issn 1868-3207 • Vol. 25 • Issue 4/2024

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international magazine of oral implantology

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1 Ratka C. et al. JCM. 2019;8(9):1397. **2** Bosshardt DD. et al. Clin Oral Invest. 2022;26(4):3735–3746. **3** Zipprich H. et al. Clin Oral Invest. 2022;26(6):4549–4558. **4** Schlee. et al. JCM. 2019;8(11):1909. **5** Schlee M. et al. JCM. 2021;10(16):3475. **6** Data on file, GalvoSurge AG.

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Dr Georg Bach

President of the DGZI

Insights and innovations in oral implantology

Dear colleagues!

In this last issue in 2024, we delve into groundbreaking research and innovative practices that are pushing the boundaries of dental implantology. The spotlight on critical topics such as the impact of periodontitis on systemic health, implant stability with torque factor adjustments, and full-arch rehabilitation in edentulous patients illustrates the magazine's commitment to connecting emerging science with clinical applicability.

One of the key discussions in this issue is the comparative analysis of immediate versus delayed loading protocols in the fully edentulous mandible. Research by Drs Harichane, Chiri, and Droz Bartholet offers insight into the delicate balance between patient satisfaction, tissue health, and implant longevity, proposing a cautious approach to immediate loading to mitigate failure risks while recognising the value in specific clinical scenarios.

Readers will find detailed case studies illustrating full-arch rehabilitations and immediate provisional restorations, emphasising clinical techniques that enhance both aesthetic outcomes and patient satisfaction. The case studies by Drs Lopes, Santos, and Guedes underscore the utility of zygomatic implants in addressing severe bone atrophy, pushing the All-on-4 protocol further with an eye on patient comfort and predictability.

In this issue's industry section, we explore how digital workflows and interdisciplinary collaborations are revolutionising implant procedures, from diagnosis through to final restoration. Advances such as dynamic navigation systems and real-time photogrammetry are accelerating the accuracy and efficiency of implant placements, transforming patient outcomes.

Each article in this issue reflects our shared commitment to pushing the boundaries of what's possible in implantology. Together, through continued learning and innovation, we can shape a future where treatments are ever more precise, resilient, and life-changing for our patients. May these insights inspire you to explore new horizons in your practice and to contribute to the collective advancement of our field.

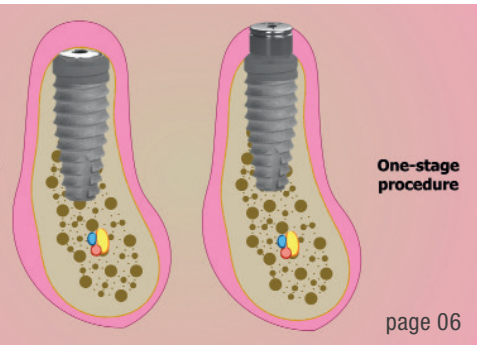
Enjoy reading the magazine!

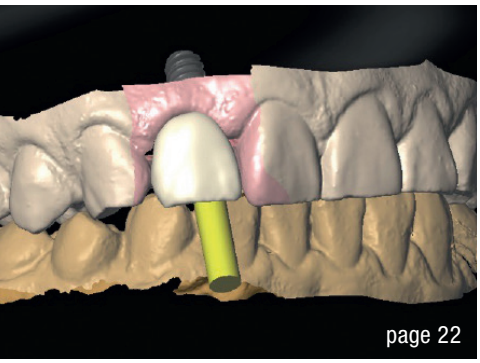
Sincerely,

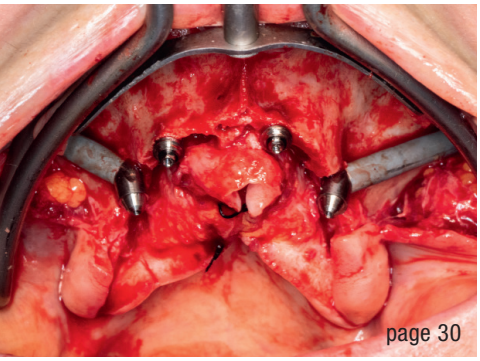
Dr Georg Bach

President of the German Association of Dental Implantology

Dr Georg Bach







Cover image courtesy of ClaroNav Inc.
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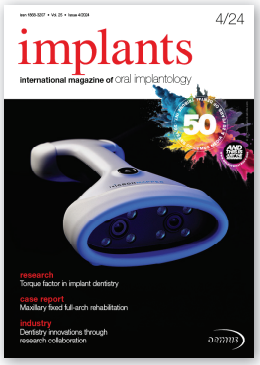
showing the MicronMapper (see also page 46)



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[1] Semper-Hogg, W, Kraft, S, Stiller, S et al. Analytical and experimental position stability of the abutment in different dental implant systems with a conical implant–abutment connection Clin Oral Invest (2013) 17: 1017.
[2] Semper Hogg W, Zulauf K, Mehrhof J, Nelson K. The influence of torque tightening on the position stability of the abutment in conical implant-abutment connections. Int J Prosthodont 2015;28:538-41.

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Immediate or delayed loading in the completely edentulous mandible

Drs Yassine Harichane, Canada, Rami Chiri & Benjamin Droz Bartholet, France

Rehabilitation of complete mandibular edentulism is considered a clinical challenge in dentistry. Conventional removable complete dentures have limitations that compromise the patient's quality of life. The McGill consensus recommended the mandibular two-implant overdenture as the standard of care, and it helps improve retention and masticatory efficiency.

To achieve osseointegration, Brånemark et al. suggested that implant loading should be done after at least three months for the mandible and six months for the maxilla. With scientific research, the healing time has been reduced. In 2008, the International Team for Implantology consensus meeting set out the following definitions of the loading protocols (Fig. 1):

- immediate loading: during the first week after implant placement.
- early loading: between one week and two months after implant placement.
- conventional or delayed loading: more than two months after implant placement.

Studies have shown that immediate loading is comparable to delayed loading for fixed prostheses. However, no consensus exists on the timing of implant loading for mandibular implant-supported overdentures. Our study sought to answer the question of whether immediate loading provides better clinical results compared with delayed loading for mandibular implant-supported overdentures.

Implant survival

One year of observation is necessary to evaluate the effect of immediate loading on osseointegration. From analysis of recent scientific literature, it appears that implants loaded immediately have a higher failure rate than those with delayed loading. However, the difference is not statistically significant. Nonetheless, the authors recommend delayed loading rather than immediate loading.

Implant placement can follow the one- or two-stage surgical protocol (Fig. 2). However, there is no significant difference in terms of early implant loss between the different surgical stages. The placement of implants according to the one-stage protocol therefore does not seem to affect either implant or crestal bone loss.

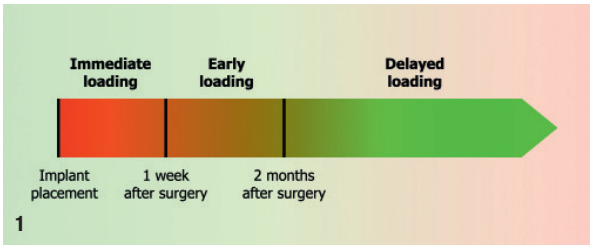

Fig. 1: Implant loading timeline.

A relevant parameter during immediate loading is the measurement of insertion torque or implant stability quotient (ISQ). Generally, during multiple restorations, a minimum torque of 20 Ncm is required, but this is not a guarantee of implant survival. Studies that measured ISQ have reported a significantly greater difference for delayed loading at three months; however, beyond three months, no difference was found between immediate and delayed loading.

Peri-implant soft and hard tissue

The evaluation of soft-tissue indices (plaque index, probing depth, bleeding on probing, etc.; Fig. 3) indicates similar values between immediate and delayed loading at one year. Crestal bone loss of less than 1.5 mm has been cited as a criterion for implant survival. It should be noted that an average of 1 mm of marginal bone loss normally occurs during the first year and is followed by a loss of 0.2 mm each year. The meta-analyses included did not find any statistical difference between the two loading protocols.

Type of attachment

Analysis showed that different types of attachments did not result in a statistically significant difference between immediate loading and delayed loading. Furthermore, no difference was found between splinted and non-splinted implants (Fig. 4). However, probing depth appeared to be lower with a ball attachment and delayed loading rather

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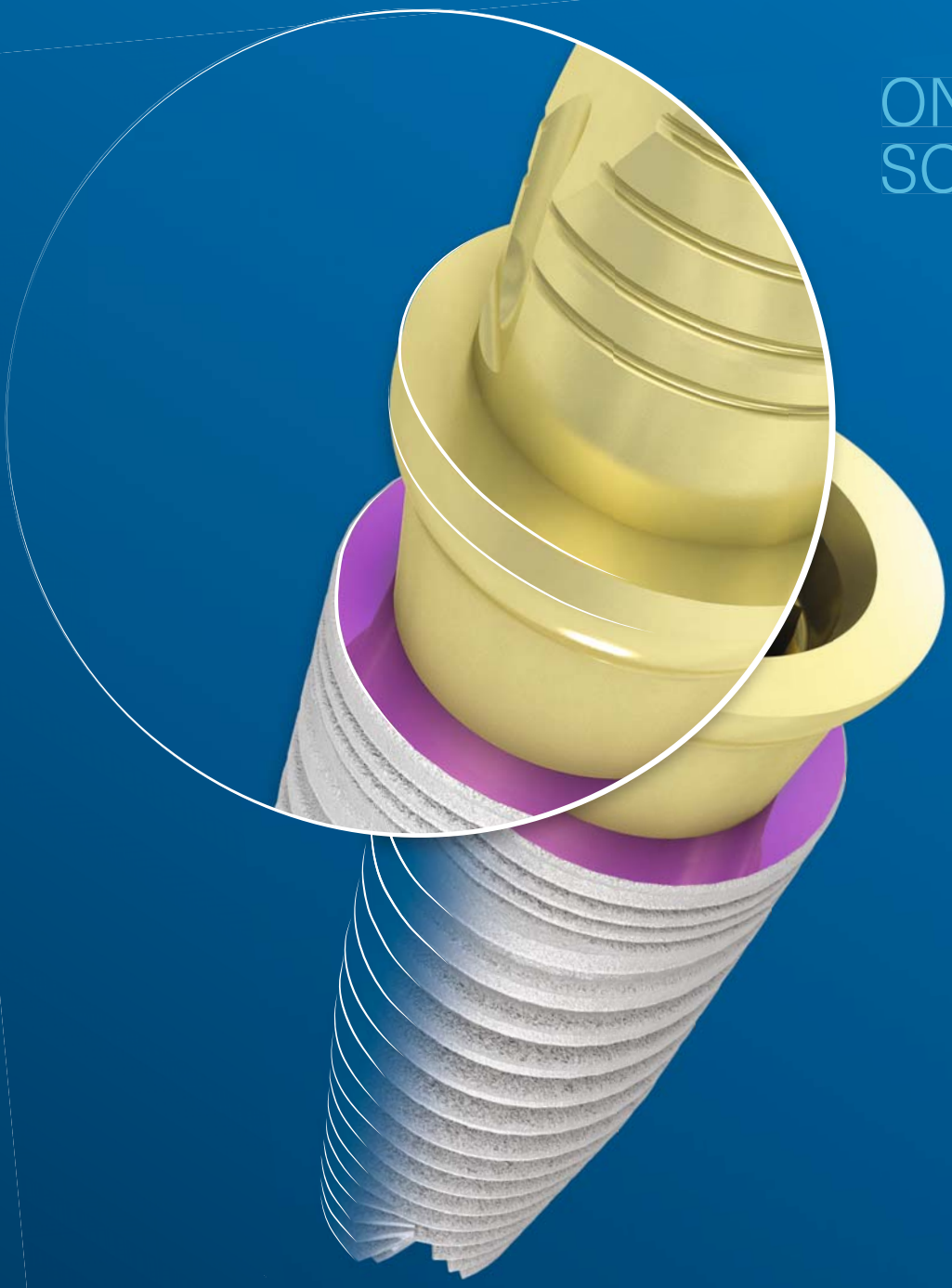

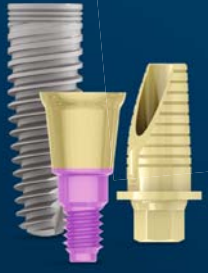

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than with a bar and immediate loading. This can be explained by the easier cleaning of the ball, whereas the bar, being less easily cleaned, can lead to gingival hyperplasia. A single meta-analysis has shown that delayed loading is preferable with ball or LOCATOR attachments (Zest).

Number of implants

Most of the studies we included compared two implants versus four and found no significant differences. During the initial years of mandibular implant overdenture treatment, four interforaminal implants were used with a secured bar. Over the years, the use of two implants with axial or bar-connected attachments has proved to be as effective as the four-implant bar option. The results of the meta-analyses included indicate that there is no difference in implant failure or marginal bone loss with immediate or delayed loading when two unsplinted or four splinted implants are used (Fig. 5). Concerning overdentures supported by one or three implants, the research is insufficient in quantity and quality to determine statistically significant differences.

Patient's oral health-related quality of life

Patient satisfaction may be associated with the stability obtained once the patient's removable prosthesis has been converted to a fixed implant-supported prosthesis. Dissatisfaction with delayed loading may be related to discomfort or pain caused by the interference of healing screws with the existing prosthesis.

From our literature review, no significant difference between immediate and delayed loading with regard to patient discomfort, pain or oedema has been reported. One explanation could be that the procedures were rarely uncomfortable, the number of patients included was too small and the questionnaires were not sensitive enough to detect differences.

The same arguments could be made for patient satisfaction, as most patients were very satisfied with the treatment. The lowest satisfaction score was found for satisfaction with the temporary prosthesis. At one year, studies have found no difference in patient satisfaction between immediate and delayed loading protocols (Fig. 6). This may indicate that patients may have forgotten the procedure over time. Thus, the claimed greater patient satisfaction with immediate loading is not supported by solid evidence. The patient's perception of the implant treatment is more dependent on other factors than the loading protocol. Patients can accept temporary discomfort if they are convinced that it is essential to obtaining a stable long-term result.

Prosthetic complications and maintenance

Studies have compared immediate and delayed loading regarding prosthetic complications and maintenance.

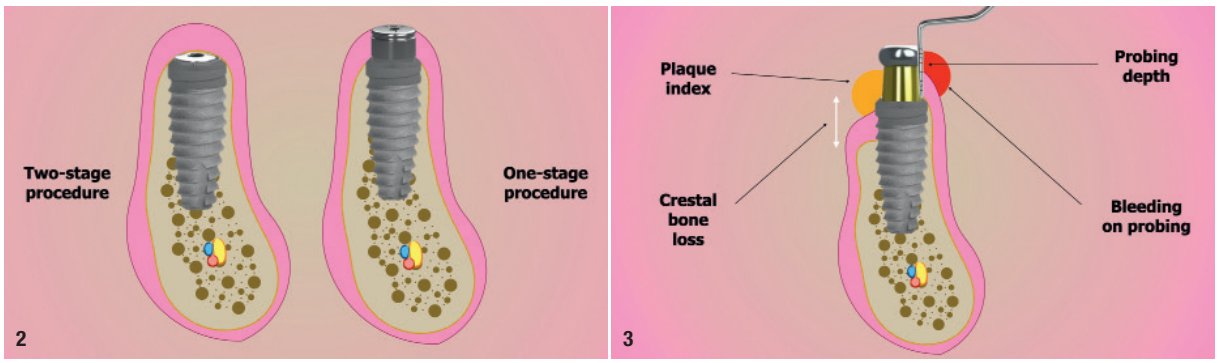

Fig. 2: Comparison of the surgical protocols. **Fig. 3:** Peri-implant tissue measurement indices.

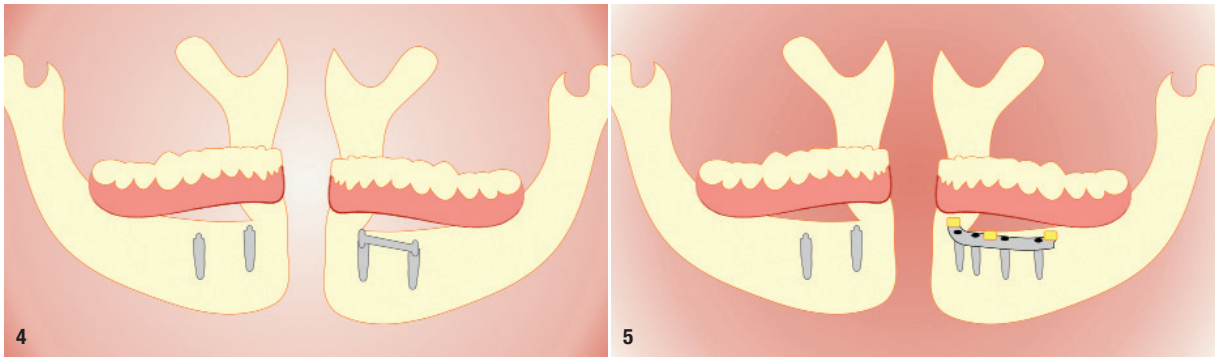

Fig. 4: Comparison of attachment types. **Fig. 5:** Comparison of number of implants.

