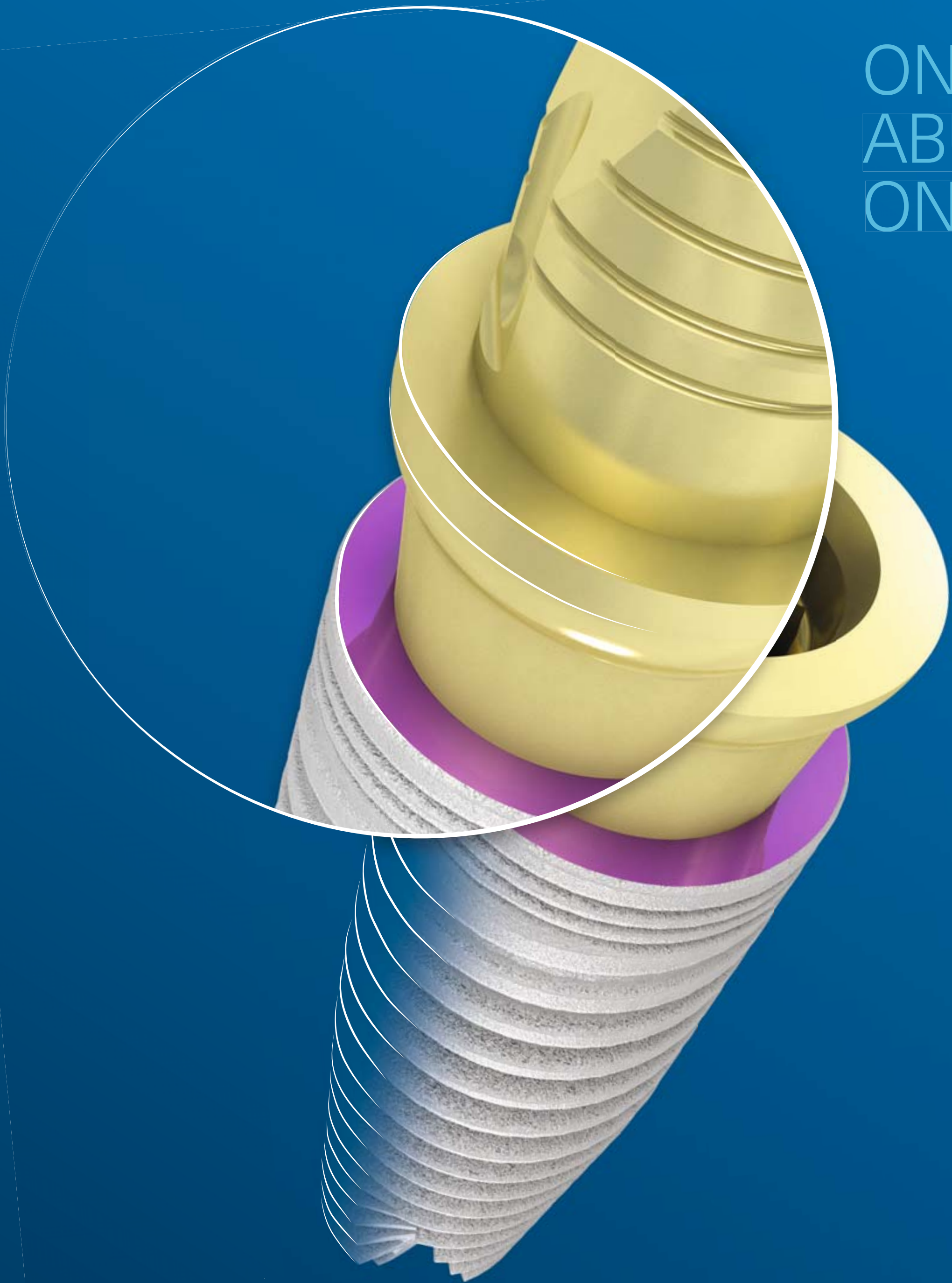
We are educating dentists worldwide under the Biodentistry 3.0 paradigm: a new era that harmonises advanced surgical techniques with functional medicine, positioning the dentist as a holistic healthcare expert of the future.

Literature

Dr Dominik Nischwitz

contact

Dr Dominik Nischwitz
Specialist for Biological Dentistry
DNA Health&Aesthetics –
Center for Biological Dentistry
+49 7071 975977
www.dnaesthetics.de
info@dnaesthetics.de



Saving the implant and the prosthesis: Regenerative treatment of peri-implantitis

Dr Jochen Tunkel, Germany

The following case report presents the successful management of peri-implantitis in a 56-year-old patient affecting the implant in region #16. Despite regular maintenance and no systemic risk factors, the patient showed clinical signs of inflammation and radiographic vertical bone loss. Treatment involved non-surgical therapy, electrolytic decontamination using GalvoSurge, and guided bone regeneration with autologous and xenogeneic biomaterials. The original prosthesis was preserved and replaced after soft-tissue healing. At 12 months, the peri-implant tissue was healthy, and the implant remained stable, demonstrating effective resolution of the inflammatory process.

Introduction

Peri-implantitis is a biological complication that is affecting a growing number of patients with implants. Characterised by inflammatory changes in the peri-implant soft tissue and progressive loss of supporting bone, it poses a significant threat to implant survival if not appropriately managed. Effective treatment remains a clinical challenge, particularly owing to the difficulty in achieving thorough decontamination of the implant surface and promoting predictable re-osseointegration.

This case report presents the surgical and regenerative management of peri-implantitis in a patient with a previously restored implant in the posterior maxilla. The patient presented with clinical signs of inflammation and radiographic evidence of vertical bone loss, despite adherence to supportive periodontal care and absence of systemic risk factors. A comprehensive treatment plan was developed, combining non-surgical therapy, surgical debridement, electrolytic decontamination and guided bone regeneration (GBR).

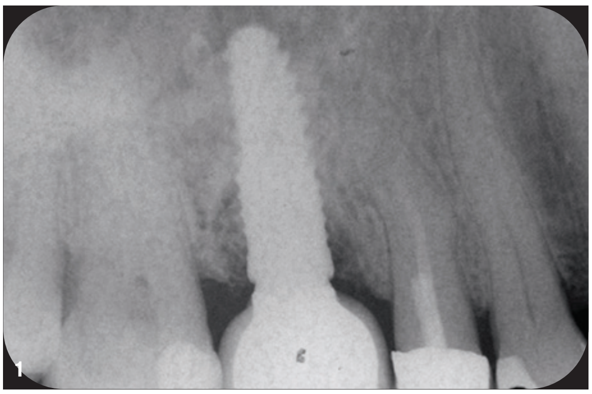


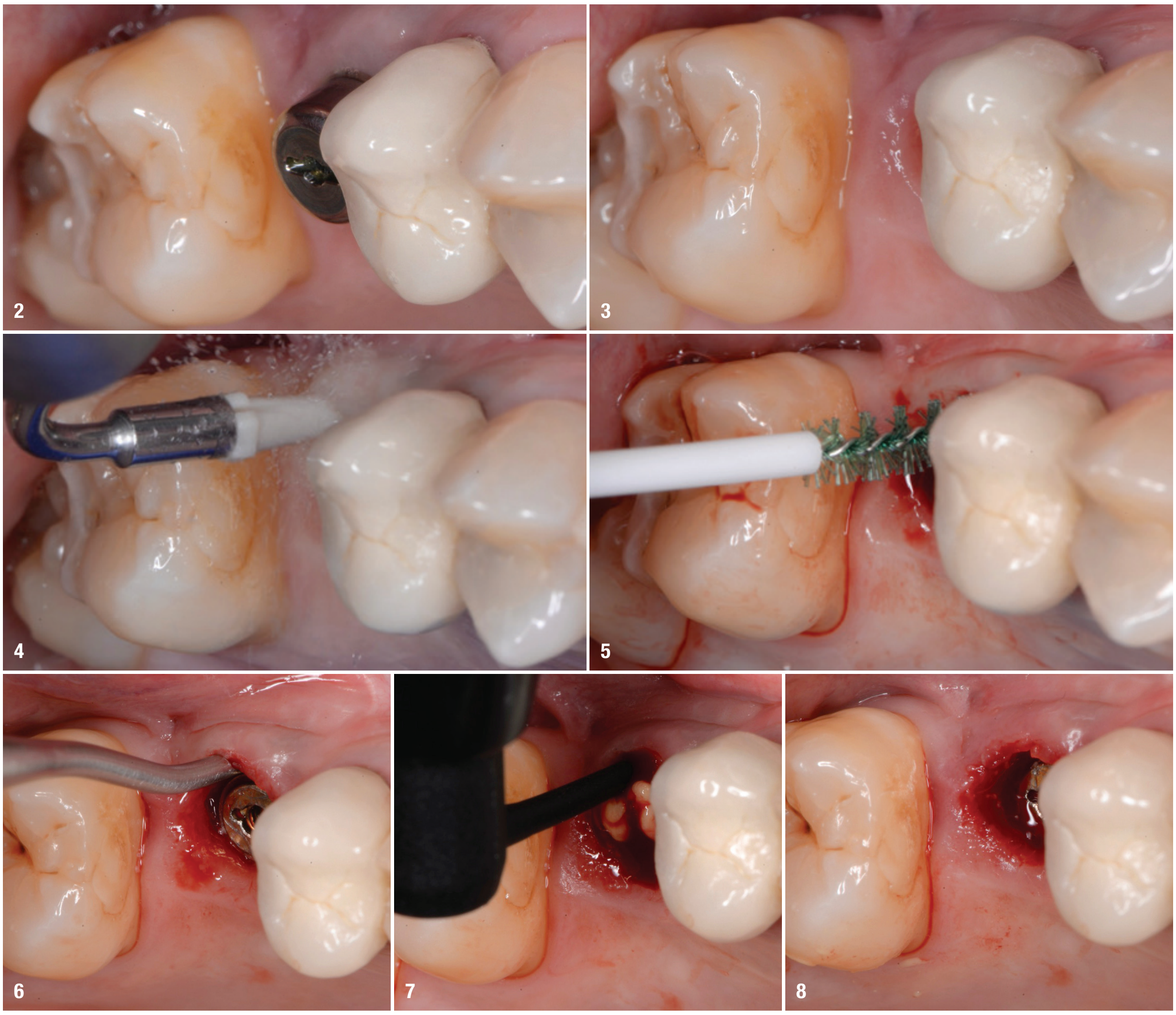
Fig. 1: Radiograph shows vertical bone loss; prognosis remains favourable.

Electrolytic cleaning offers a novel approach for implant surface decontamination, aiming to disrupt the biofilm at a microscopic level without mechanically altering the implant surface.[1,2] In this case, it was integrated into a regenerative protocol involving autologous bone, xenograft material and a non-resorbable membrane. This approach was chosen based on evidence supporting re-osseointegration after electrolytic cleaning combined with regenerative therapy.[3,4] The aim was to restore peri-implant health and preserve the existing prosthesis through a minimally invasive, biologically driven approach.

Initial situation

A 56-year-old female patient presented with the chief complaint of recurrent inflammation of the mucosa of region #16, accompanied by occasional bleeding and exudate. Her primary expectation was resolution of the inflammatory process and recovery of the health of the peri-implant tissue. The patient reported no systemic risk factors. Her medical and dental history included the extraction of tooth #16 in 2014, followed by implant placement in the same region that year and prosthodontic restoration in 2015. The patient had since received regular supportive implant therapy. There was no history of periodontitis or other significant dental disease.

The intra-oral examination showed localised inflammation around the implant in region #16, characterised by redness, swelling, bleeding on probing and suppuration. The radiographic evaluation revealed vertical bone loss adjacent to the implant and confirmed that horizontal bone availability and bone quality remained within acceptable



Figs. 2–8: Non-surgical periodontal therapy with professional cleaning and oral hygiene instructions. Subgingival debridement performed using Labrida BioClean®.

limits. The prognosis of the remaining dentition was favourable based on the clinical and radiographic findings (Fig. 1). Comprehensive clinical and radiographic findings led to the diagnosis of peri-implantitis at region #16.

Treatment planning

The treatment workflow included:
1. non-surgical periodontal therapy in the form of professional tooth cleaning and oral health instructions, as well as local antibiotic treatment with doxycycline for 14 days before surgery, in combination with subgingival debridement using Labrida BioClean (Figs. 2–8);
2. surgical treatment involving the use of GalvoSurge and GBR with autologous bone, Straumann XenoGraft, hyaluronic acid and a permamem membrane (botiss biomaterials);
3. second-stage surgery for prosthetic restoration of implant #16; and
4. follow-up visits for clinical review.

Surgical procedure

The surgical procedure took place under local anaesthesia combined with intravenous sedation using midazolam to ensure anxiety control and patient comfort. A full-thickness flap was raised to allow access to the peri-implant defect and to enable augmentation, followed by meticulous debridement of inflamed granulation tissue and mechanical decontamination of the implant surface (Figs. 9–13). After removal of the prosthetic screw, the GalvoSurge system was applied for implant surface decontamination (Figs. 14–16).

Local autologous bone was harvested using a Safescraper (Geistlich Pharma) and combined with a xenograft (Straumann XenoGraft) and hyaluronic acid to perform GBR (Figs. 17–19). A synthetic PTFE membrane (permamem) was used to stabilise the graft (Figs. 20–22). The flap was advanced and closed primarily without tension (Fig. 23). Upon completion of the first-stage surgery, a follow-up radiograph was taken, revealing the membrane fixation screws and confirming correct positioning. (Fig. 24).

Four months after the surgical procedure, a second procedure was performed to remove the fixation screws and membrane and to improve the soft-tissue contour. A partial-thickness flap was raised for soft-tissue management. After reflection of the periosteum, the screws and membrane were extracted, and the previously removed prosthesis was reinserted (Figs. 25–28). A small graft of palatal tissue was then harvested to improve the soft-tissue conditions around the implant, and the flap was sutured (Figs. 29+30). Postoperative care included appropriate antibiotics, analgesics and chlorhexidine mouthrinses, and the patient was enrolled in a 12-month follow-up programme to monitor wound healing, tissue stability and prosthetic function.

