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1/23

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research
Clinical success rate of two-piece zirconia dental implants

case report
Magneto-dynamic site preparation for zirconia implants

news
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Titanium versus zirconia? Osteo-immunology in implantology

Dr Johann Lechner, Germany
Integrative Oral Medicine and Osteoimmunology
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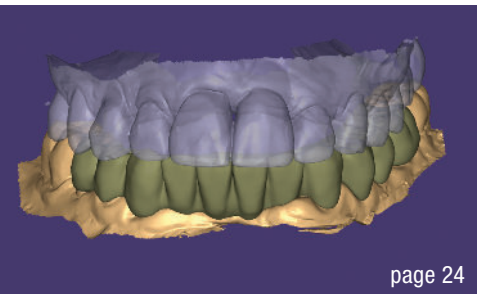
Author details

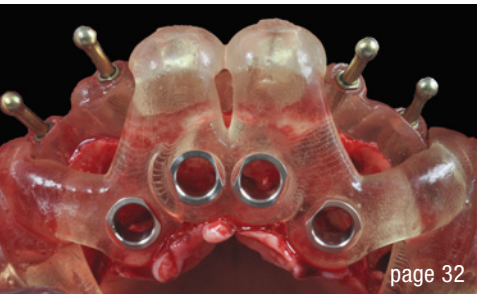
Titanium and zirconia are the two primary materials used in dental implantology. While both materials have been used successfully for many years, there is still a debate about which one is better. Titanium has been the traditional choice for dental implant surgery for over 40 years. However, there are some concerns with the use of titanium implants. One growing concern is that dissolved titanium particles induce inflammatory reactions not only in the superficial margin but also around the bony bed of the titanium implant. Specifically, the inflammatory cytokine tumour necrosis factor-alpha (TNF-β) is expressed in the adjacent bone. The transition from TNF-β-induced local inflammation after placement of titanium implants to a chronic stage of "silent inflammation", that is, low-grade chronic inflammation, could be a cause of apparently unexplained medical conditions, and this neglected area of consideration is investigated in osteo-immunology. Osteo-immunology, however, is an emerging field, but has already provided valuable insight into the mechanisms of bone growth, development and regeneration, as well as the role of the immune system in these processes. In the context of implantology, osteo-immunology is important because the success of dental implants depends on the ability of the implant to integrate with the surrounding bone tissue. When a foreign material such as a dental implant is introduced into the body, the immune system reacts to it. This immune response can be beneficial, as it can help to promote the integration of the implant with the surrounding bone tissue. However, if the immune response is too strong, it can lead to chronic inflammation and potentially contribute to implant failure. By understanding the interactions between the immune system and bone tissue, researchers can develop better implant materials and techniques that minimise the risk of inflammatory responses and improve the long-term success of dental implants.

Multiple studies have proved that zirconia implants induce little to no peri-implant tissue inflammation and allow for high levels of epithelial attachment. Thus, in recent years, these ceramic implants have gained significant traction as a viable alternative to traditional titanium implants. They offer numerous advantages, including superior biocompatibility, enhanced aesthetics and excellent mechanical properties.

In conclusion, the choice between titanium and zirconia implants ultimately depends on the individual patient. While titanium implants have been the traditional choice, zirconia implants are becoming increasingly popular.

Yours,
Dr Johann Lechner


page 24


page 32


page 44

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editorial

research

case report

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Clinical success rate of two-piece zirconia dental implants

Dr Joseph Sarkissian & Minehli Kamarzar, USA

With the recent development of mechanically improved and clinically versatile zirconia implants, their clinical use over the past several years has become more widespread globally. Although zirconia implants currently represent a niche market, their popularity worldwide is growing rapidly.[1] Studies show that zirconia implants offer many advantages over metal implants, including aesthetics, greatly reduced plaque retention and incidence of peri-implantitis, lower accumulation of surface biofilm compared with titanium implants, outstanding biocompatibility, and a degree of osseointegration and soft-tissue response that is superior to that of titanium dental implants.[2–5] Owing to the white colour of zirconia implants, they do not exhibit the unsightly metallic grey shadowing under the gingival tissue as do titanium implants. This fact alone imparts a significant aesthetic advantage of zirconia over metals as a material choice for dental implants. Zirconia has a very high hardness scale, is a strong insulator, is not electrogalvanic and does not corrode. Overall, zirconia implants provide an excellent aesthetic and biocompatible alternative not only for today's health-conscious patients but for mainstream dentistry as well.

This article reports on a study involving only one of the many zirconia dental implant models offered by Z-Systems. Specifically, the clinical performance of all Z5c implants placed in our dental practice between January 2016 and July 2022 will be presented.

The Z5c is a two-piece implant system which has an implant with a flared platform intended to be at tissue level and an abutment which is cemented into an internal access hole in the middle of the platform. The proprietary Zirkolith process and SLM (Surface Laser Modified) technology used in the production of all Z-Systems' implants were introduced in 2009.[6]

All Z5 implants are made from TZP-A Bio-HIP. The hot isostatic pressing (HIP) process results in a material which has a far greater flexural strength than titanium.[7] The laser modification of the surface increases the surface area, facilitating excellent osseointegration and tissue response. The tissue-level design of the implants allows for preparation of both the abutment and the

Fig. 1: Z5c implant after the four- to six-month healing period and preparation and exposure of the implant margins with the Waterlase prior to cementing the abutment. **Fig. 2:** Abutment cemented and prepared prior to scanning. **Fig. 3:** IPS e.max CAD crown milled with CEREC and cemented on the same day.

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*Brunello G, Rauch N, Becker K, Hakimi AR, Schwarz F, Becker J. Two-piece zirconia implants in the posterior mandible and maxilla: A cohort study with a follow-up period of 9 years. Clin Oral Implants Res. 2022 Dec;33(12):1233-1244. doi: 10.1111/clr.14005. Epub 2022 Oct 31. PMID: 36184914.

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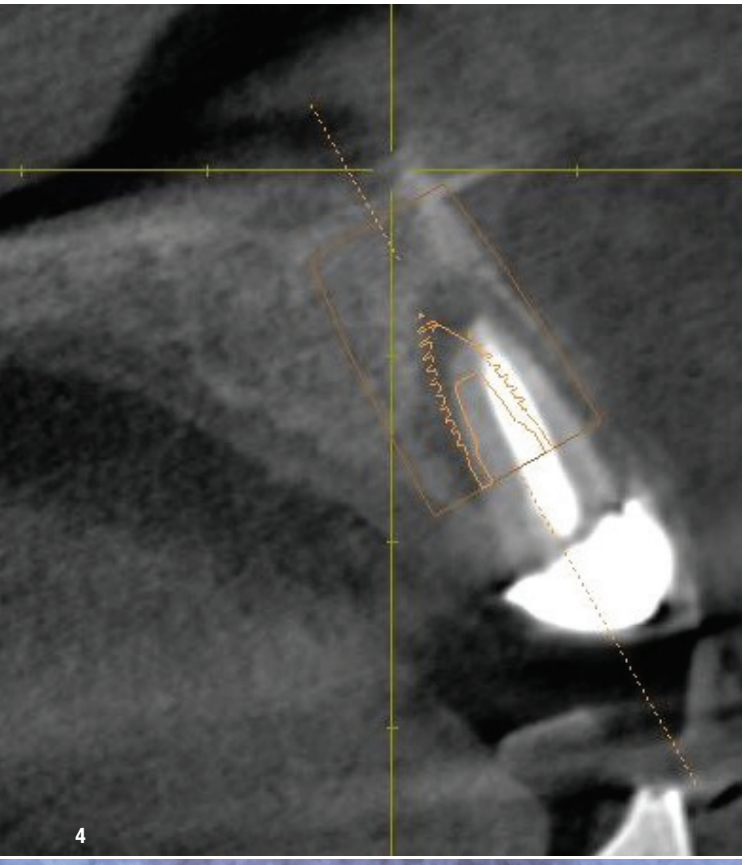

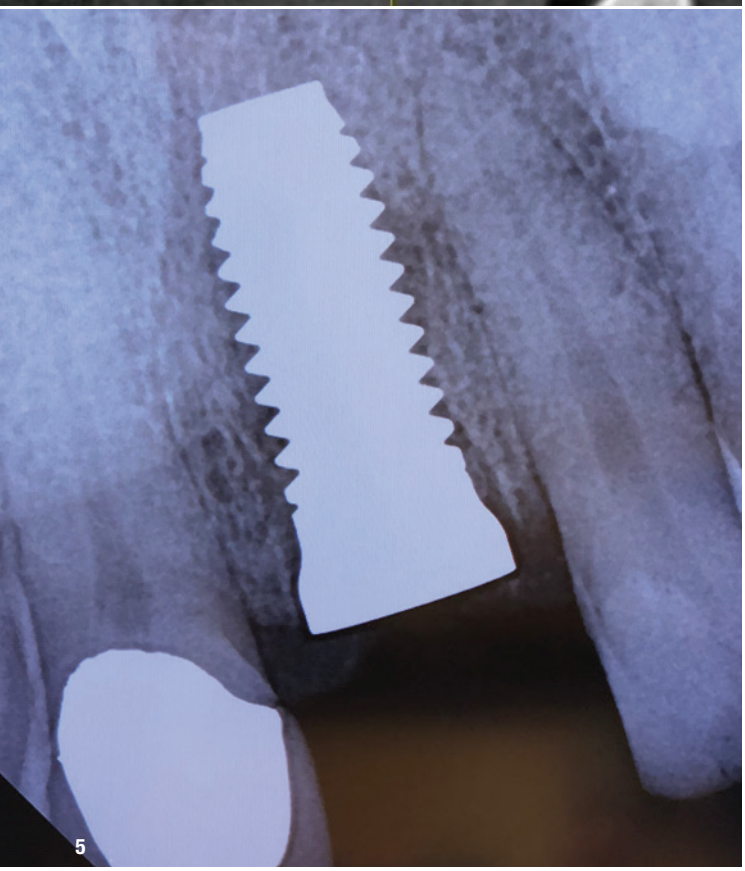

Fig. 4: Failing endodontically treated maxillary incisor planned for extraction and immediate replacement with a Z5c implant.
Fig. 5: Radiograph of the implant after immediate placement.

margins. The most desirable attribute of the tissue-level implant is that it does not interfere with the highly vulnerable biological zone between the alveolar crest and the gingival surface.

Materials and methods

Of the 110 implant cases, 74 were performed in female patients and 36 in male patients. The final cases included in the study were a cohort of 73 patients, 47 female patients and 26 male patients.

All the surgeries followed a semi-guided protocol. A CBCT scan was obtained, and a surgical guide was made using various methods. The surgical guides were intended and designed to be used for the initial osteotomy with a pilot drill to a depth short of 2 mm of the projected depth. In most cases, a flapless or conservative papilla-sparing flap design was used. A radiograph with a guide pin was taken to confirm and modify depth and angulation after the initial osteotomy. Bone threading was performed except in sites of D3 and D4 bone quality. All the implants were placed within 1 mm of the gingival level; however, most were placed either at or slightly below gingival level. Only implants of 4 and 5 mm in diameter and lengths of 8, 10 and 12 mm were used, depending on the osseous anatomy. The placement torque ranged from 25 to 35 Ncm.

All the patients were required to wear a protective Essix appliance 24/7, even while eating, for two months. The Essix appliances were made on a preoperative model with a vacuum forming unit using Essix A+ or PLUS Plastic (Dentsply Sirona) of 1 mm thickness. The implant sites were blocked out to prevent any contact during wear. The healing times ranged from three to six months.

After healing, testing for successful osseointegration was carried out with a torque test at 20 Ncm. After the internal access hole had been thoroughly decontaminated and primed, the abutments were cemented with a dual-polymerising resin cement, such as PANAVIA SA Cement Universal (Kuraray Noritake Dental) or RelyX Unicem (3M). After placement of the abutment, a Periotest reading (Medizintechnik Gulden) was obtained. Fully integrated implants exhibit a Periotest value of between –0.5 and –7.0, a higher negative number indicating stronger integration.

The abutment and implant shoulder were typically ground and shaped with a fine, red-striped diamond bur to conform to the contours of the gingiva and create adequate abutment angulation, taper and clearance. The implant margins were prepared and exposed with the Waterlase (BIOLASE) prior to cementing the abutment. The crowns were made in-house on the same day with CEREC technology from either IPS e.max CAD (Ivoclar) or Lava Ultimate materials (3M). Their occlusion was designed with less intensity than on the rest of the dentition. The crowns were cemented with the same dual-polymerising resin cement used for the abutments. The implants were typically followed up every six months during the recall appointments, and Periotest values were taken (Figs. 1–21).

Fig. 6: Occlusal view of the implant after immediate placement. **Fig. 7:** Occlusal view of the same implant after five months of healing, ready to be restored. **Fig. 8:** Same implant after laser exposure of the margins, abutment cementation and preparation for a CEREC-milled crown. **Fig. 9:** Same implant after receiving the final crown on the same day. **Fig. 10:** Implant ready to be scanned, demonstrating excellent tissue response after ideal margin exposure and emergence profile creation performed on the same day with the Waterlase. **Fig. 11:** Same implant restored on the same day with a CEREC-milled IPS e.max CAD crown. **Fig. 12:** Implant replacing a maxillary second premolar after four months of healing, demonstrating excellent tissue healing and no foreign-body response. **Fig. 13:** Same implant after laser margin exposure and removal of the abutment access hole seal.

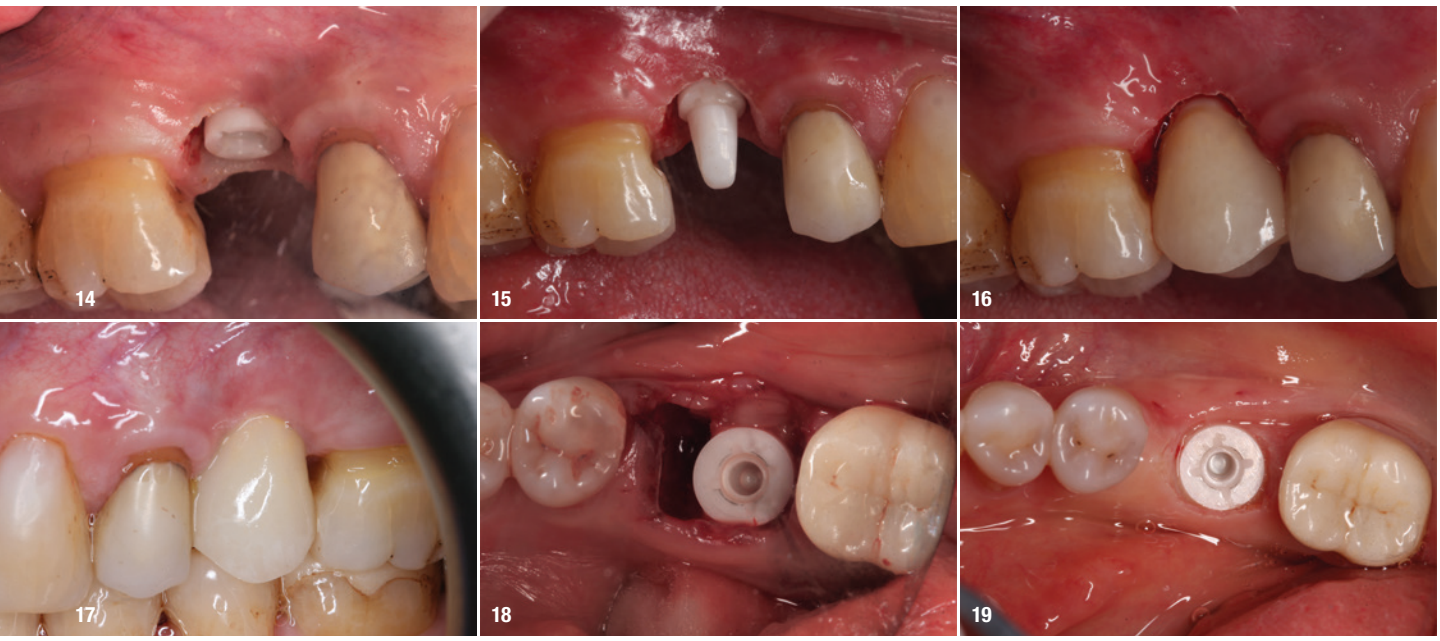

Fig. 14: Side view of the same implant. **Fig. 15:** Side view of the same implant after cementation and preparation of the abutment. **Fig. 16:** Same implant restored with a CEREC-milled IPS e.max CAD crown on the same day. **Fig. 17:** Same implant and crown at the three-month follow-up, demonstrating excellent tissue response. **Fig. 18:** Immediate implantation and simultaneous grafting after extraction of a mandibular molar. **Fig. 19:** Occlusal view of the same implant after four months of healing, demonstrating excellent tissue response.

Results and discussion

Of the 110 implant cases, 104 were successful and six failed (Table 1), yielding a success rate of 94.5% and a failure rate of 5.5%. The failure rates according to sex were not statistically significant. The average time between implantation and removal due to failure of the implants was 7.33 months. Of the six failures, three of them were delayed, occurring after initial osseointegration and final restoration of the implant. The follow-up period for the successful implants ranged from eight months to seven years, representing the time elapsed from their respective placements to the date of completion of this study.

In a retrospective analysis of the failures in this study, all of them had an underlying mitigating circumstance which increased the risk of implant failure. One case revealed elevated blood glucose and cholesterol levels along with a low vitamin D_3 level in a blood test performed in the months after implantation. One other failure case also had a low vitamin D_3 level. Two other cases had a simultaneous crestal sinus lift and insufficient primary stability when the implant was placed. One case in an older female patient failed owing to reckless chewing habits and non-compliance during the period immediately after restoration. Other causes of failure may have been insufficient primary stability (namely an insertion torque of around 20 Ncm) and epithelial migration into the implant–bone interface.

Failure was more common in patients older than the age of 40 (Table 2; Fig. 22). Owing to the low number of failures, however, the statistical significance of age and site location (Table 3) could not be determined. Additionally, there are many other risk factors which may contribute to

Months elapsed to failure*	Tooth no.	Sex (M/F)	Age (years)
2	16	M	55
6	37	F	63
6	46	F	58
8†	13	F	76
8†	46	F	43
14†	37	M	59

Table 1: Variables of failed implants.

* Average number of months elapsed between implantation and failure was 7.33.

† Failed after restoration.

Age (years)	Implant success rates
20–29	3/3 = 100%
30–39	10/10 = 100%
40–49	16/17 = 94.12%
50–59	20/23 = 86.96%
60–69	36/37 = 97.30%
70–79	17/18 = 94.44%
80–89	2/2 = 100%

Table 2: Implant success rates according to age.