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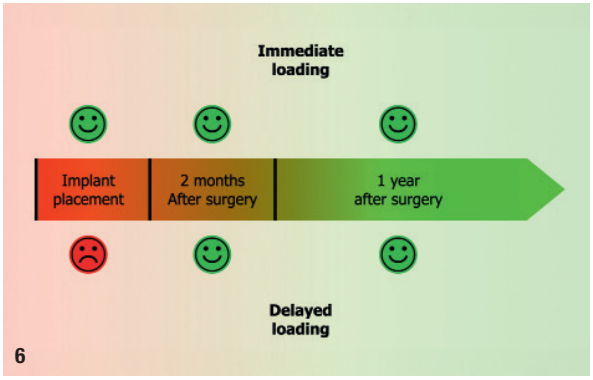


Fig. 6: Patient satisfaction timeline.

The main complications reported for immediate loading included prosthetic fracture and relining. For delayed loading, attachment displacement, screw fracture and denture fracture were more common. No differences were found between the two loading protocols.

Conclusion

Based on our reading of recent scientific literature, the following conclusions can be drawn:

- There is no statistically significant difference in implant failure rate and marginal bone loss between immediate and delayed loading for mandibular implant-supported overdentures.
- The risk of early implant loss (before one year) is higher with immediate loading compared with early loading.
- The available evidence shows no differences in the health of peri-implant tissue regardless of the type of attachment, the number of implants or the loading protocol.
- An overall analysis of all the studies included revealed that no specific attachment type, number of implants or loading protocol had a significant advantage over the other.
- Patient satisfaction and oral health-related quality of life are similar for immediate and delayed loading protocols. However, with immediate loading, patients restored with fixed prostheses are more satisfied than those treated with removable prostheses. However, this difference does not persist after one year.
- Prosthetic complications and maintenance of mandibular implant-supported overdentures were similar between delayed loading and immediate loading.
- Further studies are needed to strengthen the evidence and make firm recommendations on loading protocols. The available evidence recommends early rather than immediate loading and delayed rather than early loading.

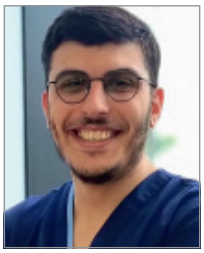
In summary, immediate loading in the completely edentulous mandible is a scientifically validated protocol. However, many factors must be taken into account to obtain a clinically satisfactory result. The role of the practitioner is to evaluate the risk–benefit ratio in carrying out such a procedure. The immediate loading protocol has advantages for mandibular implant-supported overdentures; nevertheless, the potentially higher risk of implant failure cannot be ignored. Therefore, the patient should be informed of the risks and benefits beforehand. Arguments such as patient satisfaction and reduction in the number of treatment sessions with immediate loading are not sufficiently relevant given the risk of therapeutic failure.

Editorial note: This article was first published in issue 10/2023 of *Dental Tribune France*.

Literature

about the authors

Dr Yassine Harichane holds a DDS, MSc and PhD and is in private practice in Canada.



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1 Norton MR, Astrom M. The influence of implant surface on maintenance of marginal bone levels for three premium implant brands: A systematic review and meta-analysis. Int J Oral Maxillofac Implants 2020;35(6):1099-111

Torque factor in implant dentistry

Dr Sushil Koirala, Nepal

Dental implants have revolutionised dentistry, providing a permanent, functional and reliable solution for missing teeth. With advancements in technology, the success rates and outcomes of implants have become more predictable, solidifying their role in restorative dentistry.

The practice of implant dentistry should be informed by the clinical outcomes from a clinician's own cases based on long-term records. Clinicians should embrace the role of practice-based researcher, using their experiences and documented evidence to help refine implant dentistry into a more straightforward, predictable and affordable method of restoring missing teeth.

Numerous implant manufacturing companies around the world produce a variety of implant designs and suggest different surgical and restorative protocols, each with various claims. However, many novice practitioners face challenges in selecting the appropriate implant system and developing the necessary skills to achieve clinical competency. This often results in an over-reliance on guidance from mentors, company-backed speakers, marketing materials, social media and financially motivated offers from implant suppliers.

To address this issue, leading clinicians worldwide are collaborating to share their long-term research findings, clinical experiences and expert opinions through unbiased, philanthropic educational platforms. These efforts aim to support young practitioners and simplify the field of implant dentistry, enhancing affordability and quality of care.

Implant systems

Implants are designed to support the restoration of missing teeth and remain in the jawbone permanently, making the selection of the right implant system crucial for success. Simplifying the learning and adoption of these systems is essential for long-term practice success.

There are multiple approaches to classification of implant systems, such as implant design, surface treatment, materials used, implant length and diameter, placement level and site, prosthetic design, and surgical and restorative protocols. If you carefully examine the key factors of implant systems based on fundamental biomechanical principles and core benefits, you will likely find the same factors that guide my practice.

In my 32 years of clinical practice and extensive involvement in teaching and mentoring in the area of minimally invasive comprehensive dentistry (MiCD), one of the most challenging questions I frequently encounter from fellow practitioners and trainees worldwide is which implant system is best and easiest to master. While this question seems simple, it requires long-term practice-based research and clinical experience to effectively teach or share skills and concepts with colleagues in implant dentistry.

Owing to my passion for sharing and teaching clinical skills based on my own practice-based research, I have had the opportunity to work with many like-minded re-

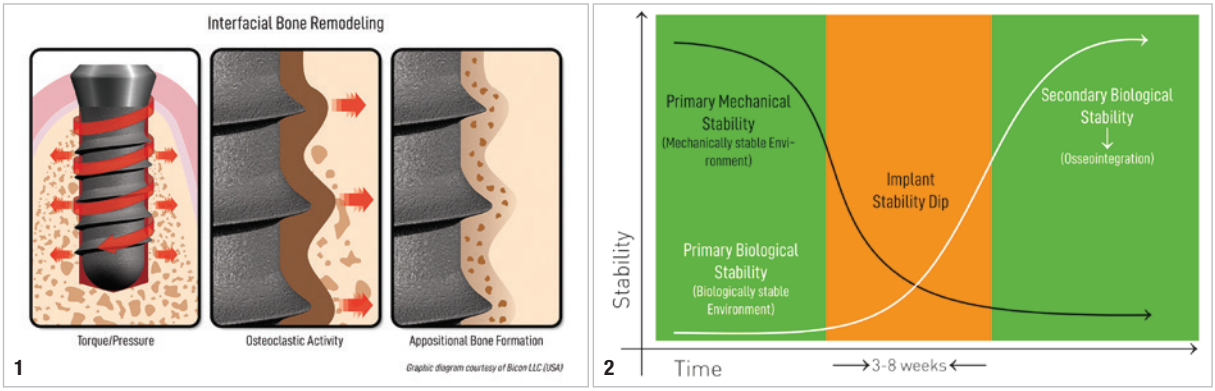


Fig. 1: Interfacial bone remodeling: Insertion torque generates pressure around the surrounding bone of the implant and osteoclastic activities start taking place with bone resorption. Slowly this resorbed area will be altered by newly formed woven bone, which eventually re-establishes the contact to the implant interface (secondary biological stability), and will subsequently remodel multiple times toward a lamellar configuration that will support the metallic device throughout its lifetime. (© Bicon) **Fig. 2:** Graphic representation of osseointegration pathway of torque-based implant system.

searchers and academics and well-recognised clinicians worldwide. This collaboration has given me the opportunity and confidence to use different implant systems and observe their clinical predictability and long-term success in my own practice. Our group at MiCD Global Academy has witnessed both successes and failures across various systems, emphasising the importance of respecting biology and individual biomechanical adaptation capacity.

Based on these observations, I have proposed a simplified classification for implant systems based on the application or avoidance of the torque factor in implant dentistry. By carefully examining the implant system used in your practice and how you approach the torque factor, you can understand the sensitivity of this art and science during surgical and restorative processes. In this brief article, I will summarise the clinical and scientific facts and contemporary professional understanding of the torque factor[1–78] that we apply, knowingly or unknowingly, in our implant dental practice.

New classification of dental implant systems

I propose a new classification of implant systems based on the use or avoidance of the torque factor in implant placement and prosthesis fixation. This classification aims to simplify clinical practice, enhance teaching methodologies and support practice-based research in implant dentistry. By categorising the available systems into two simple groups, clinicians can more easily choose the appropriate system for their patients, improving outcomes and streamlining the learning process (Table 1).

Torque-based implant system

The torque-based implant system utilises a threaded design and appropriate torque to place the implant in the jawbone, following the concept of primary mechanical stability as the foundation for secondary biological stability, or osseointegration. Primary mechanical stability is achieved by applying a specific amount of torque to insert the implant into an under-prepared osteotomy site, creating

Key issues	Torque-based implant system	Torque-free implant system
Implant macro-design	Screw root form	Plateau root form
Healing chambers	None/limited	Well focused and in-built design
Primary mechanical stability	Considered foundation for success	Not applicable
Osteotomy diameter	Smaller than implant diameter	Similar to implant diameter
Preferred implant length	Longer/standard	Shorter (minimally invasive)
Torque application stages	Multiple	Not necessary
Implant insertion torque	Multiple recommendations	Not applicable
Cover screw placement/removable torque	Necessary and based on implant design	Screwless, so not applicable
Healing abutment placement/removable torque	Necessary and based on implant design	Screwless, so not applicable
Abutment screw placement/removable torque	Necessary and based on implant design	Screwless, so not applicable
Prosthetic screw placement/removable torque	Necessary and based on implant design	Screwless, so not applicable
Healing pathway	Interfacial bone remodelling	Intramembranous-like bone remodelling
Healing speed	1–2 µm per day	20–50 µm per day
Primary stability dip phase	Present	Not present
Functional loading protocols	Multiple approach	Single approach
Delayed functional loading (gold standard)	Biological stability dependent	Biological stability dependent
Early functional loading	Possible if primary stability value permits	Not recommended
Immediate functional loading	Possible if primary stability value permits	Not recommended

Table 1: Key issues related to torque factor in implant dentistry. This helps differentiate torque-based and torque-free implant systems, enabling clinicians to understand the long-term benefits and technique sensitivity of the system they are using or planning to adopt.

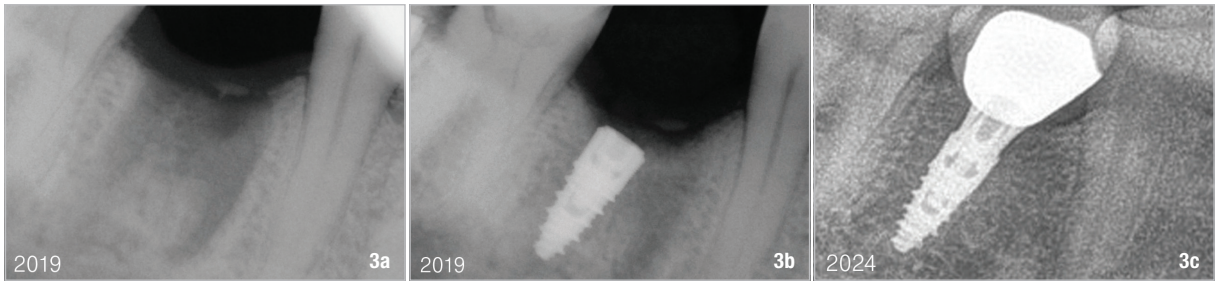


Fig. 3a: Healing extraction socket. **Fig. 3b:** A torque-based implant (Intra-Lock) was placed with a torque range of 25 Ncm due to the low density of bone at the time of implant placement (2019), and functional loading was done after four months. **Fig. 3c:** Bone gain is evident in follow-up X-ray of 2024.

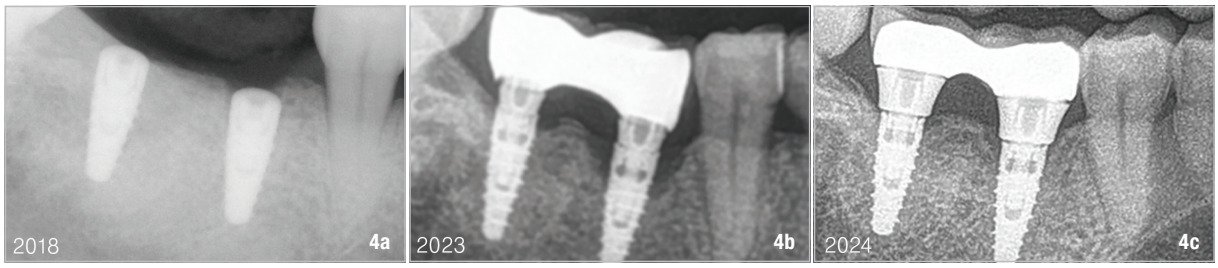
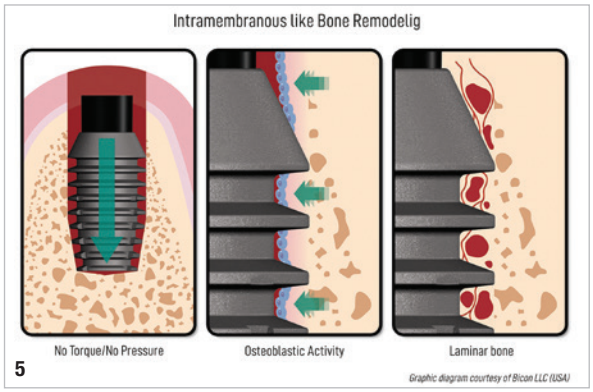


Fig. 4a: Two torque-based dental implants (Intra Lock) were placed (2018) with a torque range of 45–55 Ncm. **Fig. 4b:** Bone loss was observed (2023) around implant #46, hence the prosthesis was removed for thorough debridement of the affected area. A new prosthesis with a wider gingival diameter was provided after two weeks. **Fig. 4c:** Bone healing noted after one year (2024).

a mechanically stable environment. The primary mechanical stability achieved by such an implant system must endure the implant stability dip phase of the healing process (Figs. 1–4).

The general clinical implications of the torque-based implant system are as follows:

1. Primary mechanical stability depends on factors such as bone density, implant design and the level of torque application.
2. Assessing the patient's bone quality is essential before determining the appropriate torque level. Dense bone typically requires higher torque, whereas softer bone necessitates a more conservative approach.
3. High torque during implant insertion can induce tissue stress, potentially compromising healing. Primary mechanical stability may decrease during the initial healing phase, making immediate and early functional loading protocols sensitive and often requiring special measurement tools to confirm stability.
4. Precise torque application demands a high level of surgical skill and experience. Using high-quality, calibrated torque instruments is essential to ensure accuracy. Digital torque wrenches provide precise control, reducing the risk of human error.
5. Mechanical complications, such as screw loosening and fracture, and ultimately implant failure may arise from incorrect torque application during the restorative phase.



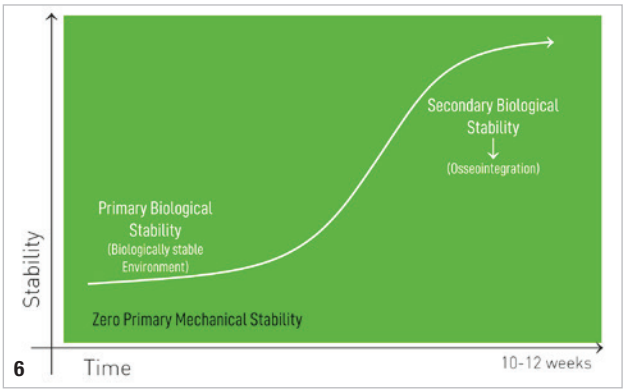


Fig. 5: Intramembranous like bone remodeling: The void spaces left between bone and implant bulk, is referred as healing chambers, will be filled with blood clot immediately after placement and will not contribute to primary stability. Such healing chambers, filled with the blood clot, will evolve toward osteogenic tissue that subsequently ossifies through an intramembranous-like pathway. (© Bicon) **Fig. 6:** Graphic representation of osseointegration pathway of the torque-free implant system.

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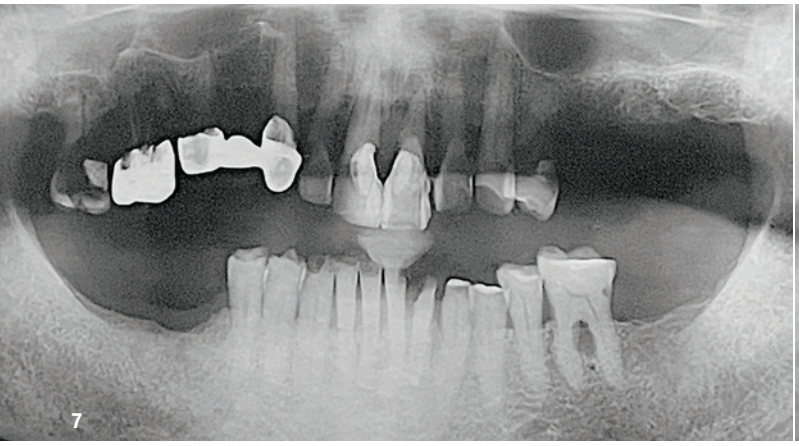


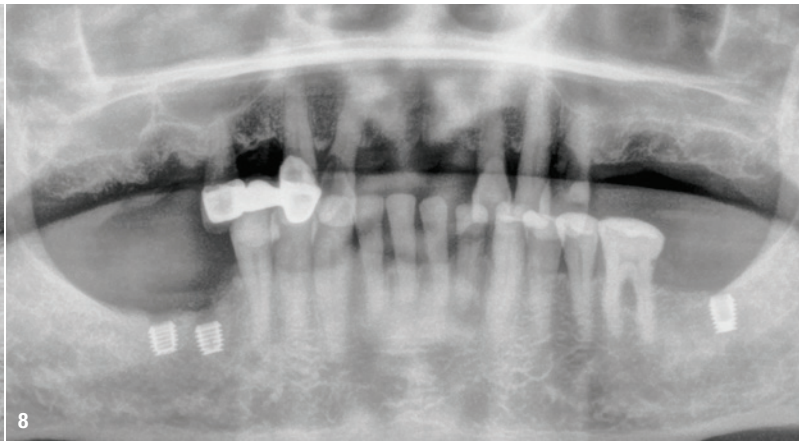


Fig. 7: The patient had a history of conventional implant failure, so we decided to place torque-free short implants. (© Bicon) **Fig. 8:** Three torque-free short dental implants (Bicon) were placed in the posterior region of the mandibular arch, and the patient was provided with a removable upper denture.