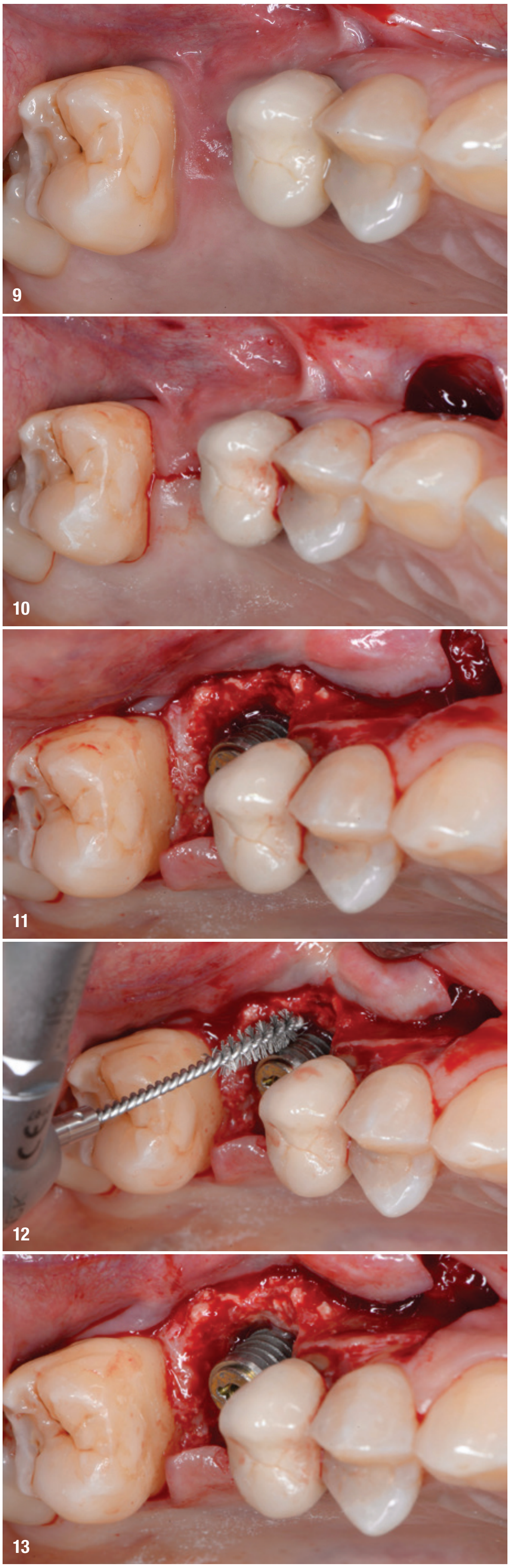
Treatment outcomes

At the 12-month follow-up, the implant in region #16 showed healthy peri-implant tissue with no signs of inflammation, bleeding on probing or suppuration (Figs. 31+32). Probing depths remained within normal limits, and radiographic evaluation confirmed stable marginal bone levels (Fig. 33). The reinserted prosthesis functioned without complication, and the occlusal parameters remained stable. Both the patient and the clinician were highly satisfied with the outcome, particularly the resolution of symptoms, preservation of the original prosthesis and regeneration of lost bone.

Discussion

The treatment of peri-implantitis remains a clinical challenge owing to its complex aetiology. In this case, a combined non-surgical and surgical approach was used to achieve re-osseointegration and soft-tissue stability. Initial non-surgical therapy included subgingival debridement with Labrida BioClean, an instrument with fibres of chitosan, which is a material with documented bacteriostatic and anti-inflammatory properties. This instrument has shown promising results in improving outcomes in peri-implant therapy owing to its biocompatibility and antimicrobial action,[5] along with local doxycycline to reduce inflammation and improve tissue handling during surgery.

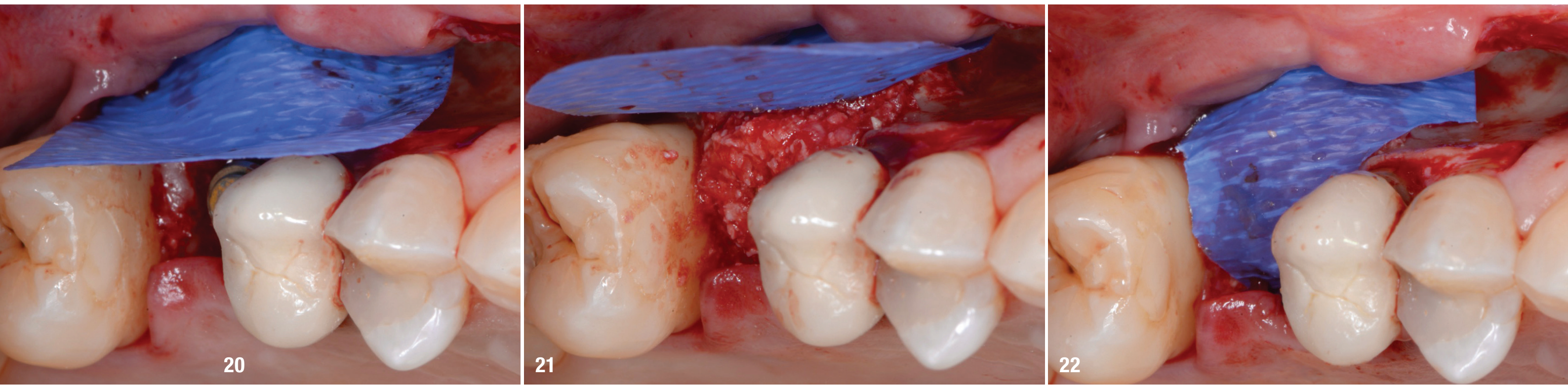
Subsequently, GBR in combination with GalvoSurge decontamination, autologous bone, xenograft, hyaluronic acid and a non-resorbable membrane was performed. At four months, a second intervention optimised the soft-tissue contours using a partial-thickness flap and palatal grafting. Soft-tissue refinement through palatal grafting



Figs. 9–13: Flap elevation enabled peri-implant defect access, surface decontamination.

Figs. 14–16: Implant surface decontamination with GalvoSurge® after prosthetic screw removal.

Figs. 17–19: Guided bone regeneration using autologous bone, Straumann® XenoGraft, and hyaluronic acid.



Figs. 20–22: Permamem® membrane was used to stabilise the graft.

has been identified as a key factor in achieving long-term soft-tissue stability and aesthetic integration.[6]

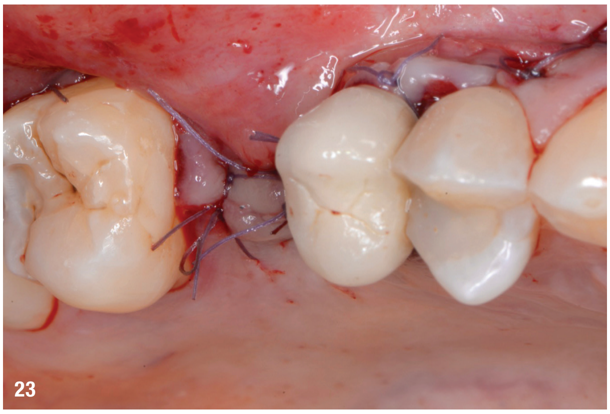
The combination of decontamination using GalvoSurge and of biological regeneration reflects established strategies that recognise the critical role of surface decontamination prior to grafting procedures to achieve successful re-osseointegration.[7,8] An *in vitro* study demonstrated that electrolytic cleaning was significantly more effective at inactivating bacterial biofilms compared with a powder spray system.[9] This case highlights the effectiveness of combining electrolytic decontamination with GBR to achieve favourable functional and biological outcomes in the treatment of peri-implantitis, even in complex cases.

Author’s testimonial

The combination of GalvoSurge with GBR and a non-resorbable membrane greatly improved my defect filling results. In my clinical practice, complete re-osseointegration is no longer unpredictable.

The patient stated, “I am happy that all my inflammatory problems have been completely resolved. I was afraid of losing the implant after I saw the defect on the X-ray. It is amazing that it could be completely regenerated.”

Literature



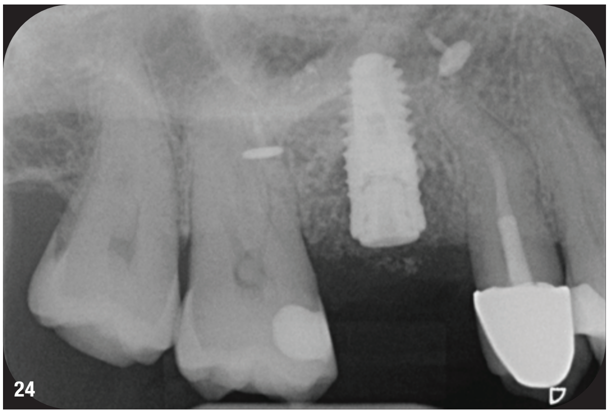
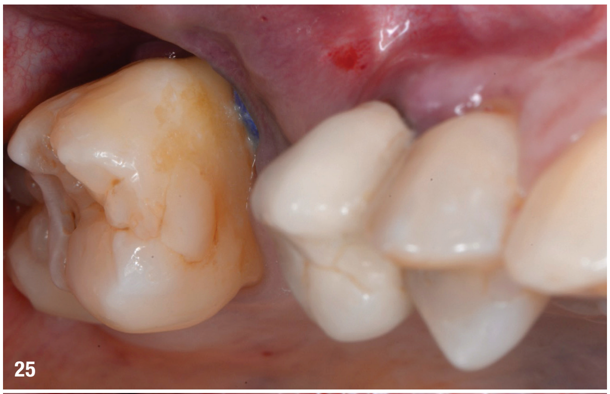
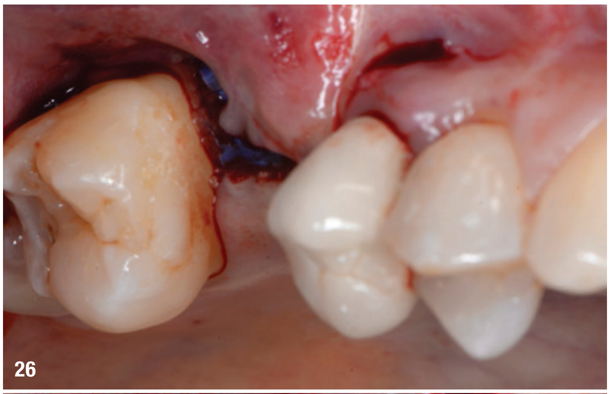
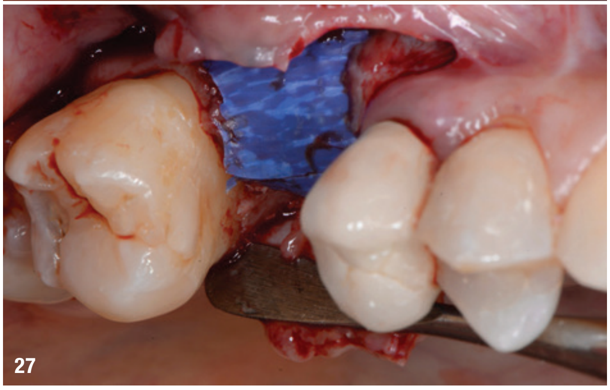
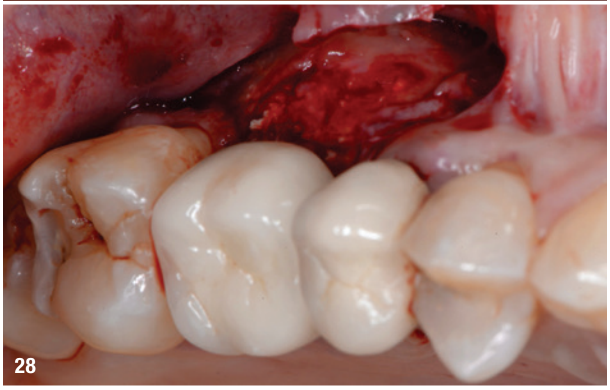


Fig. 23: Tension-free primary closure achieved after flap advancement. – **Fig. 24:** Radiograph after first-stage surgery confirmed proper positioning and stability of pins.

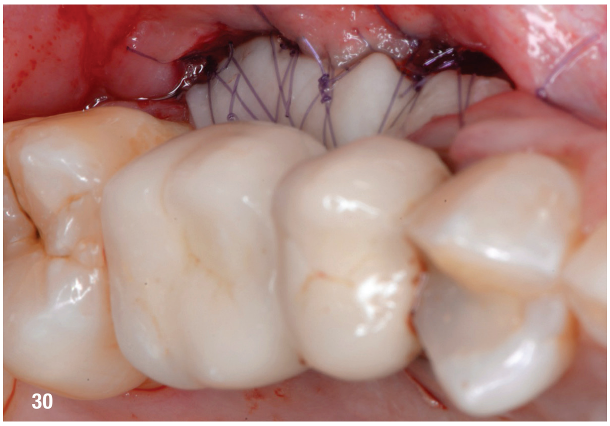




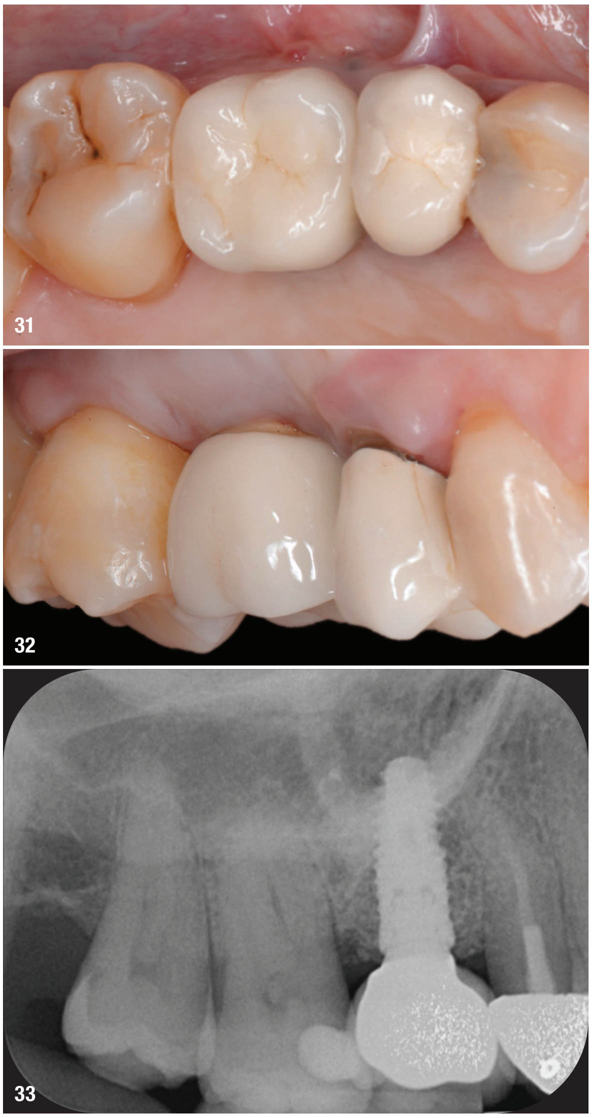




Figs. 25–28: Second-stage surgery at four months: screws and membrane were removed, soft-tissue management performed, and prosthodontic restoration reinserted.



Figs. 29+30: Palatal graft harvested to enhance peri-implant soft tissue; flap sutured.



Figs. 31–33: 12-month follow-up: clinical and radiographic examination demonstrates stable tissues and restored function.