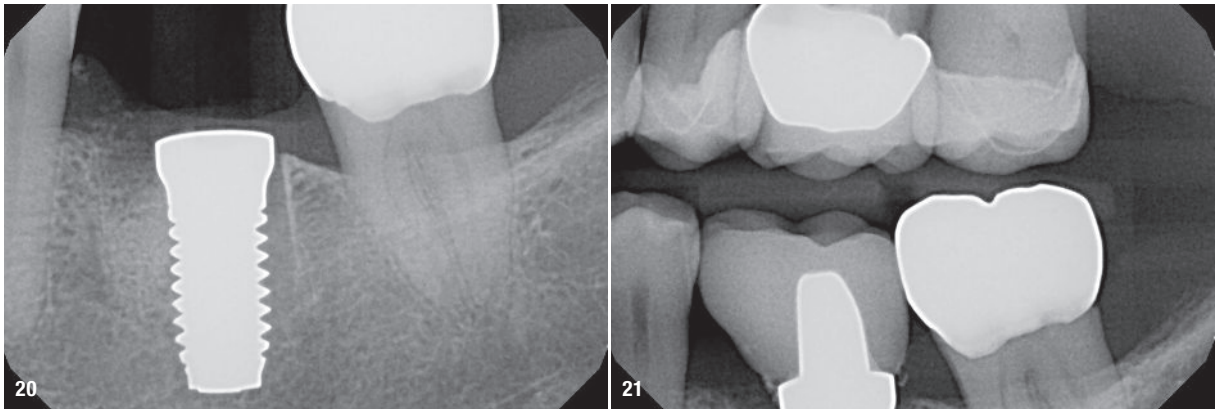

Fig. 20: Radiograph of the same implant after four months of healing. **Fig. 21:** Bitewing radiograph of the crown after cementation.

Maxilla (44 implants)		Mandible (66 implants)	
Tooth no.	No. of implants	Tooth no.	No. of implants
18	–	38	–
17	2	37	7
16	6	36	22
15	6	35	6
14	5	34	3
13	2	33	1
12	–	32	–
11	2	31	–
21	1	41	–
22	–	42	–
23	1	43	–
24	4	44	2
25	8	45	4
26	7	46	18
27	–	47	3
28	–	48	–

Table 3: Number of implants placed in the maxilla and mandible.*
* Includes failed implants.

implant failure, such as immediate implantation, bone quality, low vitamin D_3 levels, bruxism, prediabetes, smoking and patient cooperation in wearing the protective devices. It is common to expect higher success rates among younger populations. Regardless of age, however, careful case selection combined with the highly biocompatible nature of zirconia, as well as the improved health status of the current ageing population, suggest that age should represent only a small determinant of implant success. Similarly, implant failure in relation to sex and tooth specificity in our study was not statistically reliable, owing to the low number of failures reported.

Conclusion

This clinical survey, along with many others in the literature, proves that zirconia implants exhibit high success rates comparable to those of titanium implants and can serve as a viable alternative. The population demand for aesthetic and biocompatible implants is constantly rising. More studies are highlighting the allergies to titanium.[8] Dentists are encouraged to acknowledge the risk factors of all implants on one hand and the biocompatibility, science, workflow and encouraging success rates of zirconia implants on the other. Dentists are also encouraged to embrace them as an alternative to satisfy rising demand in a modern ageing population which has a higher standard of living and therefore higher expectations regarding aesthetics and biocompatibility.

about the author

Dr Joseph Sarkissian studied microbiology at the University of Alabama in the US and then attended the dental school of the University of Göttingen in Germany, graduating in 1989. Over the next eight years, he practised dentistry on the Mediterranean island of Cyprus. During that time, he trained in homeopathy, abandoned the use of amalgam and expanded his knowledge of the biological aspects of dental therapy. In 1998, he moved to Los Angeles and received his licence to practise in California in the US. He owns a state-of-the-art biological dental practice in Glendale in California. Dr Sarkissian is a member of the International Academy of Oral Medicine and Toxicology, World Clinical Laser Institute, International Academy of Biological Dentistry and Medicine, and International Association for Orthodontics.

Literature

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Dr Joseph Sarkissian

Immediately placed two-piece zirconia implant with customised healing abutment in the maxillary molar region

Drs Alexandre Marques Paes da Silva, Dennis de Carvalho Ferreira, Francisco Augusto Horta dos Santos, Mayla Kezy Silva Teixeira, Daniel Moraes Telles & Eduardo José Veras Lourenço, Brazil

Over the past two decades, the utilisation of metal-free materials for oral rehabilitation has surged and emerged as an alternative to titanium in the production of dental implants.[1] Among these materials, yttria-stabilised tetragonal zirconia polycrystal has gained recognition as the preferred choice for such applications owing to its superior mechanical properties and reduced tendency to accumulate bacterial plaque.[2]

It is important to highlight that in the aesthetic region there is a risk of peri-implant tissue recession, which can cause titanium implants to become visible through the soft tissue. This is especially problematic in cases where the biotype is thin, compromising the overall aesthetics of the restoration.[3]

Initially, zirconia was primarily used to make one-piece implants.[4] However, this limits the prosthetic options available, as there is no possibility of adjusting the implant to the prosthetic component. This is especially concerning in the aesthetic region.[5] In contrast, two-piece implants can minimise this problem by providing prosthetic abutment angulation to improve implant positioning in certain situations. This can significantly enhance prosthetic versatility.[6]

In addition to their aesthetic demands and request for metal-free materials, in recent years, patients have come to desire a reduction in the number of surgical and clinical steps.[7] To reduce the total treatment time, extraction followed by immediate implantation has proved to be a

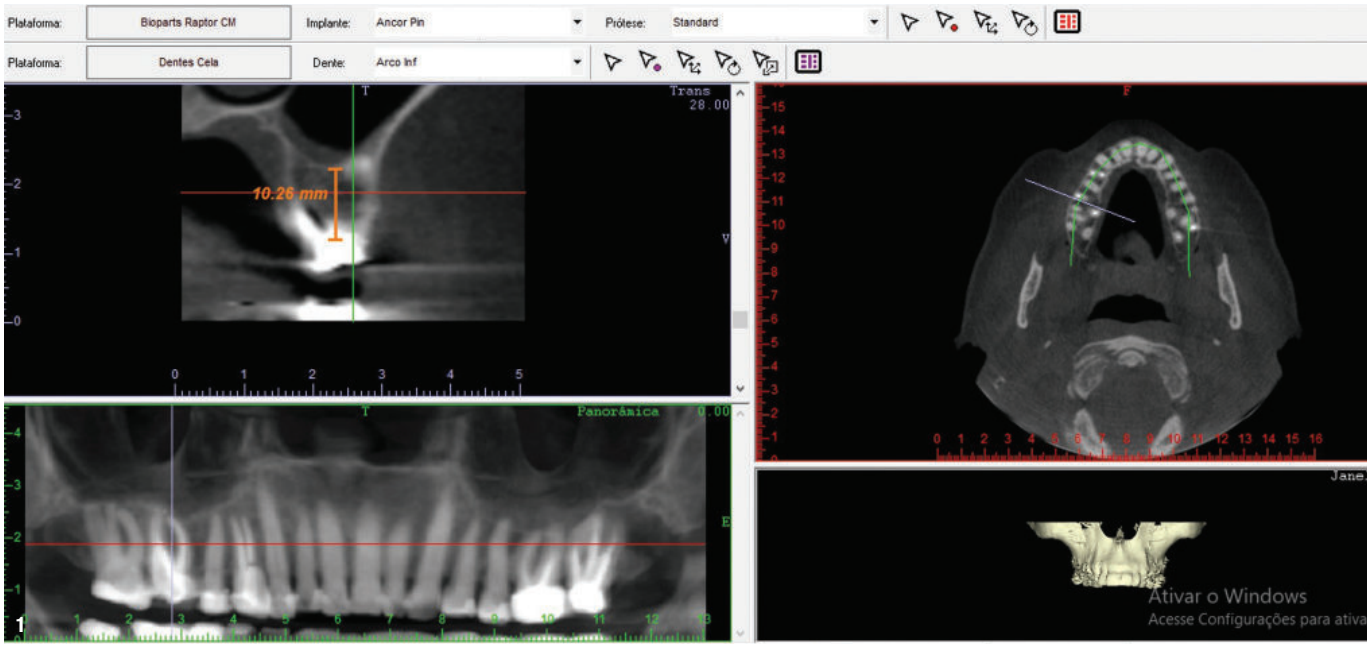


Fig. 1: Pre-op CBCT scan of the patient.

safe option with predictable results, but this does not prevent tissue shrinkage.[8,9] Nevertheless, when this is combined with alveolar ridge preservation procedures, post-extraction tissue loss can be significantly reduced.[10] To preserve the transgingival profile immediately after extraction, the socket sealing abutment technique was proposed.[11] This technique also allows for primary wound closure and protects the alveolar clot and biomaterial particles underneath.[12] The aim of this case report is to demonstrate the use of a two-piece ceramic implant system and a custom healing abutment to replace the maxillary right first molar and review the clinical and radiographic situation after ten months of follow-up.

Case presentation

This study was submitted to the ethics committee of the State University of Rio de Janeiro in Brazil and approved under No. 5.598.463. The patient was invited to participate in and informed about the study and signed informed consent to participate, and all ethical requirements were met.

The patient, a 60-year-old woman, was referred to a private clinical study centre in Rio de Janeiro complaining about pain at the first molar on the right side of the upper jaw. The patient was a non-smoker and in good general health, but reported having type 2 diabetes, which was however well controlled. To carry out the correct planning and diagnosis, a CBCT scan was obtained (Fig. 1). The radiographic examination showed unsatisfactory endodontic treatment and the presence of periapical periodontitis. According to the patient, the tooth had already undergone endodontic retreatment, but without success. Thus, the decision to extract and replace the tooth was taken.

Fig. 2: Pre-op situation before sectioning of the roots. **Fig. 3:** Socket preparation. **Fig. 4:** GZi implant. **Fig. 5:** Placement of the implant **Fig. 6:** Final bone-level position of the implant.

Surgical procedure

After local anaesthesia (4% articaine with 1:100,000 adrenaline, DFL), tooth extraction was performed via a minimally invasive surgical approach. The roots of the first molar were sectioned and extracted separately using delicate periotomes to sever the periodontal ligament and lift the tooth pieces without flap raising (Fig. 2). After extraction, the alveolus was thoroughly curetted to remove any inflammatory tissue and abundantly irrigated with saline solution. The recipient site preparation sequence was performed according to the manufacturer's recommendations (Zi ceramic implant, Neodent) as described in a previous study (Fig. 3).[13] A two-piece yttria-stabilised zirconia implant (4.3 × 10.0 mm) was placed into the socket to a final insertion torque of 45 Ncm (Figs. 4–6).

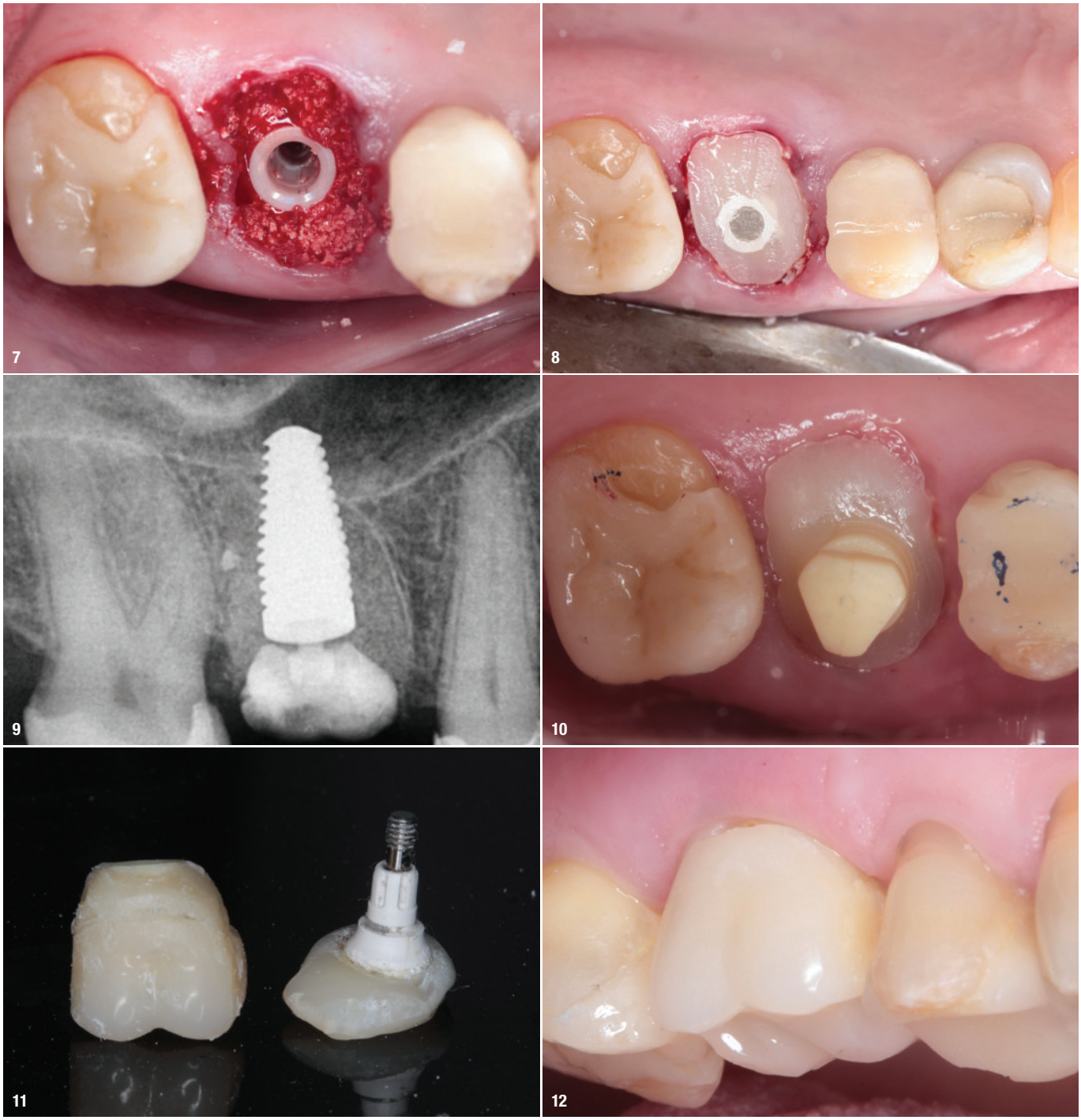


Fig. 7: After placement of the bone substitute material. **Fig. 8:** Customised healing abutment *in situ*. **Fig. 9:** Post-op radiograph with customised healing abutment. **Fig. 10:** Gingival emergence profile carefully copied using light-polymerised flowable resin. **Fig. 11:** Provisional crown and customised healing abutment. **Fig. 12:** Provisional crown *in situ*.

In addition, a bone substitute material (0.5 cm^3 of 0.5–1.0 mm maxresorb granules, Straumann) was used to fill the gaps between the fresh socket walls and the external face of the implant (Fig. 7). A PEEK abutment was selected, and a customised healing abutment was made using light-polymerised flowable resin (Fig. 8). It was not necessary to use a suture to close the surgical wound. At the end of the surgery, a radiograph was taken (Fig. 9).

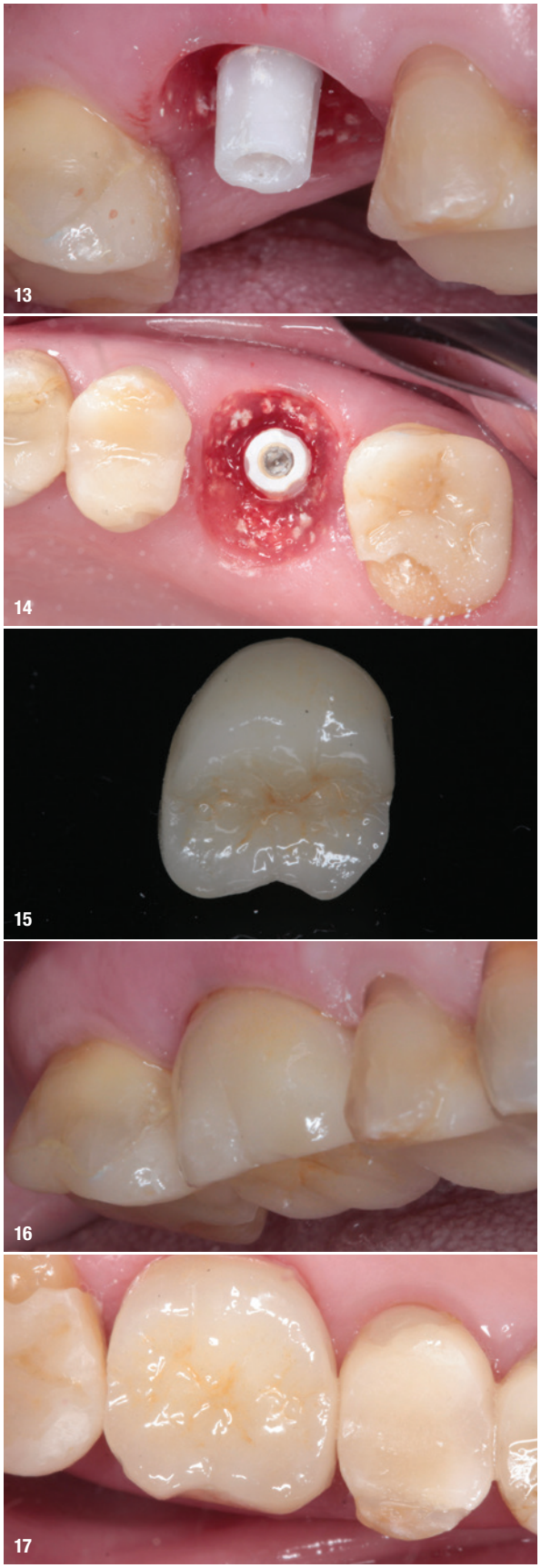
The three-month postoperative period was uneventful. The customised healing abutment was carefully removed, and conventional impressions were taken with a putty and medium-bodied addition-cured silicone using the closed-tray technique. A provisional crown was made with self-polymerising resin and seated. It remained in the patient's mouth until the day of cementation of the definitive crown. It is important to highlight that the gingival emergence profile was carefully copied using light-polymerised flowable resin (Figs. 10–12). A lithium disilicate crown was manufactured and cemented on to the prosthetic abutment with adhesive cement (Figs. 13–18).