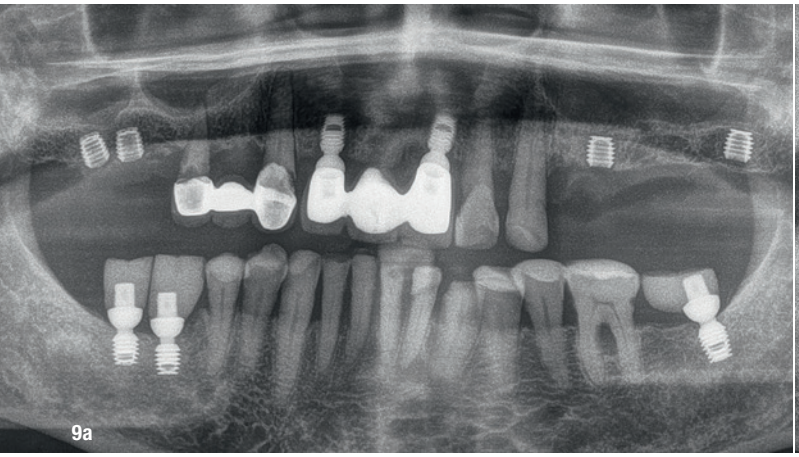
6. Long-term secondary biological stability is often reliable if primary mechanical stability is successfully achieved by respecting bone biology and the healing approach.
7. Immediate and early functional loading protocols in torque-based implant dentistry are becoming popular, demanding optimal primary mechanical stability and objective confirmation before seating the prosthesis.

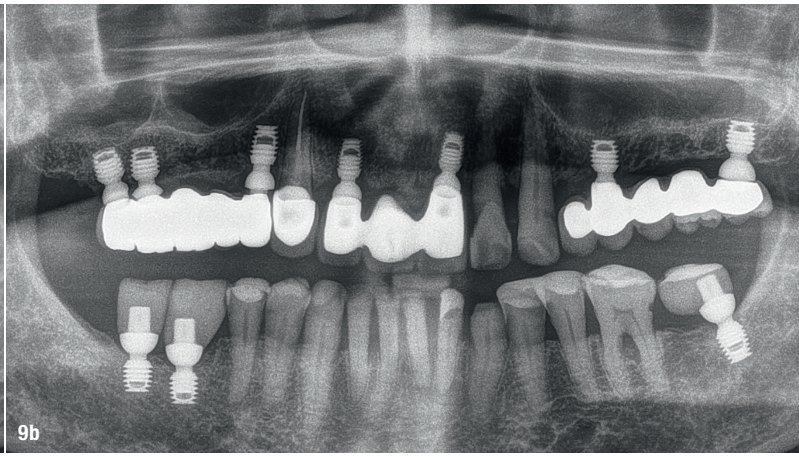
Torque-free implant system

The torque-free implant system avoids primary mechanical stability by keeping the final osteotomy size similar to the implant diameter. Such implants have built-in healing chambers that increase the implant surface area, promoting primary biological stability (biologically stable environment) that facilitates faster secondary biological stability. Additionally, such a system incorporates bioactive surface treatment technology, enhancing the implant's ability to bond with bone cells. Since this system does not rely on primary mechanical stability, there is no primary stability dip phase during the healing process (Figs. 5–8).

The general clinical implications of torque-free implant systems are as follows:

1. The gentler approach of placing implants without torque preserves bone integrity, creating a biologically favourable and stable environment for healing.
2. Placement is less invasive and technically less demanding, potentially reducing surgery time and improving patient comfort.
3. Patients with poor bone quality or density can benefit from these innovative solutions.
4. The bioactive surfaces of the implants can accelerate bone healing and help achieve earlier secondary biological stability.
5. These implants are beneficial in areas with limited bone volume, where achieving primary stability through torque-based methods is challenging.
6. Since the implant sits passively within the bone, immediate functional loading is not possible, and early loading is not advisable.
7. Implant systems based on torque-free implant dentistry are suitable for cases with low bone volume and density.





Figs. 9a & b: With the success of torque-free short dental implants, the patient was encouraged to have similar implants placed in the upper arch to avoid sinus lift and bone graft procedures.

Conclusion

As dentists integrate implant dentistry into their practices, understanding the role of torque and selecting the right implant system is crucial. Torque-based systems provide reliable results when precise torque application is achieved, requiring clinical skill and additional instruments to confirm primary stability for successful immediate or early functional loading. Torque-free systems offer predictable results with simplified instruments and are ideal for practitioners who prefer predictable techniques that are less invasive, often avoiding sinus lift and other grafting procedures.

Both systems have their place in modern implantology, each with unique advantages. Recent research and developments indicate that contemporary implant manufacturers are focusing on combining the benefits of both a mechanically stable environment (tight fit) and a biologically stable environment (healing chambers) in a single implant through innovative implant design, leading to the emergence of hybrid implant systems. Only long-term clinical and practice-based research will determine their future success.

By leveraging shared knowledge and experience, dentists can enhance their skills and make implant dentistry more accessible and rewarding. For further learning, explore the MiCD learning station at www.micdglobalacademy.com.

Literature

Editorial Note: This article first appeared in *Implant & Digital Dentistry—Nepal* and is reprinted here with the publisher's permission in an edited version.

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Impact of periodontitis on systemic health and on implants

Prof. Curd Bollen & Prof. Paul Tipton, UK, Dr Mishel Kocharyan & Prof. Gagik Hakobyan, Armenia

Introduction

Mouth and health go hand in hand. After all, the mouth is the entrance gate to our body. Food enters through there and our teeth are the instruments to chew this food so that the food components we need can also be effectively released. There is a need for a healthy mouth, to keep a healthy body!

After all, infections in the mouth have an enormous impact on the rest of our general health. Biting and chewing can continuously force oral bacteria into our bloodstream, where they move through the body, and can cause damage in several organs (e.g. kidneys, heart, lungs and brain).

Thousands of scientific articles have already been published about this topic: on 1 August 2024, there were 3,966 hits combining both topics on PubMed! However, this phenomenon is still insufficiently known to the public and even to many dentists and physicians.[1]

Meanwhile, periodontitis, the severe gum infection that damages the soft tissue and destroys the tissues that support the teeth, has been linked to several systemic diseases. This connection is largely due to the inflammatory nature of periodontitis which is accompanied by large quantities of highly pathogenic bacteria (eg. *Porphyromonas gingivalis*, *Prevotella intermedia* and *Fusobacterium nucleatum*). These pathogens have farreaching effects beyond the oral cavity because they strongly trigger the immune response.[2]

The local consequence is limited to tissue destruction: the inflammatory response leads to the destruction of gum tissue, periodontal ligament and alveolar bone.[3]

The systemic impact of these focal infections is however often neglected although the scientific literature is very clear: periodontitis undeniably causes or worsens several systemic health problems.[4]

This first article in a series of two, will focus on six key points about the relationship between periodontitis and systemic diseases. The second article will come up with six more associations between periodontal disease and systemic diseases.

1. Cardiovascular disease

Cardiovascular disease (CVD) encompasses a range of heart and blood vessel disorders, including coronary artery disease, hypertension, and stroke.

Periodontitis and cardiovascular disease are interconnected through various mechanisms, involving systemic inflammation, endothelial dysfunction, and shared risk factors.

The inflammation caused by periodontitis can contribute to the buildup of plaques in arteries (atherosclerosis), leading to heart attacks and other cardiovascular events. Moreover, periodontitis increases the risk of a heart attack by two times.[5] The risk of a stroke or TIA is even three times higher when periodontitis is present.[6] Existing heart problems are also aggravated by the presence of oral infections.

The four main connections between periodontitis and cardiovascular disease are:

1. **Systemic inflammation:** periodontitis can cause an increase in systemic inflammatory markers like C-reactive protein (CRP), which is also linked to atherosclerosis.
2. **Endothelial dysfunction:** bacteria and inflammatory mediators from periodontal disease can enter the bloodstream, leading to endothelial dysfunction, a precursor to atherosclerosis.
3. **Bacterial translocation:** oral bacteria from periodontitis can enter the bloodstream, contributing directly to the formation of arterial plaques.
4. **Immune response:** the immune response to periodontal infection can exacerbate inflammatory processes in the arteries—chronic inflammation is a key factor in the development of atherosclerosis.

Cardiovascular disease and periodontitis have several major shared risk factors: smoking, diabetes, age, genetics and diet.[7]

The obvious link between the two diseases invites patients and practitioners to some clinical implications:

1. Early screening: regular dental check-ups and periodontal assessments help identify individuals at risk for CVD.
2. Structured preventive care: good oral hygiene and periodontal therapy reduces systemic inflammation, lowering the risk of CVD.
3. Promoting integrated care: serious collaboration between dental and medical professionals improves overall patient health outcomes.

2. Diabetes

Diabetes is a chronic metabolic disorder characterised by high blood glucose levels due to either insufficient insulin production (Type 1 diabetes) or insulin resistance (Type 2 diabetes).

There is a bidirectional relationship between periodontitis and diabetes. Not only are people with diabetes more susceptible to periodontitis, but periodontitis can also make it more difficult to control blood sugar levels, thereby exacerbating diabetes.[8] More than 90% of periodontitis patients are at risk of diabetes. In this bidirectional relationship, both conditions can influence the onset and progression of the other.

Impact of diabetes on periodontitis:

1. Impaired immune response: hyperglycemia can impair the immune system, making it harder to fight off bacterial infections in the gums.
2. Increased inflammation: high blood sugar levels increase the inflammatory response, exacerbating gum disease.
3. Poor healing: diabetes can slow down the healing process of gum tissue, worsening periodontitis.[9]

Impact of periodontitis on diabetes:

1. Increased blood sugar levels: chronic inflammation from periodontitis can increase insulin resistance, making blood sugar control more difficult.
2. Systemic inflammation: periodontitis can elevate systemic inflammatory markers, which can negatively affect blood sugar regulation.
3. Complications management: poor oral health can complicate the management of diabetes, leading to a vicious cycle of worsening health.

In these processes there are three mechanisms of interaction. Both conditions increase the production of inflammatory cytokines such as TNF-α and IL-6, which contribute to insulin resistance and tissue destruction. Furthermore, advanced glycation end-products (AGEs) which are elevated in diabetes, can accumulate in periodontal tissues, promoting inflammation and tissue damage there.[10] Finally, increased oxidative stress in both diabetes and periodontitis can lead to further tissue damage and complications.

Due to this two-way relationship, similar clinical recommendations can be highlighted as for CVD:

1. Screening and monitoring: for diabetics patients regular dental check-ups are crucial to detect and manage periodontitis early. Whereas for periodontitis patients' blood glucose monitoring can help identify undiagnosed diabetes or prediabetes.
2. Integrated care: dentists and other healthcare providers should work together to manage both conditions. Furthermore, educating patients on the importance of oral hygiene and diabetes control is vital for overall health.
3. Preventive and therapeutic strategies: regular brushing, flossing, and professional cleanings can help prevent periodontitis. Maintaining optimal blood sugar levels through diet, exercise, and medication can reduce the risk of periodontal disease. Medications and therapies to reduce inflammation can benefit both conditions.

3. Respiratory diseases

Respiratory diseases include a range of conditions affecting the lungs and airways, such as chronic obstructive pulmonary disease (COPD), pneumonia, and asthma. Chronic periodontitis has been linked to an increased risk of these respiratory conditions. The latter is thought to occur due to the aspiration of bacteria from the mouth into the lungs. A similar link has also been demonstrated with the severity of COVID-19 infections.[11]

The relationship between respiratory disease and periodontitis involves shared mechanisms such as inflammation and bacterial infection.

The interconnection between both pathologies is based on:

1. Bacterial aspiration: bacteria from the oral cavity can be aspirated into the lower respiratory tract, leading to infections such as pneumonia. This is particularly a risk in elderly patients and those with weakened immune systems.[12]
2. Systemic inflammation: periodontitis can increase systemic inflammatory markers (e.g. IL-6, TNF-α) into the bloodstream, which can exacerbate chronic inflammatory conditions like COPD and asthma.[13]
3. Immune response: the immune response to periodontal infection can weaken the body's ability to fight off respiratory pathogens.
4. Oral hygiene: poor oral hygiene associated with periodontitis can increase the risk of respiratory infections due to higher levels of pathogenic bacteria in the mouth.

The same clinical recommendations as for periodontitis–diabetes/CVD are also applicable here: good oral hygiene,

regular dental check-ups, interprofessional dental–medical collaboration and early screening.

The therapy consists of anti-inflammatory treatments (managing periodontal inflammation reduces systemic inflammation and potentially improve respiratory health) and eventual antibiotic therapy (when the bacterial infection is significant, targeted antibiotics may be necessary).

4. Pregnancy

Pregnancy is of course not a disease, but it involves significant physiological changes that can influence oral health. Pregnant women with periodontitis are at a higher risk of adverse pregnancy outcomes because inflammatory mediators from periodontitis may affect the fetal environment.

There are three main types of impact from periodontitis on pregnancy:

1. **Preterm birth:** periodontitis has been linked to an increased risk of preterm birth (delivery before 37 weeks). The inflammatory mediators produced in response to periodontal infection can enter the bloodstream and potentially trigger premature labor.[14]
2. **Low birth weight:** inflammatory cytokines and bacterial endotoxins from periodontitis can affect the placental function, potentially leading to low-birth-weight babies.[15]
3. **Preeclampsia:** periodontitis has been associated with an increased risk of preeclampsia, a pregnancy complication characterised by high blood pressure and damage to other organs, often the kidneys.

Furthermore, there are also three sorts of impact from pregnancy on periodontitis:

1. **Pregnancy gingivitis:** increased hormone levels can cause gums to become more sensitive and prone to inflammation, known as pregnancy gingivitis. If left untreated, it can progress to periodontitis.[16]
2. **Exacerbation of existing periodontitis:** hormonal changes during pregnancy can exacerbate existing periodontal disease due to increased blood flow to the gums and an altered immune response.[17]
3. **Altered oral hygiene:** morning sickness and changes in diet can lead to increased plaque accumulation, affecting periodontal health.[18]

The key aspects of these interactions include:

1. **Hormonal changes:** elevated levels of estrogen and progesterone. These hormones can enhance the inflammatory response in gum tissues.
2. **Immune system alterations:** modulated immune response to accommodate fetal development. These changes in the immune system can alter the host response to periodontal pathogens.
3. **Inflammatory mediators increase:** cytokines and prostaglandins produced during periodontal inflammation can affect pregnancy outcomes.
4. **Increased blood volume:** enhances tissue sensitivity and bleeding.

The clinical advice consists of: pre-conception care, regular dental visits, oral hygiene education, professional cleaning, good oral hygiene practices, nutritional guidance and management of morning sickness.

5. Rheumatoid arthritis

RA is an autoimmune disorder characterised by chronic inflammation of the joints, leading to pain, swelling, and eventual joint destruction. There is evidence suggesting a link between periodontitis and rheumatoid arthritis. Both share several pathogenic mechanisms and risk factors. The more severe the periodontitis, the more severe the rheumatism. Specific oral bacteria are responsible for this.

Emerging evidence suggests a bidirectional relationship between these diseases.

There are four shared mechanisms between rheumatoid arthritis and periodontitis:

1. **Chronic inflammation:** both conditions involve chronic inflammation driven by an overactive immune response.
2. **Cytokine production:** elevated levels of pro-inflammatory cytokines like TNF-α, IL-1, and IL-6 are common in both RA and periodontitis.
3. **Genetic predisposition:** certain genetic factors, such as shared susceptibility loci, may predispose individuals to both conditions.
4. **Autoimmunity:** the presence of autoantibodies like rheumatoid factor (RF) and anti-citrullinated protein antibodies (ACPAs) is common in RA and may be found in periodontitis patients.

The impact of periodontitis on RA deals not only with increased inflammation (periodontal infection can exacerbate systemic inflammation, potentially worsening RA symptoms), but also with bacterial translocation (oral bacteria, particularly *P. gingivalis*, can enter the bloodstream and contribute to RA pathogenesis through molecular mimicry and citrullination of proteins).[19]

Meanwhile, the impact of RA on periodontitis bears with an altered immune response (the dysregulated immune response in RA can impair the body's ability to control periodontal infections) and the effects of medication (immunosuppressive medications used to treat RA can affect oral health, either by increasing susceptibility to infections or causing dry mouth, which can exacerbate periodontitis).[20]

Clinical implications comprise again: screening and diagnosis (regular periodontal assessments for RA patients—individuals with severe periodontitis should be evaluated for signs and symptoms of RA), integrated care (rheumatologists and dentists should collaborate) and preventive and therapeutic strategies (oral hygiene, professional dental care and anti-inflammatory treatments).