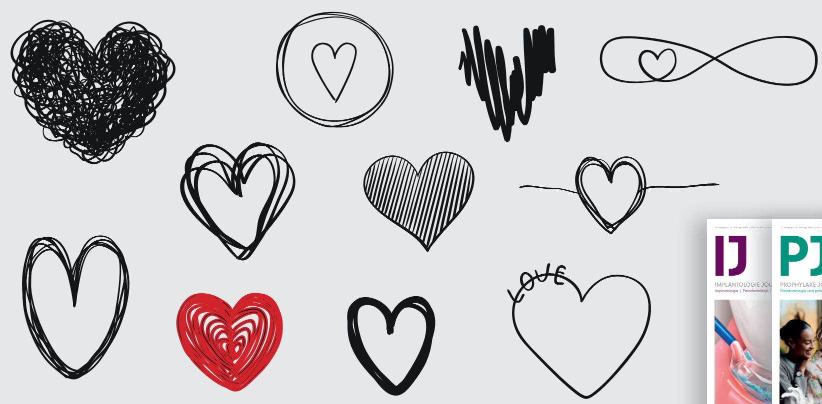
about the author

Dr Jochen Tunkel completed his dentistry degree at the University of Würzburg in Germany and then gained certification in periodontics through the Zahnärztekammer Westfalen-Lippe (dental chamber of Westphalia-Lippe) and the German Society of Periodontology. He qualified in implantology through the German Association of Oral Implantology and the European Association of Dental Implantologists and thereafter completed a Master of Oral Medicine in Implantology at the International Medical College, then affiliated with the University of Münster, and was certified in oral surgery by the Zahnärztekammer Westfalen-Lippe. He is in private practice in Bad Oeynhausen in Germany. His practice has been designated a Straumann Emdogain training centre and a competence centre for allogeneic bone plates in bone regeneration and is accredited by the European Centers for Dental Implantology. Dr Tunkel is a fellow of and speaker for the International Team for Implantology. He also shares his expertise in periodontics and implantology as a visiting and supervisory consultant for the German Association of Oral Implantology, German Society of Periodontology, and Akademie Praxis und Wissenschaft (the continuing education arm of the German Society of Dentistry and Oral Medicine).

contact

Dr Jochen Tunkel
Königstraße 19
32545 Bad Oeynhausen
Germany
info@fachzahnarzt-praxis.de

Dr Jochen Tunkel



Effective strategies for managing late implant failure and peri-implantitis

Dr Marco Tallarico, Carlotta Cacciò & Dr Silvio Mario Meloni, Italy

Late implant failure, particularly in the aesthetic zone, presents significant clinical and biological challenges. This case report describes a digitally guided, biologically sound treatment pathway for managing a failed implant due to peri-implantitis and malposition in a 26-year-old female patient. The implant was removed using a reverse torque technique, and this was followed by vertical guided bone regeneration using autogenous and xenogeneic grafts and then by soft-tissue augmentation and reimplantation with an implant with a hydrophilic, sand-blasted, acid-etched surface. Digital workflows supported every phase from planning to definitive restoration. One year postoperatively, the implant showed stable osseointegration and optimal soft-tissue architecture, and the patient was very satisfied. This case underscores the importance of peri-implantitis prevention, prosthetically driven positioning and timely intervention in modern implantology.

Introduction

Dental implants are a cornerstone of modern oral rehabilitation, offering long-term stability and aesthetic outcomes in both partial-arch and full-arch cases. Despite high implant survival rates, the increasing prevalence of implant-related complications—including implant fracture, peri-implant mucositis and peri-implantitis—has highlighted the need for advanced prevention and retreatment protocols.[1] Peri-implantitis, in particular, is a multifactorial disease influenced by a range of risk factors, such as plaque accumulation, implant design, prosthetic misfit, occlusal overload and patient-related conditions like smoking or systemic disease.[2] Left untreated, peri-implantitis can lead to late implant failure, characterised by progressive bone loss, infection, and aesthetic or functional compromise.

In cases of advanced bone loss or high aesthetic demands, implant removal and replacement often become necessary. While this approach allows for a new start, it presents considerable challenges: the loss of peri-implant bone and soft tissue frequently necessitates advanced reconstructive strategies. Guided bone regeneration (GBR), combined with careful prosthetic planning, is crucial to re-establishing a suitable foundation for future implant placement.[3] In this context, digitally assisted workflows—incorporating CBCT, intra-oral scanning and computer-guided surgical protocols—can greatly enhance the precision and predictability of reimplantation procedures.[3]

Additionally, malpositioning or poor planning of implants is a major contributing factor to long-term biological and prosthetic failure, especially in the aesthetic zone. Even slight deviations from ideal positioning can result in biomechanical overload, prosthetic compromise and eventual tissue breakdown.[4] Early diagnosis and timely correction, often through implant removal and site regeneration, are vital for optimal retreatment outcomes.

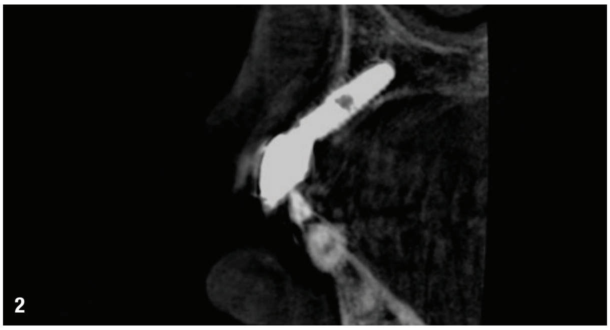


Fig. 1: Peri-implant mucosal inflammation and umbrella effect from bone loss and titanium show-through. – **Fig. 2:** CBCT evidence of labial implant malposition and bone loss.

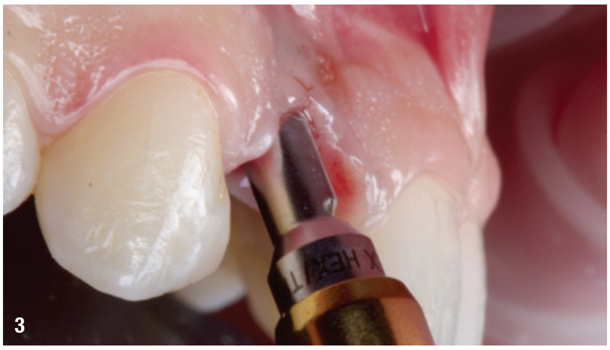
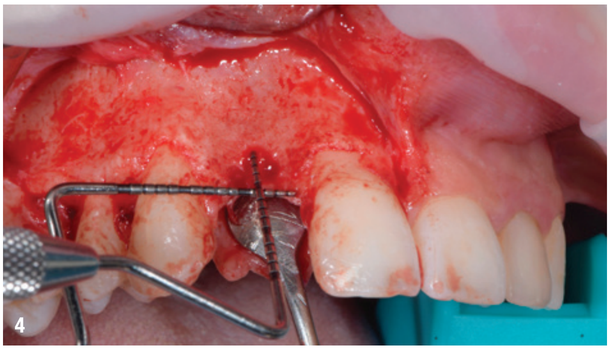



Fig. 3: Atraumatic implant removal using reverse technique. – **Fig. 4:** Vertical guided bone regeneration procedure carried out after an eight-week healing period by experienced operators.

Recent advances in implant surface technology can improve clinical outcomes in reimplantation cases. Hydrophilic surfaces have demonstrated enhanced wettability and early cellular interaction, promoting faster healing and supporting early osseointegration. In particular, implants featuring sand-blasted, acid-etched surfaces modified with pH-buffering agents—such as the SOI (Super Osseo-Integration) surface—have shown promising results in enhancing early stability and bone response under early loading conditions.[5] These innovations are particularly valuable in cases of compromised bone or when immediate or early loading protocols are indicated after regeneration.

Ultimately, successful management of late implant failure requires an individualised, multidisciplinary approach—one that integrates digital planning, advanced regenerative procedures and biomaterial innovations. The goal is not only to recover lost tissue and restore function, but also to meet the aesthetic expectations of patients through precise, biologically driven protocols.

Case summary

A 26-year-old partially edentulous female patient was referred to our clinic with an aesthetic concern in the region of the maxillary right lateral incisor. Clinical examination revealed an osseointegrated but malpositioned implant. The peri-implant soft tissue appeared thin and inflamed. Additionally, a dark-greyish discoloration was visible through the gingiva—referred to as the umbrella effect—caused by the loss of peri-implant bone and show-through of the titanium implant (Fig. 1).

Periapical radiographs showed bone contact on the mesial and distal aspects of the implant. However, clinical probing and CBCT revealed labial and palatal bone loss, consistent with a labially malpositioned implant (Fig. 2).

The patient reported congenital agenesis of the maxillary right lateral incisor and placement of the implant several years prior. After a comprehensive discussion of the treatment options, the patient consented to implant removal and future replacement after bone regeneration. This decision was based on aesthetic concerns and the high risk of further bone loss during medium- to long-term follow-up. The patient was healthy and a non-smoker.

At the initial visit, digital impressions were obtained using the Medit i700 scanner. Periapical radiographs and standardised intra-oral and extra-oral photographs were also acquired. A virtual diagnostic wax-up was generated to guide treatment planning. On the day of surgery, local anaesthesia was administered, and the implant was atraumatically removed using the reverse torque explantation technique. The surgical site was debrided and cleaned, and Type I collagen was applied to the socket (Fig. 3).

A provisional Maryland bridge was bonded to restore the edentulous area aesthetically. After an eight-week healing period, a vertical GBR procedure was performed by two experienced clinicians (MT and SMM). Antibiotic prophylaxis was administered (amoxicillin 2 g 1 hour preoperatively, followed by 1 g twice daily for eight days). The patient also rinsed with 0.2% chlorhexidine for 1 minute before surgery, and the surgical site was isolated with a sterile drape.

Anaesthesia was delivered using 4% articaine with 1:100,000 adrenaline (Ubistesin, 3M ESPE). A crestal incision through the keratinised mucosa was made using a No.15c blade, and a full-thickness flap was elevated. Vertical releasing incisions were placed two teeth away, both mesially and distally (Fig. 4).

The recipient site was debrided, and autogenous cortical bone was harvested from the ipsilateral mandibular ramus (external oblique ridge) using a bone scraper (MICROSS, META). A resorbable collagen membrane (Ubgen SHELTER® Slow slow pericardium membrane double layer) was secured on the palatal aspect of the defect. A one-to-one mixture of autogenous bone and anorganic bovine bone (A-Oss; particle size: 0.25–1.00 mm;

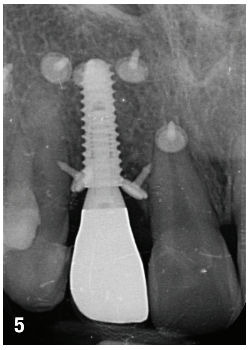
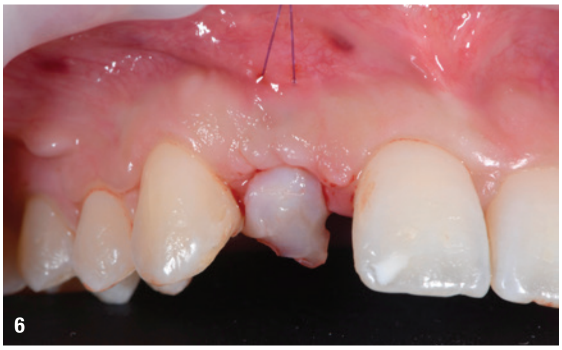
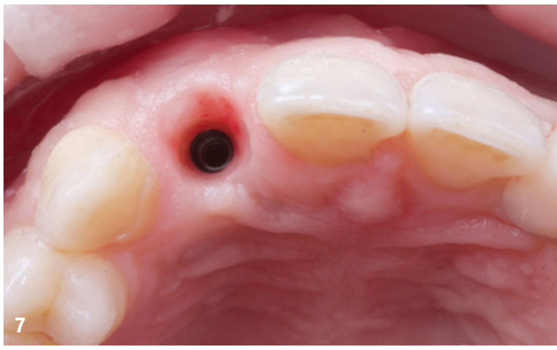




Fig. 5: Post-op intra-oral radiograph after implant placement and vertical guided bone regeneration. – **Fig. 6:** Connective tissue graft from the palate sutured to thicken the peri-implant mucosa after implant placement. – **Fig. 7:** Tissue healing after implant placement and connective tissue grafting.

0.5 g in total; OSSTEM IMPLANT) was packed into the defect. The membrane was then stabilised with two additional fixation screws.

After eight months of uneventful healing, a CBCT scan (6 × 8 cm field of view, 90 kVp, ~ 7 mA) was performed. A prosthetically guided surgical guide was designed to ensure optimal implant positioning. Under local anaesthesia, a flap without vertical releasing incisions was raised. A new implant (TSIII SOI, 3.5 × 11.5 mm; OSSTEM IMPLANT) was placed using a fully guided protocol (Fig. 5). After implant placement, a connective tissue graft was harvested from the palatal area (first premolar to first molar region) and sutured to thicken the peri-implant mucosa (Fig. 6). The patient was provided with detailed postoperative care instructions and medication.

After four months of healing, a minimally invasive uncovering procedure was performed, and a digital impression was taken. Two weeks later, a screw-retained provisional restoration was delivered to contour the peri-implant soft tissue (Figs. 7+8).

After approximately three months, a final impression was captured, and a definitive porcelain-veneered zirconia crown was fabricated and cemented over a titanium hybrid abutment (Fig. 9). The occlusion was carefully adjusted, and the patient was enrolled in a structured maintenance programme with four-month recall intervals.

At the one-year follow-up, the implant demonstrated excellent clinical and radiographic outcomes, showing stable soft tissue and no signs of inflammation or bone loss. The patient reported full satisfaction with the aesthetic and functional results.

Discussion

This case highlights the multifactorial nature of managing late implant failure, particularly in the aesthetic zone, and underscores the individualised, biologically and prosthetically guided intervention. As implant dentistry matures, clinicians are increasingly confronted with failing implants placed years earlier, often under suboptimal conditions. Late complications such as peri-implantitis and aesthetic compromise are now common, reinforcing the need for comprehensive diagnostic, surgical and restorative planning to prevent risks such as malposition.[1]

The first critical clinical decision in managing a failed implant is whether to attempt salvage or proceed with removal. This choice must be guided by a combination of scientific evidence, clinician experience and patient-specific factors—including bone loss, soft-tissue status, aesthetic expectations and long-term prognosis. The consensus classification of peri-implant disease emphasises staging and grading to help determine disease severity and appropriate intervention.[2] In this case, the implant presented with progressive labial and palatal


Fig. 8: Provisional screw-retained restoration placed to shape the peri-implant soft tissue. – **Fig. 9:** Definitive prosthesis delivery: porcelain-veneered zirconia crown cemented on to a titanium link abutment.

bone loss and thin soft tissue—both unfavourable prognostic indicators. According to recent consensus, implants showing progressive or circumferential bone loss, especially in aesthetic regions, should be removed promptly to prevent further hard- and soft-tissue compromise.[3,4]

Once removal was indicated, the use of the reverse torque explantation technique allowed for a minimally invasive and bone-preserving approach. This conservative method has been shown to minimise additional trauma and maintain the integrity of the recipient site, thus supporting future regenerative procedures.[5]

The cornerstone of successful reimplantation is prosthetically driven implant placement, ensuring ideal 3D positioning relative to the definitive restoration. In this case, initial malpositioning had led to biological and aesthetic failure, illustrating how even minor deviations can cause long-term complications. Proper implant positioning not only facilitates optimal load distribution and soft-tissue management but also supports aesthetic harmony.[6] Achieving this requires early digital planning, CBCT-based evaluation and virtual wax-ups to visualise the ideal outcome and design a surgical approach to attain it.