After cementation of the definitive crown, the stability of the marginal bone level was observed on the final radiograph in relation to the immediate postoperative radiograph. The patient has been followed up periodically for the last ten months, and there have been no complications to date. At the end of the treatment, she was asked to rate her degree of satisfaction with the aesthetic results of the treatment according a visual analogue scale and selected "very satisfied".

Discussion

To our knowledge, this is the first ten-month follow-up clinical report on the use of this two-piece zirconia implant system in the molar region using a customised healing abutment. According to a European Federation of Periodontology consensus report, peri-implant soft-tissue health is an important criterion for implant success.[14] In the present study, after ten months of follow-up, seven of them under occlusal loading, the soft tissue around the ceramic implant appeared healthy and to be of a natural colour. It should be noted that the use of a customised healing abutment favoured the maintenance of the soft- and hard-tissue architecture around the ceramic implant, as previously reported in another study, which used PEEK healing abutments seated on titanium implants replacing posterior teeth.[15]

Studies on animals have shown that the osseointegration potential of zirconia is comparable to that of titanium implants.[13,16] The implant in this case achieved osseointegration during the first three months, and no bacterial plaque adhering to the surface of the implant or prosthetic abutment was observed during the follow-up



Figs. 13 & 14: Clinical views of the healthy peri-implant tissue free of inflammation. **Fig. 15:** Lithium disilicate crown. **Figs. 16 & 17:** Clinical views of the definitive crown.

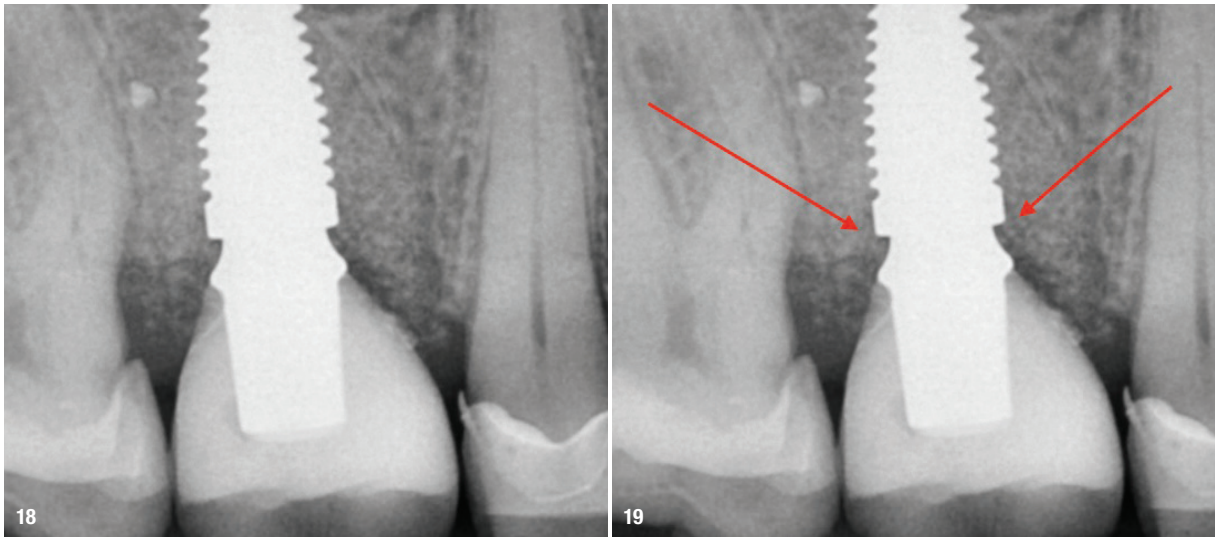


Fig. 18: Final radiograph with the definitive crown. **Fig. 19:** Radiograph at ten months showing marginal bone stability.

consultations. This is an important finding, since the adhesion of bacterial plaque is a critical problem and can be the first stage of peri-implant disease.[17] Indeed, studies show less affinity for bacterial plaque on zirconia surfaces compared with titanium surfaces.[18] A prospective clinical study showed that patients who received two-piece zirconia implants had low plaque and bleeding rates after six years, suggesting healthy peri-implant tissue.[19] In this same research, as well as in our study, the authors observed that the marginal bone levels remained stable over time.[19]

Yttria-stabilised zirconia, such as used for the system employed in the present study, is the material of choice for the manufacture of ceramic implants, not only because of the aesthetic advantages, but also because it is a material resistant to corrosion, wear and tear, and especially masticatory forces.[20] Another important point reported in the current study was the high patient satisfaction reported, also found by another study that investigated the performance of zirconia implants.[21]

It should be noted that, although ten months is a short follow-up time, there were no clinical, biological or radiographic complications, and both the bone level around the implant and peri-implant health were maintained.

Conclusion

This clinical case suggests that treatment with this new two-piece zirconia implant using a customised healing abutment for soft- and hard-tissue maintenance is a safe and reliable alternative in oral rehabilitation involving a posterior tooth. Studies with a higher number of implants and a longer follow-up time are necessary to confirm our findings, and the patient involved in this case will continue to be monitored.

about the author

Dr Alexandre Marques Paes da Silva graduated in dentistry from the former Universidade Gama Filho in 2005 and obtained a master's degree in dentistry from the Universidade Veiga de Almeida in 2017 and a PhD in dentistry from Estácio de Sá University in 2020, all in Rio de Janeiro in Brazil. He is currently pursuing postdoctoral research in dental prosthetics with an emphasis on implant dentistry (ceramic implants) at the State University of Rio de Janeiro. He is a member of the International Team for Implantology and of the International Academy of Ceramic Implantology. Dr Marques has experience in dentistry and focuses mainly on immediate placement and loading in implantology, ceramic implants and oral rehabilitation in atrophic maxillae.

Literature

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Magneto-dynamic site preparation for zirconia implants: A dry, cold and minimally invasive protocol

Dr Franco Giancola, Italy

Today, dentistry is facing new challenges. Demanding and fragile patients who require quick, atraumatic and risk-free treatments are increasingly presenting to our dental clinics. These patients require immediately loaded implants even in local situations of bone atrophy and despite precarious health conditions such as diabetes, heart disease, osteoporosis and other chronic diseases. Furthermore, the COVID pandemic has made dental care increasingly complex regarding the management of operating times and the prevention of infections. The use of minimally invasive procedures in medicine and dentistry has increased exponentially for reduction in postoperative complications, lower consumption of analgesic and anti-inflammatory drugs, and shorter recovery time.

To cope with the changing demands and requirements, biomaterials technology has made significant progress in recent years. Today, we have zirconia implants that are very reliable in terms of biocompatibility and resistance. There are numerous types of dental implants on the market that allow the surgeon to rehabilitate in any clinical situation. However, the clinical results depend not only on the material used but also on the general condition of the patient, on the biological response of the tissue and on the operative technique.

Fig. 1: Correct grip of the Magnetic Mallet handle with one hand.

The patient's health can be improved through the correction of pathological conditions and the administration of nutraceuticals that improve the health of the tissue (vitamin D in high dosage, Lithothamnion calcareum, Ganoderma lucidum). The use of platelet growth factors in the form of membranes or liquids to be infiltrated makes it possible to reduce discomfort after surgery and stimulates the biological response.

For good implant osseointegration, however, the preparation of the implant site is essential for adequate immediate mechanical retention and stable biological integration over time. Unfortunately, the surgical technique for positioning implants has remained unchanged over time. Mucosal flaps are still raised and the implant site prepared using high-speed rotary drills and a water jet for cooling. The use of drills can lead to overheating of the tissue and tissue necrosis especially when using metallic materials that wear. The need for cooling of the rotating instruments exposes patients and operators to infectious contamination due to the aerosol cloud that is created during the operative sessions. Finally, preparation using drills alters the bone microstructure and removes tissue that is already very deficient in edentulous conditions.

In addition to traditional techniques, today it is possible to prepare the implant site using magneto-dynamic surgery with the Magnetic Mallet (Osseotouch), allowing the expansion of the alveolar crest without the use of water jets and without removing bone tissue. Magnetic dynamic technology is based on the concept of acceleration with a short impact time and high force of the pulse, thereby increasing effectiveness. Through this technology, it is

possible, without the use of irrigation, to easily extract teeth (ankylosed), perform crestal sinus lift, expand thin alveolar ridges and prepare implant sites in low-density bone (Type D3 and D4).

The Magnetic Mallet surgical device is equipped with various inserts, such as for dental extraction, implant site preparation and regenerative surgery. The device applies greater force than conventional methods in short time on a focus point in the area being treated along a central axis moving up and down. An implant site can be prepared using only osteotome inserts of increasing diameter. Plastic bone deformation is facilitated by shock waves (130 daN in 80 µs) through their tips. The implant site is created by expanding bone tissue laterally and apically. No bone tissue is removed. Instead, the tissue is compacted, creating increased density and enabling greater primary stability.

Magneto-dynamic surgery has several advantages. The force applied to the inserts is high and brief; therefore, the intervention is faster and more precise. The handpiece is operated with one hand (Fig. 1). The movement is only longitudinal; therefore, we will have better operative control and reduced operational risk. The absence of rotating instruments and lack of irrigation permit cold surgery without the risk of tissue overheating and infectious contamination.

The ZiBone implant system (COHO Biomedical Technology) has an ideal topography for placement using the magneto-dynamic technique. The standard ZiBone implant is made in one piece (endosseous and abutment portions) of highly pure and extremely resistant zirconia. The cylindrical body and apex's conical design allow the implant to achieve high primary stability. The thin threads on the implant collar increase the contact area and mechanical retention. The broad threads on the implant body improve primary stability and enhance osseointegration. The sandblasted intraosseous area gives to the implant a micro- and macro-roughness that favours better tissue integration. *In vivo* studies have demonstrated 60% bone–implant contact just eight weeks after implant placement.

Surgical protocol

In the case of an edentulous area with intact tissue, gingival access is created using a tissue punch mounted on a surgical handpiece rotated at 250 rpm (flapless technique) or by incision and raising of a flap with a zirconia scalpel. In the case of a compromised tooth, the root is first extracted using dedicated magneto-dynamic inserts (EXTR1, 2, 3, 4 and 5). After the cleaning and disinfection of the alveolus, the best site and inclination are sought for the preparation of the implant site according to the morphology of the alveolar crest and the condition of the residual bone.

The preparation of the site for the positioning of one-piece implants is achieved using the Black Ruby osteotomes owing to the excellent correspondence of shape and dimension. The Black Ruby inserts have a double

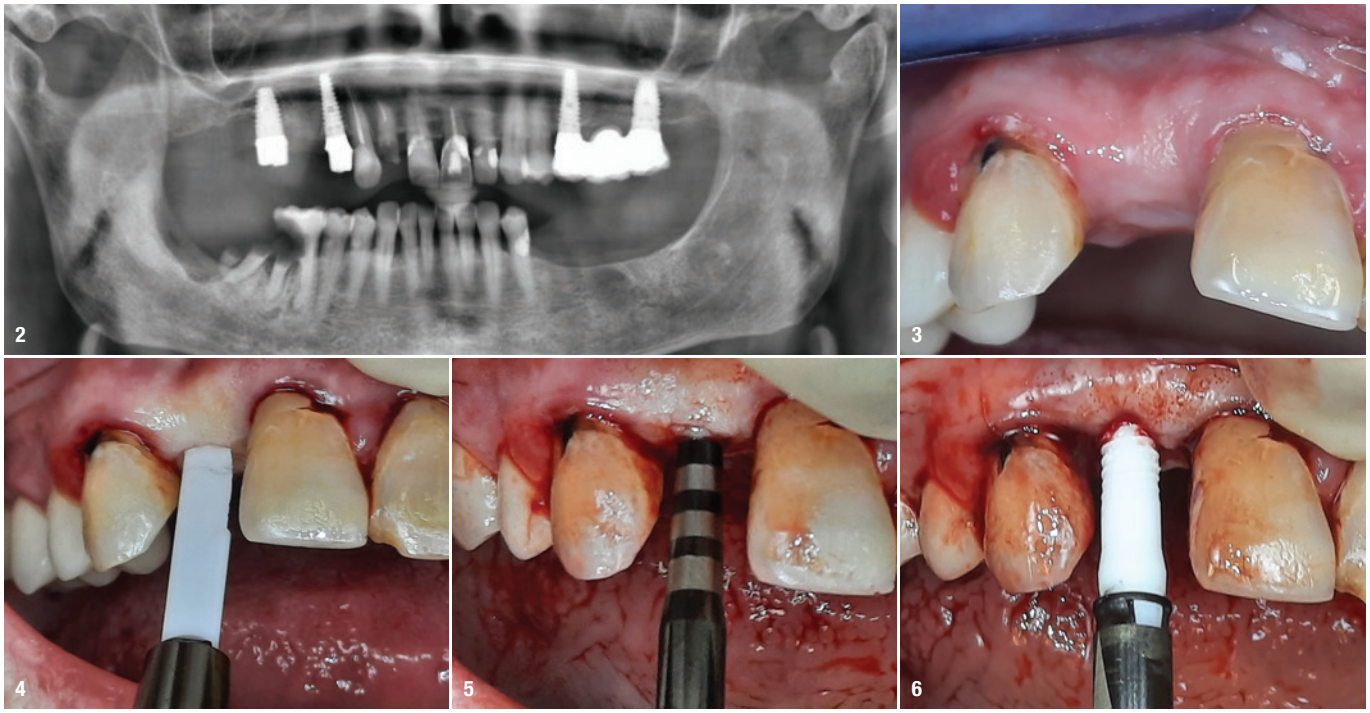

Fig. 2: Dental panoramic tomogram before surgery. **Fig. 3:** Initial clinical situation. **Fig. 4:** Gingival incision using a zirconia scalpel (ZiBone CST-B15).
Fig. 5: Initial osteotomy preparation using a BLK-R1 osteotome. **Fig. 6:** Placement of the implant into the osteotomy.

taper, a rounded tip and a diamond-like carbon coating which decreases friction with the tissue and facilitates the sliding of the instrument into the bone being prepared.

The penetration of the alveolar cortical bone is performed with the Black Ruby pointed osteotome (BLK-R1) with force Level 1. The implant site is created by expanding the bone tissue laterally and apically against the pre-existing bone. The instrument is slowly advanced through electromagnetic pulses and back and forth movements of the insert to allow the bone to adapt to the elastic stresses it has undergone. The osteotomy is progressively widened by means of a succession of inserts with progressive diameter (BLK-R2, BLK-R3, BLK-R4 and BLK-R5) until the dimensions compatible with the chosen implant are reached. The osteotomy is progressively expanded with the force distributed by the Magnetic Mallet osteotomes by 1 mm at each pulse. The final diameter of the osteotomy has to be between 0.5 mm and 1.2 mm under-prepared depending on the local bone density and the type of implant. In cases where sinus lift or adaptation of the osteotomy is required, standard flat-head inserts (200-F, 300-F and 330-F osteotomes) can be used. After preparation of the host site, the implant is first conditioned with the patient's platelet growth factors and subsequently positioned with a surgical handpiece or impacted with an adapter mounted on the Magnetic Mallet.

Case presentation

Case 1

A 79-year-old woman with psychiatric disorders, previous femoral fracture due to severe osteoporosis and sequelae of stroke presented for the replacement of a lost incisor. Considering the general condition of the patient and the lack of cooperation, it was decided to place the implant using a minimally invasive protocol (Figs. 2 & 3).

The gingival mucosa was incised using a zirconia scalpel, and a flap was raised (Fig. 4). The penetration of the alveolar cortical bone was performed using the BLK-R1 insert (Fig. 5). The instrument was made to advance to the desired depth through magneto-dynamic pulses of force Level 1 by rhythmic up and down and rotational movements. The implant was then mounted on a modified adapter and advanced into the prepared alveolus by the mechanical impulses delivered by the Magnetic Mallet (Fig. 6). The impact insertion allowed further expansion of the alveolar ridge and greater bone condensation essential for primary stability (Figs. 7–10). At the end of the treatment, autologous platelet growth factors were infiltrated via injectable platelet-rich fibrin (i-PRF) into the peri-implant tissue, which allowed a pain-free postoperative course; therefore, the patient did not need analgesics.

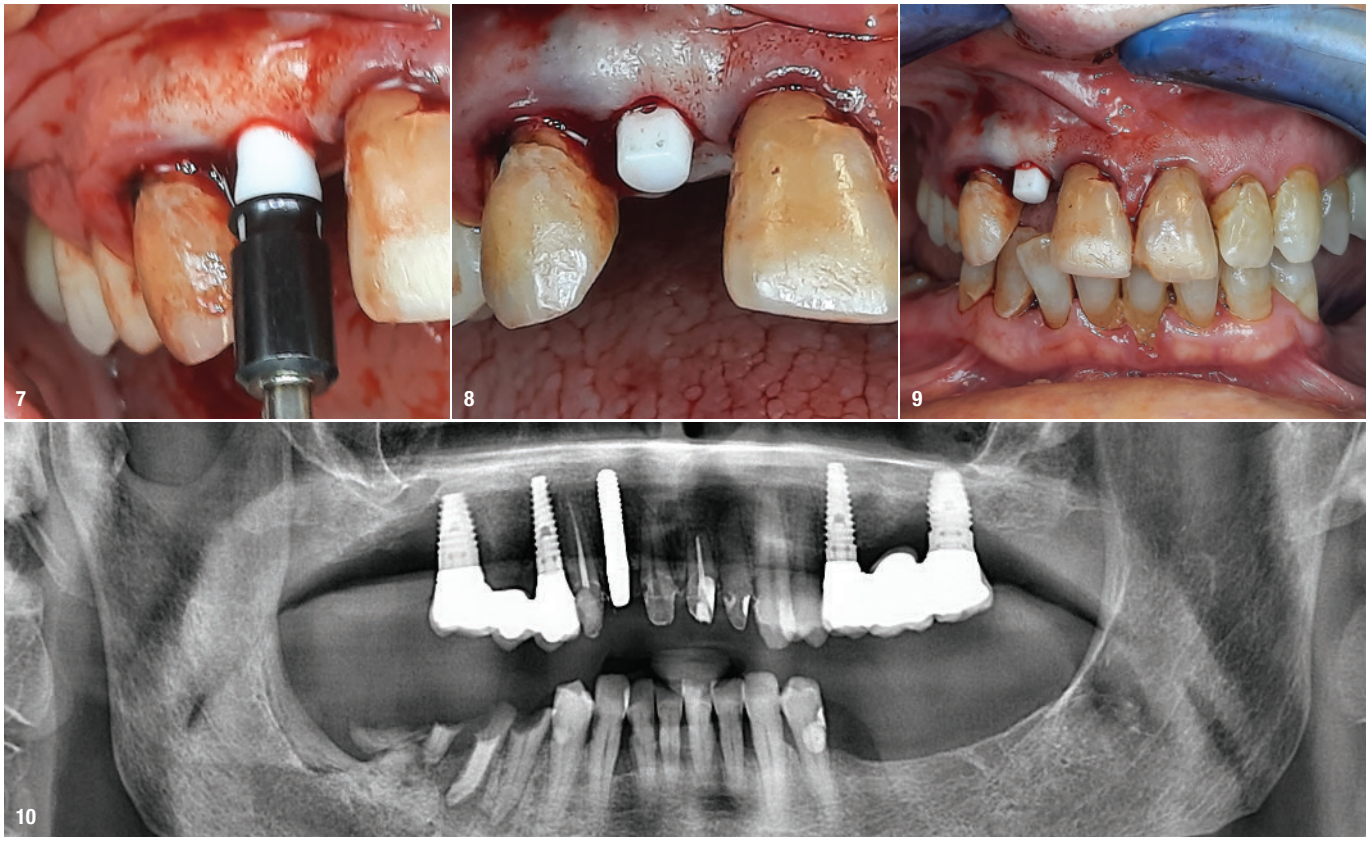

Fig. 7: Implant impacted in the implant site by means of a Magnetic Mallet device at force Level 1. **Fig. 8:** Final position of the one-piece ZiBone implant. **Fig. 9:** Frontal view after implant placement. **Fig. 10:** Dental panoramic tomogram after surgery.