6. Chronic kidney disease

CKD is a progressive loss of kidney function over time, which can eventually lead to kidney failure. It is often associated with other comorbidities, such as cardiovascular disease and diabetes. Periodontitis has been associated with an increased risk of chronic kidney disease. Inflammatory processes and bacterial infections common to both conditions might play a role in this connection.

The combination of periodontitis and kidney disease leads to increased mortality due to the increase in the total inflammatory burden.

Chronic kidney disease (CKD) and periodontitis are interconnected through shared risk factors, inflammatory mechanisms, and potential bidirectional influences.

The shared mechanisms between these two diseases are based on:

1. **Chronic inflammation:** both CKD and periodontitis involve chronic inflammatory responses. Periodontitis can contribute to systemic inflammation, exacerbating CKD.
2. **Immune dysregulation:** CKD can impair the immune system, making individuals more susceptible to infections, including periodontal disease.
3. **Common risk factors:** conditions like diabetes and cardiovascular disease are risk factors for both CKD and periodontitis.

Periodontitis has a three-way influence on CKD:

1. **Systemic inflammation:** periodontal infection can increase systemic inflammatory markers such as C-reactive protein (CRP), which can worsen kidney function.
2. **Bacterial translocation:** oral bacteria and their by-products can enter the bloodstream, potentially affecting the kidneys and contributing to the progression of CKD.
3. **Endothelial dysfunction:** chronic inflammation from periodontitis can lead to endothelial dysfunction, a factor in the progression of CKD.[21]

In the other direction, CKD has a trilateral impact on periodontitis:

1. **Reduced immune function:** CKD impairs the immune response, increasing susceptibility to periodontal infections.
2. **Altered oral environment:** CKD and its treatments can alter the oral environment, making it more conducive to periodontal disease. For instance, reduced salivary flow can lead to increased plaque accumulation.
3. **Medication side effects:** medications for CKD, such as immunosuppressants and antihypertensives, can affect oral health and increase the risk of periodontal disease.[22]

The clinical implications are similar as for the other systemic conditions: screening and diagnosis, integrated care and preventive and therapeutic strategies.

Summary

The effect of periodontitis is not limited to the oral cavity. Periodontitis is not only causing tooth loss, but it has also a far-reaching impact on general health. Periodontopathogens and their toxins are causing harm to different organs and systems in our body.

Therefore, dentists and all other medical practitioners are not only responsible for their specific field of training/interest, but they are all co-responsible for the overall health of their patients.

It is of utmost importance to not only make patients aware of the dental–general health connection, but also to sensitise all medical professionals for this link. Therefore, a holistic medical/dental approach is highly advised.

Literature

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Immediate implant placement and provisional restoration in the aesthetic zone

Drs Luiz Otavio Camargo, Livia Lamunier de Abreu Camargo & Lucio Kanashiro, Brazil

The immediate implant placement approach, introduced decades ago, has established the practice of implant placement in freshly extracted sockets. Indeed, research and evidence support the assertion that immediate restoration is at least as effective and safe as delayed restoration.[1]

Immediate implant placement offers notable benefits, such as a reduced number of surgical interventions, a shorter overall treatment duration, and improved aesthetic outcomes. This approach also preserves the existing bone and gingival structure, contributing to the support of interdental papillae.[2]

However, reaching and maintaining optimal gingival aesthetics around implants in the anterior region is a challenging task. Ensuring sufficient primary stability is a prerequisite for the success of this approach. The design of the implant itself is a crucial factor. Recently, the findings from a series of cases indicated that the immediate placement of a novel self-cutting, tapered implant (Straumann® BLX, Straumann) with immediate provisionalisation through an integrated digital workflow, can yield reliable functional and aesthetic outcomes when transitioning compromised single teeth in the aesthetic zone.[3]

The Straumann® BLX Implants are made from Roxolid® material with the SLActive® surface. The use of Roxolid® material allows the placement of reduced-diameter implants while ensuring successful osseointegration. Moreover,

Figs. 1 & 2: Chipping of the metal–ceramic crown on tooth #12. **Fig. 3:** Hopeless tooth #12 after the crown removal. **Fig. 4:** Gingival inflammation surrounding the residual root. **Fig. 5:** CBCT image showing adequate apical bone.

the integration of SLActive® surface technology accelerates osseointegration and minimises the healing period.

The following case report outlines a successful treatment result for a compromised tooth in the aesthetic region, characterised by a thin gingival biotype. The treatment involved the utilisation of the Straumann® BLX Implant System, along with cerabone® and mucoderm® (botiss biomaterials) with a digital workflow.

Initial situation

A young and healthy non-smoker 25-year-old male patient, presented at our clinic due to the fracture of his crown on the upper right lateral incisor. The patient was seeking a prompt, durable, and aesthetic solution.

The extra-oral examination showed a medium smile line. On intra-oral examination, a metal–ceramic crown with chipping on the palatal side was observed on tooth #12 (Figs. 1 & 2).

After removing the crown, there was not enough stump left. The tooth was listed as hopeless. Additionally, signs of gingival inflammation around the residual root were noted (Figs. 3 & 4).

The cone beam computed tomography (CBCT) imaging revealed that the root was oriented toward the buccal wall (~1 mm), and there was an adequate amount of apical bone, making it feasible for an immediate implant placement (Fig. 5).

In terms of surgical classification, the patient was categorised as complex and prosthodontically advanced based on the SAC classification (Fig. 6).

Treatment planning

Considering the clinical and radiographic observations, the chosen treatment approach included the immediate implant placement and subsequent restoration.

The treatment workflow encompasses several essential steps. Initially, a multifunctional guide will be prepared, including both the surgical guide and the provisional restoration for optimal outcomes. The hopeless tooth #12 will be extracted. Following the extraction, an immediate Straumann® BLX Roxolid®, SLActive implant, measuring

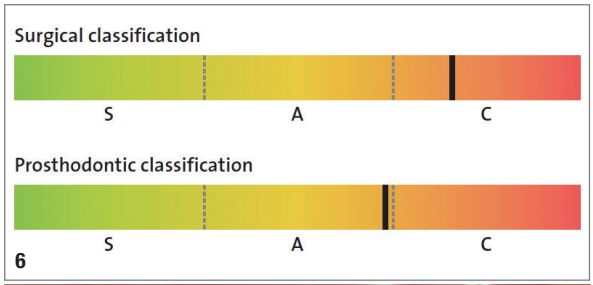
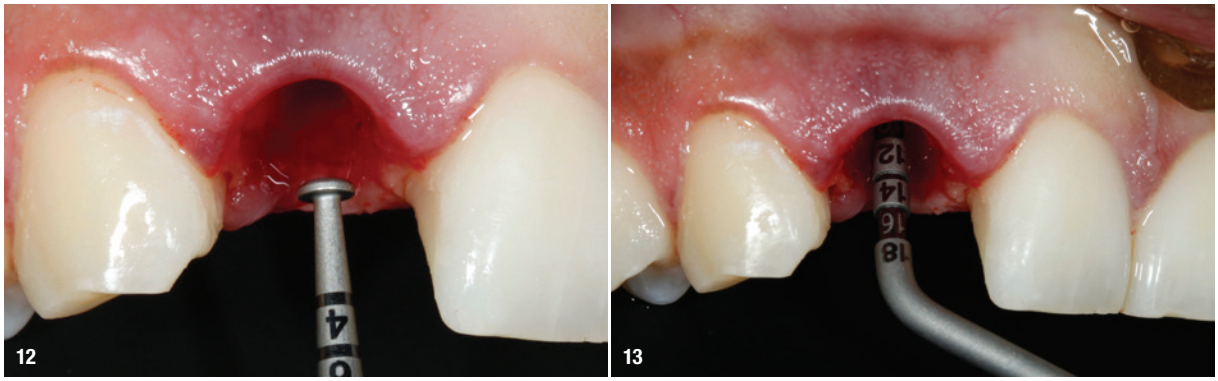


Fig. 6: SAC classification of the patient. **Fig. 7:** Pre-surgical check of multifunctional guide for accurate fit. **Fig. 8:** Assessment of the distance between gingival margin and buccal bone wall. **Figs. 9 & 10:** Implant bed preparation following manufacturer's instructions. **Fig. 11:** Placement of the surgical guide to check proper alignment.



Figs. 12 & 13: Buccal wall integrity was verified with an implant depth gauge.

Figs. 14 & 15: The Straumann BLX implant was inserted.

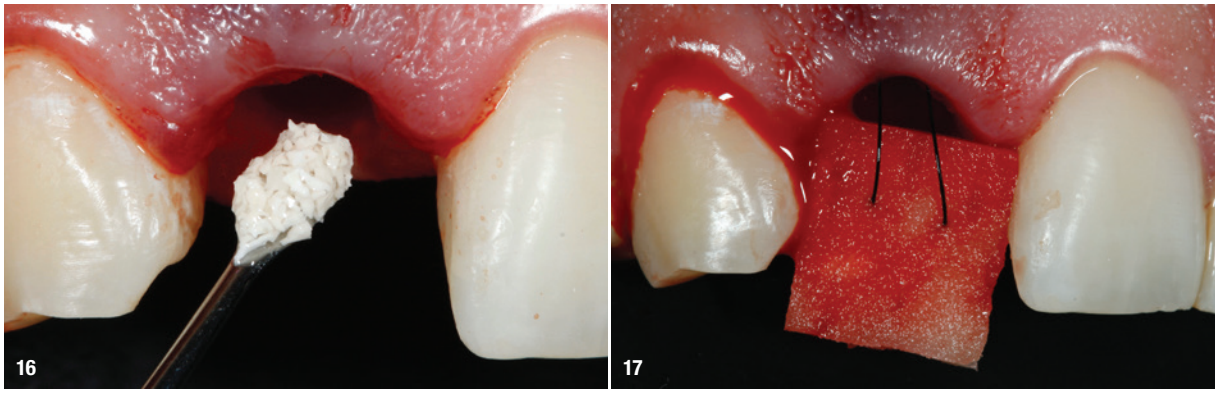


Fig. 16: The gap is filled with Cerabone® xenograft. **Fig. 17:** Gingival tunneling followed by placement of botiss mucoderm®.

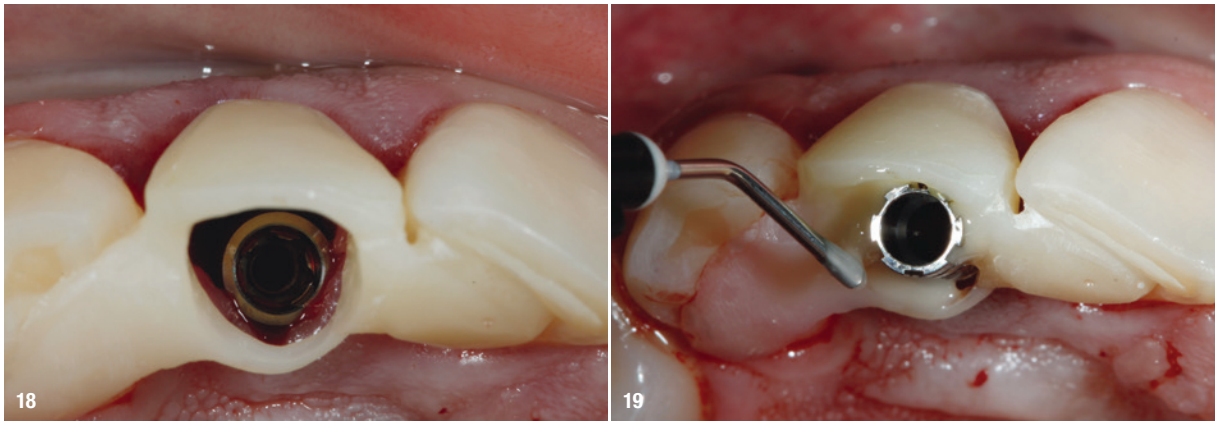


Fig. 18: A temporary abutment was placed. **Fig. 19:** The multifunctional guide was bonded to the temporary abutment with resin.

3.75 x 12 mm, will be inserted without a flap elevation. To address the resulting gap, cerabone® will be used, along with the placement of mucoderm® in the buccal zone. An immediate temporary abutment will then be applied, along with a chairside tooth shell pick-up. Next, digital crown planning will be carried out using the Straumann® CARES Visual system. Finally, the treatment will conclude with the delivery of the final screw-retained crown.

Surgical procedure

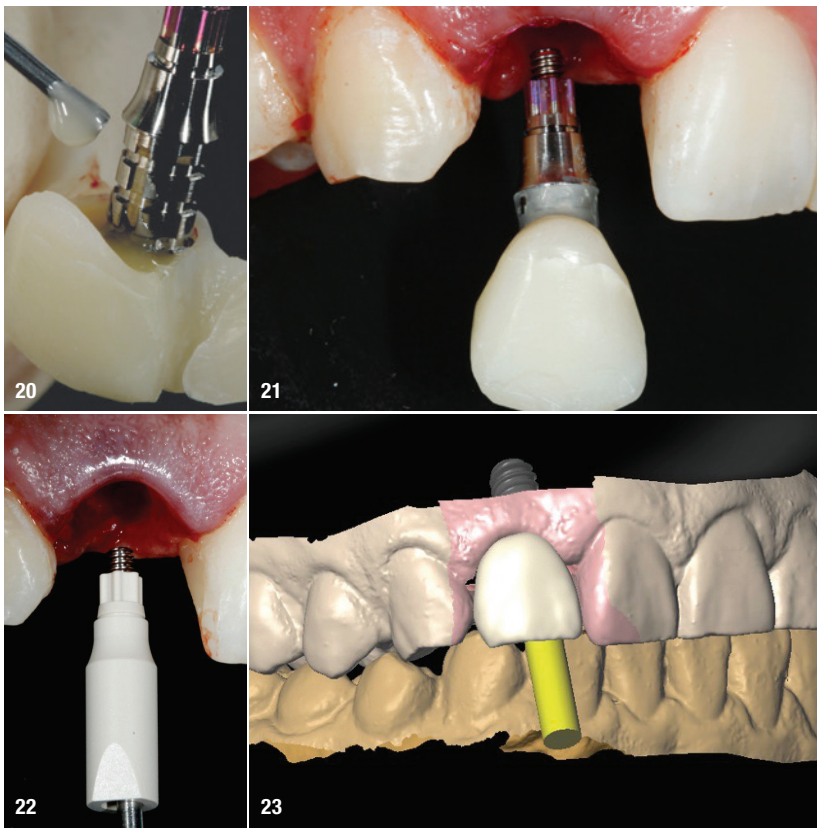
Prior to the surgical procedure, the individualised and prefabricated multifunctional guide—designed to serve both as a surgical guide and a prospective temporary restoration—was carefully checked in the oral cavity to ensure a precise fit (Fig. 7). After confirming its proper position and alignment, a local anesthetic containing 2% lidocaine and 1:100,000 epinephrine was administered. Following this, a meticulous extraction of tooth #12 was performed with the goal of minimising trauma to the surrounding tissues. The socket was then debrided using a bone curette and irrigated with saline solution to ensure cleanliness. A thorough evaluation of the gingival margins was subsequently conducted, revealing a distance of 3 mm between the gingival margin and the buccal wall margin of the bone (Fig. 8).

Within the Straumann® Implant System, all BLX drills are delivered with a distinct colour code that corresponds to the specific diameter of the implant. The implant bed preparation was done following a prescribed sequence, which included the utilisation of a needle drill 1.6 mm followed by a 2.2 mm pilot drill (blue) and a subsequent 2.8 mm BLX drill (yellow; Figs. 9 & 10), in accordance with the position determined by the surgical guide. The surgical guide, along with the alignment pin, was employed to ensure precise depth measurements and the accurate alignment of the osteotomy's orientation and position (Fig. 11).

After concluding the drilling procedure according to the manufacturer's instructions, the osteotomy was checked using an implant depth gauge (> Ø 2.1 mm end) for accurate depth measurement, tactile examination of the osteotomy and the verification of the integrity of the buccal wall (Figs. 12 & 13).

Next, the Straumann® BLX 3.75 x 12 mm implant was carefully inserted into its final position using the implant driver, applying a torque of 50 Ncm with the BLX Torque Control Device for Ratchet. The implant was turned clockwise during this process (Figs. 14 & 15), achieving optimal primary stability.

The space between the implant and the buccal wall was filled with Xenograft cerabone® (botiss biomaterials). This choice was made due to its sustained graft preservence, which aids in preserving volume over the long term (Fig. 16). Subsequently, gingival tunneling was performed, and mucoderm® (botiss biomaterials) was positioned on the buccal side with a 5/0 Nylon suture. This was done to facilitate the gradual growth of bone tissue into the grafted area (Fig. 17).



Figs. 20 & 21: The subgingival segment was contoured with flowable composite. **Figs. 22 & 23:** The final prosthesis was created using a digital workflow.

Prosthetic procedure

The placement of the BLX implant was done according to the prosthetic plan (Fig. 18). Subsequently, the multifunctional guide was adhered to the temporary abutment by injecting flowable resin into the contours (Fig. 19).

Furthermore, the subgingival segment was contoured with flowable composite in accordance with the slim concave emergence profile concept, contributing to the shaping of the gingival tissues (Figs. 20 & 21).