To reconstruct the lost alveolar ridge, vertical GBR was performed. Vertical bone defects remain one of the most challenging indications in regenerative dentistry owing to limited vascularity and higher risk of complications. However, predictable outcomes can be achieved with a structured protocol involving autogenous cortical bone, xenografts and resorbable membranes stabilised by fixation screws.[7] The choice of grafting material and membrane plays a significant role in maintaining space and supporting osteogenesis during the healing period.[8]

A further innovation in this case was the use of a hydrophilically modified sand-blasted, acid-etched implant surface. Implants with high surface energy and wettability have demonstrated superior early bone response, faster osseointegration and better outcomes in grafted or compromised sites.[9,10] These benefits are particularly valuable in regenerated bone, where vascularity and healing dynamics are more delicate than in pristine bone.

Despite the clinical success, this case underscores the importance of prevention as the key strategy in modern implantology. Prevention begins with correct implant placement, thoughtful prosthetic design and individualised maintenance protocols. Poor positioning, inadequate planning or neglected peri-implant maintenance significantly increase the risk of late complications. Long-term success hinges not only on surgical skill and biomaterials but also on the clinician's ability to apply a preventive philosophy from the outset.[11]

Conclusion

This case exemplifies a comprehensive, digitally guided and biologically sound approach to managing late implant failure in the aesthetic zone. The sequence of atraumatic removal, vertical GBR, soft-tissue grafting and prosthetically driven reimplantation led to an aesthetically and functionally stable outcome. The use of biomaterials—specifically autogenous bone, a xenograft, a resorbable membrane and an implant with a hydrophilic surface—contributed to predictable healing and long-term success. Most importantly, this case reinforces the primacy of prevention: placing implants in the correct position, supported by digital planning and prosthetic foresight, remains the most effective strategy to reduce future complications. In compromised or failing cases, timely intervention—guided by staging and grading systems—can transform biologically challenging scenarios into predictable restorative opportunities.

about the author

Dr Marco Tallarico is an associate professor in the Department of Medicine, Surgery and Pharmacy of the University of Sassari in Italy.

Carlotta Cacciò works at the Department of Medicine, Surgery and Pharmacy of the University of Sassari in Italy.

Dr Silvio Mario Meloni is an associate professor in the Department of Medicine, Surgery and Pharmacy of the University of Sassari in Italy.

Literature

contact

Dr Marco Tallarico
segreteria@osstemaicitaly.it

Precision implant surgery in the aesthetic zone

Buccal wall reconstruction using a resorbable magnesium membrane

Dr Erick Mota Gonzalez, Dominican Republic

Guided bone regeneration (GBR) is a well-established and widely adopted surgical technique designed to reconstruct alveolar bone deficiencies, particularly in preparation for or in conjunction with dental implant therapy. The core principle of GBR is based on the selective exclusion of soft-tissue cells from the defect site through the application of a barrier membrane, thereby promoting the repopulation of osteoprogenitor cells and the formation of new bone.[1,2]

Over the past decades, GBR has become a standard component of implant therapy, especially in cases of alveolar ridge atrophy or post-extraction defects where maintaining or reconstructing bone volume is critical for functional and aesthetic outcomes.[2,3]

Physiological bone remodeling following tooth extraction is a well-documented phenomenon, with the most pronounced dimensional changes occurring within the first three to six months post-extraction.[4,5] The buccal aspect of the maxilla is particularly susceptible to resorption due to the predominance of thin cortical bone, which in many cases measures less than 1 mm in thickness.[6,7,20–22] This rapid loss of alveolar structure can compromise ideal implant positioning, negatively affect peri-implant soft-tissue contours, and ultimately impair both the aesthetic and long-term functional outcomes.[7] In scenarios where the buccal plate is absent or severely resorbed, spontaneous healing often leads to soft-tissue collapse and loss of the natural ridge architecture.[8,20–22] As a result, ridge preservation or augmentation using GBR techniques has become an integral part of contemporary implantology, especially in the anterior maxilla where aesthetic demands are high.[21,22]

A variety of membrane materials have been utilised in GBR procedures, each with distinct biological and mechanical properties. Resorbable collagen membranes are commonly favoured for their biocompatibility, ease of handling and predictable degradation profiles.[9–11] However, their limited mechanical stability and susceptibility to premature resorption present challenges in cases with insufficient soft-tissue coverage or when space maintenance is critical. Conversely, non-resorbable membranes, such as expanded polytetrafluoroethylene (ePTFE) and dense PTFE (d-PTFE), offer superior structural integrity and space maintenance but are associated with increased risk of membrane exposure and necessitate a secondary surgi-

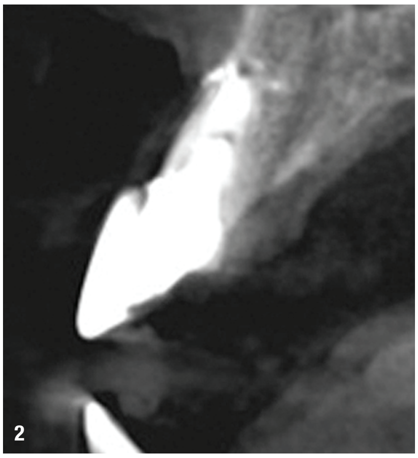


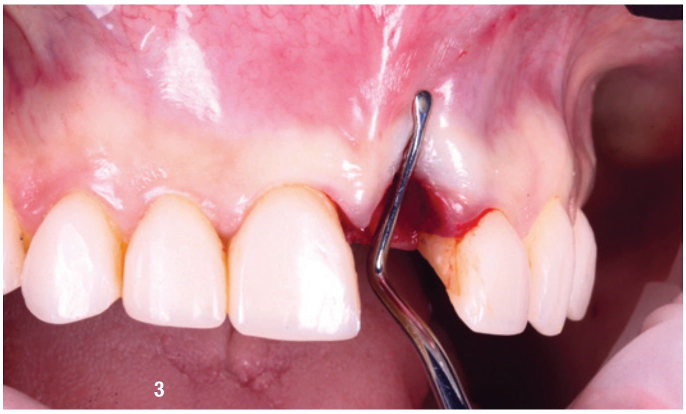
Fig. 1: Intra-oral view. Recession and suppuration left central incisor. – **Fig. 2:** Control CBCT before tooth extraction.

cal procedure for removal, potentially increasing patient morbidity.[10,11]

Recent advances in biomaterials have led to the development of resorbable metallic solutions, such as those composed of magnesium, which aim to combine mechanical strength with gradual resorption. Magnesium-based biomaterials represent a novel class of fully resorbable devices for bone regeneration in oral and maxillofacial surgery.[12] As a physiologically relevant element, magnesium plays a central role in bone metabolism and has been shown to promote osteogenesis through stimulation of osteoblastic activity and matrix mineralisation.[13,14] Compared to collagen-based alternatives, magnesium-based devices provide superior mechanical strength, enabling reliable space maintenance and fixation in larger or more complex defects.[12,15] A recently developed biomaterial is designed to overcome the limitations of conventional resorbable and non-resorbable solutions. It maintains structural integrity during the critical healing phase, ensuring reliable space maintenance, and gradually degrades *in vivo*, eliminating the need for surgical retrieval.[12,16,17]

The reconstruction of extensive buccal bone defects, particularly in the anterior maxilla, remains a significant clinical challenge in implant dentistry. In cases of complete buccal plate loss, immediate implant placement must be carefully planned and executed to avoid complications such as implant malposition, soft-tissue collapse, and aesthetic compromise.[20–22] Predictable outcomes in such scenarios depend on precise three-dimensional implant positioning, adequate volumetric bone support, and meticulous soft-tissue management.[21,22] The advent of digital treatment planning and guided implant surgery has significantly improved surgical accuracy and has become an essential tool in the management of anatomically complex cases. The Magnesium Membrane Shield Technique (MMST) has been previously described as a novel approach for bone wall reconstruction in compromised sockets, enabled by the unique mechanical and biological properties of resorbable magnesium. Initial clinical reports have demonstrated favourable outcomes, including reliable space maintenance, simplified handling compared to conventional approaches, and consistent formation of new cortical bone.[18,19]

Currently, clinical evidence on the use of resorbable magnesium-based biomaterials in the aesthetic zone remains limited, particularly in the context of immediate implantation in compromised extraction sockets. This report presents the clinical application of the MMST in a



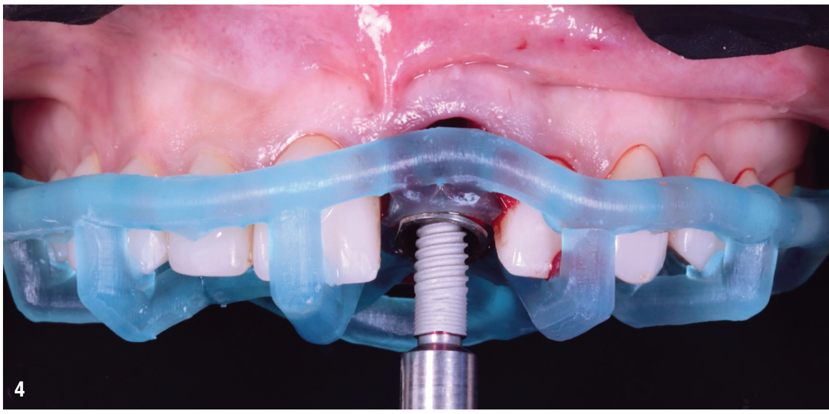


Fig. 3: Atraumatic, flapless extraction with a different gingival margin on the left incisor and loss of the vestibular wall. – **Fig. 4:** Immediate implant placement.

young female patient with a fractured maxillary central incisor and complete loss of the buccal bone wall, corresponding to a Type 2C socket defect and aims to expand the existing body of knowledge by detailing the clinical workflow, handling characteristics, and associated surgical considerations.

Case presentation

A 28-year-old female patient with no relevant medical history presented to the clinic with a horizontally fractured upper left central incisor, accompanied by suppuration and pain (Fig. 1). The patient's primary concern was the restoration of aesthetics and function, particularly the replacement of defective composite restorations. Written informed consent was obtained for the use of clinical images and all case-related documentation.

A cone beam computed tomography (CBCT) scan revealed complete loss of the buccal bone plate at the affected site (Fig. 2). Given the anatomical deficiency and aesthetic demands of the anterior maxilla, immediate implant placement was considered with caution, as such defects are associated with an increased risk of improper three-dimensional implant positioning, peri-implant soft-tissue collapse, and compromised aesthetic outcomes. A comprehensive digital treatment plan was developed, incorporating guided implant placement to ensure prosthetically driven positioning. Due to the highly specific apical bone availability, precision in execution was essential. A novel resorbable magnesium-based barrier (NOVAMag® SHIELD, botiss biomaterials) was selected to provide mechanical stability and eliminate the need for a second surgery for removal.

Digital planning and guided surgery

Intra-oral scanning was performed using the Aoralscan 3 (Shining 3D) and CBCT imaging was acquired with the I-Max 3D Ceph (Owandy). The digital data were imported into MSOFT (MIS Implants) for the design of a custom surgical guide, which was 3D printed using a Formlabs system.

Under intravenous sedation (midazolam 3 ml iv) and local infiltration anaesthesia (articaine with epinephrine 1:100,000), a minimally invasive, flapless extraction was performed to preserve the surrounding soft tissues and prevent papillary collapse (Fig. 3). The extraction socket was thoroughly debrided using a serrated curette. The surgical guide was positioned intra-orally and a full osteotomy was performed, followed by the insertion of a MIS V3 implant (3.9 × 13 mm, MIS Implants) with primary stability (>40 Ncm). An intermediate abutment (CONNECT, 2 mm, MIS Implants) was placed immediately in accordance with the "One Abutment, One Time" protocol to minimise micromovement and microleakage at the implant–abutment interface (Fig. 4).

Buccal bone reconstruction was achieved using a structured three-layer regenerative approach. This included the application of a subepithelial connective tissue graft, a resorbable magnesium-based shield (NOVAMag® SHIELD, botiss biomaterials) and a cortico-cancellous allograft (maxgraft®, botiss biomaterials; Fig. 5). To facilitate the placement of these biomaterials, a submucosal tunneling technique was employed, allowing for atraumatic access and adequate soft-tissue coverage (Fig. 6). The tunnel was carefully extended mesiodistally to encompass approximately 50 per cent of the adjacent teeth and apically to the mucogingival junction, ensuring sufficient space for stable biomaterial integration. A free de-epithelialised connective tissue graft was harvested extra-orally and secured in position using resorbable monofilament sutures (Seralene 5/0, Serag-Wiessner) to provide additional soft-tissue volume and support for the underlying augmentation procedure.

The magnesium shield was adapted and shaped using manufacturer-specific instruments (NOVAMag® Instruments, botiss biomaterials), ensuring smooth edges to minimise the risk of galvanic corrosion (Fig. 5). The barrier

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was placed at least 3 mm below the gingival margin and extended 2 mm mesiodistally beyond the adjacent teeth to enable passive stabilisation without fixation screws or additional sutures (Fig. 6). The buccal defect was then filled with allogeneic bone material, completing the Magnesium Membrane Shield Technique (Fig. 7).

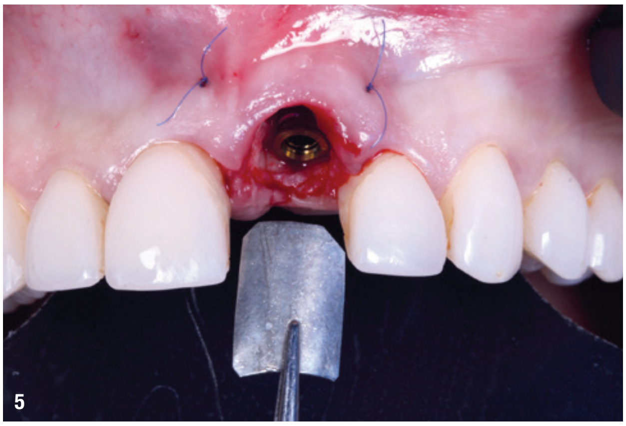
An immediate provisional restoration was delivered to meet aesthetic expectations and support the peri-implant tissues. Gingival margin contouring was achieved using a double-crossed traction suture (Fig. 8). The patient was prescribed an appropriate postoperative regimen and throughout the follow-up period, the patient reported no discomfort or complications at the surgical site.