Case 2

A 60-year-old man presented for the removal of a titanium dental implant and minimally invasive rehabilitation of the mouth using ceramic implants. The anamnesis found that the patient had Crohn's disease and an allergy to metals. The dental evaluation found severe periodontal disease, edentulous areas and peri-implantitis with bleeding deep periodontal pockets in the area of the previously inserted titanium implant (Figs. 11 & 12). Given the patient's request and pathological conditions, it was decided to perform a targeted periodontal treatment, extract the compromised teeth and rehabilitate the mouth using one-piece zirconia implants positioned with the Magnetic Mallet to reduce trauma and preserve residual bone tissue.

The extraction of the teeth was performed using forceps (Fig. 13), and the alveoli were first cleaned and then disinfected using ozone at a concentration of 20 µg/ml. Subsequently, the implant sites were prepared by osteotomy creation and sinus lift via the crestal route using standard inserts for bone condensation (160-F, 230-F and 300-F osteotomes; Fig. 14). Once the appropriate dimensions of the sites had been reached, the implants were positioned first using a surgical handpiece and then with a manual dynamometric ratchet up to a torque

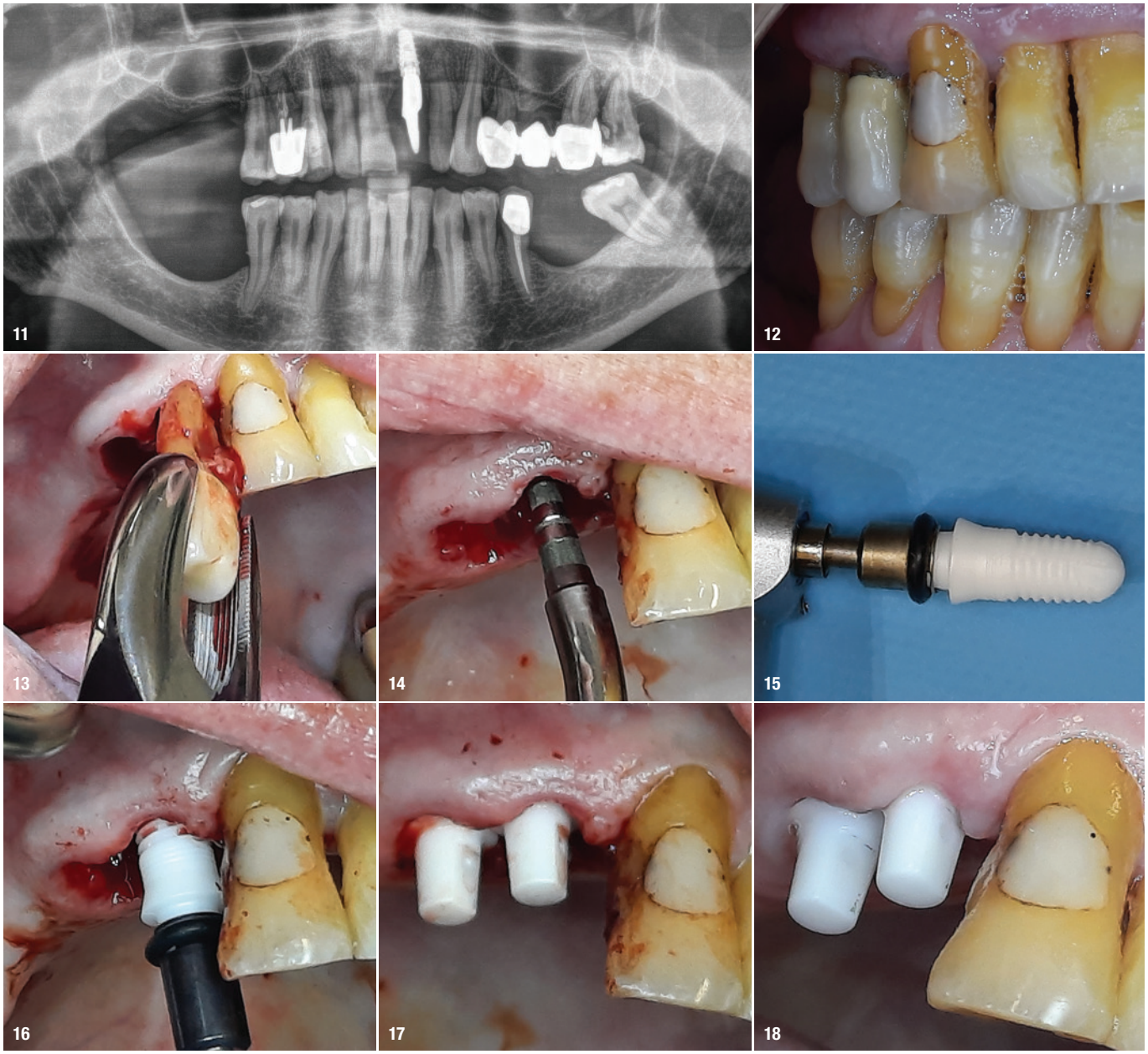

Fig. 11: Dental panoramic tomogram before surgery. **Fig. 12:** Lateral clinical view of the affected area. **Fig. 13:** Atraumatic extraction of the compromised tooth. **Fig. 14:** Initial preparation of the socket with a 100-P pointed osteotome. **Fig. 15:** One-piece implant (ZiBone Zr-I5010) mounted on a surgical micromotor. **Fig. 16:** Screwing of the implant into the prepared site. **Fig. 17:** Lateral view of the implants after placement. **Fig. 18:** Clinical situation the day after surgery.

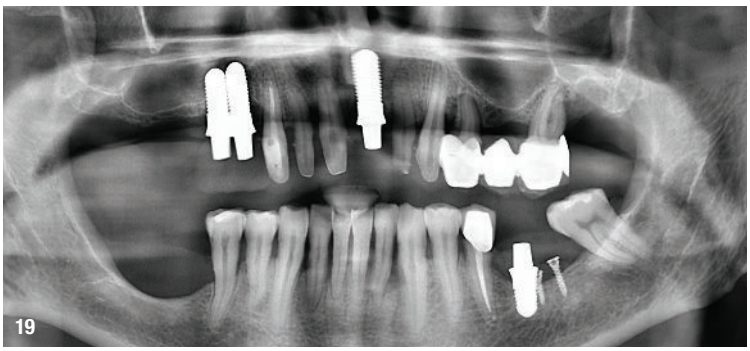

Fig. 19: Dental panoramic tomogram after treatment.

of 35 Ncm (Figs. 15–17). At the end of the treatment, the peri-implant tissue was infiltrated with i-PRF and the patient underwent a session of systemic ozone therapy at a concentration of 30 µg/ml. The patient returned the next day for the positioning of provisional prosthesis and reported that he had not taken any analgesics, having had no pain (Figs. 18 & 19).

Case 3

A 56-year-old dental phobic woman presented to our clinic for aesthetic smile rehabilitation. The clinical and radiographic evaluation found widespread dental caries and apical granulomas associated with devitalised teeth (Figs. 20–22). Patients who are attentive to natural therapies and very sensitive to pain want to quickly improve their dental aesthetics without putting their health at risk. It was therefore decided to proceed with the extraction of the compromised teeth using a minimally invasive technique and placement of zirconia implants in the same session.

The extraction of the compromised teeth was performed first gently to detach the periodontal ligament and then more decisively to complete the dislocation of the tooth root. We worked on the mesial and distal sides not to damage the thinner and more delicate vestibular cortical bone. We continued with the cleaning and disinfection of the alveoli using ozone at a concentration of 20 µg/ml. The implant sites were prepared using standard osteotomes

Fig. 20: Dental panoramic tomogram before surgery. **Fig. 21:** Frontal view at the first dental visit. **Fig. 22:** Occlusal view of the affected arch. **Fig. 23:** Initial osteotomy preparation with a 100-P pointed osteotome. **Fig. 24:** Subsequent preparation with a 230-F osteotome. **Fig. 25:** One-piece zirconia implants (ZiBone Zr-I5010) correctly positioned. **Fig. 26:** Occlusal view after surgery. **Fig. 27:** Dental panoramic tomogram after surgery.

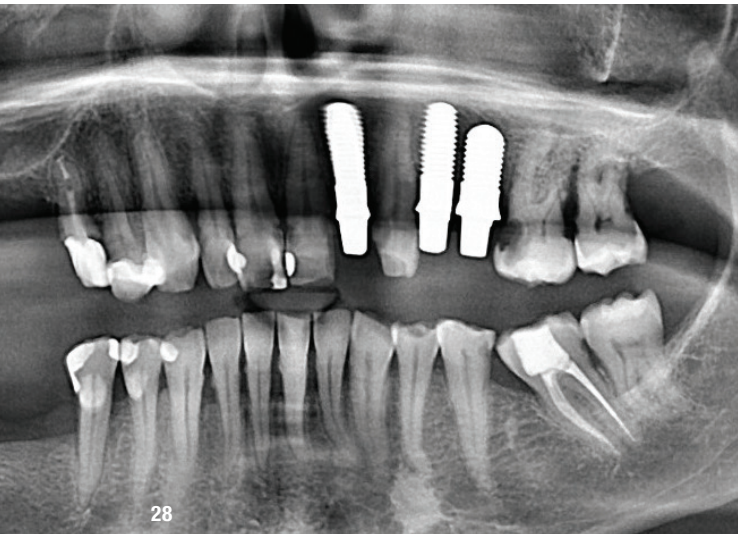

Fig. 28: Cementation of the resin prosthesis the day after surgery after preparing the abutment teeth.

for bone condensation to the chosen size (Figs. 23 & 24). After the surgery, a systemic ozone therapy session was performed at a concentration of 30 µg/ml, and peri-implant infiltration was performed with i-PRF to reduce postoperative discomfort and promote healing of damaged tissue to ensure primary stability. The one-piece zirconia implants were inserted to a torque of 35 Ncm to ensure primary stability (Figs. 25–27). The following day, all the teeth of the maxillary arch were prepared, and a resin prosthesis was positioned (Fig. 43).

Discussion

The aim of this article is to demonstrate an alternative way to place zirconia implants into poor-quality bone in fragile patients. In bone that is less dense, Magnetic Mallet osteotomes increase the density around the implant. In the cases reported in this article, the implant sites were prepared by use of osteotomes which compressed the native bone and by cortical sinus lift as reported by the literature. These surgical procedures, supported by data from several experimental studies, resulted in faster and greater bone apposition compared with conventional drilling. The Magnetic Mallet site preparation increased the bone–implant ratio in early phase placement, enhancing primary stability of the implant and expediting bone healing.

Conclusion

The use of the Magnetic Mallet in poor-quality bone (Types D3 and D4) and in fragile patients can make zirconia implant surgery safer, more predictable, faster and more comfortable for patients. The surgery improves tissue healing and long-term implant survival. All the patients treated with ZiBone implants placed with magneto-dynamic surgery had less pain and little postoperative discomfort; therefore, they did not need to take analgesics and their healing was quicker.

The positioning of implants using the Magnetic Mallet also has advantages for the dentist, as it is faster, more precise and more efficient. The absence of drills and irrigation leads to a lower risk of infectious contamination, avoids bone overheating and saves bone tissue in the case of thin alveolar ridges. The ZiBone one-piece implants adapted perfectly to the implant sites prepared using the Black Ruby inserts. Magneto-dynamic surgery represents a good alternative to traditional osteotomy preparation using rotary drills.

Literature

about the author

Dr Franco Giancola is serving as a specialist in Ceramic Implantology and Guided Regenerative Surgery at DENTZIA Clinic in Barcelona since September 2022. He is registered with the Valencia College of Official Dentists and Stomatologists and the Barcelona College of Physicians. Dr Giancola is also a Director of Health and Freelance specialist in Immunocompatible Implantology, Ozonotherapy and Regenerative Medicine at the Domus Medica European Ceramic Implantology Clinic in San Marino since October 2018.

Dr Giancola's previous experience includes working as a Chief of Ceramic Implantology and Autologous Regenerative Surgery at Nuova Villa Claudia and Villa Mafalda in Rome. He also worked at SALVATOR MUNDI International Hospital in Rome as a Chief of Ceramic Implantology and Biological Dentistry. He has undergone training and received certification in various areas of expertise, including Ceramic Implantology, Guided Regenerative Surgery, Ozonotherapy, and Regenerative Medicine.

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Modern workflow of immediate zirconia implant surgery utilising dynamic navigation: case studies and benefit analysis

Dr Daniel Madden, USA

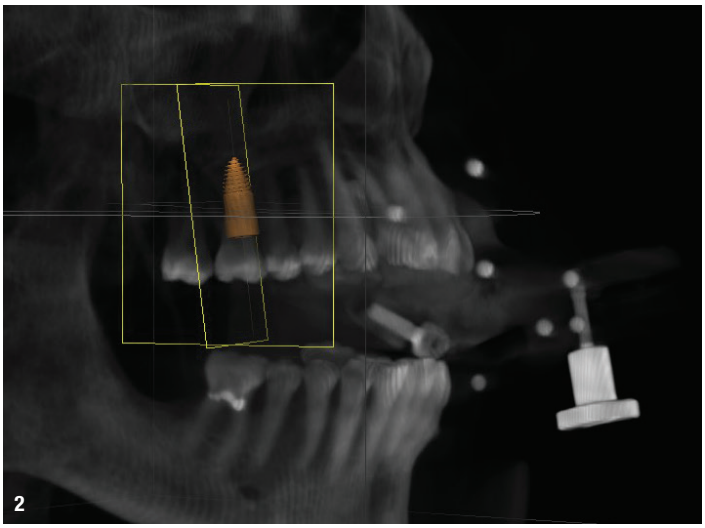
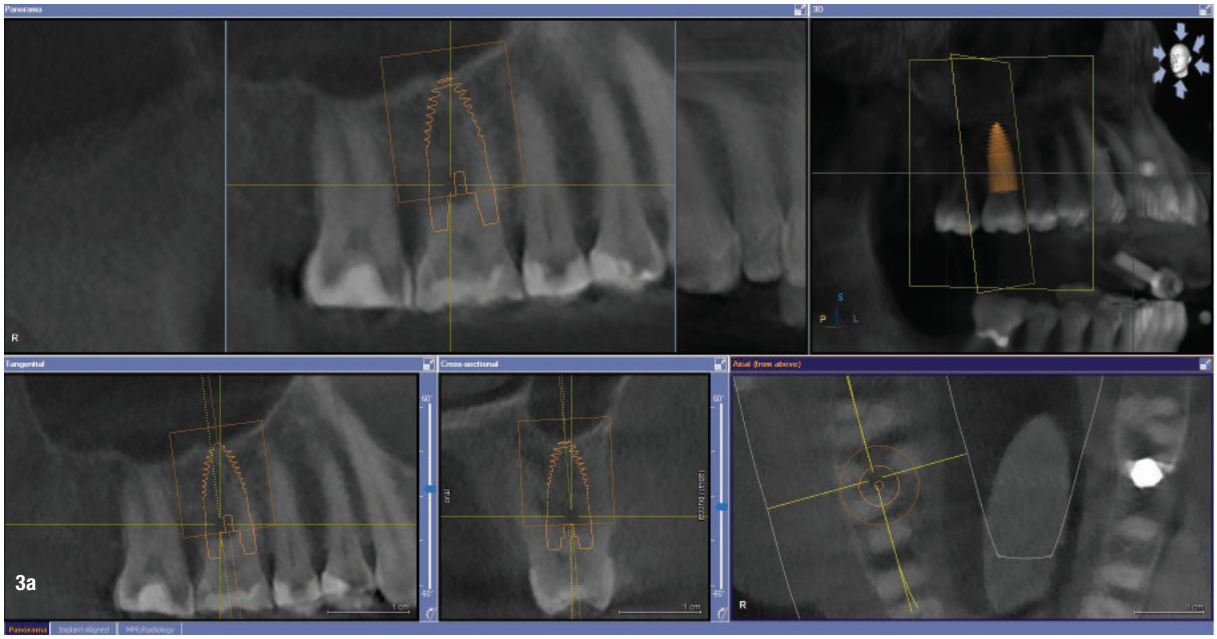


Fig. 1: Yomi-Link and fiduciary array. **Fig. 2:** CBCT of initial situation with link attached.

Dental implant therapy is an integral and growing treatment modality for today's clinicians. With the advent of digital workflows dental implant treatment has become more accessible, faster, safer, and more predictable. All which can provide a better patient experience and more idealised final restorations.