The final prosthesis was manufactured using a digital workflow. A digital impression was obtained with the Straumann® Virtuo intra-oral scanner, which accurately captured the 3D position of the implant, aided by a scan body attached to the BLX implant (Fig. 22). This process generated an STL file. Subsequently, we used CARES® Visual—recognised as one of the dental industry's most

flexible and powerful CAD/CAM software platforms—for the design of the crown for tooth #12 (Fig. 23).

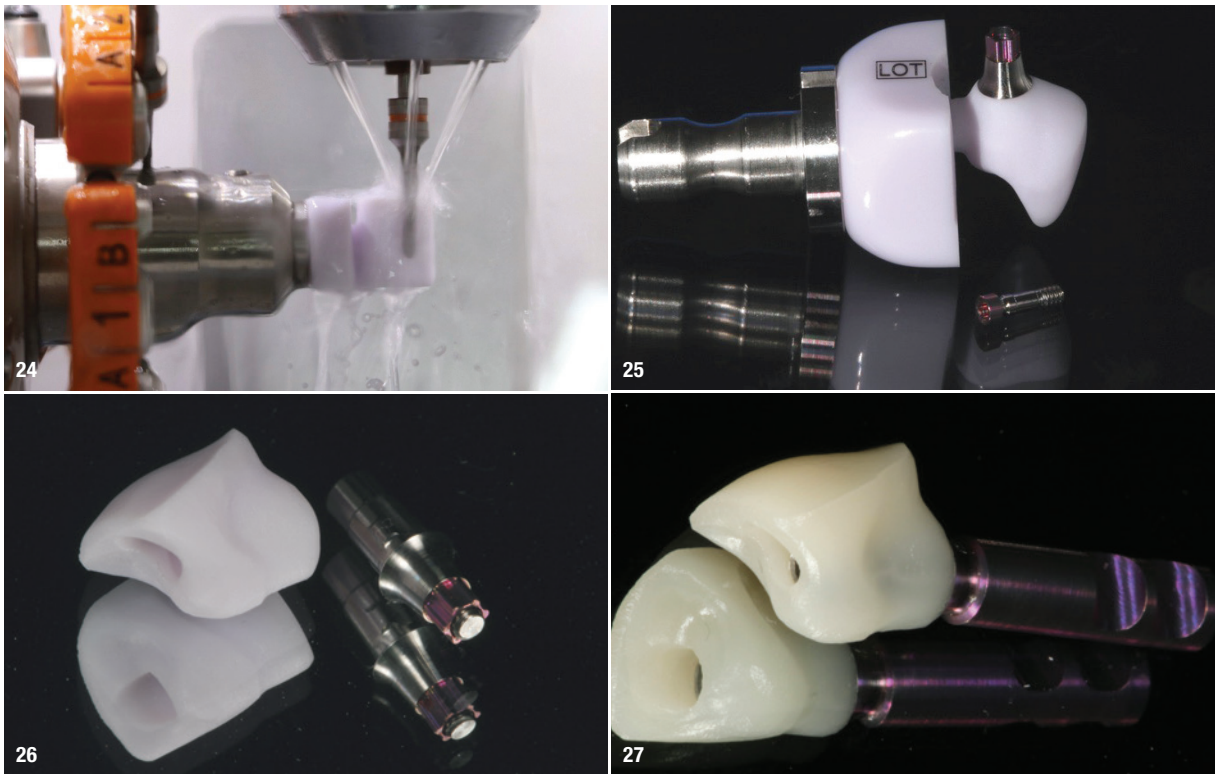
Subsequently, the Straumann® CARES® C series was utilised in-house to mill a customised lithium disilicate abutment (Figs. 24–26). This abutment was then cemented extra-orally to an RB/WB Variobase® using Multilink® cement (Fig. 27). Following this, a lithium disilicate veneer was adhered to the customised abutment (Figs. 28 & 29).

The restoration was then positioned and secured by screwing it in place with a torque of 35 Ncm (Fig. 30). Afterwards, the access holes were filled with composite restoration material and Teflon. A thorough occlusion check was performed, and oral hygiene instructions were provided to ensure proper postoperative care.

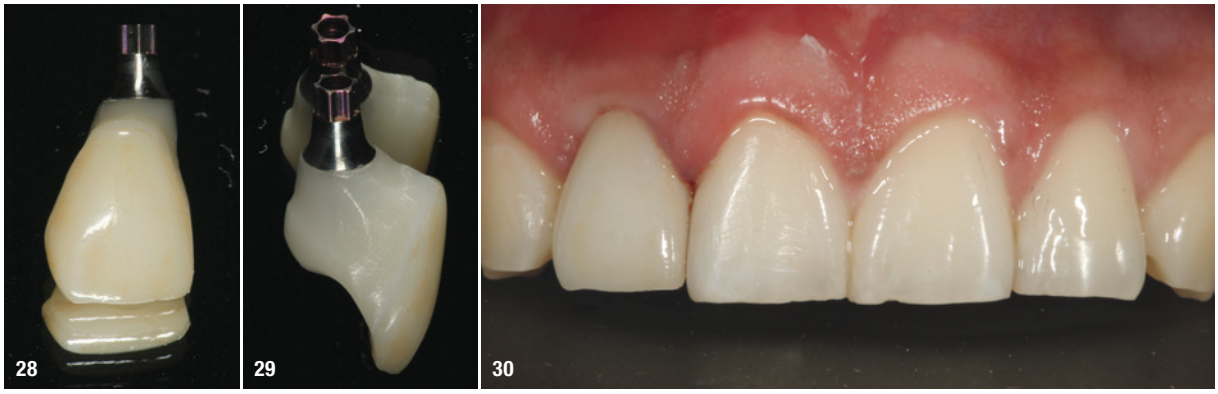
Treatment outcomes

The patient was very satisfied with the implant placement procedure and the opportunity to receive a restoration promptly following the extraction of his anterior tooth (Figs. 31–33). The patient was enrolled in an annual maintenance programme.

Four years post-implant placement, a comprehensive clinical and radiographic assessment revealed favourable implant stability and the healthy condition of the adjacent tissues (Figs. 34 & 35).



Figs. 24–26: The Straumann® CARES® C series was used to mill a customised abutment. **Fig. 27:** The abutment was cemented extra-orally to an RB/WB Variobase®.



Figs. 28 & 29: A veneer was adhered to the abutment. **Fig. 30:** The restoration was positioned, and the access hole was filled with composite and Teflon.

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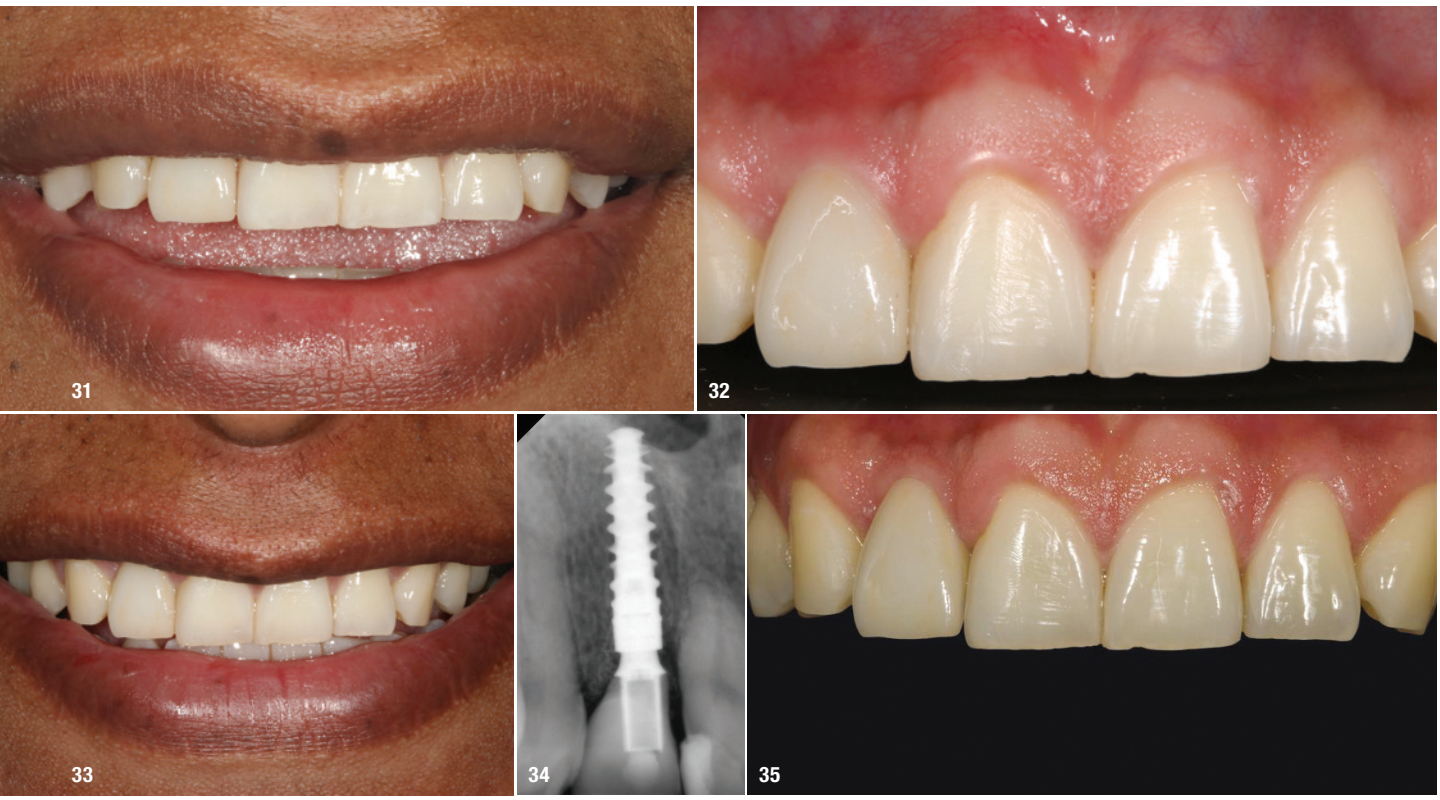

Figs. 31–33: A happy patient with final outcome. **Figs. 34 & 35:** At the four-year follow-up, implant stability and healthy tissues were observed.

The final outcome resulted in health maintenance in the hard and soft tissues.

Adequate primary stability is a prerequisite to enable this type of treatment. The implant design plays an important role in this context. In my clinical experience, the Straumann® BLX implant offers the ideal properties for these clinical situations. At the same time, the SLActive® surface has an impact on the early osseointegration of immediately restored implants.

Authors' testimonial

Reaching and maintaining optimal gingival aesthetics around implants in the anterior region is a challenging task. One of the main characteristics of immediate implant placement and provisionalisation is its effectiveness in the aesthetic outcome, preserving the existing bone and gingival architecture.

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Literature

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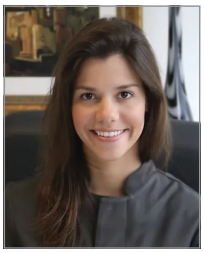

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25–26 SEPTEMBER 2025
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Maxillary fixed full-arch rehabilitation

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The use of zygomatic implants inserted in immediate function through the extra-maxillary technique presents a viable solution for patients with insufficient bone volume in the maxilla. This article presents a clinical case of an upper maxillary implant-supported fixed rehabilitation in a woman with atrophic maxilla, employing the All-on-4 hybrid concept. This rehabilitative approach offers numerous advantages over alternative therapeutic strategies, including enhanced predictability, increased simplicity, and a superior success rate.

Introduction

The use of zygomatic implants has become a good treatment alternative for the rehabilitation of the severely atrophic maxilla,[1–3] eliminating donor graft site morbidity, and reducing the overall cost of surgical and prosthetic treatment while maintaining excellent patient satisfaction outcomes.[4,5]

There is generally a low frequency of complications reported in the literature with the use of zygomatic implants: the most prevalent complication seems to be sinus infections,[1,2,6–10] followed by mechanical complications[10,11] and, to a smaller degree, functional complications.[12,13] This group of complications may have a connection to classical surgical techniques for inserting zygomatic implants.[14] For example, the internal technique[15] consists in the insertion of the zygomatic implant intra-sinus, with a potential increased probability of sinus complications and a bulky prosthesis caused by the palatal emergence. The extra-maxillary surgical technique aims to overcome these limitations, by placing the zygomatic implant extra-maxillary (external to the maxillary sinus before anchoring in the zygomatic bone, covered only by soft tissue along its lateral maxillary surface)[16] providing the preservation of the Schneiderian membrane and a decreased vestibular-palatine width of the prosthesis due to the more crestal emergence of the zygomatic implant. The aim of the present case report is to describe the short-term outcome of a fixed prosthetic rehabilitation of the atrophic maxillae supported by standard and zygomatic implants placed through the extra-maxillary surgical technique.

Case report

A 64-year-old Caucasian woman has been under our care since 2004, following the successful placement of an All-on-4 implant in the mandible (Fig. 1). She had been completely edentulous in the upper arch for over 30 years and expressed a strong motivation to undergo surgical

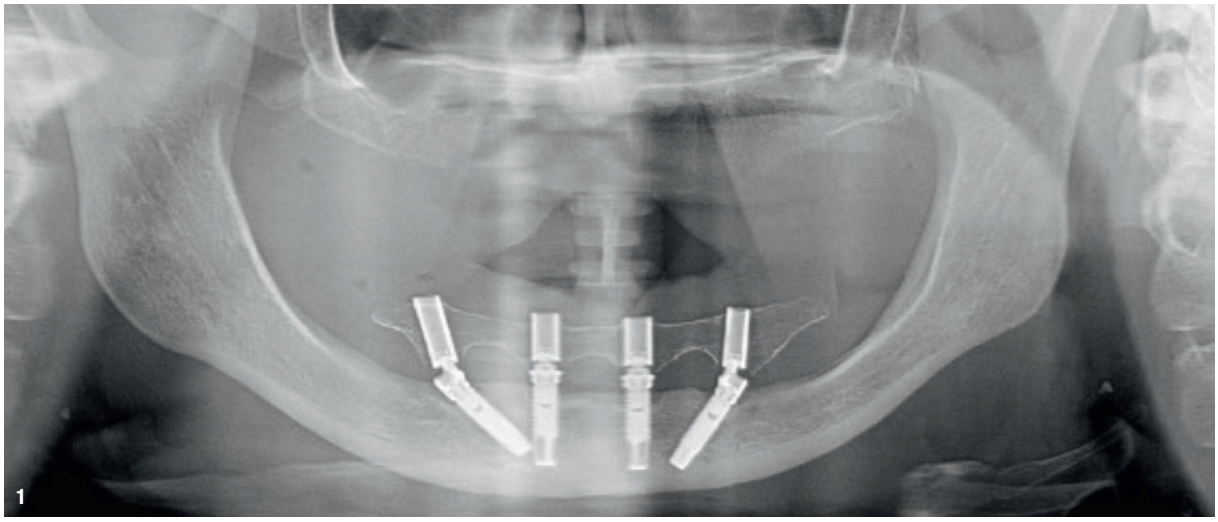


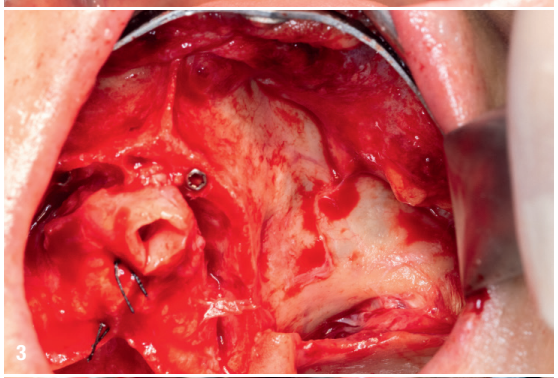
Fig. 1: Pre-operative orthopantomogram.

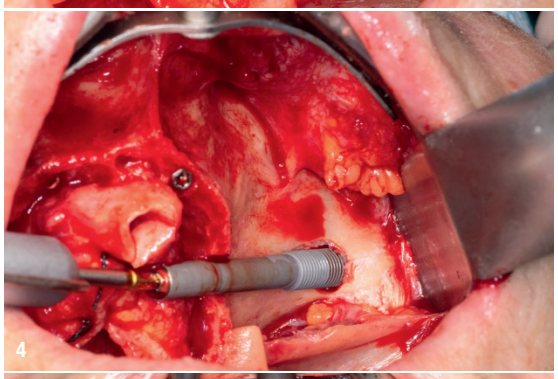
intervention to restore her upper jaw. Her primary objectives were to secure fixed prosthetic teeth and to restore both masticatory function and aesthetic appearance (Fig. 2).

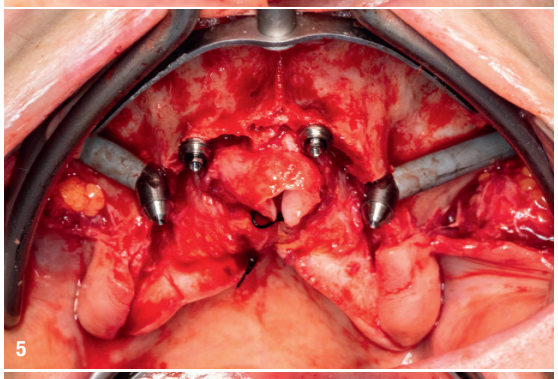
The proposed treatment plan entailed total rehabilitation of the upper jaw with the All-on-4 hybrid technique and was presented in February 2024. The surgical procedure in the upper jaw began with a mucoperiosteal incision performed along the crest of the ridge, slightly palatal (in each quadrant) from the region corresponding to the second molar to the canine. Relieving incisions were done in the first molar area to access the corresponding zygomatic bone. Full thickness flap reflection was performed, and the flap was stabilised using a full arch retractor (Carl Martin) exposing the inferior edge of the zygomatic bone and the insertion of the masseter fascia in the zygomatic arch (distal limit). A second retractor, the zygoma retractor (Carl Martin) was used to access the zygomatic bone body and reflect the soft tissues in this higher level (Fig. 3). The zygomatic implant site was then prepared using a round bur as posterior as possible on both sides, to reduce the cantilever to a minimum. This was followed by 2.9 mm drill (Nobel Biocare), a depth indicator to verify the correct length of the implant, and drills of 3.5 mm, 4.0 mm, and 4.4 mm (Nobel Biocare) used sequentially. During preparation, the soft tissues were reflected and protected, with particular attention being paid to the base of orbit to prevent damage to its contents.