Results

Four months after surgery, a second-stage reentry procedure was performed. Clinical inspection and CBCT analysis revealed successful bone regeneration and full integration of the allograft (Fig. 9). Notably, no remnants of the magnesium shield were detected, and no signs of encapsulated material were observed within the soft tissue, confirming complete and uneventful resorption. The peri-implant soft-tissue architecture remained stable, and the gingival margins showed ideal contour and volume preservation.

A final full-mouth rehabilitation was carried out from tooth 15 to 25 using lithium-disilicate restorations, achieving a functionally stable and aesthetically pleasing outcome. This case demonstrates the potential of resorbable magnesium-based barriers to provide structural support and promote predictable bone regeneration in challenging anterior maxillary defects, particularly when combined with immediate implant placement in compromised sockets.

Definitive prosthetic rehabilitation was initiated after appropriate healing, using a fully digital workflow. An intra-oral scan was performed with the Shining 3D Aoralscan 3, following the REPLICA-D technique as described by Clavijo et al., which enabled the dental laboratory to obtain a highly accurate replica of the intra-oral conditions. For the restoration of tooth 21, a custom monolithic zirconia abutment (Aidite 3D Pro) was designed and fabricated. This served as the foundation for a cement-screw-retained veneer, ensuring optimal aesthetic integration and functional stability. The restoration achieved a seamless match in shape, colour, and translucency with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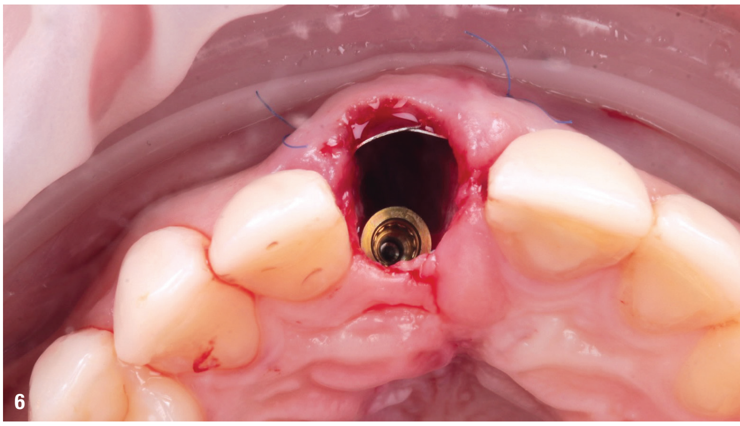
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Fig. 5: Resorbable magnesium shield was used to reconstruct the buccal alveolar wall, placing it between the soft tissue and remaining bone wall without any fixation. – **Fig. 6:** Occlusal view. Soft tissue supported by the magnesium-based structure without additional fixation. CTG its sutured to the buccal gingiva.

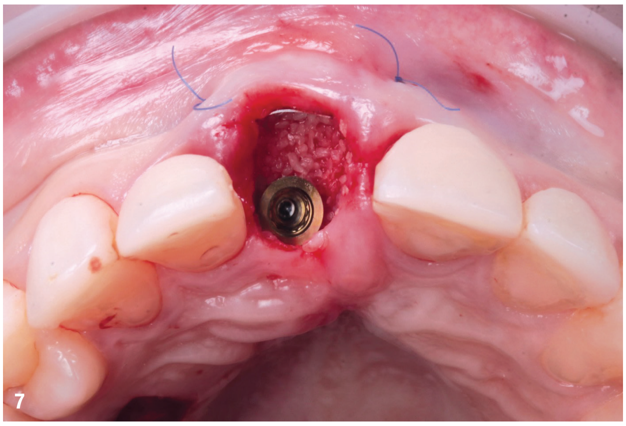
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Fig. 7: Occusal view after allograft placement to fill the alveolar gap. – **Fig. 8:** Immediate loading and double-crossed suture to traction the flap.

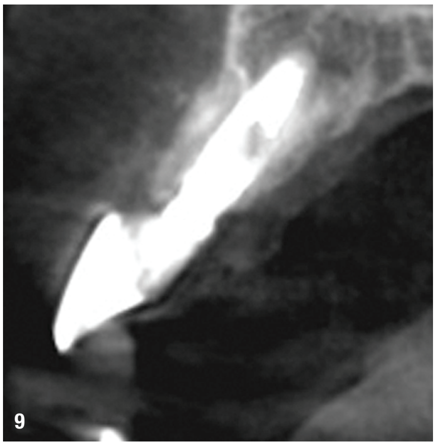


Fig. 9: Control CBCT after implant placement. – **Fig. 10:** Clinical situation one year after implantation.

the adjacent lithium-disilicate veneers, fulfilling the patient's high aesthetic expectations.

At the one-year follow-up, clinical evaluation confirmed stable peri-implant soft tissues with no signs of inflammation or recession (Fig. 10). Complete regeneration of the buccal wall was demonstrated, including the formation of a well-defined corticalised plate, effectively restoring the vestibular wall that was previously absent at the time of implant placement. These outcomes underline the long-term success and predictability of the applied regenerative and prosthetic protocol in managing complex anterior maxillary defects.

Conclusion

This case report demonstrates the successful application of a novel resorbable magnesium-based solution for buccal wall reconstruction in conjunction with a three-layer regenerative protocol for the immediate implant placement in a highly compromised aesthetic zone. The complete loss of the buccal bone plate presented both surgical and prosthetic challenges, necessitating precise digital planning, guided implant surgery, and advanced hard- and soft-tissue augmentation techniques. The use of a pre-shaped, mechanically stable, and fully resorbable magnesium material enabled effective space maintenance without the need for fixation devices or secondary surgery for removal. The minimally invasive, flapless surgical approach preserved the soft-tissue architecture and enhanced the aesthetic outcome, while the use of an immediate provisional restoration maintained tissue stability during healing. One year postoperatively, clinical and radiographic evaluations confirmed long-term stability of both hard and soft tissues, with complete integration of the grafted material and resorption of the magnesium shield. The Magnesium Membrane Shield Technique thus represents a promising, innovative approach for complex defects, combining mechanical reliability with biological advantages. This magnesium shield not only supported effective bone regeneration upon immediate implant placement in the aesthetic area but also simplified the clinical procedure by allowing easy adaptation and placement without fixation, eliminating the need for a second surgery. This case supports the growing clinical evidence for the use of magnesium-based biomaterials in regenerative implant dentistry, offering a reliable solution for achieving both functional and aesthetic success.

Literature

about the author

Dr Erick Mota Gonzalez obtained his dental degree in 2015 in the Dominican Republic and completed his implantology training at the University of Barcelona in 2018. He is Director of the Scientific Committee of the Dominican Society of Implants and lecturer in implant-focused master's programmes at two Dominican universities. Since 2020, he is part of the MIS LATAM Expert Team.

contact

Dr Erick Mota Gonzalez
Department of Periodontology
School of Dentistry
Pontificia Universidad Católica Madre y
Maestra Santo Domingo
Dominican Republic
erickmotagonzalez@hotmail.com

Dr Erick Mota Gonzalez

The only longitudinal metric for implant stability

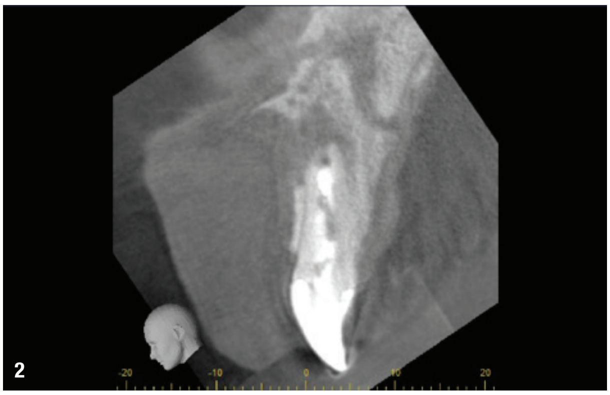
Resonance frequency analysis

Dr Michael R. Norton, UK

Over the last two decades, there has been an increasing demand for accelerated dental implant treatment protocols to minimise treatment duration and to avoid the need for provisional removable prostheses. However, immediate loading of implants was considered a risk factor for early failure owing to occlusal overload.[1,2] In the absence of any alternative proposals, implant companies resorted to the anecdotal design of tapered and aggressively threaded implants in an effort to enhance mechanical implant fixation into bone as measured by insertion torque. This rather carpenter-like approach nonetheless yielded much higher success as clinicians looked to push the envelope with ever-higher insertion torques,[3] perceived as increasing primary stability, and achieved comparable survival rates to those of conventional loading protocols, at least in the short to medium term. However, the literature has since become replete with evidence that such high insertion torques, typically > 50 Ncm, are in fact damaging the surrounding bone, these high strains resulting in microfractures, loss of vascularisation, osteocyte cell death and consequently waves of resorption propagating at some distance from the bone-to-implant interface.[4–6] At the extreme, this has resulted in excessive marginal bone loss and ultimately compression necrosis and complete implant failure.[7,8] In the longer term, it has been proposed that the damage induced in the bone

Fig. 1: Pre-treatment clinical photograph of tooth #11.

makes it more vulnerable to advancing marginal bone loss and peri-implantitis.[9] It is known that healing and therefore osseointegration are delayed and that the resulting integration is of inferior quality, bone-to-implant contact being reduced. Thus, while it may be true that success rates for immediate loading when higher insertion torque is used are comparable to those of conventional implant loading, there remains a broad lack of knowledge about the long-term consequences arising from the damage induced in the peri-implant bone as well as the misconception that lower insertion torques yield higher failure.



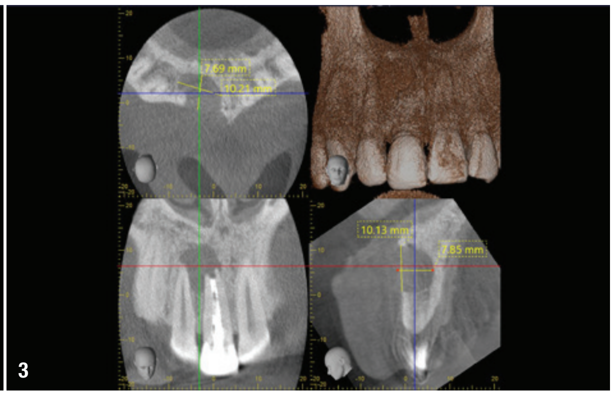
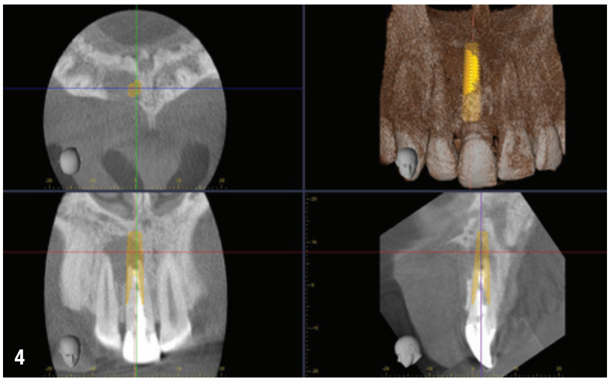


Fig. 2: CBCT scan of failing tooth #11, showing inadequate root canal treatment and apical fenestration but an intact labial-crestal plate. – **Fig. 3:** Cystic cavity measuring approximately 10 × 8 mm.



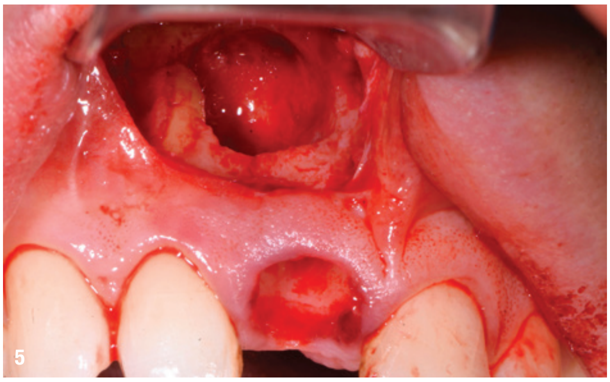
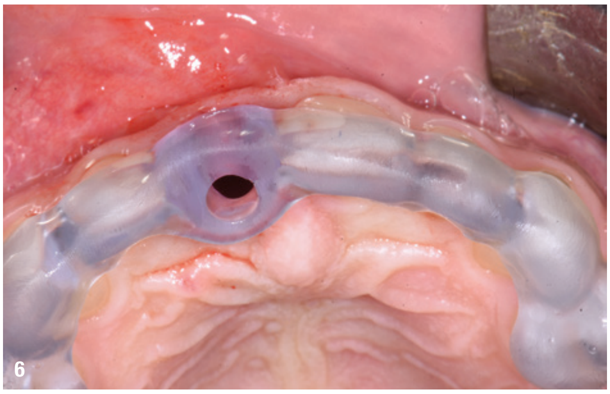


Fig. 4: CBCT scan showing the planned implant placement. – **Fig. 5:** Extraction socket with the infra-bony cyst cavity exposed.



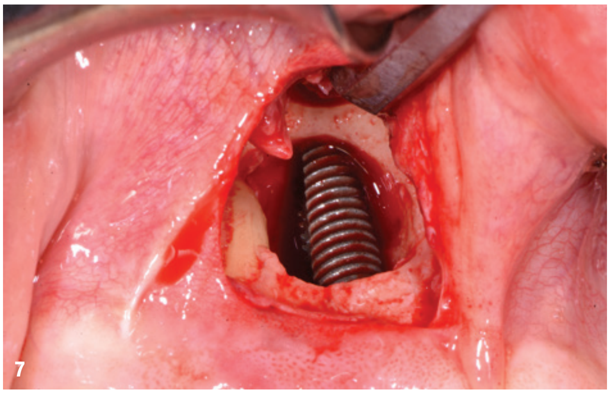


Fig. 6: Surgical guide *in situ*. – **Fig. 7:** View of the implant passing across the infra-bony cavity.

The issue is one of perception and threshold. Since many clinicians now happily use torques of 75 Ncm or more, the idea of placing an implant to 20 Ncm seems unreliable at best and high risk at worst, and there has been a complete failure to grasp the notion that 20–25 Ncm represents a likely threshold above which additional increases in torque yield little in the way of added stability, but only damage the bone. I first proposed this idea in 2011[10] and again discussed it in an editorial in the *International Journal of Oral and Maxillofacial Implants*,[11] and I presented subsequent research demonstrating that baseline resonance frequency analysis (RFA) can yield implant stability quotient (ISQ) values approaching or even exceeding the desired target of 70 when using an insertion torque of ≤ 25 Ncm.[12] More importantly, the singular benefit of RFA is the ability to repeat measurements over time, enabling the clinician to infer the dynamic biological changes that are taking place during healing and thus gain objective evidence of ongoing osseointegration, thereby allowing the clinician to restore the implant at the most appropriate time and with greater confidence. In contrast, insertion torque is a once-off measure and can therefore provide no longitudinal information about the dynamic process of osseointegration. The following case report is an everyday example of my own experience of placing implants into extraction sockets, followed by immediate provisionalisation, using low insertion torque and performing RFA to document the ISQ values over time.