As the knowledge of the excellent healing profiles and popularity of zirconia implants continues to grow, ideal placement and treatment outcomes of these implants becomes ever more important.[6–9] As such we must look at designing predictable and repeatable surgeries. Studies have shown adding dynamic navigation resulted in higher accuracy than the freehand surgical method and while similar accuracies were found between dynamic navigation and static guidance for deviations; we will look at some potential benefits of dynamic guidance using the Yomi platform (Neocis Inc.) over static guidance in the digital implant workflow.[1–5]

Despite the introduction of CBCT-based planning software and fabrication of static surgical guides, challenges remain in efficiently and accurately transferring the plans to surgery. Limitations inherent in the static guide workflow include multiple steps and appointments in fabrication, the risk of poorly fitting guides, and the physical bulk of the guide impeding surgical site access and visualisation.[1–5] Immediate dental implant placement in conjunction with tooth extraction can require us to be dynamic in our placement. We as dental surgeons know that sometimes what we plan on a CBCT and what we see visually intra-orally, may have us wanting to alter our plan. Immediate implants have well documented success rates and navigating anatomical variations and tooth associated pathologies is essential to their long-term success.[12] Small changes in direction, depth and angulation can be the difference between success with proper initial stability and the inability to place the implant the same day. Robotic assistance using haptic boundaries



Figs. 3a & b: Surgical planning for bicortical fixation with placement in furcal bone.

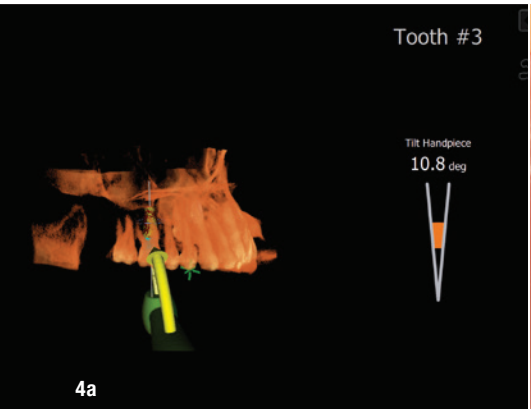
has been shown to enhance accuracy, precision, and flexibility across surgical fields.[1,2] The Yomi dynamic navigation platform with haptic feedback allows for small adjustments in real time and accurate visualisation of drills into the surgical site. This can be significantly impactful when managing close implant placement to sensitive anatomical structures of the IAN, drill depth management in vertical sinus lift augmentation, and assuring immediate implant placement into adequate native bone. The following case studies will review the digital workflow of dynamic navigation with Yomi when performing immediate zirconia implant surgery and the perceived benefits therein.

Case presentations

Case 1

A 60-year-old female presented with history of LANAP at the periodontist on #3 for a 9 mm periodontal pocket on the DB one year ago. Upon recall at the periodontist, the vertical bone defect was non healing, and the tooth was deemed hopeless. The patient came to our clinic hoping for extraction and immediate implant placement, risks and alternatives were given to the patient including the possibility of inability to place the implant the same day due to bone anatomy in the area.

Yomi link was attached to her upper left using bite registration and a CBCT was taken with the additional fiduciary arrays attached to the link (Figs. 1 & 2). Surgery was planned for bicortical fixation with placement in furcal bone avoiding the defect on distal (Figs. 3a & b). The surgical procedure involved a planned implant depth to the sinus floor, followed by a gradual increase in depth to perform an internal sinus lift. The extraction was carried out atraumatically, and the socket was thoroughly cleaned. Yomi guide arm was then attached to the link and the landmark verified, ensuring accurate stable navigation. Under surgeon guidance and robotic assistance the pilot drill was guided to the surgical site. The osteotomy continued with a drill path and depth that locked once in the planned position. The osteotomy was completed to the sinus floor with confirmation of depth via dynamic live CBCT navigation. Incremental advancement of the drill depth stop was used to complete the sinus lift. Proper visualisation aided in depth management of the transgingival implant. The implant (2.2_5411, SDS) was placed



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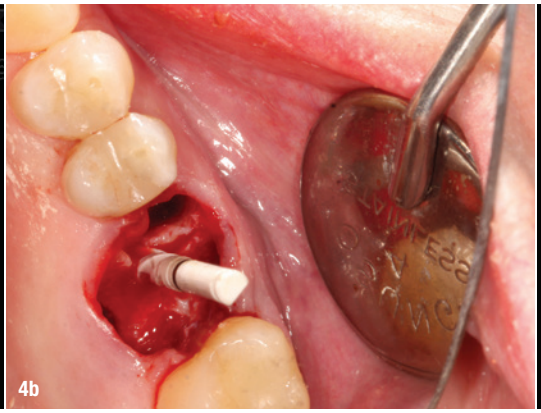
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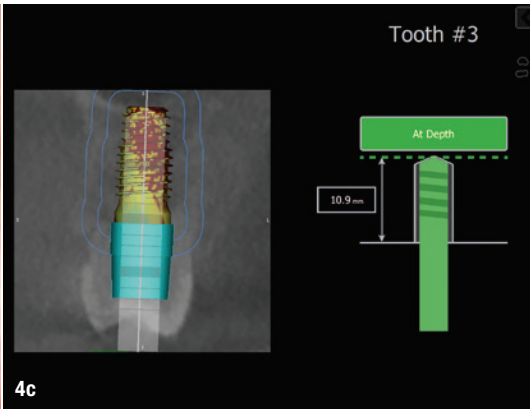

4c

to 35 Ncm, and the sockets were subsequently grafted with allograft (cortical min/demin blend, particle size .25–1mm), hydrated with i-PRF, and covered with an A-PRF+ membrane that was sutured in place (Figs. 5 & 6). The postoperative radiograph showed accurate implant placement (Fig. 7).

Discussion

Visualisation of the surgical site was crucial in this scenario to prevent a bone defect on the distal and ensure sufficient native bone around our implant. The plan and guide path were adjusted in real time for ideal depth and location to achieve optimum results.

Case 2

The patient presented having previously seen an endodontist who deemed the retreatment of tooth 19 non-restorable. The patient wanted to explore replacement options, and a comprehensive clinical assessment was performed, including CBCT and bitewing radiographs. Multiple periapical radiolucencies were noted, associated with failing root canals of teeth 19, 21, and 27, and a horizontal root fracture was observed in tooth 29 (Figs. 8a & b). Due to decay and abscess, a failing double abutted bridge was observed in teeth 21/22-27/28, making full-mouth rehabilitation without implants a poor option (Fig. 9).


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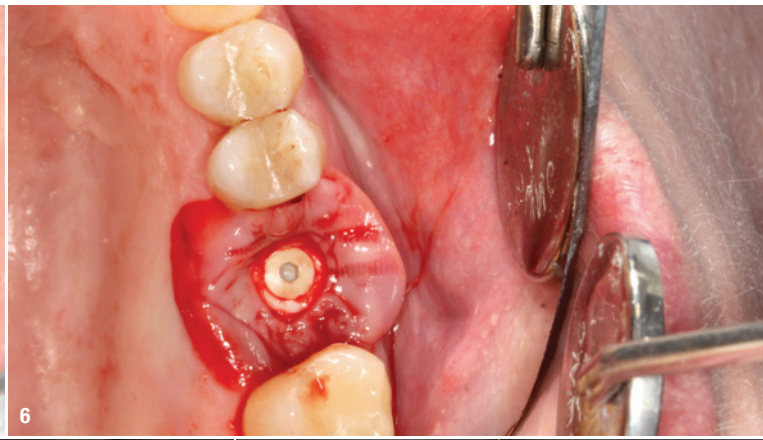
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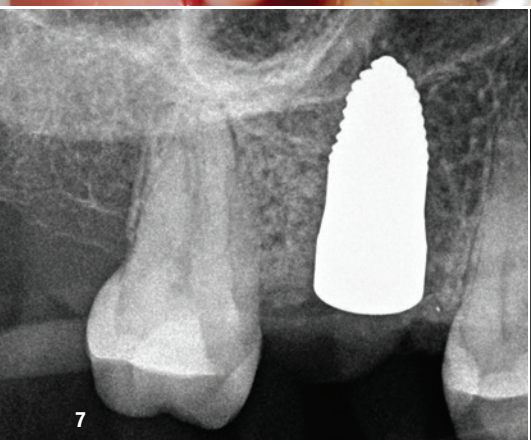
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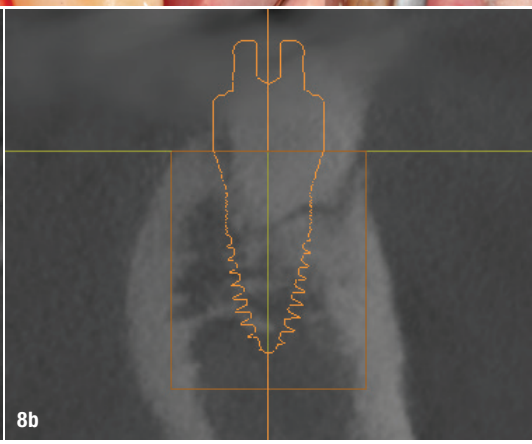
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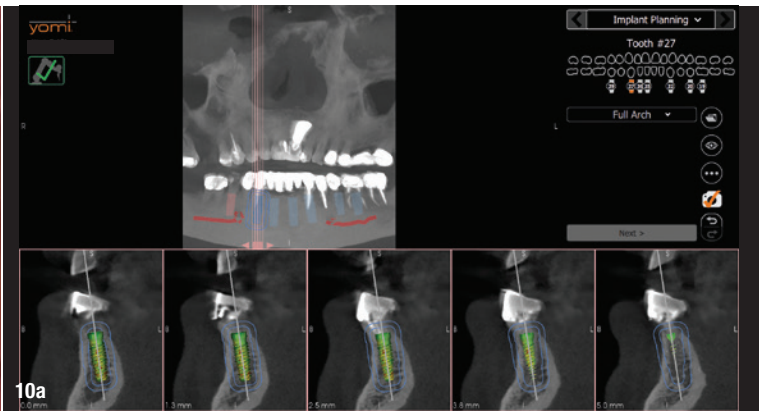

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Treatment plan

A thorough discussion of treatment options, limitations and risks was reviewed with the patient. Poor long-term prognosis was given to remaining mandibular teeth except #30. The patient's primary concerns were to have no teeth during healing, not wanting a removable prosthesis, and to have biologically friendly materials. Delicate consideration was made to design an immediate implant surgery that provided the patient with a stable temporary restoration and protected our healing implants. One-piece SDS (Swiss Dental Solutions) implants were chosen for their variety of diameters and lengths. Posterior teeth 18, 28, 30 were elected to remain in place during the temporary healing phase to provide posterior stops for occlusion and to maintain stability of implants and temporary restoration during healing phase. Pre-surgical planning was performed using CBCT and Yomi planning software to parallel all implants (Figs. 10a & b). Preoperative maxillary and mandibular arch scans were taken and sent to the lab to aid in temp mock-up (Fig. 11).

Surgical Phase

The procedure began with the administration of bilateral inferior alveolar nerve blocks for anaesthesia, followed by sectioning and removal of the PFM bridge. The Yomi link was then attached to the lower left using bite regis-

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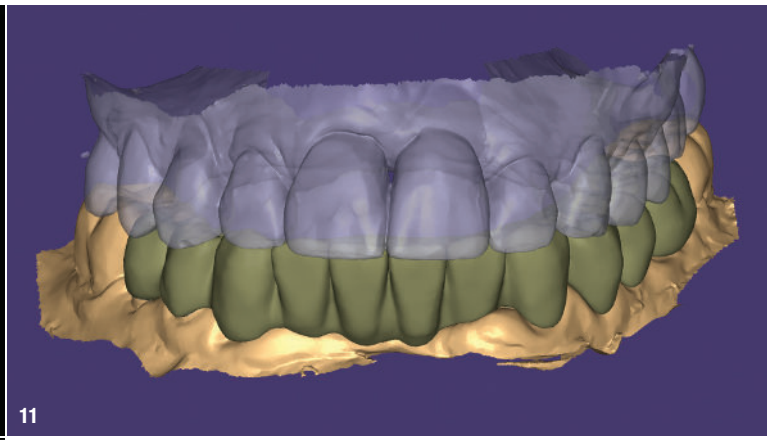

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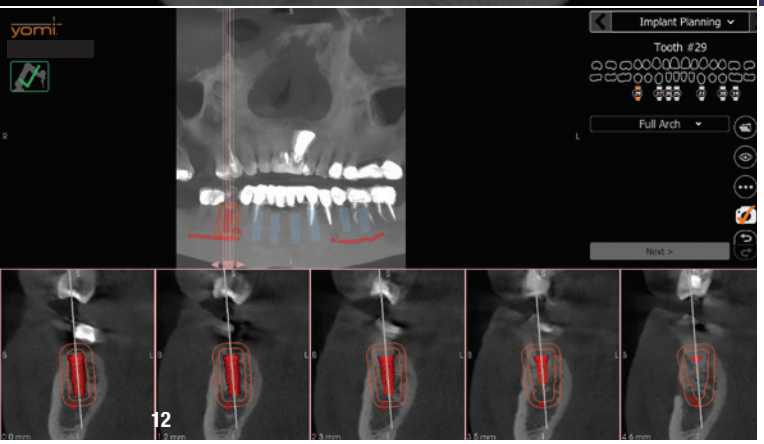

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Fig. 4a: Placement of the pilot drill into the surgical site via dynamic live CBCT navigation. **Figs. 4b&c:** Osteotomy was completed to the sinus floor with confirmation of depth via dynamic live CBCT navigation. **Fig. 5:** Placement of the ceramic implant (2.2_5411, SDS) to 35 Ncm. **Fig. 6:** PRF covering with allograft. **Fig. 7:** Postoperative radiograph showing accurate implant placement. **Fig. 8a:** Initial situation on CBCT showing multiple periapical radiolucencies associated with failing root canals of teeth 19, 21, and 27. **Fig. 8b:** Horizontal root fracture in tooth 29. **Fig. 9:** Failing double abutted bridge in teeth 21/22-27/28. **Figs. 10a & b:** Pre-surgical planning using CBCT and Yomi. **Fig. 11:** Preoperative maxillary, mandibular and bite scans to aid in temp mock-up. **Fig. 12:** Immediate implantation in site #29 using the Yomi robot with haptic controls and locked drill path depth and angulation.

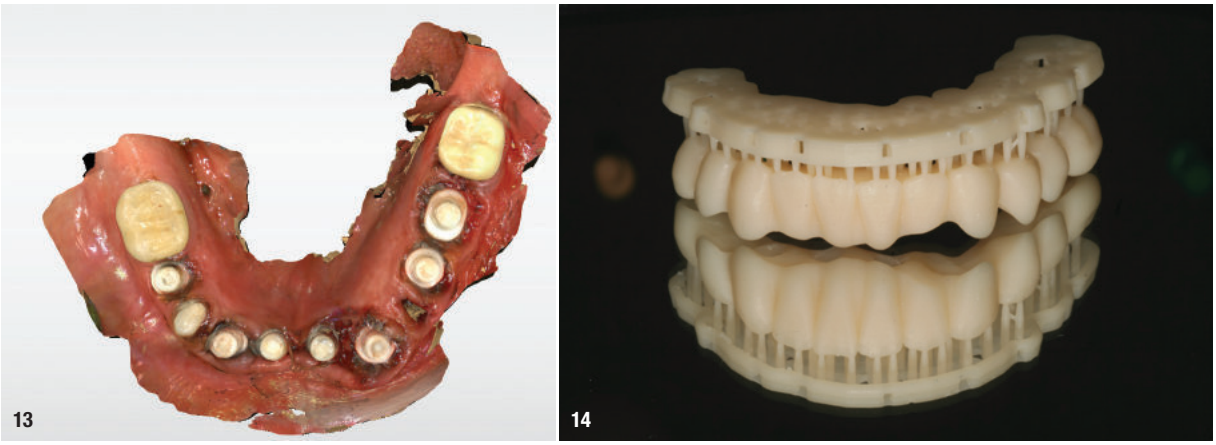
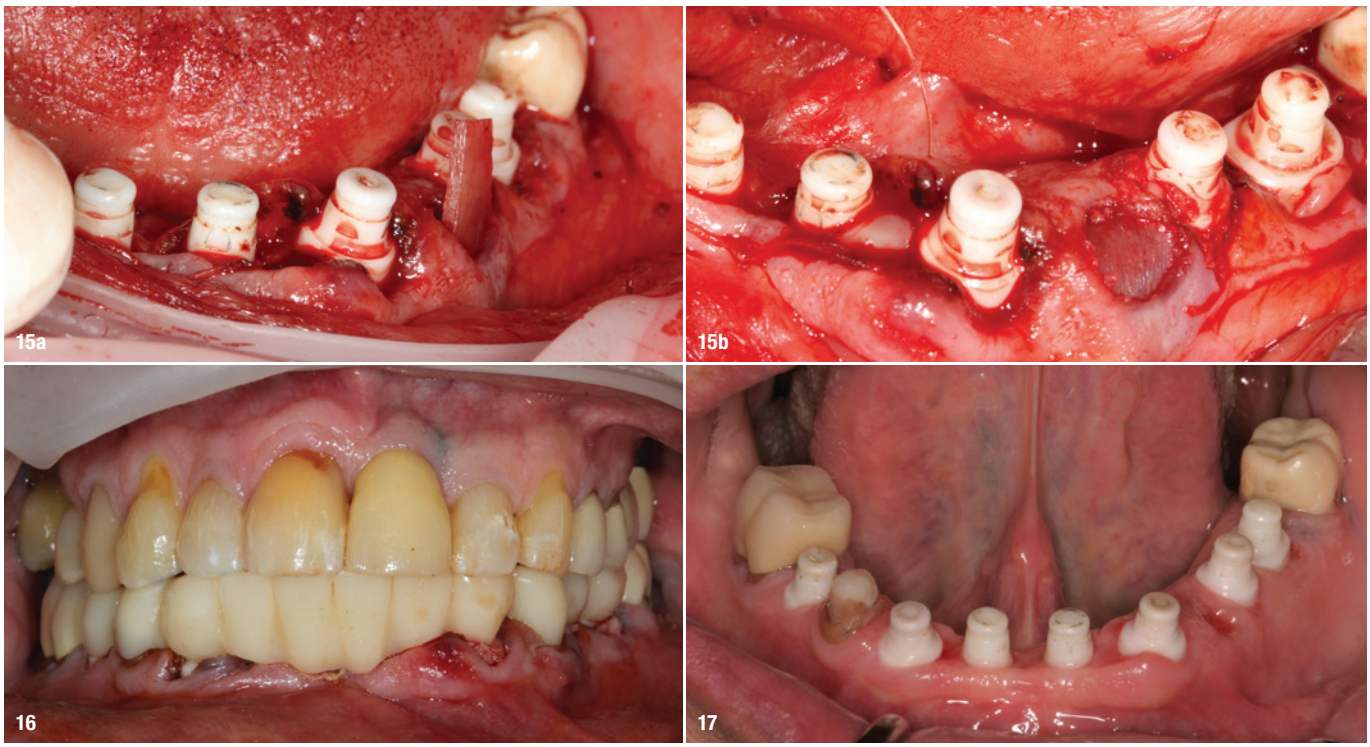


Fig. 13: Intra-oral scans of the surgical sites for temporary fabrication. **Fig. 14:** 3D lab-printed temporary with Flexera-Smile Ultra+ (Desktop Health).

tration, and a CBCT scan with fiducial arrays was taken for accurate planning. The placement of the link allowed for complete visualisation of the surgical field between teeth #22 and 30. A-PRF+ and i-PRF were created using horizontal centrifugation to aid in healing. Atraumatic extractions of teeth #29, 27, and 22 were performed initially, followed by the creation of a small crestal incision and full-thickness flap from teeth #27 to 22. The surgical sites were degranulated using curettage and degranulation burs, and decontamination ozone therapy was administered to the sockets using 03 gas and 03 water. Surgery was then initiated using a lance drill in sites #29, 27, 25, and 24, with osteotomies being incrementally increased to manufacturer's recommendations. The orientation of the drills was confirmed intraorally and via dynamic live CBCT navigation. Close proximity to the nerve was successfully navigated during immediate implantation in site #29 with high confidence using haptic controls and locked drill path depth and angulation with Yomi robot (Fig. 12). Implants were placed in sites 29, 27, 25, and 24. The first phase of the surgery was completed in approximately 90 minutes, and the Yomi link was removed, and the guide arm detached.