One zygomatic implant (Nobel Zygoma 0°, Nobel Biocare) measuring 5 mm in diameter and 42.5 mm in length was placed with an insertion torque of >50 Ncm in each quadrant in the position of the second premolar (Fig. 4). To compensate for the slope of the implants, 45°/6 mm angulated abutments were used (Multi-Unit Abutment, Nobel Biocare) with a torque tightened at 30 Ncm.[17] Two straight implants (Nobel Speedy Groovy, Nobel Biocare) measuring 3.3 mm in diameter and 11.5 mm in length were placed with an insertion torque >50 Ncm in the anterior region (13 and 21) and two straight abutments of 3 mm (13) and 2 mm (21) were used (Multi-Unit Abutment, Nobel Biocare) with a torque tightened at 25 Ncm (Fig. 5). The flap was repositioned and sutured (4/0 silk; B. Braun Medical; Fig. 6).

The patient's existing PEEK denture was captured directly in the mouth and converted into an immediate fixed prosthesis.







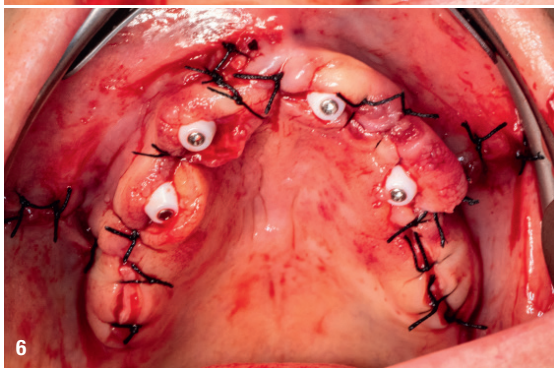


Fig. 2: Intra-oral preoperative occlusal photograph of the maxilla. **Fig. 3:** Intra-oral photograph capturing the inferior view of the zygomatic bone. **Fig. 4:** Intra-oral occlusal photograph demonstrating the placement of a 42.5 mm zygoma implant at 0° in the second quadrant, with flap retraction supported by a zygomatic retractor and a full arch retractor (Carl Martin). **Fig. 5:** Intra-oral occlusal photograph displaying implants and abutments positioned according to the All-on-4® hybrid protocol. **Fig. 6:** Intra-oral occlusal photograph following suturing.

Fig. 7: Intra-oral occlusal photograph of the provisional fixed prosthesis post-delivery. **Fig. 8:** Extra-oral smile photograph showcasing the provisional fixed prosthesis after delivery.

The provisional bridge was finished in the dental laboratory and delivered to the patient's mouth 90 minutes after the surgery ended, achieving immediate function (Figs. 7 & 8).

On day ten post-operation, the patient was seen in the follow-up clinic for removal of sutures; the wound was noted to be healing well and a system for patient follow-up at two, four and six months post-surgery was established (Fig. 9).

Discussion

The present clinical case reports the short-term outcome of a fixed prosthesis supported by immediate function zygomatic implants inserted extra-maxillary with 45-degrees angulated abutments in conjunction with standard implants for the rehabilitation of a severely atrophic maxillae, with high success rates for prosthesis, implants, and abutments. This concept of rehabilitation has several advantages over other therapeutic strategies, namely bone grafts: higher predictability, more simplicity, higher success rate, higher patient comfort and aesthetics, and the possibility of immediate function through provisional low-cost prostheses.[6,18,19] The biggest advantage of applying the All-on-4 extra-maxilla hybrid technique over other techniques lies in the high success rate it can achieve, in contrast to bone grafting techniques (from iliac crest, for example). Using extra-long implants placed externally anchored into the maxilla and zygomatic bone allowed overcoming the anatomical limitations posed, thus opening a new approach to use fixed implant-supported rehabilitation in extreme situations.[6,20]

The importance of planning in advance the rehabilitation of totally edentulous cases with implants must be stressed: whether carried out pre-surgically (using anamnesis, clinical examination and imaging), surgically (through non-guided or guided surgery—static or dynamic) or post-surgically (using an appropriate follow-up regimen).

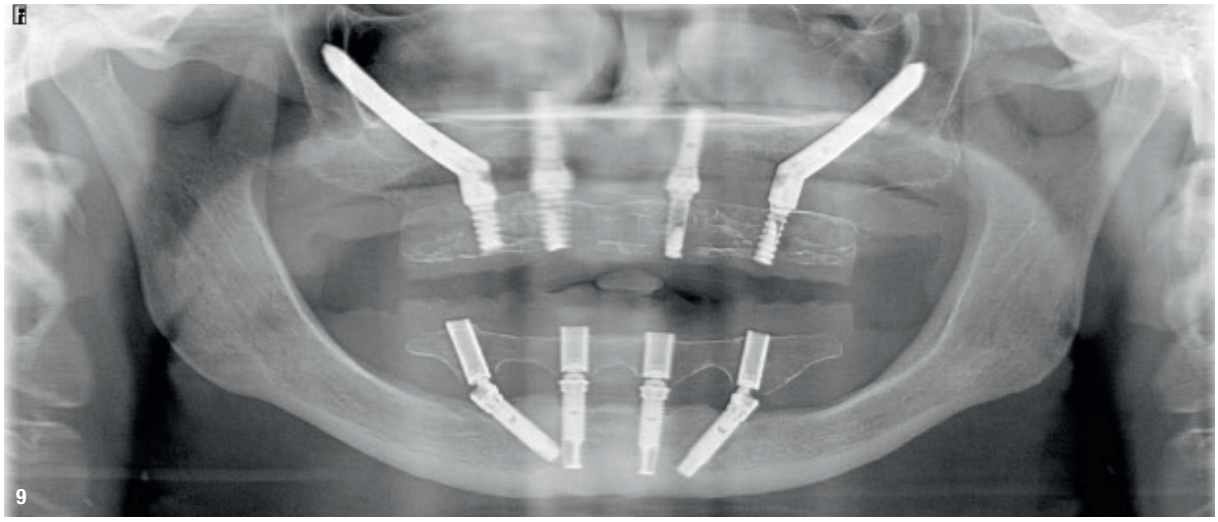


Fig. 9: Post-operative orthopantomogram.

Conclusion

This case study illustrates that the All-on-4 hybrid concept is a viable treatment option for patients with significant atrophy in the upper jaw. Despite the challenges posed by extensive bone loss, this innovative approach enables effective rehabilitation, providing patients with a functional and aesthetically pleasing solution. The All-on-4 protocol utilises only four strategically placed implants to support a complete arch of prosthetic teeth, which minimises the need for bone grafting and other invasive procedures.

Literature

about the authors

Dr Armando Lopes graduated from the University of Lisbon in 2003 and joined MALO CLINIC in 2004 as Director. He specialises in oral surgery and implant rehabilitation, particularly in MALO CLINIC and All-on-4 protocols. He holds a Master's (2013) and PhD (2019) from the University of Granada and has published several scientific works.

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Full-arch dentistry with dynamic navigation and photogrammetry

Dr Emilien Tronc, France

Nowadays, an increasing number of patients are coming to our office with cases of implant failure, whether biological or aesthetic. Recovering from these situations is often complex, as a second failure is not an option. It is crucial to identify the causes of the initial failure and to use all the tools available today to perform both from a surgical and prosthetic perspectives.

How can we find a sustainable solution without incurring significant new costs of care? We will explore this through a common case, where a new workflow allows us to address these challenges effectively.

Case presentation

Our patient is a 61-year-old female business owner who was referred to us due to discomfort with her upper implants, which she finds aesthetically unappealing. She places a high priority on her appearance and is determined to avoid any period without teeth.

The patient reports no systemic diseases, allergies, or medications.

The clinical examination reveals a marked loss of vertical dimension and a collapse of soft tissues and lips, although the upper lip remains intact (Figs. 1a–c). A high smile line is evident, exposing substantial crown height and showing noticeable offsets at the necks of teeth #11 to #22 in comparison to adjacent teeth.

Intra-orally, the patient has two cemented implant-supported bridges in the maxilla, spanning teeth #12 to #15 and #23 to #26. All other remaining teeth are crowned, except for teeth #18 and #28. In the mandible, an implant-supported bridge extends from teeth #35 to #37, and a substantial tooth-supported bridge spans from #44 to #48 (Figs. 2a–c). Clinical examination of the gingiva reveals signs of erythema and inflammation, with edematous and purulent areas, suggesting active periodontal disease as well as peri-implant disease.

Fig. 1a: Initial expression with a closed, natural smile. **Fig. 1b:** Relaxed open mouth smile. **Fig. 1c:** Full, confident smile showcasing unaesthetic implants. **Fig. 2a:** Left quadrant—side view of dental implants and restorations. **Fig. 2b:** Front view of dental work. **Fig. 2c:** Right quadrant—opposite side view of dental implants and restorations.

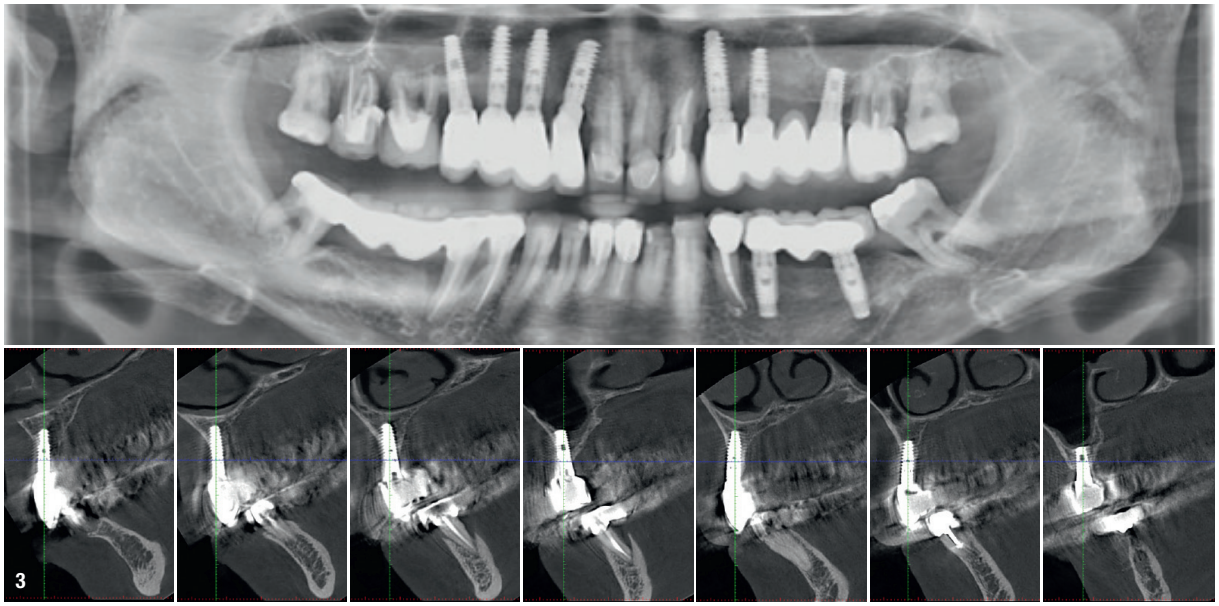


Fig. 3: Panoramic radiograph along with CBCT slides.

Radiographic findings further underscore these concerns, showing attachment loss characterised by angular defects and cratering around the maxillary implants, which were originally placed in 2017 (Fig. 3). A CBCT scan was conducted to analyse implant positioning and evaluate the remaining peri-implant bone structure, revealing additional details pertinent to the patient's periodontal and implant health.

Treatment plan

We noted the patient's clinical complexity, with multiple compromised teeth and implants requiring extensive reconstruction and healing. To improve local conditions, we began periodontal treatment. During reevaluation, we assessed the prognosis of both teeth and implants based on their response to therapy and the patient's enhanced plaque control, all while considering her aesthetic priorities.

Temporary solutions were proposed to help the patient retain her teeth, accommodating her professional commitments. We informed her that management of quadrant four would follow maxillary treatment, as the mandible showed positive response to periodontal therapy, with maintenance every three months.

The maxillary treatment plan was deferred until reevaluation. Teeth #16, #17, and #27 were considered non-conservable due to periodontal issues. Significant bone loss in the vestibular area and the three-dimensional positioning complicated the aesthetic preservation of implants in sectors one and two.

Although there were no indications for extraction, teeth #11 and #22 presented aesthetic challenges. The patient expressed fixed solutions over removable prosthetics.

We evaluated the option of implant removal and tooth extractions, followed by placement of new implants and bone grafting; however soft-tissue quality and inadequate residual bone height made complicated predictable outcomes challenging.

Given the complexity of the case, we opted to use Navident dynamic navigation for precise implant placement and MicronMapper photogrammetry for the prosthetic phase. These technologies ensure optimal accuracy and predictability, ultimately enhancing the aesthetic outcomes we aim to achieve for the patient.

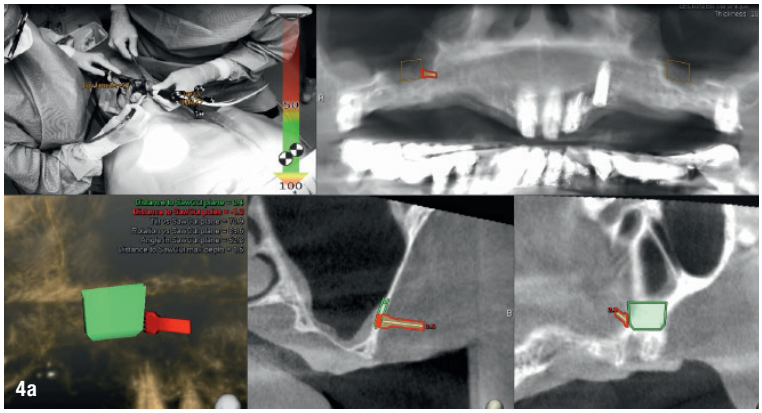
Final treatment plan:

- Step 1: Remove implants and extract teeth #16, #17, and #27; prepare teeth #11, #18, #21, #22, and #28; place a temporary PMMA bridge. Plan for soft-tissue thickening in three to four months.
- Step 2: Conduct bilateral sinus grafting via a lateral approach, with 2D/3D augmentation scheduled for six months afterwards.
- Step 3: Place eight implants; extract teeth #11, #18, #21, #22, and #28; place a functional bridge on the implants six months later.
- Step 4: Final placement of a definitive bridge.

Implementation of the treatment plan

Temporisation

Prior to the first surgery, the patient visited the clinic to gather necessary data for her temporary bridge. Photographs were taken to assist in bridge design, and a digital wax-up was requested. Once received, the wax-up and optical impressions were sent to the prosthetist to fabricate a PMMA bridge with teeth #11, #18,



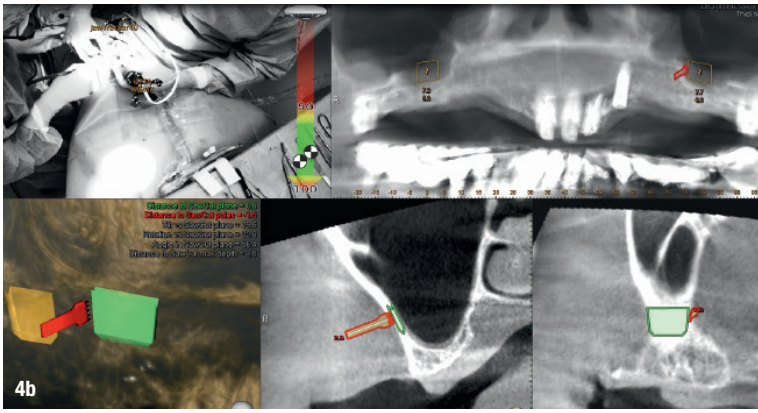


Fig. 4a: Left quadrant—navigated piezo surgery and saw cut. **Fig. 4b:** Right quadrant—navigated piezo surgery.

#21, #22, and #28 as abutments, ensuring thickened pontics.

We recorded the vertical dimension based on the maxillary wax-up and requested a 3D impression of the mandibular model for splints and composite injections for teeth #34 to #38 and #45 to #48.

All prosthetics and implant abutments were removed. At the extraction sites, A partial thickness flap was created while a full-thickness flap from teeth #11 to #22 facilitated implant removal with a left-handed wrench. Most extractions were straightforward, except for tooth #23, which required additional bone surgery. The partial thickness flaps also provided stabilisation for a connective tissue graft.

Postoperative bone remodeling

Two months later, a CBCT scan showed insufficient volume after the removal of the implant and tooth extractions, necessitating remodeling of the maxillary sinus and horizontal augmentation.