Case report

A 37-year-old male patient was referred to my clinic for extraction and replacement of a failing maxillary right central incisor. The history revealed that the patient had suffered a childhood trauma at age 12, when the tooth was fractured close to the gingival margin. The patient underwent endodontic therapy for root canal obturation, and the tooth was crowned. After ten years, the patient became aware of symptoms, and a recurrent abscess was diagnosed. The root canal was partially filled with composite to attempt to further obturate it. After a further

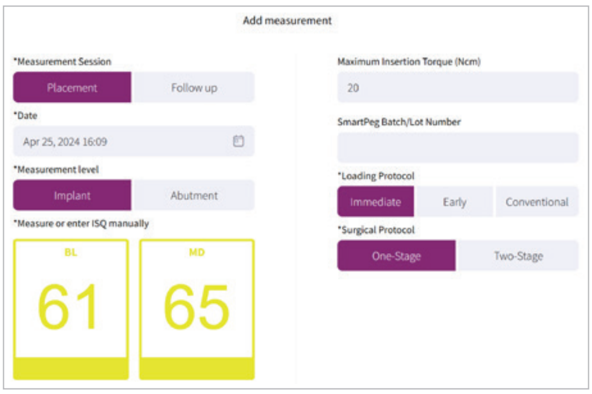


Fig. 8: OsstellConnect showing an initial ISQ value of 61 and 65, representing acceptable primary stability of the implant.

five years, the patient was provided with a new post and crown. Nonetheless, the infection remained, so approximately nine years before, the tooth had undergone apicectomy, after which it settled down for a period, but it flared up again in early 2024. At that point, the patient was referred to my practice for treatment.

On examination, the patient presented with a minimally restored dentition with a few composite restorations and a crown on tooth #11. The tooth being in the aesthetic zone increased the challenge of delivering a good outcome. The patient had a healthy periodontium and only a few isolated non-pathological pockets of 4–5 mm in depth at the lingual surfaces of the mandibular molars, accompanied by some minor bleeding on probing. The patient was advised to seek more regular hygiene focusing on these areas.

Tooth #11 was immobile and associated with adequate ridge width and a wide band of keratinised tissue (Fig. 1). There was also a favourable Class I incisor relationship and adequate space to accommodate an implant-supported restoration. A CBCT scan of the site revealed an inadequately endodontically treated tooth with a lack of an apical seal and incomplete obturation of the canal. The tooth benefited from good bone support provided by a robust facial bone plate at the alveolar crest (Fig. 2), but there was a large periapical dentigerous cyst measuring approximately 10 × 8 mm, extending to the mesial surface of tooth #12, and complete fenestration of the facial plate superiorly (Fig. 3). The prognosis of the tooth was deemed to be hopeless, and extraction was indicated.

Typically, with such a large cyst, the treatment plan would be extraction, cyst enucleation and grafting, followed by implant placement after healing of the graft, and the patient would be provided with a provisional, often removable, prosthesis. However, I have for many years specialised in complex immediate implant placement and have published extensively on the use of low insertion torque with high success, even in the case of immediate provisionalisation. Accordingly, the risks and benefits were discussed with the patient, who elected for a simultaneous approach and immediate restoration. This was planned in the CBCT scan using i-Dixel software (Morita) for the placement of a PrimeTaper EV implant (Dentsply Sirona, 4.2 × 17.0 mm; Fig. 4), and a bovine bone mineral substitute was chosen as the grafting material.

An atraumatic extraction protocol was used, involving initial luxation with a periotome and a rotational rather than facial-palatal method of displacement, thereby preserving the facial plate. Once the tooth had been extracted, a sub-sulcular envelope incision was used to gain access

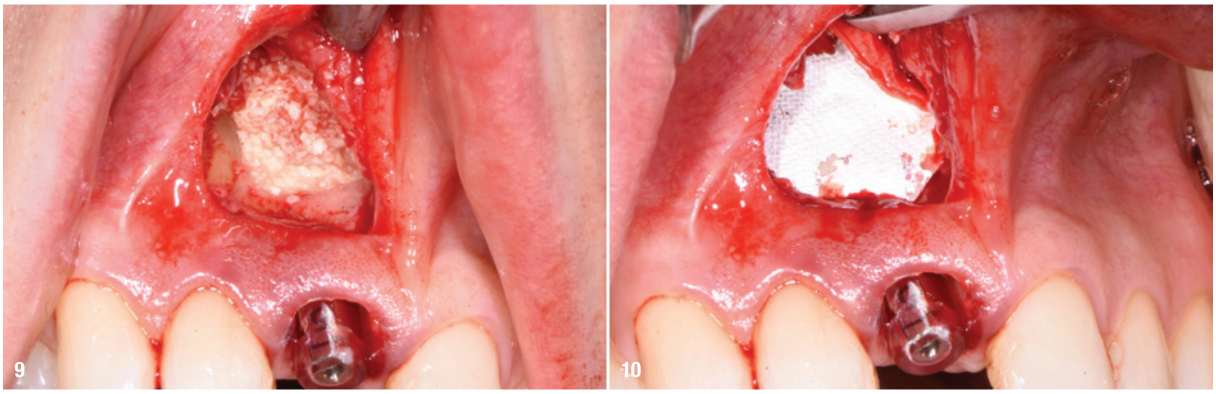


Fig. 9: Infra-bony cavity grafted with a bovine bone mineral rehydrated in a tetracycline solution. – **Fig. 10:** Placement of an OSSIX Plus collagen barrier membrane.

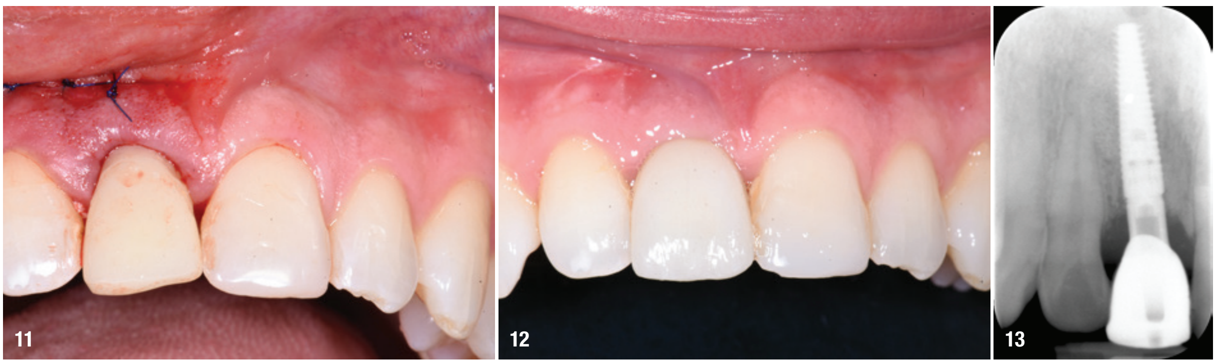


Fig. 11: Under-contoured provisional restoration placed immediately and out of occlusal contact to allow soft-tissue fill. – **Fig. 12:** Definitive screw-retained zirconia crown on an Atlantis CustomBase milled titanium abutment. – **Fig. 13:** Radiograph of the implant at baseline insertion of the definitive crown.

Fig. 14: OsstellConnect ISQ treatment curve mapping implant stability over 14 months. – **Fig. 15:** ISQ curve showing a drop in stability and the time taken to recover stability over 14 months.

to the lesion, and the cyst was enucleated and the surrounding bone curetted and decontaminated (Fig. 5). A surgical guide was used to ensure the optimal position of the implant (Fig. 6), and the apical cutting threads of the PrimeTaper EV implant (Fig. 7) ensured that the implant engaged effectively with the apical bone, but the insertion torque only reached 20 Ncm owing to the large cyst-related cavity and the resulting lack of significant initial bone-to-implant contact. The baseline ISQ value was 61 and 65 in the facial-palatal and mesiodistal directions, respectively (Fig. 8), but in my experience, this combination of torque and ISQ value indicated that the implant was suitable for immediate loading, since the torque was ≥ 20 Ncm and the ISQ value was ≥ 65 in one direction.

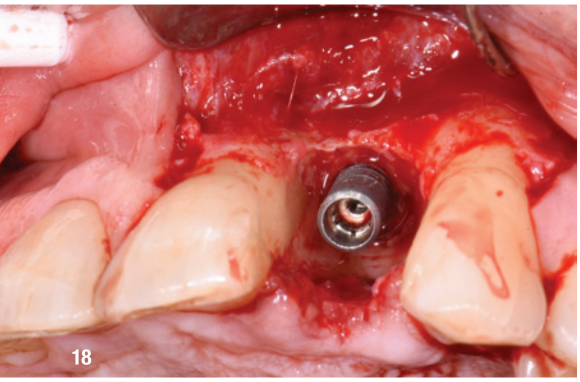
The infrabony defect was grafted with the bovine bone mineral and covered in a resorbable collagen membrane (OSSIX Plus, Dentsply Sirona) before the wound was closed and the immediate provisional restoration fabricated, which was under-contoured on purpose to allow for soft-tissue volume to increase around the neck of the crown and to bring the zenith coronally in order for it to be level with that of the adjacent central incisor (Figs. 9–11). RFA was then utilised to monitor changes in stability, increasing to 64/69 ISQ after six weeks and an impressive 79/82 ISQ after just over four months of healing. These values indicated progressive bone remodelling, graft consolidation and osseointegration and thus that the site was ready for definitive restoration.

At this stage, impressions were taken using an intra-oral scanner, and the definitive screw-retained crown was fabricated utilising an Atlantis CAD/CAM abutment (Dentsply Sirona) and a bonded zirconia crown (Fig. 12). RFA was performed again at nine months and one year after placement, resulting in further increases to 85/84 ISQ and 86/86 ISQ, respectively. This plateauing of the ISQ values indicated that the graft had matured and complete secondary stability had been achieved. Thus, at the 12-month follow-up, not only was the patient satisfied with the aesthetics of the fixed restoration, including the enhanced soft-tissue profile, and the favourable radiographic outcome (Fig. 13), but we also gained insightful and detailed information on implant stability from the longitudinal ISQ values, giving us confidence in the long-term prognosis of this implant-supported restoration.

All the ISQ values were recorded electronically utilising the OsstellConnect software (Osstell) to clearly demonstrate the longitudinal change in implant stability (Fig. 14) and the gradual shift from primary mechanical to secondary biological stability. Not only is OsstellConnect a repository for implant stability measurements, but the longitudinal graph that it maps of multiple ISQ measurements can be a metric by which a customised treatment can be determined according to the rate of gain in ISQ values, or indeed the fall of ISQ values, indicating a possible issue with healing and serving as a warning to delay loading.

For another patient, the implant was seen to dramatically reduce in ISQ values from a baseline of 72/74 to 56/58 at the three-month postoperative review, even though the implant was immobile and was resistant to manual torque without pain (Fig. 15). However, a simple intra-oral radio-

Fig. 16: Baseline radiograph of the implant mapped in Figure 15, showing good marginal bone levels. – **Fig. 17:** Radiograph of the implant after three months of osseointegration, showing significant cratering of the crestal bone.



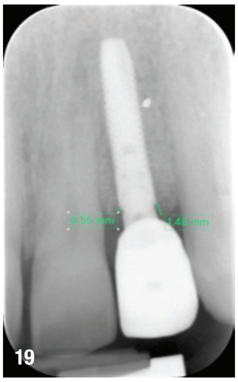


Fig. 18: Clinical photograph of the defect. – **Fig. 19:** Radiograph taken 11 months after remedial surgery and guided bone regeneration around the implant, demonstrating good graft confinement and consolidation.

graph confirmed that, compared with baseline (Fig. 16), there was significant loss of crestal bone (Fig. 17), thus corroborating the significance of the drop in ISQ values.

Surgical re-entry revealed significant facial and palatal bone loss and marked apical migration of the alveolar crest of the adjacent teeth (Fig. 18). The implant and surrounding bone were decontaminated and the site repaired using classical guided bone regeneration techniques. Subsequent monitoring of the ISQ values revealed that, over a period of nine months, the implant and surrounding graft underwent consolidation and achieved enhanced biological stability, which continued to progress in response to functional loading, yielding a final ISQ value of 80/79 one year and five months after initial insertion of the definitive crown. There was also radiographic evidence of favourable marginal bone levels (Fig. 19). No other instrument or metric can offer such important information regarding the changes taking place at a biological level or provide this kind of longitudinal stability data.

In addition, OsstellConnect is a useful auditing and monitoring tool, enabling the clinician to document information such as the patient's medical risk factors, details of the surgical protocol (including any staged or simultaneous grafting procedures), the insertion torque values and the dates of the recording of each ISQ value. In this way, as more cases are recorded in OsstellConnect, so will the value of the information about the factors which influence ISQ values, over and above implant brand, type and size, become increasingly apparent, offering new insights into those factors which affect primary and secondary stability. Therefore, this is not just a valuable tool for the individual clinician, but also an essential audit registry for the profession.

Conclusion

There has been a concerted effort on the part of industry to drive clinical practice into the realms of carpentry, ever-higher insertion torques being recommended for implant primary stability, especially under the conditions of immediate loading. Sadly, this recommendation has been misplaced and is an abuse of our greater understanding of the literature and indeed common sense. The biology of bone, a viscoelastic material, is well known, and this tissue is vulnerable to high levels of strain, plastic deformation to the point of fracture and mass waves of resorption when subjected to high insertion torques. While this does not necessarily result in implant failure, it does result in a delayed healing response and an inferior quality of osseointegration.

Insertion torque is a once-off measure that has no ability to give the clinician any insight into the biological process of healing towards secondary stability. In contrast, RFA can map the changes from primary to secondary stability, providing insight into the changes in stiffness which indicate the healing and maturation of the bone at the implant interface, and give insight into the onset of secondary biological stability. By using this map of stability, it is possible to customise the treatment for each implant in a patient, making informed decisions about whether to delay loading, to progressively load or to place the definitive restoration. I believe that an insertion torque of 20–25 Ncm and an ISQ value of ≥ 65 in any one direction represent the optimal markers for immediate loading and that an increase in ISQ value to > 70 thereafter provides a sound basis for finalisation of the case.