The second phase involved the removal of teeth 19, 20, 21, and 22. An attempt was made to connect link to



Figs. 15a & b: Placement of laminar bone sheet into minimally released buccal and lingual flap. **Fig. 16:** Full arch temp adjusted and seated with temp cement. **Fig. 17:** Excellent healing situation seven weeks after surgery.

the the lower right side of the patient's mouth, utilising teeth 30 and 28, and implant abutments 29 and 27, but it was then unsuccessful. Yomi's traditional workflow only allows for working on one quadrant of the mouth at a time, and a new scan and four or more stable teeth are required to anchor the link on the other side. This has now been overcome with a new Yomi bone link which would have been ideal in this case.

Freehand immediate placement and parallelisation of implants (#22, 20, and 19) was possible with the visual aid of the previous implants. Intra-oral scans of the surgical sites were made and sent to the lab for temporary fabrication (Figs. 13 & 14). Site #21 had significant bone loss due to infection and was grafted with allograft and a laminar bone sheet. The bone sheet was trimmed and placed into a minimally released buccal and lingual flap and covered with A-PRF+ (Figs. 15a & b). Suturing was completed, and a full arch temp was adjusted and seated with temp cement (Fig. 16). Seven weeks later, the patient's loose temp was removed, cleaned, and recemented. Excellent healing of the soft tissue was shown in Figure 17.

Discussion

Ceramic dental implant placement can be a delicate process, having ideal emergence with one piece dental implants remains one of the biggest challenges and ideal placement is essential. A fixed drill path and depth combined with Yomi's surgical flexibility and the dentist's visualisation during surgery may be one of its advantages over other guided navigation systems. As patient awareness grows of different dental materials, zirconia implants with their excellent healing profiles are poised to continue to gain attention. Accurate and ideal placement of zirconia implants is essential in gaining trust of our patients and dental community. With the variety of modern digital workflows choosing a surgical method that is predictable and repeatable is what we as clinicians must evaluate. The benefits of robotic assistance point towards Yomi holding its place in the surgical suite and will likely continue to pave the path forward in giving patients access to safe, efficient, accurate and long-lasting zirconia implant therapy.

Acknowledgements to Dr Shepard Delong for his guidance and introduction to ceramic implantology and to Lotus Dental Wellness, Lake Oswego, Oregon.

about the author

Dr Daniel Madden received his Doctor of Dental Surgery from the University of Minnesota and pursued advanced studies in implantology and comprehensive dentistry abroad at the Radboud University Medical Center in Nijmegen, the Netherlands. He has served as adjunct affiliate assistant professor at Oregon Health and Science University and is a certified Integrative Nutrition Health Coach. He has a passion for education and technology in dentistry, and believes that this leads to a more comfortable, efficient and pleasurable patient experience. He offers patients biologic treatment solutions for optimum oral and whole-body health at Lotus Dental Wellness in Lake Oswego, Oregon, and his surgical services through his company Peak Potential Dental at multiple private practice locations in Oregon and Washington State.

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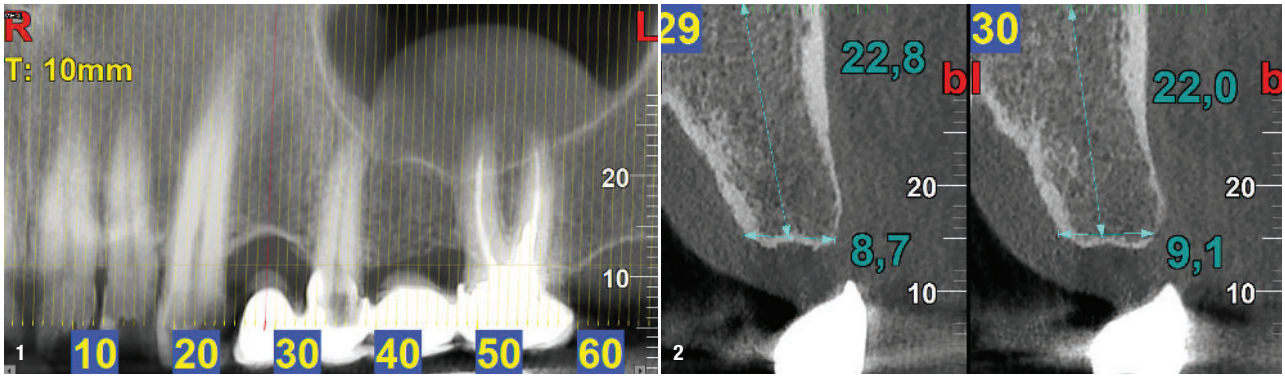
Dr Daniel Madden

Literature

Looking for a ceramic solution

Dr Olivier Chéron, Spain



Initial situation and treatment planning

A 40-year-old patient in good general health came to our practice wishing to replace the bridge extending from pontic #24 to tooth #27 and to place an implant in region #24. An initial digital radiograph and a CBCT scan were performed to analyse the possibility of placing an implant in this area (Figs. 1 & 2). The area did not present with any periapical or intraosseous lesions. The bone width and height were found to be sufficient for implantation, and there was no atrophy. A mucous retention cyst was observed in the left maxillary sinus.

After the initial evaluation, it was decided to replace the bridge from tooth #25 to tooth #27 and to place a Zi implant (Neodent) in the region of tooth #24. The old bridge would be reattached with temporary cement until placement of the final crown on the implant and of the new bridge.

Procedure

Prior to the surgery, local anaesthesia was administered. Once the gingival flap had been raised, the drilling protocol was followed according to the manufacturer's recommendation for Type D2 bone: initial drill, tapered drills of increasing diameter (2.0, 3.5, 4.3 mm), countersink drill and bone tap (Fig. 3). The implant (4.3 × 10.0 mm) was placed to a final torque of 45 Ncm (Fig. 4) and then a Zi cover screw was placed (Fig. 5). After suturing had been completed, the old bridge was temporarily cemented in place.

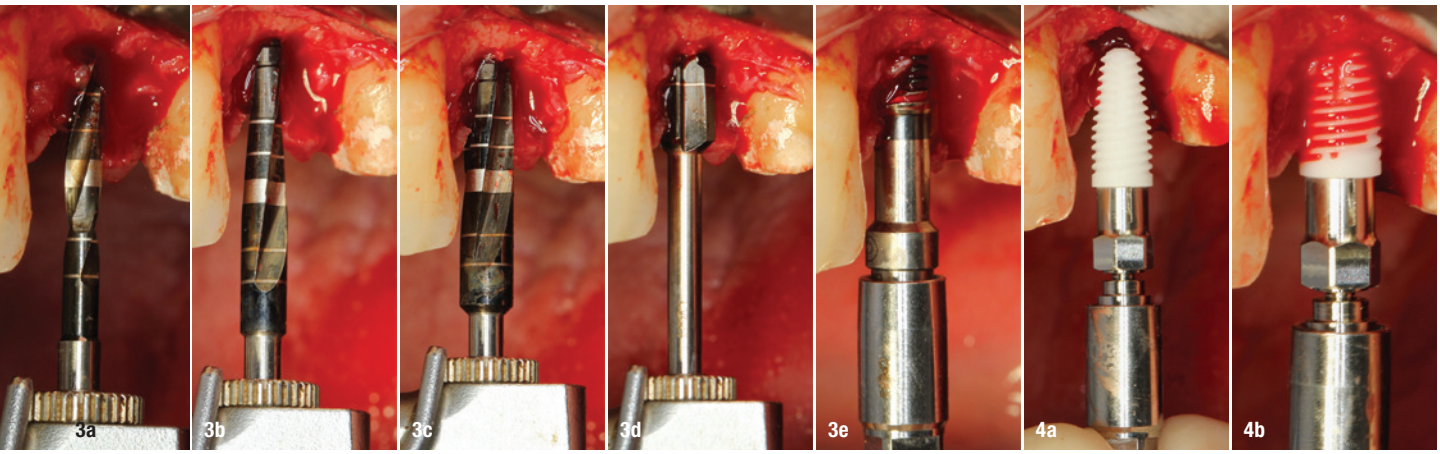


Fig. 1: Radiograph of the initial patient situation. **Fig. 2:** CBCT scan of the initial situation regarding tooth #24. **Figs. 3a–e :** Drilling according to protocol using a 2.0 mm diameter tapered drill **(a)**, a 3.5 mm diameter tapered drill **(b)**, a 4.3 mm diameter tapered drill **(c)**, a countersink drill **(d)** and a bone tap **(e)**. **Figs. 4a & b:** Placement of the Zi implant.

Prosthetic restoration

After three months, a secondary surgery was carried out to place a Zi healing abutment (4.5 × 2.5 mm). Fifteen days after the second surgery, the Zi implant scan body was seated and an intra-oral scan taken (Figs. 6 & 7). The final crown was seated over the Zi base. The crown and a new bridge were placed, and the occlusal adjustments were performed (Figs. 8 & 9).

Discussion

Alternative treatment options would have been either fabricating a new bridge for tooth #24 to tooth #27 or placing two implants in regions #24 and 26, restoring these with crowns and restoring teeth #25 and 27 with crowns. I however chose the treatment solution described because the patient had wished for a ceramic solution already years ago. He had opted for being fitted with a bridge as he did not want a titanium implant. The patient thus approached our practice looking for a ceramic solution.

In this case, the clinical indications for the ceramic implant system employed required strictly following the surgical drilling protocol recommended by the manufacturer, in order to achieve primary stability and to avoid the stress of screwing into the ceramic. The mentioned procedure requires more attention in positioning and the surgical procedure.

about the author

Dr Olivier Chéron is an implantologist specialising in treatment with ceramic implants and has employed a therapeutic approach based on biological dentistry since 2006. He is co-founder of the Equilibria dental clinic in Barcelona in Spain. Dr Chéron is the European Academy of Ceramic Implantology's ambassador for Spain and co-director of the International Team for Implantology's Barcelona study club. He is also a member of AFNOR.

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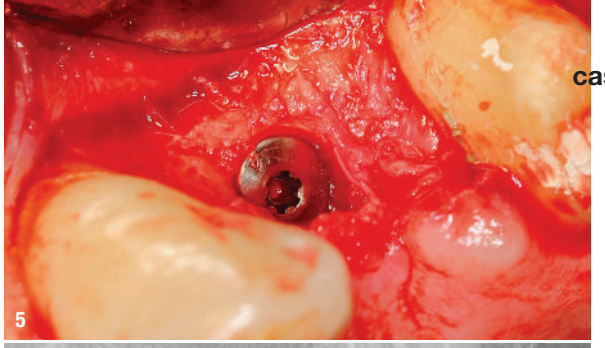

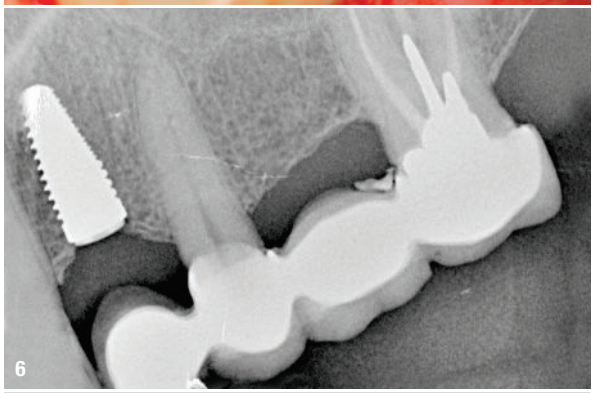

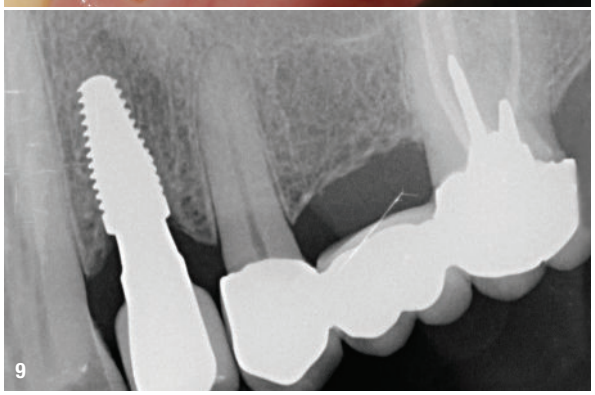

Fig. 5: Zi cover screw *in situ*. **Fig. 6:** Radiograph after three months. **Fig. 7:** Intra-oral scan of the situation with the scan body *in situ* three months after implant placement for prosthetic assessment. **Fig. 8:** Final situation with the crown and bridge *in situ*. **Fig. 9:** Final radiograph.

Full-arch maxillary rehabilitation using Y-TZP protheses on ceramic implants—18 month follow up

Dr Rodrigo Pohlmann, Dr Rodrigo Gomes Beltrão, Cristine Finco, Dr Vinicius Dutra & Marcos Chevarria, Brazil

Nowadays, ceramic materials are increasingly used in the dental field. Ceramic implants, which can be successfully included in different treatment workflows and indications, are today considered reliable thanks to the development of new surfaces, innovative materials and enhanced clinical protocols.

The demand for such metal-free solutions is continuously growing, and there is increased scientific evidence available owing to the growing desire for metal-free treatments and a natural, highly aesthetic appearance, as well as to meet the needs of patients with metal hypersensitivities.

Scientific publications have shown promising preclinical results of ceramic implants and a favourable response of peri-implant tissue thanks to significantly reduced biofilm formation.[1] For example, a prospective clinical study reported a 100 per cent survival rate for ceramic implants and a marginal bone loss of 1.2 ± 0.76 mm after seven years.[2] In addition, a systematic review from 2022 found that all-ceramic restorations supported by ceramic implants demonstrated promising survival rates over a medium-term observation period.[3]

The following case report describes immediate implant placement followed by an immediate restoration protocol using the Straumann PURE Ceramic Implant for the full-arch rehabilitation of the maxilla.

Initial situation

A healthy 63-year-old female patient came to our clinic seeking dental treatment for her upper jaw. She reported being a non-smoker and having no relevant medical history or allergies. Her chief complaint included aesthetic and functional issues. She had generalised dental pain and mobile teeth that did not allow her to eat properly and affected her quality of life. Moreover, she was dissatisfied with the shape, distribution and colour of her maxillary teeth. She also requested an immediate fixed metal-free solution.

The extra-oral examination revealed a smile that slightly exposed the gingiva. The cervices of crowns #12 and 23 were visible. A central diastema was present, and the absence of the maxillary premolars, right molars and left molars was noted (Fig. 1). The intra-oral examination showed missing teeth in the mandible too. The periodontal examination revealed generalised tooth mobility, clinical attachment loss, inflammation, deep periodontal pockets, plaque and bleeding upon probing (Fig. 2). Furthermore, the CBCT examination before treatment showed vertical and horizontal bone loss, periapical lesions and bilateral sinus pneumatisation in the upper jaw (Fig. 3).

Treatment planning

The clinical and radiographic examination indicated that the prognosis for the maxillary teeth was not favourable, and all were considered hopeless.

After discussing various treatment options with the patient and considering her wishes, it was decided on full-arch rehabilitation with yttrium tetragonal zirconia polycrystal (Y-TZP) prostheses with ceramic implants.