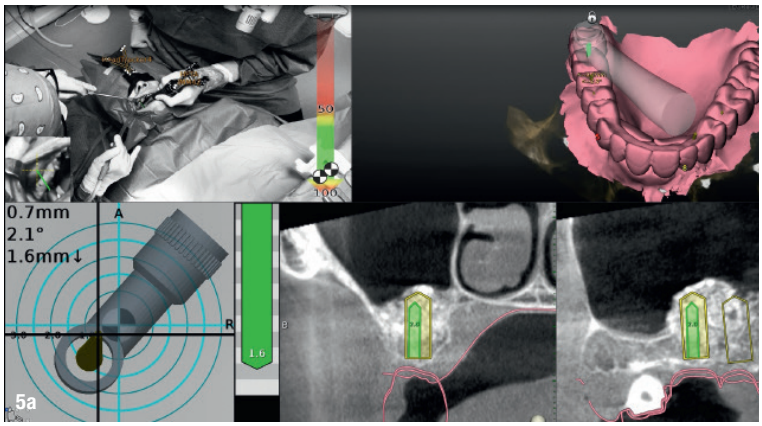
Piezo surgery was employed to elevate and remove the last implant at site 23, thereby creating a cavity to prevent titanium contamination.

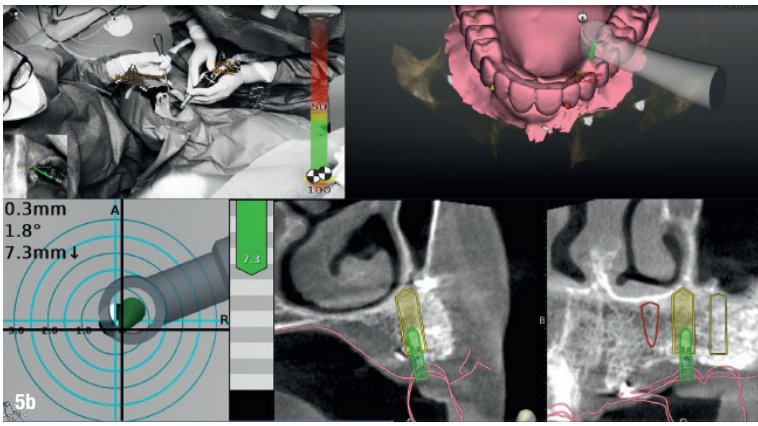
The use of navigated surgery with the Navident EVO system provided precise control and improved access to the sinus windows, ensuring optimal positioning of the graft material. This was possible by first planning the accurate position of the cut in the bone, then executing according to the plan with precise navigation of the piezo blade. The Navident EVO's advanced tracking technology allowed for real-time adjustments, enhancing the accuracy of the procedure (Figs. 4a & b).

Horizontal ridge augmentations were performed following sinus grafts. Sutures were placed and the PMMA provisional bridge was repositioned. The patient is scheduled for follow-up appointments at 15 days, one month, and three months and has diligently adhered to postoperative recommendations.

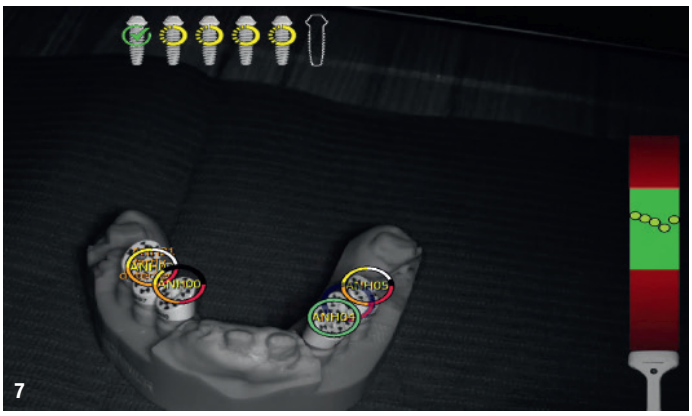
Implant and prosthetic phase

On the day of the implant surgery, we made a crestal incision positioned palatally, minimising elevation to avoid disrupting the previously grafted area. The access provided was adequate for implant placement using navigated guided surgery with Navident EVO, which offered real time tracking of the bone drills along all steps of placing the osteotomy. Using dynamic navigation allowed for





Figs. 5a & b: Navigated implant surgery.



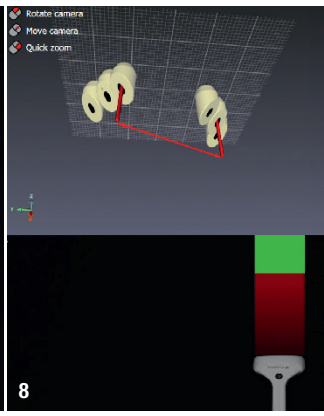


Fig. 6: Printed model with scan bodies. **Fig. 7:** Photogrammetry software showing scan progress. **Fig. 8:** Photogrammetry software showing scan and accuracy.

accuracy checks, precise axis management, and optimal placement of the implants while preserving crestal bone for placing definitive abutments.

We utilised Straumann BLC conical implants to achieve maximum primary stability and anchorage in the native bone, with the exception of sites 16 and 26. All implants were placed at torque levels exceeding 30 Ncm and we recorded the Implant Stability Quotient (ISQ) values ranging from 15 to 25 to confirm the torque during placement, with most values surpassing 70, except for site 14, which recorded 60.

Definitive SRA abutments with a gingival height of 3.5 mm were subsequently screwed in. Healing caps were placed while we managed the soft tissues, utilising the papilla rotation technique to bring gum tissue between each abutment, which was sutured to the palatal flap. We intentionally retained the residual teeth before and after implant placement to:

- Facilitate precise patient registration to use the Navident dynamic navigation system.
- Ensure alignment of implants with the preoperative impression where the wax-up of the functional bridge was placed (Figs. 5a & b).

Photogrammetry using MicronMapper

The photogrammetry software uses scan bodies to capture implant positions with precision down to 20 microns. This level of accuracy is essential for achieving a true passive fit, significantly reducing risks like screw loosening and implant stress—factors crucial for long-term patient outcomes. By minimising manual adjustments and eliminating the need for verification jigs, MicronMapper enables clinicians to deliver faster, more consistent results with fewer patient visits.

We then placed the scan bodies to obtain a soft tissue optical impression. A second impression was taken with MicronMapper using photogrammetry to generate an STL file, which could be combined with both the preoperative and postoperative impressions. Our goal was to provide thorough information and accurate recordings to the prosthetist, aiding in the fabrication of a prosthesis that fits passively. Initially, we incorporated only the first six implants in the provisional bridge.

Illustration of the workflow

The workflow carried out in the mouth is demonstrated using a printed model with analogues as no intra-oral photos were available (Figs. 6–8).

The lab technician gathers all this information in exocad software to complete the design of the new provisional bridge, ensuring it adheres to the previous design and occlusion of the original provisional bridge. The file is then sent back to the office for 3D printing of the provisional bridge in resin. This printing process takes 30 minutes, followed by an additional 20 minutes of postprocessing. The bridge is subsequently sandblasted with 50-micron alumina and cleaned with steam. Finally, a primer is applied before a light finish is done (Figs. 9a & b).

Ultimately, the provisional bridge, engineered for a passive fit, is placed one hour and 30 minutes after surgery,

Fig. 9a: Individual crowns, and printed provisional bridge. **Fig. 9b:** Side perspective, highlighting the contour and alignment.

Fig. 10a: Passive fitting prosthesis after new bridge and implants are placed (one month). **Fig. 10b:** Passive fitting prosthesis after new bridge and implants are placed (three months).

Fig. 11a: Pre-treatment image of patient with full confident smile, and unaesthetic implants. **Fig. 11b:** Post-treatment final result of restored implants and bridge.

with occlusion resembling that of the previous provisional bridge.

This immediate passive fit not only improves comfort but also saves time, reduces the risk of complications, and minimises the need for rework, facilitating better integration with the underlying structures (Figs. 10a & b).
The patient is scheduled to return for postoperative follow-up appointment at 15 days, one month, and again at three months.

Follow-up treatment plan

The functional bridge will be kept in place for a minimum of six months to give the patient sufficient time to plan and complete her mandibular treatment (posterior sectors) before proceeding with the construction of the definitive bridge with the referring practitioner (Figs. 11a & b).

Conclusion

Today, the patient requires comprehensive treatment, including periodontal care, aesthetics, occlusion as well as surgical and prosthetic precision.

The use of nano-filled ceramic resin transforms these temporary bridges into a functional, long-term bridge that can be modified or replaced in a very simple way, helping to reduce overall treatment costs for the patient.

Effective planning for each case is crucial to the success of our therapies and should be paired with efficient tools to be as reproducible and predictable as possible.

Special thanks to Dr Valentini, who greatly contributed to the success of this case study.

about the author

Dr Emilien Tronc is a specialist in periodontology, oral surgery, full-mouth rehabilitation, and digital workflow integration. Based in France, he holds several advanced degrees, including the European Diploma in Oral Implantology from the University of Corsica.

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Literature

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Dr Alina Ion
Editorial Manager

Dr Alina Ion is a knowledgeable dentist with a sharp eye for detail and a wealth of experience in the dental world. Here at our publishing house, she directs a range of national and international publications, sharing the latest breakthroughs and research in dentistry and implantology with professionals around the globe. With her years in the dental industry, Alina has an insider's understanding of the field's challenges and innovations, particularly in implantology. Her expertise and dedication make her a trusted voice, keeping colleagues and readers on the cutting edge of innovation.

Outside the office, Alina's interests take a creative turn. She's an avid theatre enthusiast and finds a unique joy in restoring small antique furniture, reviving old treasures with a touch of polish and a lot of patience—a refreshing balance to her professional pursuits.

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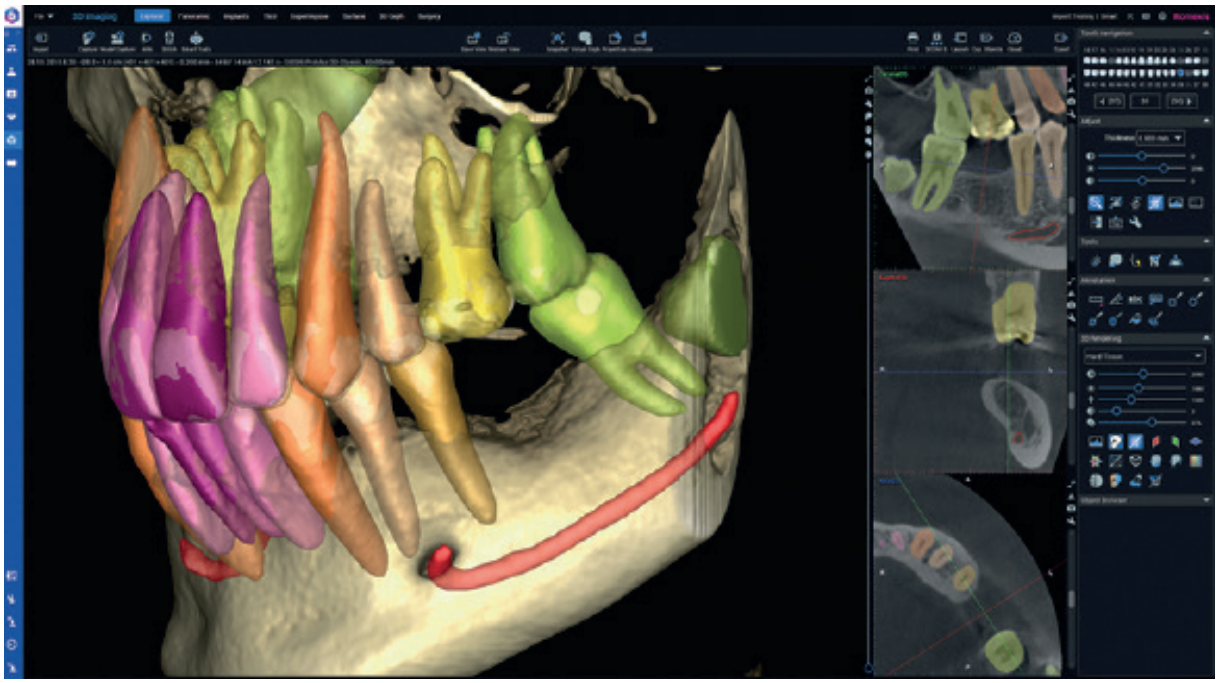
Dentistry innovations through research collaboration



Many of Planmeca's innovations have been born through joint research and close collaboration with research institutions and universities. Research collaboration also allows Planmeca to observe the development of emerging technologies and gain in-depth understanding of their potential applications.

The company has always strived to explore forward-thinking ideas and bring them into practice. This culture of discovery has allowed it to continue to evolve and to always stay one step ahead. Planmeca has been the first in the field of dentistry to introduce several groundbreaking innovations that have been tested with scientific rigour and proven to make a difference.

Of course, development is a never-ending process. Products are never truly finished and there is also an infinite need for new solutions. A strong dedication to research allows the company to push the limits of technology and to open entirely new doors to improvement. After all, much of what is routine today was once considered impossible.

As the largest family-owned company in dentistry, Planmeca is in a fortunate position that has allowed it to adopt a long-term perspective characterised by an enduring and unusually strong commitment to research and development.

This R&D commitment has helped to create an open-minded environment that is very stimulating for those with a deep passion for innovation. The culture of discovery encourages in-house researchers to think beyond current limitations and to explore the potential of emerging technologies and future trends.

Game-changing innovations drive dentistry forward

New technologies and treatment concepts drive the field forward and improve the standard of care. Many of the most influential ideas have been formed as a collaborative effort.

Planmeca's close cooperation with leading dental universities, research organisations and other companies has indeed paved the way for several game-changing dental innovations. While technological breakthroughs are often impressive on their own, their value is ultimately derived from the real-world benefits they offer.

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The company has an extensive history of working together with academic and clinical experts to make sure that research ideas are transformed into tangible products and solutions that make a difference. One of the best known examples is the proprietary Planmeca Ultra Low Dose™ algorithm, the leading and scientifically proven method for acquiring CBCT images at low effective patient doses without compromising the image quality.

Of course, its research efforts have not ended there. In fact, Planmeca is involved in numerous ongoing scientific research projects. Through scientific projects, it even has the opportunity to collaborate with other technology companies, such as different sensor manufacturers.

“In the world of research, it is relatively common for companies and even competitors within the same industry to participate in the same projects. This also applies to big players like Philips or Siemens, which have long been involved in joint projects. This is because few companies can control the entire value chain or achieve significant results on their own in today’s interconnected world. Collaboration, however, allows achieving beneficial outcomes to everyone involved,” explains Jukka Kanerva, Senior Vice President of Planmeca.

The power of research collaboration lies precisely in sharing knowledge and creating synergies among different stakeholders. Consequently, research collaboration not only advances Planmeca’s technological development but also lays the foundation for a sustainable future and broad expertise.

Promising results in ongoing AI research projects

Several ongoing research projects, in which Planmeca has been actively involved in the past few years, have already advanced to the stage of applying for official approvals for the developed solutions. One of them is the AI Head Analysis project, in which Planmeca, CGI, and HUS Helsinki University Hospital are collaborating to develop a diagnostic tool for detecting cerebral haemorrhage from X-ray images with the help of artificial intelligence. The project is part of the CleverHealth Network research ecosystem, which has been formed to facilitate the development of new digital solutions for healthcare.

“AI Head Analysis is an excellent example of how joint research projects can support the development of innovative solutions, which help improve people’s health and well-being. While we continue to develop the AI algorithm within the project, our own product development teams are already exploring future options for utilising the algorithm in maxillofacial images captured with Planmeca devices,” tells Jukka Kanerva.

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Another example of Planmeca's ongoing research collaboration projects also involves leveraging artificial intelligence—this time for locating the nerve canal in the lower jaw. Taking place within the Finnish Center for Artificial Intelligence (FCAI), the collaboration involving Aalto University, Tampere University Hospital and Planmeca has produced a deep learning model to locate the mandibular canal in CBCT images rapidly and accurately. The model has been trained with anonymised hospital data, which is remarkably diverse, including annotated CBCT data from various devices, ethnicities, and surgery cases.

The ultimate goal of the project is to provide a tool for Planmeca Romexis® software, which automatically segments the nerve canal to help dental professionals in implant planning and wisdom tooth extraction. The project has already produced four scientific papers with conclusive results, for example proving the accuracy of the segmentation against the golden standard provided by four specialist radiologists. Thanks to Planmeca's active involvement in steering the research, the AI solution has been designed to work on any Romexis workstation. The work now continues to secure the necessary regulatory approvals for customer use.

Romexis has already been complemented with new tools for 2D and 3D imaging that harness the potential of artificial intelligence, which have also been developed together with academic and clinical experts. For example, Romexis Smart utilises scientifically proven Relu AI engine, which has been developed together with KU Leuven.

Exploring diverse routes of discovery

Besides AI, Planmeca is currently involved in several other research projects. One of them is TOMOHEAD, which aims to develop edge cloud computing algorithms to enhance the calculation efficiency and clinical performance of CBCT imaging. The project revolves around the edge cloud computing technology developed by Nokia and also involves Helsinki University, Oulu University Hospital and sensor technology company Detection Technologies. The three-year project is coordinated by the University of Oulu and has secured a funding of over five million euros from Business Finland.