References

about the author

Dr Michael R. Norton is a specialist in oral surgery and a fellow of the Royal College of Surgeons of Edinburgh. He is an adjunct professor in the Department of Periodontics at the University of Pennsylvania School of Dental Medicine in the US. Dr Norton is a past president of the Academy of Osseointegration and of the Association of Dental Implantology. He is an associate editor of the *International Journal of Oral and Maxillofacial Implants*.

contact

Dr Michael R. Norton
BDS FDS RCS(Ed)
Specialist in Oral Surgery
manager@nortonimplants.com
www.nortonimplants.com

Dr Michael R. Norton

"Transition to ceramic materials in implant dentistry is inevitable"

An interview with Dr Alessandro Alan Porporati

Dr Alessandro Alan Porporati is a distinguished expert in zirconia-based materials and has extensive expertise in hip arthroplasty. Based on more than 20 years of research experience, Dr Porporati specialises in the development and clinical application of advanced high-performance ceramics for orthopaedic and dental implants. He is the director of medical and scientific affairs at the Medical Products Division of the CeramTec Group in Plochingen in Germany. At the German Society for Environmental Dentistry's 2025 annual meeting in Leipzig in May, he gave a lecture titled "Materials for dental implants: Hip arthroplasty teaches us that it is matter of time". He discusses this topic in the following interview.

In your lecture at the German Society for Environmental Dentistry's annual meeting, you pointed out that the transition to ceramic materials in implant dentistry is inevitable given the trend towards the use of ceramics in hip arthroplasty over the last two decades. Could you elaborate?

Indeed, I believe that the transition to ceramics is just a matter of time—mainly because we've already seen this shift in hip arthroplasty. At the beginning of total hip arthroplasty surgery in the early 2000s, cobalt–chromium and stainless steel were the materials of choice for implants, but in the last two decades, there has been a clear and steady move towards ceramic materials. This shift to ceramics is clearly reflected in the registry data. In Germany, according to the German Arthroplasty Registry, over 90% of femoral heads used in primary total hip replacements in 2023 were ceramic, making ceramic by far the dominant material.[1] In the UK, the National Joint Registry reported that about 59% of femoral heads in 2023 were ceramic, making them the clear majority choice.[2] In the US, recent registry data shows that more than 80% of femoral heads in primary hip replacements are now ceramic, a significant and consistent preference.[3]

Not only is the registry data convincing, but long-term clinical and scientific evidence also shows that orthopaedic surgeons are increasingly choosing ceramic components because they are more wear-resistant and biocompatible and because they reduce metal-related complications such as adverse local tissue reactions. Moreover, over the last decade, a growing body of evidence has shown that ceramic bearings reduce the risk of revision due to infection. These same advantages can also be applied to dental implants. In implant dentistry, we're following the path that orthopaedic surgery has already forged. The materials have matured, the clinical results are convincing, and as more data comes in, confidence in ceramics is growing. So, yes, as in hip arthroplasty, I think it's only a matter of time before ceramics share the dental implant market with titanium.

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What are the key requirements for materials used for dental implants compared with those used in hip replacements?

That's an important question, because while hip and dental implants might seem very different, the materials used share a lot of performance requirements, albeit with different emphases, and differ in some key areas. Both applications demand materials with excellent biocompatibility, fracture strength and toughness, and chemical stability. These are essential properties for long-term performance under load and in contact with living tissue. In implant dentistry, however, the challenges go even further. The oral cavity is a much more hostile environment: it's constantly exposed to saliva, fluctuating pH levels and temperature changes, and it's subject to bacterial colonisation. Corrosion resistance is therefore the most important prerequisite for success of a dental material, whereas for hip implants wear resistance of the material is the most important property for articulating surfaces. Another consideration is aesthetics. This is a requirement where zirconia outperforms titanium. For dental implants, the material colour and translucency really matter, especially in

“The materials have matured, the clinical results are convincing, and as more data comes in, confidence in ceramics is growing.”

visible areas such as the anterior teeth. That’s not something we need think about with hip implants. In contrast to hip implants, dental implants are in direct contact with the bone and therefore require integration.

In summary, while both applications rely on high-performance materials, dental implants place even greater demands on corrosion resistance, immunological profile and appearance. For these reasons, advanced ceramics such as monolithic zirconia and alumina-toughened zirconia (ATZ) are becoming increasingly important in this field.

In your presentation, you said that ceramics in implant dentistry are now considered mature. What exactly do you mean by that?
What I meant is that ceramics have gone through the full innovation cycle. If you look at the evolution of ceramic materials in implant dentistry—especially zirconia and its composites such as ATZ—they’ve moved beyond the early hype and uncertainty. In the beginning, there were very high expectations but also scepticism owing to issues with earlier materials that hadn’t performed well enough in dental applications. This was followed by a period of disillusionment, during which adoption slowed as limitations became clearer. But, over time, with better manufacturing processes and clinical validation, we’ve reached what we might call a “plateau of productivity”. Today, dental implants made of high-performance ceramics are no longer experimental; they’re supported, for instance, by ten-year clinical evidence showing over 95% survival rates. We now

know how to work with these materials, and they meet both functional and biological requirements. In short, ceramics in implant dentistry are a reliable and mature option for clinical use. However, one should always bear in mind that the production of advanced ceramics requires a high level of expertise, and this means that zirconia composites that appear identical can exhibit completely different performance characteristics.

Are there other factors that have been significant in the evolution of dental implant systems and contributed to wider usage of ceramic implants?
Several key milestones have shaped the evolution of dental implants. In 1962, Prof. Sami Sandhaus introduced the CBS system—an alumina-based ceramic implant produced by Rosenthal Technik AG, linked to CeramTec. In 1965, Prof. Per-Ingvar Brånemark placed the first titanium implant, establishing osseointegration as a clinical standard. By 1972, Japanese oral surgeons began using synthetic sapphire, and by 1977, Brånemark's titanium implants had shown proven clinical success. In 1985, Prof. Sandhaus introduced the zirconia-based SIGMA implant. Research in the early 1990s by Miani and Akagawa confirmed zirconia's osseointegration potential, reinforcing its viability as a metal alternative.[4] Over time, implant materials have gradually shifted toward more biocompatible and aesthetic ceramics, alongside continuous improvements in design and manufacturing.

> "Zirconia and ATZ are now … clinically proven, safe and ready for broader adoption. … Ceramics are successful when the technology and clinical understanding catch up."

Given the growing interest in ceramic implant materials, particularly zirconia composites, how do they compare with titanium in terms of biological performance?
Titanium is a widely accepted material in implant dentistry. However, zirconia composites such as ATZ and zirconia are slowly proving to perform equally or better in all three areas: cytocompatibility, bone regeneration and bacterial resistance. Preliminary scientific data shows that zirconia and ATZ surfaces support osteoblast adhesion and metabolic activity just as well as Grade IV titanium does. That means that bone-forming cells interact with and adhere to zirconia and ATZ surfaces, an indication of their cytocompatibility and a key factor in successful osseointegration. Furthermore, zirconia and ATZ show lower cytotoxicity in comparison with Grade IV titanium, providing a safe and stable environment for surrounding tissue. Another crucial factor is their osteogenic potential. Preliminary data from an ongoing study shows significantly increased expression of key osteogenic differentiation markers—alkaline phosphatase, COL1A1 and osteocalcin—on zirconia and ATZ surfaces compared with titanium, confirming the osteogenic potential of zirconia and ATZ. Finally, perhaps most importantly in clinical practice, zirconia and ATZ have a strong bacteriostatic effect. Ongoing *in vitro* studies show reduced bacterial activity and viability of periodontal pathogens such as *Porphyromonas gingivalis* and *Aggregatibacter actinomycetemcomitans* on ATZ and zirconia surfaces. These are two of the main periodontal bacterial species involved in peri-implantitis, which can lead to implant failure. Titanium, however, shows higher levels of bacterial colonisation. When you put it all together—better cell compatibility, higher osteogenic differentiation and better bacterial resistance—zirconia and ATZ aren't just alternatives to titanium. In many ways, they offer a clinically more advanced solution for modern implant dentistry.

You stated that hip arthroplasty teaches us that transition to ceramic implants is a matter of time. How does that relate to the future of ceramics in implant dentistry?
That statement reflects the pattern we've seen in both fields. In hip arthroplasty, alumina ceramics were the first to gain acceptance. Over time, alumina-based composites such as zirconia-toughened alumina matured and became standard because of their superior performance. It didn't happen overnight; it took decades of development, data collection and clinical refinement. Now, if we look at implant dentistry, it's almost a mirror image, just offset in time. Zirconia and ATZ are now where zirconia-toughened alumina was in orthopaedics about 15–20 years ago, clinically proven, safe and ready for broader adoption. It's the material evolution repeating itself in a different field. Ceramics are successful when the technology and clinical understanding catch up. However, it should be emphasised that the real-world data provided by arthroplasty registries has contributed significantly to improving medical decision-making and to demonstrating the superior long-term performance of ceramic bearings compared with metal bearings. In implant dentistry, that time is now.

So exciting. Thank you very much for this conversation, Dr Porporati.

References

“Zero Peri-Implantitis” Session at the EAO Congress in Monaco

What if peri-implantitis could be predictably prevented? What if you could preserve the original aesthetics of your implant restorations for the long term—because the peri-implant soft tissue remains stable, healthy, and recession-free?

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Soft-tissue bond for Zero Peri-Implantitis

Zero Peri-Implantitis, a prevention-oriented approach in implant dentistry, has been proven in two long-term studies to prevent peri-implantitis, stabilise soft-tissue, and achieve long-term aesthetics—thanks to targeted design principles and comprehensive biological integration.

At the heart of the concept is the world’s first scientifically proven bond between peri-implant soft tissue and a transmucosal implant surface. Specific to Patent™ Dental Implants, this soft-tissue bond forms a dynamic protective barrier that prevents plaque and bacteria from penetrating into the peri-implant tissue. As a result, tissue inflammation can be minimised, and the progression from peri-implant mucositis to peri-implantitis can be prevented.

Fig. 1: Prof. Anton Sculean at a recent “Zero Peri-Implantitis” session, held at EuroPerio11 in Vienna: “We have data showing how difficult it is to treat peri-implantitis. That’s why our focus must be on prevention rather than treatment!”

Session in Monaco

In the free Patent™ session “Zero Peri-Implantitis” in Monaco, leading experts will present the latest study results on the soft-tissue bond of Patent™ Implants. Discover the groundbreaking significance this novel cell bond holds for the prevention of peri-implant diseases in clinical practice.

Session registration is done via the official congress registration website. Although congress registration fees apply, attendance at the Patent™ session “Zero Peri-Implantitis” is free of charge.

Fig. 2: Dr Roland Glauser emphasised at the same session: “The soft-tissue bond around the Patent™ Implant is really one-of-a-kind—the missing element in the prevention of peri-implant diseases!”

Session:	Zero Peri-Implantitis (Patent™)
Speakers:	Prof. Anton Sculean, Dr Roland Glauser, Dr Pascal Karsenti
Date:	Thursday, 18 September 2025
Location:	Patio 7 (Grimaldi Forum Monaco, EAO-SFPIO Joint Meeting)

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Writing history together in implant dentistry

GCCG Boston

“**Why are we here?** To help more patients worldwide receive better, more predictable dental care—together, inclusively, and across all barriers. And because we love dentistry!” With these words, Prof. Ronald E. Jung, steering committee member and co-initiator, set the tone as the first Global Consensus for Clinical Guidelines (GCCG) took place in Boston.

Fig. 1: A new global implantology family.

From 16 to 18 June 2025, nearly 120 participants from 27 countries gathered for a landmark moment in implant dentistry.

The goal of the GCCG is to move beyond regional statements and build clear, practical, globally relevant clinical guidelines—starting with one of the field’s greatest challenges: the edentulous maxilla. Unlike traditional consensus conferences, the GCCG combines systematic reviews and Delphi survey results, asking patients and clinicians what outcomes matter most, to create scientifically robust guidelines tailored for real-world clinical practice.

Bridging science with real-world experience

Dr Frank Schwarz, scientific leader and co-initiator, emphasised the importance of connecting science with real-world clinical practice: “We started to ask clinicians about their real-life experience, which may not always align with scientific evidence but reflect established clinical practice—and from there, we evaluated these procedures based on the current evidence and developed recommendations that can be applied in any setting,” he said.

“It is a dream come true,” said Hom-Lay Wang, also scientific leader and co-initiator. “Over the past three days, we truly made history. This has been a long-standing dream of mine, and thanks to our team’s remarkable support and unwavering dedication, we turned it into reality. The insights and recommendations produced here will undoubtedly have a lasting impact on the field of implant dentistry.”

Fig. 2: Nearly 120 participants from 27 countries gathered together in Boston.

Fig. 3: Dr Frank Schwarz, Germany, scientific leader and co-initiator. – **Fig. 4:** Prof. Ronald E. Jung, Switzerland, steering committee member and co-initiator. – **Fig. 5:** An important event to remember.

Approaching the edentulous maxilla

During long working days, sometimes exceeding 12 hours, four working groups tackled key questions in the treatment of the edentulous maxilla: how many implants to use; when to place and load them; when to choose short, standard, or zygomatic implants; how to approach sinus grafting and ridge augmentation; and when to opt for fixed or removable prostheses. These groups were chaired by Gil Alcoforado & Nikos Donos, German Gallucci & Jörg Neugebauer, Christer Dahlin & Joseph Fiorellini and Charlotte Stilwell & Ronald Jung.

Among the backbone of the meeting were the Delphi survey experts Giulia Brunello and Franz Strauss, who introduced the participants to the modified Delphi survey procedure applied in the core outcome set development. Together with Guo-Hao (Alex) Lin and Todd Schoenbaum, they worked tirelessly in advance of the meeting to gather and analyse the data from clinicians, patients and cross-disciplinary experts to inform the structured consensus process, and on-site they all provided invaluable support to the working groups.

A unique approach to clinical guideline development

The recommendations were developed by four working groups, informed by the results of the Delphi survey and aligned with the scientific evidence. A structured nominal group technique was applied to draft the recommendations. These were then presented to all consensus conference participants, discussed in plenary, and amended by the working groups based on the feedback received. On the third and final day of the consensus conference, all recommendations were formally voted on by the plenary, and the outcomes were documented after each vote. Consensus was defined as agreement by at least 75 per cent of the voting participants.

Ina B. Kopp, Director of the Association of the Scientific Medical Societies' Institute for Medical Knowledge-Management (AWMF-IMWi), served as methodological adviser, consensus conference moderator and facilitator. She said, "It was a great honour and pleasure to be invited and to have the opportunity to work with this group of experts from around the globe. I am deeply impressed

Fig. 6: Four working groups addressed key questions in treating the edentulous maxilla. – **Fig. 7:** Plenary voting session during guideline consensus approval.

Fig. 8: Working group discussion.

by their remarkable commitment to sharing expertise globally, helping to avoid duplication of efforts and potential contradictions in recommendations for better patient care."

After the final votes were cast, applause and standing ovations marked a truly memorable moment. One participant captured the feeling: "It was an experience that I keep reliving in my mind. I left inspired with a new global family, a new panoramic perspective, and a voice I never thought I'd find."

Fig. 9: The GCCG committee. – **Fig. 10:** Dr Charlotte Stilwell, UK, president of the ITI, surrounded by participants.