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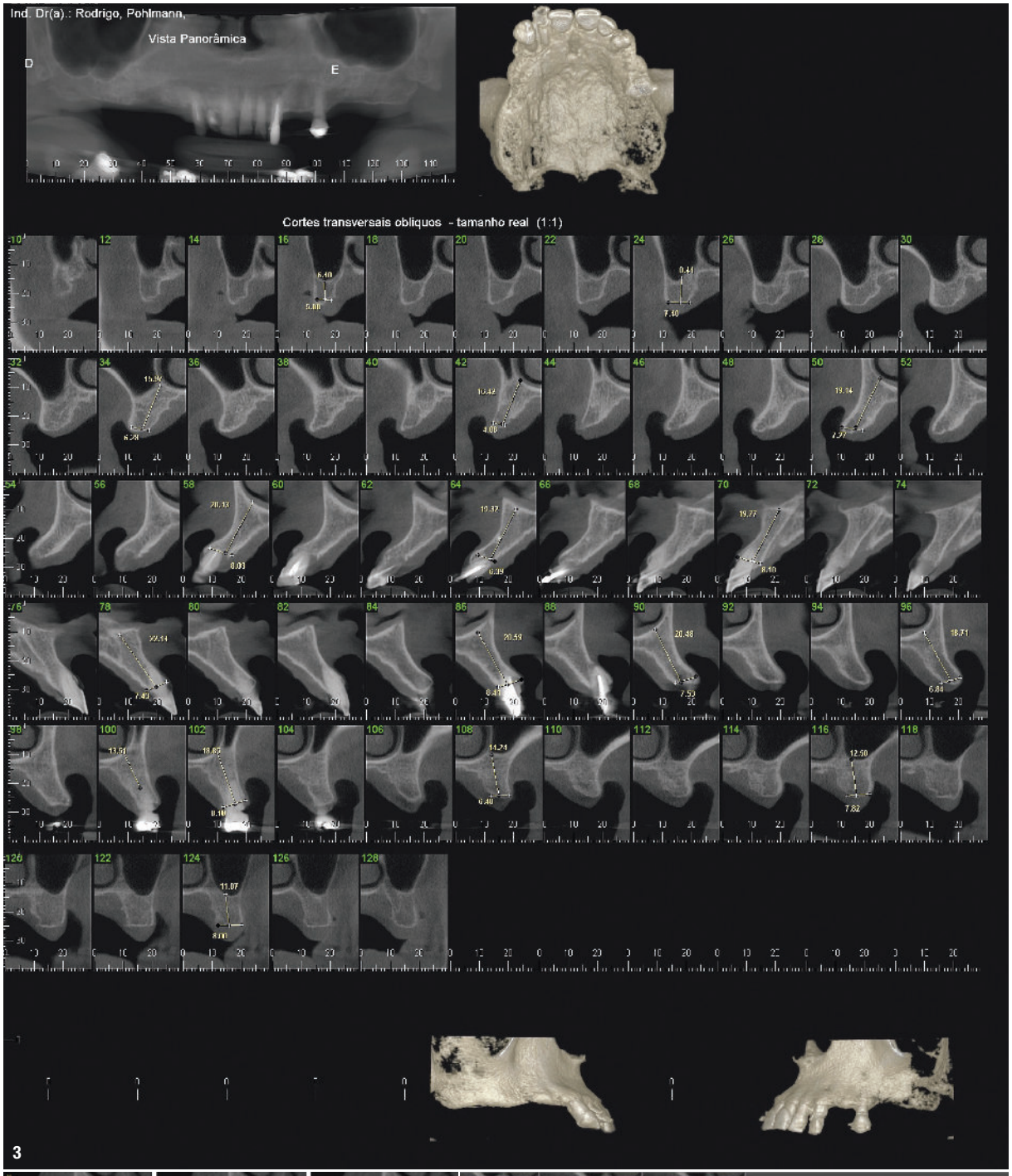
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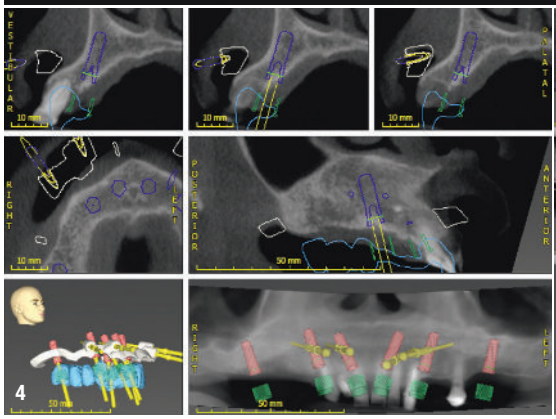
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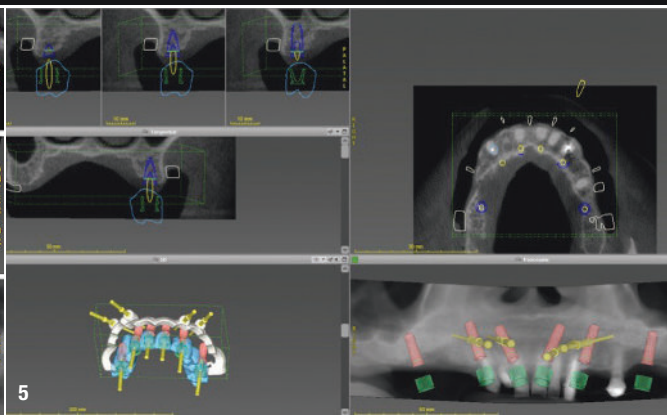
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The main steps for the treatment workflow were the following:

1. oral hygiene instructions, restoration of caries and periodontal treatment in the lower jaw;
2. digital assessment and planning in coDiagnostiX (Dental Wings);
3. positioning of the first surgical guide to define the positions of the anchor pins based on a tooth-supported guide;
4. full-arch extractions of the hopeless teeth in the maxilla;
5. use of two surgical guides for ridge reduction, and drilling protocol stabilisation to enhance the 3D-position of the implants;
6. immediate placement of Straumann PURE Ceramic implants in positions #16 (4.1 x 10 mm), 13 (4.1 x 12 mm), 11 (4.1 x 12 mm), 21 (4.1 x 12 mm), 23 (4.1 x 12 mm), and 26 (4.1 x 10 mm);
7. seating of PEEK temporary abutments for the provisional prosthesis; and
8. final prosthetic restoration with screw-retained proth-eses on implants.

The patient received oral hygiene instructions as part of the cause-related therapy. The lower jaw was periodontally treated, and cavities were restored. Given the patient's financial constraints, it was decided to proceed first with treating the upper jaw, maintaining the periodontal health of the lower jaw until the second phase, when one-piece ceramic implants would be placed.

The treatment planning was defined by full-arch extractions with a guided procedure for ridge reduction and implant placement.

The 3D wax-up model was uploaded to coDiagnostiX to define the amount of ridge reduction and the optimal prosthetically driven 3D implant position (Figs. 4 & 5). The three-guide sequence was drawn to create the perfect ridge contours. The surgical planning was exported to the laboratory to create the perforations in the provisional prosthesis based on the implant positions (Figs. 6 & 7).

Surgical procedure

The surgery was performed under intravenous sedation. Before surgery, the surgical guides were checked for proper fit. The first guide was used to define the position of the anchor pins, and this was based on the tooth-supported guide (Fig. 8).


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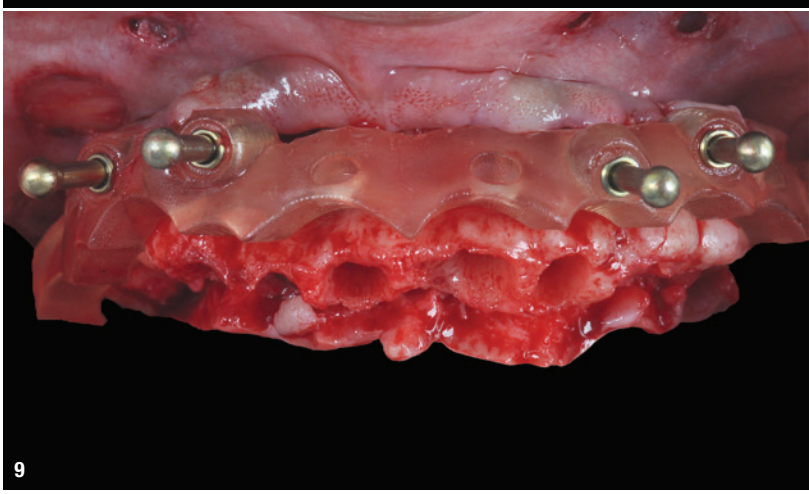
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After atraumatic extractions of the teeth that could not be saved, a full-thickness mucoperiosteal flap was raised with a crestal incision to remove inflammatory tissue and access the bone ridge. The anchor pin marks were located to insert the second guide for ridge reduction (Figs. 9 & 10).

The goal of bone reduction in the case of failing dentition is to improve the alveolar ridge profile and create the planned inter-arch space. The ridge was reduced with a bur using the pre-planned guide contours to achieve the intended inter-arch space for optimal prosthetic dimensions. The third guide was fixed on this guide to drive the implant site preparation and placement. The Straumann surgical cassette was used, and the manufacturer's instructions in the full Straumann technique guide were followed (Fig. 11).

These implants were selected for their design and surface characteristics, which enable excellent primary stability to be achieved in extraction sockets and soft bone. Since the primary stability of all the implants was between 40 and 45 Ncm, immediate loading could be performed using the PMMA pre-milled provisional prosthesis and Straumann PURE temporary abutments (Figs. 12–15).

A VITA CAD-Temp temporary cylinder abutment was attached to each implant with a multi-unit abutment screw. Next, the provisional prosthesis was seated, a passive fit on the abutments was achieved and the occlusion was checked. Since the provisional prosthesis was passively adapted and the occlusion was fine, acrylic resin was used to join the abutments to the prosthesis. Finally, the screws were tightened to 25 Ncm.

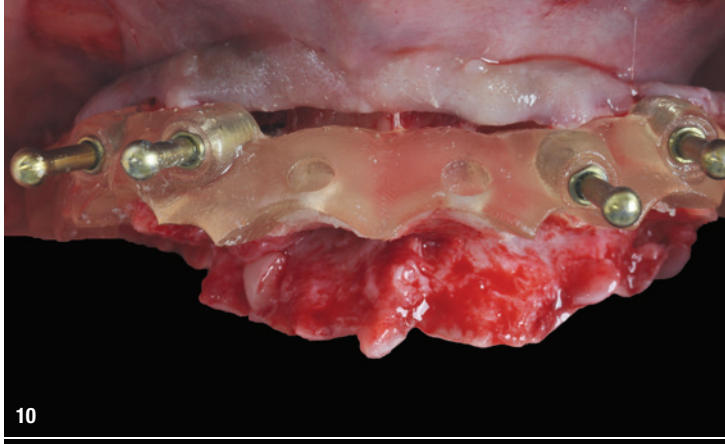
Detailed postoperative instructions were given on oral hygiene and the avoidance of extreme loading when chewing. A liquid diet was recommended for the first two days and only soft food for 30 days thereafter.

The suture removal appointment was scheduled for two weeks postoperatively. Healing was found to be uneventful (Fig. 16).

Final restorative procedure

After four months, the patient had adjusted very well to the new prosthesis and was eager to move forward with the treatment plan (Fig. 17). The soft-tissue contours were exactly as digitally planned (Fig. 18). Implant healing was outstanding, and osseointegration had been achieved.

Therefore, a conventional impression was taken to deliver Y-TZP restoration in three parts for optimal load distribution (Figs. 19 & 20). Straumann PURE Ceramic abutments were used. The occlusion was checked, and no further adjustments were needed (Figs. 21 & 22). Clinical examination at the 18-month follow-up indicated excellent maintenance of the treatment (Fig. 23).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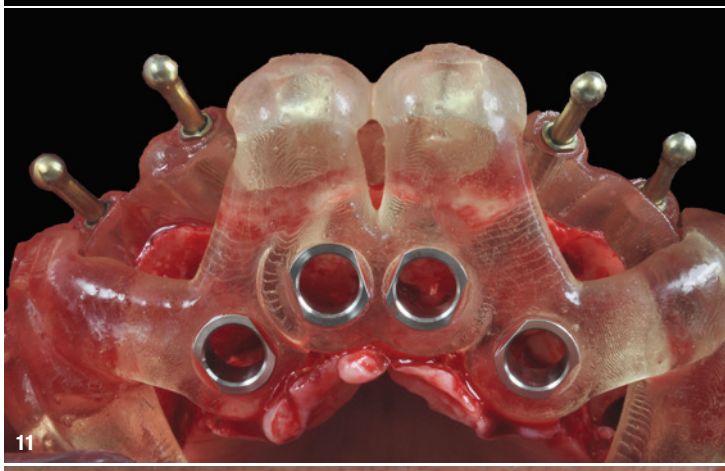
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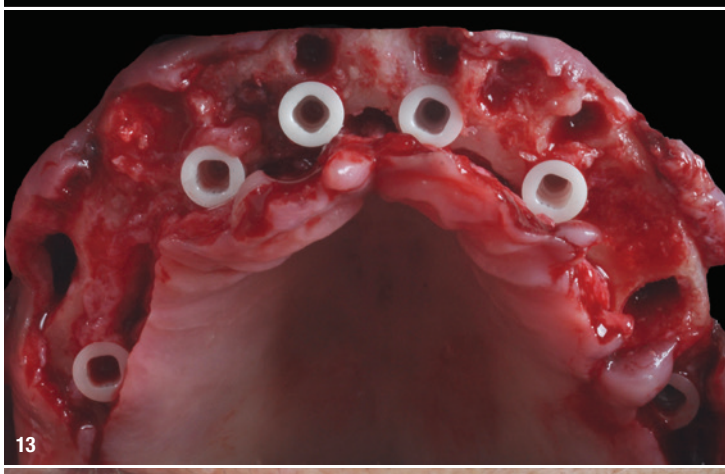
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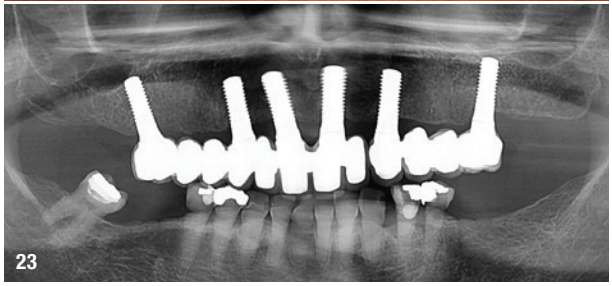
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Conclusion

The outstanding health of both hard and soft tissue was achieved thanks to prudent clinical selection, good planning, accurate 3D implant positioning and an appropriate treatment protocol. These were essential for the treatment success and outstanding aesthetic outcome, which met the patient's requirements.

Straumann PURE Ceramic two-piece implants allow clinicians to use zirconia implants not only for single-tooth cases but also as a reliable solution for multiple teeth, treatment in the posterior zone and challenging clinical situations. Correct planning with coDiagnostiX is essential for achieving successful results by placing the implant with Straumann Guided Surgery.

Literature

about the authors

Dr Rodrigo Pohlmann has been practising dentistry in his clinic for 26 years in the state of Rio Grande do Sul, Brazil. As a specialist in dental prosthesis and implant dentistry, he became acquainted with ceramic implant dentistry at the first IAOCI congress in San Diego, USA and then encouraged this philosophy in Brazil. In addition to applying ceramic implantology in his private clinic, he is now dedicated to coordinating a postgraduate course in implantology in Rio Grande do Sul, Porto Alegre, where case studies documented by students disseminate this new and already important practice among academics. Within a team of ceramic implant experts, Dr Pohlmann experiences in practice the benefits already demonstrated by scientific research.

Dr Rodrigo Gomes Beltrão graduated in dentistry from the Federal University of Rio Grande do Sul in Porto Alegre, Brazil in 2001. After pursuing his master's degree specialising in oral and maxillofacial surgery at the Pontifical Catholic University of Rio Grande do Sul in 2003, he got his PhD in dentistry (oral and maxillofacial surgery) at the same alma mater in 2009. He has been an advanced surgical implant trainee at UCLA, USA and received a post graduate degree in digital dentistry.
Dr Beltrão is CEO of the BeEasy School, Innovation Advisor at Biolab3D, a founding member of ABICeram Brazil as well as an ITI member. He has a private practice in Porto Alegre, Brazil and also works as an adjunct professor in the master's programme of dentistry at the Porto Alegre campus.

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Discover the latest in ceramic implantology at the EACim's 2023 congress in France

An interview with Dr Fabrice Baudot, scientific leader of the EACim, France

The European Academy of Ceramic Implantology (EACim) is an independent organisation established to share expertise and skills in the practice of ceramic implantology in order to promote the field. On 10 June, the EACim is holding a congress in Paris with an impressive line-up of international speakers. *ceramic implants* had the opportunity to have a conversation with Dr Fabrice Baudot, scientific leader of the EACim, to find out more.

Dr Baudot, you are one of the founding members of the EACim. Why is it important to have an organisation specifically for ceramic implants?
In 2018, when the EACim was founded, ceramic implants were not getting enough attention at the larger congresses, such as the European Association for Osseointegration's annual scientific meeting and EuroPerio. We wanted to create a forum where ceramic implants were in focus to ensure that dentists could join to learn more about current research and have a chance to exchange experiences with their fellow dentists.

What kinds of activities does the EACim arrange?
Our congress is our flagship event for 2023, but we are also arranging seminars that are more interactive where participants can come learn from experienced users. There is one on 23 September in Brussels.

There seems to be a very strong French connection in the organisation. Do dentists need to speak French to participate?
No, not at all. For the congress, there will be simultaneous interpretation into English, and the same goes for the workshops. We have ambassadors in various European countries, such as Germany, Spain, Italy, Greece, Portugal and Luxembourg, so we aim to attract dentists from all over Europe.

What are your expectations of the congress in Paris?
We will have many prominent international speakers on stage who will present new research and clinical applications of ceramic implants. I am convinced that there will be many interesting subjects covered. There are some fascinating new studies showing long-term clinical results on zirconia implants without peri-implantitis. If zirconia implants offer a way to prevent peri-implantitis, they would be a very important tool for any dentist. I also expect to have valuable interaction with my peers who already use or are about to start using zirconia implants. There are always some tips and tricks to pick up at a congress like this.

How can dentists register for the congress?
I would recommend first becoming a member of the EACim via our website. That will give the dentist a favourable rate for the congress, some other activities free of charge and of course access to the EACim website, where a lot of interesting information is made available. I would highly recommend joining the EACim to keep up to date with ceramic implantology. Dentists can find out more about registering for the congress at eacim-ceramic-implantology.com.

about the interview partner

Dr Fabrice Baudot is a French dentist specialised in periodontics and implantology. He currently leads a practice that focuses on laser-assisted microsurgery. His therapeutic approach is always based on minimally invasive surgery. Dr Baudot is frequently invited to speak at international dental conferences, and he is the author of numerous scientific publications. In addition, he is the scientific leader and one of the founding members of the European Academy of Ceramic Implantology.

Congress registration

Dr Fabrice Baudot

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ITI International Team for Implantology

All about the patient: The ITI World Symposium 2024

The ITI World Symposium is back and better than ever: More than 50 world-renowned speakers will present at the world's largest scientific implant dentistry event in Singapore from 9 to 11 May 2024. Building on its previous highly successful online edition, the ITI World Symposium 2024 once again puts patients at the centre of the action. Over three days, the more than 4,000 participants will experience real patients and their stories on stage. The speakers will discuss various treatment options based on the latest scientific evidence. But it does not stop there: world class clinicians will provide commentary on exclusively recorded clinical procedures live on stage.

"With our unique, patient-centred programme structure, we aim to combine practical, clinical insights with the discussion of scientific findings", explains ITI President Charlotte Stilwell. "We ran a survey in our community last year to identify the topics of currently greatest relevance, and these form the core of our scientific programme: soft tissue management, GBR/bone augmentation, immediate implants, peri-implantitis and the digital workflow."

Registration for the ITI World Symposium opens early April. ITI members as well as early registrations will benefit from significant discounts.

ITI International Team for Implantology
worldsymposium.iti.org

International Society for Metal Free Implantology

"Ceramic Implants meets Aesthetics" in May in Munich

Under the theme "Ceramic Implants Meets Aesthetics", ISMI invites you to its 7th Annual Meeting on 5 and 6 May 2023 at the H4 Hotel Messe Munich. The programme is available online and as a printed programme booklet. Renowned experts and practitioners from home and abroad will discuss practical experiences and current trends in the use of ceramic implants, as well as biological aspects of metal-free implantology, with participants on both congress days. Parallel to the ISMI Annual Meeting, and with some joint podiums, the anniversary congress of the German Society for Cosmetic Dentistry e.V. (DGKZ) will take place.