In the realm of 3D printing, Planmeca plays an active role within the research consortium cerAM. This consortium consists of five industrial companies dedicated to studying the 3D printing of ceramics for diverse applications, including developing 3D printable ceramic crown materials. Tampere University leads this project, which receives funding from Business Finland.

Engaging in various research projects, either as an active participant or through steering groups, enables Planmeca to keep updated on entirely new, emerging technologies. These projects can even extend beyond the realms of dentistry and medical imaging to areas like optics, photonics, and spectral imaging. For instance, Planmeca is tracking ongoing research analysing the spectral data of intra-oral tissues through steering group involvement. Planmeca also provides equipment and product support for various research projects.

Planmeca also collaborates with individual researchers, including doctoral candidates. Dr Juha Koivisto, Planmeca's Chief Physicist, has conducted several studies on lowering the effective patient doses. Dr Koivisto is also involved in numerous scientific articles based on clinical studies conducted by customers, assessing the usability of technology developed by Planmeca.

Currently, Planmeca also has an employee through the national Postdoc for Companies (PoDoCo) programme, led by the University of Eastern Finland, working on inverse mathematics to develop iterative CBCT reconstruction. Finnish Research Impact Foundation recently granted EUR170,000 in funding for the project's continuation.

"We have not limited our approach to scientific research and research collaboration. By utilising different channels, we believe we can foster innovation and breakthroughs and also expand our network of expertise and resources. You never know where the next big idea will come from. In the end, their results will benefit the users of Planmeca solutions," Jukka Kanerva says.

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Advancing interdisciplinary exchange in dentistry and dental technology

The BEGO Dialogues 2024 in Bremen successfully convened over 200 participants from the fields of dentistry and dental technology for a vibrant three-day programme. Featuring 18 renowned speakers and led by expert scientific chairs, the event covered an array of current and emerging topics. Universities from Halle, Berlin, Frankfurt, Mainz, Munich, and Düsseldorf were notably represented, with distinguished faculty sharing insights on the latest advancements in the dental sector. Key discussions centered on digital implant prosthetics, 3D printing innovations, and cutting-edge prosthetic solutions. Renowned thought leaders from academia and clinical practice introduced technologies poised to transform laboratory and clinical workflows, making them more efficient and effective. Interactive discussion sessions and collaborative case studies further reinforced the connection between dentistry and dental technology, providing attendees with practical takeaways and new perspectives for the future of the industry.

BEGO DIALOGE
ZWANZIGVIERUNDZWANZIG

A memorable networking experience

A highlight of the event was the evening gathering at the Old Shipyard, where a warm, welcoming atmosphere fostered informal conversations and networking among peers. This stylish venue created the ideal backdrop for collegial exchange, blending inspiration from the day's lectures with relaxed, meaningful networking opportunities. Reflecting on the success of the BEGO Dialogues 2024, Scientific Chair Dr Markus Tröltzsch shared, "The BEGO Dialogues offer a unique platform for interdisciplinary exchange on an equal footing. We are delighted by the positive feedback and the engaging discussions that defined this year's event."

Once again, the BEGO Dialogues underscored the vital role of collaboration and networking within the dental industry. BEGO extends its gratitude to all participants, speakers, and partners for their dedication and looks forward to continuing this impactful series in 2026.

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EAO Congress 2024: Advancing excellence in implant dentistry

Over 4,600 attendees from more than 70 countries gathered in Milan from 24 to 26 October for an exceptional EAO Congress, themed "Details Make Perfection". This year's programme, thoughtfully curated by the scientific committee, was designed to both inspire and challenge participants, with each day focusing on a specific theme: The Fundamentals, State of the Art—Certainties, and Beyond the Limits. Sessions featured the latest evidence-based practices, delivering practical techniques that dentists can readily implement in their practices.

The congress, as always, provided a unique opportunity to learn from leading experts in the field. Continuing its tradition of collaboration with prominent local associations, the EAO partnered with the Italian Academy of Osseointegration (IAO) and the Italian Society of Periodontology (SIdP). Their invaluable contributions enriched

the programme, presenting a comprehensive perspective on the latest advancements in implant dentistry.

Among the many highlights, distinguished specialists shared insights on the challenges and innovations in implant care, covering topics such as sustainable treatment models, digital advancements, and optimised protocols for complex cases. Workshops offered participants hands-on experience with the latest techniques, equipping them with practical skills for immediate application.

Attendees enjoyed cutting-edge presentations, connected with esteemed colleagues from around the world, and experienced the dynamic ambiance of one of Europe's most iconic cities. Meanwhile, an extensive industry exhibition featuring leading companies in the field fostered the exchange of the latest materials, techniques, and technologies.

This congress marked the EAO's second event in Italy in the past decade, following the successful congress in Rome in 2014. Milan, with its vibrant culture and cosmopolitan energy, served as an inspiring setting for this global gathering.

For those who could not attend all sessions, a selection of conference recordings is available on the congress platform starting 5 November free of charge.

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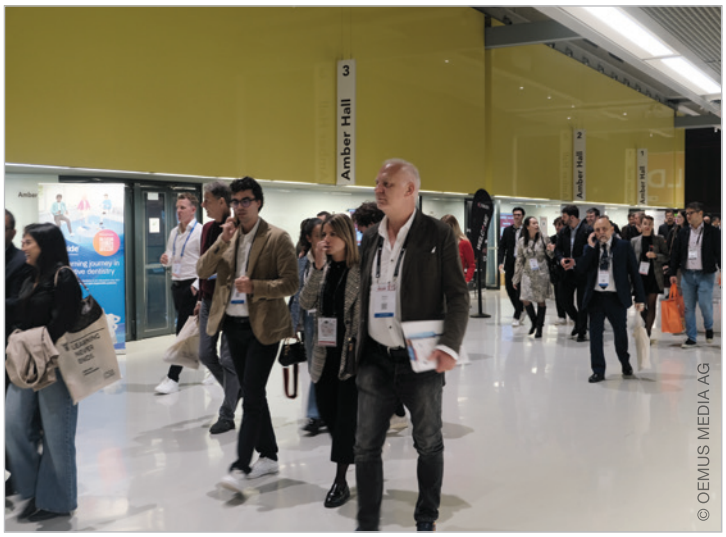

ClaroNav

MicronMapper: Precision redefined for full-arch dentistry

MICRONMAPPER

MicronMapper marks a breakthrough in full-arch dentistry, delivering exceptional accuracy and efficiency through cutting-edge photogrammetry technology. Having achieved CE mark approval in September 2024, MicronMapper is now available for European clinics, providing reliable, precise results in complex full-arch implant cases.

Designed to overcome common challenges in restorative dentistry, MicronMapper captures implant positions within 20 microns. This precision is critical for achieving a passive fit, reducing risks like screw loosening and implant stress—factors essential for long-term patient outcomes. By minimising manual adjustments and eliminating the need for verification jigs, MicronMapper enables clinicians to deliver faster, more consistent results with fewer patient visits.

Key Benefits of MicronMapper

- **Unmatched precision:** Leveraging true photogrammetry, MicronMapper ensures optimal passive fit for full-arch cases, allowing clinicians to streamline workflows and increase reliability.
- **Enhanced efficiency:** MicronMapper's data capture integrates into existing workflows, reducing chair time and boosting patient throughput by minimising rework.
- **Clear ROI:** By cutting down on costly rework and follow-up appointments, MicronMapper improves operational efficiency, offering clinics a strong return on investment while elevating patient satisfaction.

MicronMapper sets a new benchmark in dental technology, merging precision with operational ease. For clinics aiming to lead in digital dentistry, MicronMapper is an indispensable tool for achieving outstanding clinical results and enhancing the patient experience. For distribution or purchase inquiries, please contact.

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Geistlich Pharma

Geistlich receives MDR approval for entire product portfolio

The entire Geistlich product portfolio has been successfully certified according to MDR—well before the official transition period. The pioneer in medical regeneration thus confirms its claim to meet the highest quality and safety standards.

As one of the first companies in its field, the regeneration specialist Geistlich has successfully completed the approval process for its entire product portfolio in accordance with the new Medical Device Regulation (MDR) of the European Union (EU) 2017/745. Geistlich thus meets the highest European standards of quality, safety and performance for medical devices.

For MDR certification, clinical and preclinical evidence as well as safety and performance data were thoroughly reviewed. Since the project to achieve certification started in 2017, Geistlich has submitted more than 2,200 documents with almost 40,000 pages and had its quality management system audited according to MDR. The entire process required several years of collaboration between teams from different departments and shows how challenging it is to obtain MDR approval even for established products. "Without the solid scientific basis of our products and our high quality standards, MDR certification would not have been possible so quickly," says Diego Gabathuler, CEO of Geistlich.

The early MDR certification of all Geistlich products, even before the official deadline in 2027, underlines the company's strong commitment to the highest quality and safety standards. The certification is both proof and an incentive to continue to provide safe and effective solutions for patients and healthcare professionals, and to continue to advance the field of medical regeneration.

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Carl Martin

Zygoma—double hook—full arch retractor

Carl Martin GmbH, based in Solingen, Germany, has collaborated with Dr Armando Lopes of the MALO CLINIC in Lisbon, Portugal, to launch a newly redesigned series of retractors. The series was unveiled at this year's EAO Congress in Milan, Italy, where it received significant attention.

"The event was a tremendous success. Our international audience experienced firsthand the advantages of these innovative instruments at our booth, with Dr Lopes' live demonstration highlighting their benefits," said Junior CEO Philip Holzknecht.

Additional presentations for professionals interested in surgical and implantological advancements were held at the 53rd International Annual Congress of DGZI in Düsseldorf, the 40th Annual Meeting of the BDO in Berlin, and will also be presented at the 38th DGI Congress in Dresden from 28–30 November.

Carl Martin GmbH
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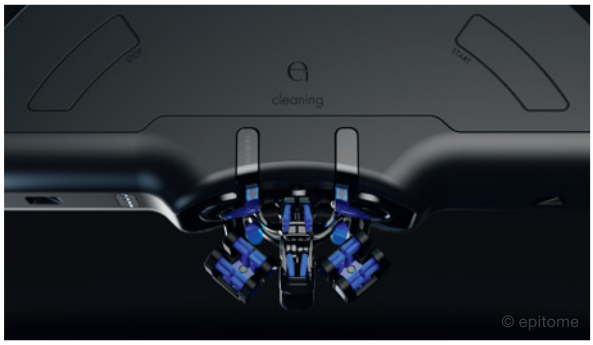
Florian Giesen, Technical Development and Sales at Carl Martin, Dr Armando Lopes, developer of the retractors, and Philip Holzknecht, Junior Managing Director at Carl Martin (from left) during the EAO Congress in Milan.

epitome

Novel dental cleaning device removes biofilm by up to 99 per cent

The "e1" by epitome represents a significant advancement in dental hygiene technology, diverging entirely from conventional toothbrushes in both design and function. As the world's first autonomous dental cleaning device, e1 was meticulously developed by a high-tech company in Vienna between 2018 and 2024. This innovative device employs sophisticated artificial intelligence to conduct a comprehensive analysis of the teeth, subsequently executing a thorough cleaning in under 60 seconds. Utilising 50 advanced sensors and 14 nano-cameras, e1 accurately detects biofilm accumulation and effectively targets its removal in a sequential process. The efficacy of this "intelligent cleaning" protocol has been substantiated through rigorous laboratory testing, demonstrating a remarkable cleaning efficiency and reach of up to 99 per cent[1] within a mere 30 seconds[2] for both the maxillary and mandibular arches.

Upon completion of the cleaning cycle, users receive an indepth analysis detailing critical health metrics, including body temperature, heart rate, blood pressure, cortisol levels, and oxygen saturation, thus promoting an integrated approach to oral and overall health.



The research and development of e1 involved collaboration with esteemed experts in the field of biofilm research, including Prof. Georgios Belibasakis, Dr Reinhard Gruber (Professor of Oral Biology at the University Dental Clinic of Vienna), and Prof. Barbara Cvikl (Sigmund Freud Private University Vienna).

e1 is available for order through the company's online shop, and interested individuals are cordially invited to experience this groundbreaking product at the pop-up store located at Kohlmarkt 10 in Vienna, Austria.

[1] Referring to the detected tooth surface.
[2] The cleaning time depends on the jaw structure, tooth alignment, and the amount of biofilm/plaque.

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Global Consensus for Clinical Guidelines (GCCG)

International experts define standards for edentulous maxilla treatment

During a press conference at the Annual Meeting of the European Association for Osseointegration (EAO) in Milan, the Global Consensus for Clinical Guidelines (GCCG) was announced. For this pioneering initiative, the EAO, the International Team for Implantology (ITI), and the Osteology Foundation have joined forces with the aim of establishing clinical guidelines for the treatment of the edentulous maxilla. Contributors from around the world and professional organisations have been invited to ensure global relevance. The GCCG uniquely integrates feedback from international clinicians, researchers, patients, and stakeholders, with the goal of enhancing patient outcomes.

© GCCG

Fig. 1: The GCCG involves contributors and associations from around the world.

"The GCCG represents an innovative, evidence-based approach to consensus-building in implant dentistry," explained the scientific leaders and co-initiators, Frank Schwarz and Hom-Lay Wang. Engaging a broad spectrum of international experts, patients, and stakeholders, this initiative contrasts traditional consensus conferences by aiming to create straightforward, practical clinical workflows that improve outcomes for clinicians and patients alike.

Enhancing treatment through evidence-based guidelines

This first GCCG focuses on the rehabilitation of the edentulous maxilla, which significantly affects patients' quality of life. Therefore, by focusing on real-world application, the GCCG seeks to equip clinicians with actionable, evidence-driven guidelines to improve treatment outcomes for these patients.

Frank Schwarz emphasised the importance of integrating patient and clinician perspectives in the GCCG: "Our guidelines aim to be clinically effective and reflective of patient needs, ensuring that our recommendations enhance treatments and ultimately improve patients' lives."

"Our guidelines aim to be clinically effective and reflective of patient needs, ensuring that our recommendations enhance treatments and ultimately improve patients' lives."

"Therefore, at the core of the GCCG's methodology are Patient Reported Outcome Measures (PROMs) and Clinician Reported Outcome Measures (CROMs), evaluated through systematic reviews," he explained. "What also makes the GCCG unique is that comprehensive feedback is gathered via tailored Delphi surveys that have been distributed to a substantial number of clinicians,

Fig. 2: Press conference during the EAO Annual Meeting in Milan.

patients, and public stakeholders. We have undertaken these extensive efforts to incorporate a wide range of perspectives. The results from these reviews, surveys, and associated meta-analysis then form the basis for formulating the actual clinical guidelines, ensuring their clinical relevance and practicality."

A global collaborative effort

The GCCG draws expertise from around the world, making the guidelines applicable in various cultural and clinical contexts. "This is not just about developing another set of guidelines; this is about reshaping how we approach clinical practice in implantology," explained Hom-Lay Wang and continued: "By bringing together voices from all over the world and including both clinicians and patients, we are creating a global framework that will have a lasting impact on the way we care for patients."

Many traditional consensus conferences had only regional impact and did not achieve global recognition and clinical relevance. The GCCG wants to overcome this by involving contributors and associations from around the world.

The efforts will culminate in a consensus conference in Boston in June 2025, where over 120 international experts will discuss and formulate the first global guidelines for the treatment of the edentulous maxilla.

Joining forces to advance clinical practice

Representatives of the three core organisations that have teamed up to jointly organise the GCCG were also present at the press conference.

Ronald Jung, President of the EAO and a co-initiator of the GCCG, underlined the collaborative strength of the GCCG, noting, "The strength of the GCCG lies in its ability to unite experts from around the world and create guidelines that will benefit clinicians and patients alike. We are striving to make sure that these guidelines will be useful across different clinical environments, ensuring better treatment outcomes for patients facing the challenges of edentulism."

Charlotte Stilwell, President of the ITI, supported this sentiment, adding, "The ITI is proud to support the GCCG because it aligns with our mission of promoting the highest standards of clinical practice. We believe that by integrating patient feedback and focusing on evidence-based solutions, the GCCG will deliver guidelines that have a tangible impact on improving patient care."

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Fig. 3: Signing of the Memorandum of Understanding.

Frank Schwarz, commented on behalf of Christer Dahlin, President of the Osteology Foundation, who could not attend. He also emphasised the alignment with their goals: "The GCCG aligns perfectly with the Osteology Foundation's focus on oral regeneration and its mission to ultimately improve patient care. Our joint aim in this collaboration is to create clinical guidelines that directly translate into better treatments for patients."

With these statements, the leaders highlighted the powerful collaboration in developing globally applicable clinical guidelines.

Concluding the press conference with a strong message of unity and a forward-looking vision, they added that this alliance might be a starting point for further collaborative efforts and could serve as a stepping stone for additional activities. "Discussions are already ongoing," they said.

Source: Global Consensus for Clinical Guidelines

"By bringing together voices from all over the world and including both clinicians and patients, we are creating a global framework that will have a lasting impact on the way we care for patients."

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Congresses, courses and symposia

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26–30 November 2024
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adfcongres.com/en/homepage/

IDS—International Dental Show 2025

25–29 March 2025
Cologne, Germany
www.ids-cologne.de

EuroPerio 11

14–17 May 2025
Vienna, Austria
www.efp.org

ITI Annual Global Conference

23–24 May 2025
Paris, France
www.iti.org

FDI World Dental Congress

9–12 September 2025
Shanghai, China
www.fdiworlddental.org

implants
international magazine of oral implantology

Imprint

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Published by
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Holbeinstraße 29
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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).

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