From Boston to daily practice

The GCCG will now move from Boston into every-day clinical practice. Frank Schwarz said: "We want to give something back to the community, and what I personally want to see is that we collectively use these guidelines for the sake of the patient."

Unlike traditional consensus meetings, the GCCG was designed for true global reach from day one, explained Ronald Jung. The Boston meeting showed what is possible when experts from around the world work together. It was jointly organised by the European Association for Osseointegration (EAO), the International Team for Implantology (ITI), and the Osteology Foundation, which provided structure and funding. Partner organisations—the Chinese Stomatological Association (CSA), Japanese Society of Oral Implantology (JSOI), Korean Academy of Oral and Maxillofacial Implantology (KAOMI), Oral Reconstruction Foundation (ORF), Osseointegration Society of India (OSI), and the Brazilian Society of Periodontology (SOBRAPI)—ensured local insights were included from the start and will help expand the reach of the GCCG's outcomes through national and regional networks. Publishing partners Quintessence and Wiley will support the publication and global dissemination of the results.

The final guidelines for the treatment of the edentulous maxilla will be published later this year in Clinical Oral Implants Research (COIR), along with the systematic reviews and survey results.

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(Chu et al., IJPRD 2021)

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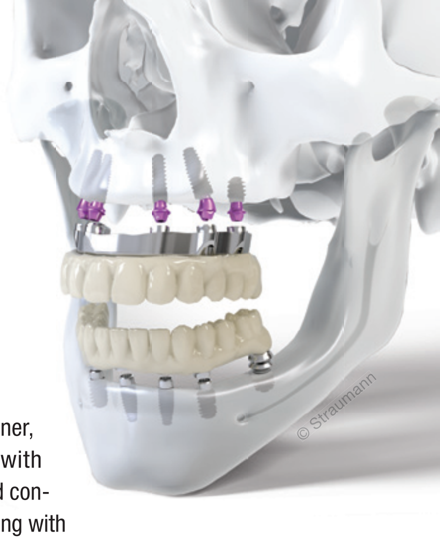

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Full-arch restorations are among the most demanding treatments in implantology—often involving extensive surgical procedures and logistical complexity. Straumann iEXCEL focuses on minimally invasive, cost-effective options thanks to short, angled and narrow implants. Proven technologies such as the SLActive hydrophilic surface and the Roxolid alloy enable reliable restorations even in compromised situations, such as poor bone quality and immediate implant placement or immediate loading scenarios—for which accelerated healing is critical to success. Supported by the Straumann Pro Arch concept, Straumann iEXCEL significantly simplifies full-arch rehabilitation.

How Straumann iEXCEL will help you work more economically—without compromising on quality

Choosing Straumann iEXCEL is not just a clinical decision; it is a sound economic one. By streamlining workflows, enhancing precision and reducing clinical complexity, Straumann iEXCEL helps practices operate more efficiently, saving valuable chair time and minimising costly complications. By supporting accelerated healing and improved outcomes, it reduces follow-ups and enhances patient satisfaction. This, in turn, boosts practice capacity and builds long-term trust and reputation backed by Straumann’s proven reliability and clinical validation, Straumann iEXCEL offers long-term value that goes well beyond the surgical suite. In today’s cost-conscious environment, it is a smart choice for clinicians aiming to deliver excellence while optimising practice performance.

Straumann
info@straumann.com
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* The articles in this category are provided by the manufacturers or distributors and do not reflect the opinion of the editorial team.

Ziacom

Enhanced conical connection design for surgical control, bone preservation and stability

The ZM10 implant system by Ziacom is a high-performance conical connection implant designed to meet clinical demands for surgical precision, mechanical strength, and biological compatibility. It integrates a prosthetic-level conical connection with a unique macro and micromorphological body, enabling optimal primary stability, reduced crestal stress, and predictable long-term outcomes.


© Ziacom medical

At the material level, the ZM10 is manufactured from Zitium, a proprietary extra high-strength Grade 4 titanium. This formulation significantly enhances the implant's yield strength and fatigue resistance, ensuring structural integrity under high functional loads, and increasing safety during immediate loading protocols or in compromised bone scenarios.

The implant body features a tapered macromorphology with a reverse conical design at the crestal region. This reverse taper reduces pressure on the cortical bone during insertion, minimising marginal bone resorption and preserving the crestal ridge. Additionally, the cervical region incorporates micro-rings that facilitate the guidance of new bone tissue, enhancing biological integration and improving the long-term anchorage of the implant.

The threading design is one of the most distinctive elements of the ZM10. It features a double-threaded, low-angle active thread with variable geometry. Coronally, the threads begin as wide trapezoidal profiles that maximise initial bone engagement. As the threads progress apically, they become narrower and V-shaped, enabling smoother insertion and better torque control. This configuration increases the bone-to-implant contact (BIC), which enhances primary stability and promotes efficient osseointegration, even in low-density bone or post-extraction sockets.

© Ziacom medical

At the apical end, the implant includes an active, self-tapping, and atraumatic apex. This design element provides controlled advancement during insertion, particularly in soft bone, and helps prevent lateral or apical displacement. It contributes significantly to achieving primary stability, which is essential for both immediate and delayed loading protocols.

The internal conical connection, set at 11 degrees with a dual internal hex, provides a strong and stable implant–abutment interface. This minimises micromovements and bacterial microleakage at the connection, reducing the risk of peri-implantitis. Importantly, all implant diameters share a single prosthetic platform, simplifying component selection, reducing inventory, and streamlining prosthetic workflows—especially advantageous in busy clinical environments.

Clinically, the ZM10's combination of features—reverse conical neck, optimised thread design, atraumatic apex, and robust internal connection—offers numerous advantages. These include reduced marginal bone loss, enhanced mechanical stability, simplified restorative procedures, and long-term biological sealing. Together, these elements contribute to the reliability, efficiency, and predictability of implant treatments across a wide range of clinical scenarios.

In summary, the ZM10 implant system delivers high-level performance in implant dentistry, supporting optimal outcomes through a design focused on surgical control, biomechanical integrity, and long-term tissue preservation.

Ziacom medical
+34 91 7233306 · info@ziacom.com
www.ziacom.com

Presidential handover at the Osteology Foundation

A conversation with Christer Dahlin and Frank Schwarz

© Osteology Foundation

A new chapter begins for the Osteology Foundation: Frank Schwarz succeeds Christer Dahlin as president.

Following the Osteology Foundation board meeting on 30 June 2025 in Zurich, Switzerland, a new chapter of leadership began. Christer Dahlin (Sweden) concluded his term as president, handing over the role to Frank Schwarz (Germany). In this joint interview, the two share their perspectives on the Foundation's strategic direction, the evolving landscape of oral regeneration, and their shared vision for the future.

Christer, looking back at your term as president, what did you see as the Foundation's most important strategic priority?
Christer Dahlin: A key priority was ensuring that the Osteology Foundation continues to be perceived as a leading authority in oral tissue regeneration. To achieve that we need strong representation from across the field and a clear connection to emerging trends. One such trend is the increasing gender balance in dentistry. This shift brings new perspectives and helps us ensure that our programmes resonate with the evolving professional landscape. Especially for the younger generation, our initiatives must reflect their values and professional needs.

Frank, you're now taking over the presidency. What are your thoughts on continuing this direction?
Frank Schwarz: Christer has laid a strong foundation, and now it's about moving that vision forward. One of the challenges we face is maintaining our relevance in a fast-evolving world, while also staying true to our mission of bridging science and clinical practice. In the future, the Foundation should continue building strong partnerships with key organisations in dentistry, such as the AAP, EFP, and through initiatives like the Global Consensus for Clinical Guidelines (GCCG). Working together allows us to share knowledge, coordinate our efforts, and increase our impact without duplicating work.

What does staying relevant mean for the Foundation's programmes and focus areas?
CD: It means being responsive to both scientific progress and societal changes. We've reworked many of our programmes to specifically address the needs of the next generation, whether researchers or clinicians. Their success is essential to the continued advancement of the field.

FS: Yes, and it also means embracing emerging topics like artificial intelligence in dentistry. AI is already starting to reshape clinical workflows and research approaches. To stay relevant, we must reflect these changes in our educational offerings and strategic outlook. Importantly, we must also acknowledge that oral tissue regeneration is no longer an isolated discipline. It has grown into an area that contributes meaningfully to both oral and general health, making our work even more impactful and far-reaching.

Frank, how would you describe your new role as president within the Foundation?
FS: The position of president at the Osteology Foundation is entirely voluntary, and I receive no financial compensation. This is something I find important to underline, as it reflects the non-profit, altruistic approach that defines the Foundation. Our executive board operates on a very collaborative level. My role as president is not to impose decisions but to moderate discussions, bring different perspectives together, and help the committees reach a balanced and well-supported outcome. It's truly a shared effort built on mutual respect and a common goal to advance the field.

How does the Foundation safeguard its independence in research and education?
FS: We are very conscious of our role as an independent foundation, separate from any commercial interest, including from our founding partner. In our educational activities, we do not allow any form of product placement. Our research funding and clinical training programmes are designed to support science, not sales. It's a principle we've held from the beginning, and it's earned us longstanding recognition from leading international societies. We're proud to offer some of the few truly independent programmes that support young professionals in research and academic development, something rare in our field.

In a few words, what's your shared vision for the Foundation?
CD: To be a forward-thinking, inclusive platform at the heart of oral tissue regeneration.

FS: And to ensure that scientific excellence, clinical relevance, and collaboration drive the field forward together.

contact

Osteology Foundation
+41 41 3684444
info@osteology.org
www.osteology.org

Graduate ceremony at the Danube Private University.

© DPU

Pathway to dental excellence: DPU's internationally recognised Master of Science

Danube Private University

In times of rapid, dynamic development in medicine, technology and artificial intelligence, lifelong learning will prove essential to your long-term success in dental practice.

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Left: Prof. Dieter Müßig, rector of the Danube Private University and director of the Center for Orthodontics. Right: Prof. Ralf Gutwald, dean of the Danube Private University and coordinator of Scientific Continuing Education and Postgraduate Studies at the university.

The Danube Private University (DPU) is an elite university for the study of dentistry. It has long-standing expertise in postgraduate education and offers a Master of Science (Continuing Education) programme with specialisations in dentistry. Some 1,100 dentists are currently enrolled in one of DPU's postgraduate university courses, and well-known professors are guiding them towards even greater success in dental practice through cutting-edge instruction.

DPU's part-time university courses, including those in orthodontics and oral surgery and implantology, comprise six semesters and have a workload of 120 ECTS credits. They are offered in German and English to students from 66 countries.

"After fulfilling the ECTS criteria (successful participation in the online and face-to-face modules listed in the curriculum, documentation of ten to 12 patient cases, and completion of a master's thesis, and oral and written examinations), graduates of our university programme in dentistry are awarded the academic degree and title of Master of Science (Continuing Education)—MSc (CE) for short—in their chosen field of dentistry," said Prof. Ralf Gutwald, dean of DPU and coordinator of Scientific Continuing Education and Postgraduate Studies at the university.

"A master's degree programme offers dentists with at least two years of professional experience excellent professional training," said Prof. Dieter Müßig, rector of DPU and academic director of the university's course in orthodontics. "It is organised in such a way that it can be completed part-time alongside a successful career. Course participants can apply their newly acquired knowledge in practice between university sessions. Students here are part of a group of engaged peers who are committed to continuing their education, and collaborations and friendships grow from that experience."

Main lecture hall at the Danube Private University.

Starting in 2025: English-language postgraduate course in oral surgery and implantology

Implantology and oral surgery are key areas of dentistry, as well as oral and maxillofacial medicine, and an understanding of each field complements the other. Implantology is one of the most noteworthy growth areas: no other field has evolved so much over recent years in terms of diagnostics, treatment and scientific research. This part-time course meets the increasingly demanding requirements of modern dentistry, allowing dentists to equip themselves with the skills they need for the future and to be confident in their ability to meet the expectations of patients.

Anyone who has encountered implantology and oral surgery will be keen to expand their knowledge and manual skills. It is important not to push oneself to one's limits straight away but to rather undergo a process of well-founded scientific learning.

In this course, education on proven concepts and alternatives, combined with training in manual skills, is aimed at enabling participants to meet the demands of successful implantation and surgery—even in difficult cases—and to intervene with confidence in the event of complications.

At Danube Private University, you can increase your professional success through lifelong learning and cultivate a sustainable approach to dental practice.

More information can be found at www.dp-uni.ac.at.

Danube Private University.

Congresses, courses and symposia

EAO-SFPIO Joint Meeting

18–20 September 2025
Monaco
www.congress.eao.org

3. European Congress for Ceramic Implant Dentistry

25–27 September 2025
Zurich, Switzerland
www.esci-online.com

International Blood Concentrate Day

25–26 September 2025
Frankfurt am Main, Germany
www.bc-day.info

54th International Annual Congress of DGZI

3–4 October 2025
Hamburg, Germany
www.dgzi-jahreskongress.de

DDS Global Congress 2025

16–18 October 2025
Venice, Italy
www.digital-dentistry.org

implants

international magazine of oral implantology

Imprint

Publisher
Torsten R. Oemus
oemus@oemus-media.de

Board
Ingolf Döbbecke
doebbecke@oemus-media.de

Lutz V. Hiller
hiller@oemus-media.de

Torsten R. Oemus
oemus@oemus-media.de

Chief Editorial Manager
Dr Torsten Hartmann (V. i. S. d. P.)
hartmann@dentalnet.de

Editorial Council
Dr Rolf Vollmer
info.vollmer@t-online.de

Dr Georg Bach
doc.bach@t-online.de

Dr Suheil Boutros
SMBoutros@aol.com

Editorial Management
Dr Alina Ion
a.ion@oemus-media.de

Executive Producer
Gernot Meyer
meyer@oemus-media.de

Product Manager
Timo Krause
t.krause@oemus-media.de

Art Director
Alexander Jahn
a.jahn@oemus-media.de

Designer
Aniko Holzer
a.holzer@oemus-media.de

Customer Service
Lysann Reichardt
l.reichardt@oemus-media.de

Published by
OEMUS MEDIA AG
Holbeinstraße 29
04229 Leipzig, Germany
Phone: +49 341 48474-0
Fax: +49 341 48474-290
kontakt@oemus-media.de

Printed by
Silber Druck GmbH & Co. KG
Otto-Hahn-Straße 25
34253 Lohfelden, Germany

implants—**international magazine of** oral implantology is published in cooperation with the German Association of Dental Implantology (DGZI).

DGZI
DGZI Central Office
Paulusstraße 1
40237 Düsseldorf, Germany
Phone: +49 211 16970-77
Fax: +49 211 16970-66
office@dgzi-info.de

www.dgzi.de
www.oemus.com
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4 weeks
Conventional Surface
6~8 weeks
Conventional (sandblasted & acid-etched) surface vs. SOI surface