The two-day event begins on Friday with an interdisciplinary session on the topic: Zirconium dioxide in general dentistry and implantology—where are we and what perspectives are there? Other offerings on the first congress day include the SDS Pre-Congress Symposium incl. Live-OP, Table Clinics, and a course on the topic: production and obtaining of autologous blood concentrates. The ISMI WHITE NIGHT—this time as a get-together in the exhibition area—ends the first congress day in a relaxed atmosphere. Saturday will be all about exciting talks from science and practice.

Details and registration

OEMUS MEDIA AG
www.ismi-meeting.com

EACim Seminar

September 23, 2023

BRUSSELS

The prosthesis on zirconia implants

Simultaneous translation in English and in French

PROGRAM

Moderator : Prof. SELENA TOMA

09:00 - 10:30 : **Pascal EPPE** (Belgium)
The zirconia implant, a preventive strategy for peri-implantitis

10:30 - 11:00 : **Break**

11:00 - 12:30 : **Dr Fabrice BAUDOT** (France)
Evolution of prosthetic concepts on zirconia implants. Biomimetic reconstructions

12:30 - 14:00 : **Lunch - Buffet**

Moderatorr : Pierre DELMELLE

14:00 - 15:30 : **Prof. Marcel WAINWRICHT** (Germany)
Difficult cases in surgery and prosthetic rehabilitation with zirconia implants. How to solve them ?

15:30 - 16:00 : **Break**

16:00 - 17:30 : **Marc NACAR** (Belgium)
Interest of digital flow in prosthetic management on ceramic implants

Accreditation RIZIV accepted (40 units)

Event open to all:
EACim members and non-members

RATE

Registration fee : 180 euros (Lunch included)

- **FREE registration for all EACim members in 2023**
- **Preferential rate 120 € for SMD members** (in order of contribution 2023)
- **Preferential rate 120 € for SBP members** (in order of subscription 2023)

LOCATION

HÔTEL LE PLAZA
Adolphe Maxlaan 118/126
1000 Brussels

ORGANISATION: EACim

Partner : Patent

INFORMATIONS & REGISTRATION : eacim-ceramic-implantology.com

5th Group & Experts Meeting at IDS 2023

Discussing the traceable connection between packaging and implant contamination

"We're so happy for the positive reactions and feedback for our global initiative at this year's IDS," summarises Dr Dirk U. Duddeck, founder and head of research of the non-profit CleanImplant Foundation (CIF), and continues: "The interactions at the world's leading exhibition for the dental industry have proven that more and more dentists and implant manufacturers are increasingly sensitised towards the problem of factory-contaminated implants". For its 5th iteration, this year's CleanImplant Group & Experts Meeting was the largest to date, with over 50 guests attending, from manufacturers' representatives to project partners.

Partner of industry and science

"With more than 135,000 subscriptions from dental professionals on Social Media, we understand the CleanImplant Foundation's role as a partner of industry and science," Dr Duddeck further states. The invited speakers, including physicist Dr Birgit Hagenhoff, Managing Director of Tascon GmbH and visiting professor at the University of Münster, and Prof. Dr Patrick R. Schmidlin, Head Division of Periodontology at the University of Zurich (Switzerland), along with Dr Duddeck emphasised the worrisome lack of binding industry standards for implant surface cleanliness. Providing a reference for patients and practitioners, the consensus-based quality guideline for implant surface cleanliness was established in 2017 by the scientific advisory board of the non-profit organisation, as the industry faces increasing backlash over lacking quality levels.

An expert in surface analysis, Dr Hagenhoff outlined the various kinds of detectable contaminations. Using ToF-SIMS analysis, a direct correlation between packaging and surface contamination could be confirmed, most

recently even on a sterile-packaged ceramic implant revealing cell-toxic residues on the implants' surface. Joining online from Zurich, Prof. Schmidlin in his lecture criticised the fact that only the osseointegration rates are considered as a success parameter of implantation, an incomplete standard overdue for reconsideration. The far more relevant indicator of success is the attachment of the soft tissue to the implant. However, this process can be affected by impurities on the implant's surface. Unveiling the causal effects of the matter, a recently initiated *in-vitro* study by the University of Zurich in cooperation with the CleanImplant Foundation investigates the

"Providing a reference for patients and practitioners, the consensus-based quality guideline for implant surface cleanliness was established in 2017 by the scientific advisory board of the non-profit organisation, as the industry faces increasing backlash over lacking quality levels."

effects of different chemically identified factory-related implant contaminants on bone and soft tissue. "This study will provide answers to the question of a connection between implant surface contaminants on the one hand and previously unexplained early implant failures and poor osseointegration on the other", adds Dr Duddeck.

On-site SEM analyses of implant surfaces

A high-resolution scanning electron microscope (SEM), provided by Thermo Fisher Scientific, was installed at the CleanImplant booth to demonstrate the analysis process of implant surfaces to the numerous spectators live at this year's IDS. Dentists brought sterile packaged implants from their practices to have them analysed directly. As expected, the revelations from the SEM analyses' visualisations caused either relief or shock, as dentists found their implants intended for use on patients to carry significant contaminations. Dr Duddeck and his team continued to educate and inform about the extent and potential consequences of factory-related contamination of dental implants. At the same time, implant types that have proven batch-spanning particle-free implant surfaces have been awarded the foundation's "Trusted Quality" seal and received praise and mention by the quality initiative for guidance and trust for practitioners.

contact

CleanImplant Foundation
www.cleanimplant.org

Fig. 1: Located directly on the Zurichberg, the venue offered a picturesque setting for exciting lectures and informative discussions about Zeramex implants.

Zeramex congress in Zurich: Exciting insights into metal-free implantology

Swiss ceramic implant producer Dentalpoint offered the possibility for an in-depth exploration of the innovative world of metal-free implantology at the Zeramex congress in combination with picturesque views of the Zurichberg. The congress highlighted why implants made of high-performance ceramic might by now be setting their very own standards.

Dentalpoint, the Swiss technology leader in metal free, two-piece ceramic implants invited to its Zeramex congress “The Future: natural, white and digital” at the Zurichberg from 31 March to 1 April 2023. The combination of scientific presentations and practical insights met a very high resonance. With 100 participants the congress was fully booked.

High biological compatibility, low plaque affinity and excellent red-white aesthetics have led to ceramic implants now being highly valued in dentistry. The interest of practitioners has been increasing continuously owing to the growing number of clinical studies and the convincing results achieved in practice. Zeramex focuses on maximum user-friendliness with its completely metal-free, two-piece and reversible screw-retained Zeramex XT implant system.

2

Top speakers and hands-on workshops

Exciting presentations and breakout sessions on metal-free implantology were at the center of the congress. Renowned experts of metal-free implantology were offering insights into their extensive experience using ceramic implants. Participants had the possibility to get in-depth knowledge of the practical work during the breakout sessions at the start of the congress: choosing between either getting to know the Zeramex XT implant system and its digital workflow or expanding their knowledge in modern patient management and dental photography.

After a welcome by Dentalpoint's CEO Adrian Hunn, the congress presentations were kicked-off by Dr Jens Tartsch, congress president and president of the European Society for Ceramic Implantology (ESCI), with a presentation on the role of ceramic implants in modern implantology and their increasing importance in practice. Dr Tartsch's lecture introduced the range of topics of the two-day congress, reaching from material specifications of zirconium dioxide and application conditions to osseointegration and the advantages of two-piece implant systems.

Repeatedly at the focus of presentations: The clinical evidence of ceramic implants in implantology practice. The speakers discussed the state of research on ceramic implants and the evidence for their functioning in practice based on their own studies, scientific findings and application experience. It was thus shown that ceramic implants can compete with implants made of titan in many criteria, whereas they are even setting their own standards in other areas such as e.g. the risk of periimplantitis or red-white aesthetics.

Fig. 2: During a press conference, CEO Adrian Hunn (third from left) and Sales Director D-A-CH Michael Wierz (second from left) provided insights into the company Dentalpoint and the Zeramex brand. **Fig. 3:** Dr Marc Balmer (left) presented the latest study results with ceramic implants in 2023 together with Dr Jens Tartsch.

Insights into implantology's future

Besides clinical evidence and practical experience with ceramic implants the congress also offered exciting insights into important topics connected to implantology. During the lecture of Dr Joseph Choukroun, inventor of the PRF technique, attendees were getting insights into osteoimmunology and gained important points of reference regarding soft-tissue management in implantology, especially with ceramic implants.

Dental technician Wolfgang Weisser focused his presentation on the role of Zeramex implants in dental technology showing their diverse possibilities in dental practice. To sum things up Dr Gerd Wirtz gave an outlook into the developments that artificial intelligence means for both practitioners and patients in his keynote speech on the future of medicine. It even inspired a spontaneous presentation of US dentist Dr Shepard Delong, demonstrating how he is supported by a highly modern robot in his implantological work.

Well attended presentations followed by lively discussions, collegial exchange and lasting learning experiences characterised the Zeramex congress. Adrian Hunn, Dentalpoint's CEO and host of the Zeramex congress was truly satisfied: „During the Zeramex congress we have once again highlighted that implants made of high-performance ceramic will not only have a supporting role in dentistry but will become an essential part of it. The outstanding feedback has proven to us that we are on the right track."

contact

Dentalpoint AG
Switzerland
www.zeramex.com

Dentalpoint

The aesthetic implant

Zirconia, the dental material of the future, the two-piece design of the implant, the unique implant–abutment connection, the conventional and digital workflow, the outstanding clinical results, and the know-how from 17 years of research and development are the pillars of success of the Swiss ceramic implant system Zeramex XT.
The heart of the implant–abutment connection is the VICARBO screw made of carbon re-reinforced high-performance PEEK. The principle: the implant made of zirconium dioxide absorbs the compressive forces, while the VICARBO screw counteracts tensile and bending forces. The design of the external thread ensures high primary stability and the microrough and hydrophilic Zerafil surface demonstrates convincing osseointegration with a success rate of 98%.
Studies show decisive advantages of zirconium dioxide over other materials: it has lower plaque accumulation, lower bacterial adhesion as well as reduced thickness of the accumulated biofilm. It also contributes to better blood circulation in the peri-implant soft tissue which results in healthier gingiva and improved aesthetics.

Dentalpoint AG, Switzerland
www.zeramex.com

Straumann

Ceramic Healing Abutments: the first step to harmonious soft tissue healing

These healing abutments for Straumann bone level implants enable aesthetics from the day of surgery and offer favourable conditions for soft-tissue attachment, thereby supporting a healthy peri-implant environment. Their well-proven zirconia material helps surgeons and prosthodontists who are looking for less plaque attachment (smoother surface compared to titanium) and they support soft-tissue healing from the day of surgery.
In general, more favourable soft-tissue attachment around zirconia than around titanium can be observed, with blood circulation similar to that around a natural tooth, as well as a more mature and pronounced soft-tissue integration. This comes with an ease of use entailing aspiration security thanks to the integrated screw and a colour-coding to clearly identify the corresponding prosthetic platform.

Institut Straumann AG
Switzerland
www.straumann.com

Zircon Medical Management

The two-piece zirconia implant with long-term studies

Patent™ has eliminated the drawbacks of conventional two-piece zirconia implants. Its innovative prosthetic concept perfectly complements the material properties of zirconia: the cemented glass fibre post, having a dentine-like modulus of elasticity, is able to attenuate masticatory forces and transfer them to the implant in favourable way, ensuring reliable long-term function. Additionally, the patented production process, in which all surface-machining steps are completed before sintering, creates a high endosteal surface roughness (Ra 5,7 µm) that is essential for fast and predictable osseointegration. During the subsequent sintering, any process-induced microcracks are eliminated, maximising fracture resistance. The success of the Patent™ Concept has been proven by science: in the first long-term study on two-piece zirconia implants, integrated Patent™ Implants showed no fractures, healthy soft tissues, stable bone levels, and no signs of peri-implantitis after almost a decade.[1] In a preclinical study they demonstrated bone-to-implant contact (BIC) of over 70% after just four weeks of healing, outperforming all implants investigated in similar studies thus far in terms of osseointegration speed.[2]

Zircon Medical Management AG, Switzerland
www.mypatent.com

Literature

1. Brunello G, Rauch N, Becker K, Hakimi AR, Schwarz F, Becker J. Two-piece zirconia implants in the posterior mandible and maxilla: A cohort study with a follow-up period of 9 years. Clin Oral Implants Res. 2022 Dec;33(12):1233-1244. doi: 10.1111/clr.14005. Epub 2022 Oct 31. PMID: 36184914.
2. Glauser R, Schupbach P. Early bone formation around immediately placed two-piece tissue-level zirconia implants with a modified surface: an experimental study in the miniature pig mandible. Int J Implant Dent. 2022 Sep 14;8(1):37. doi: 10.1186/s40729-022-00437-z. PMID: 36103094; PMCID: PMC9474793.

bredent medical

High primary stability and aesthetic appearance

The whiteSKY implant system from bredent is among the best-documented zirconia implant systems worldwide. It has not only demonstrated excellent osseointegration and longevity in numerous studies but has also proven its efficacy in practice. In fact, the longevity of whiteSKY implants is comparable to that of titanium implants. The whiteSKY implant system offers two different implant types: the whiteSKY Tissue Line and the whiteSKY Alveo Line. The narrow whiteSKY Tissue Line implant provides sufficient space for both the hard and soft tissue and ensures an aesthetically pleasing appearance with its slightly tapered shape in the sulcus area, transitioning from the gingiva to the implant crown. The whiteSKY Alveo Line, on the other hand, is ideal for immediate loading as it fills the extraction socket. At the same time, it provides the treating doctor with the possibility to individualise the implant according to the specific requirements of the clinical case.

bredent medical GmbH & Co. KG, Germany
info@bredent.com · www.bredent-implants.com

Optimal conditions for soft tissue attachment and high mechanical stability

Both the Alveo and Tissue Line implants of the whiteSKY system offer optimal conditions for soft tissue attachment due to their specially designed sulcus surface. The whiteSKY implants are made of hardened zirconia and are one-piece, which gives them particularly high mechanical stability. Thanks to the improved thread design and bone-quality-oriented surgical protocol, the whiteSKY implants achieve high primary stability, making them ideal for immediate loading. Studies have shown that immediate implant placement can improve the bone-implant contact by more than 50 per cent.

Zircon Medical Management

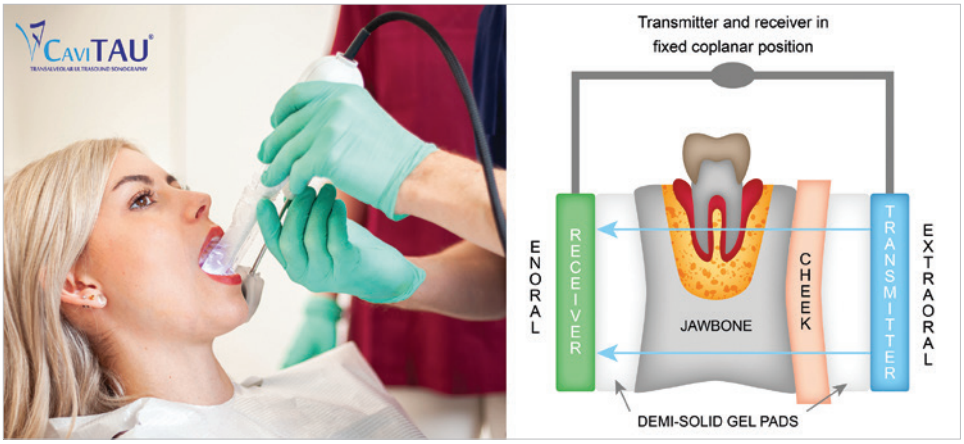
First long-term study on two-piece zirconia implants published

At IDS 2023, the very first long-term study on two-piece zirconia implants was presented. In the independent prospective 9-year study by the University of Düsseldorf, two-piece Patent™ Implants (Zircon Medical Management) demonstrated that long-term oral health with dental implants can be achieved. The results after 9 years of implant function are groundbreaking: no peri-implantitis; high survival rate; healthy soft tissues (bleeding on probing: 12.9 per cent; mucosal recession: <1 mm); no implant fractures; stable plaque indices, pocket depths, and bleeding on probing at 2- and 9-year follow-ups. Marco Waldner, CEO of Zircon Medical, is not surprised by the study results: "We have been seeing exactly this for the last 14 years in the practices of our long-standing customers." The first long-term study of its kind closes a fundamental gap in research and takes two-piece zirconia implants a giant leap closer towards scientific and, as a result, clinical recognition. Prof. Marcel Wainwright, Patent™ user and dental implant specialist, emphasized during the IDS press conference at which the long-term study was presented: "In order to achieve the results Patent™ Implants have demonstrated in the 9-year study in daily practice, users must be thoroughly trained and strictly follow the surgical protocol of the manufacturer."

Source: OEMUS MEDIA AG

CaviTAU

New insight into an underrecognised entity



CaviTAU® application with LED gel pad and schematic representation of transalveolar sonography.

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Lectures in English with simultaneous translation into French

Dr NORBERT CIONCA \ Corrosion of oral implants : causes and consequences \
Dr FABRICE BAUDOT \ Biomimetic implantology with zirconia implants \
Dr GORAN BENIC \ Hard tissue management at ceramic implants \
Dr MARC BALMER \ Ceramic implants: new clinical evidence \
Pr MICHAEL GAHLERT \ Single tooth rehabilitation with zirconia implants: clinical outcome and long term results \
Dr ROLAND GLAUSER \ Discovering a whole new level of tissue integration and patient care – experimental insights and clinical implications \
Dr ANDREA BORGONOVO \ A new generation one-piece ceramic implants based on long term evidence \
Dr PAUL PETRUNGARO \ A paradigm shift in dental implant materials and designs: utilizing zirconia implants from anterior aesthetics to full mouth reconstruction, the future is now! \

CLOSING COCKTAIL \ The conference day will end with a walking dinner cocktail

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3rd EACim CONGRESS

INFORMATION & REGISTRATION

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5–6 May 2023
Munich, Germany
www.ismi-meeting.com

ORAL RECONSTRUCTION FOUNDATION

Oral Reconstruction Global Symposium

18–20 May 2023
Rome, Italy
www.symposium2023.orfoundation.org

52nd International Annual Meeting of DGZI

6–7 October 2023
Hamburg, Germany
www.dgzi-jahreskongress.de

3rd JOINT CONGRESS for CERAMIC IMPLANTOLOGY

13–14 October 2023
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www.joint-congress.com

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