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EDI Journal

European Journal for Dental Implantologists

TOPIC

How much medicine does dentistry need?

»EDI News: Corona virus in Europe at a glimpse · BDIZ EDI relies on continuity · MDR: PMS vigilance system »European Law: ECJ ruling on product liability for health care tips »Case Studies: Soft tissue emergence profile reconstruction · Facially-guided fast and fixed rehabilitation of an edentulous maxilla »Clinical Science: Predictable management of combined atrophy with narrow short and extra-short implants

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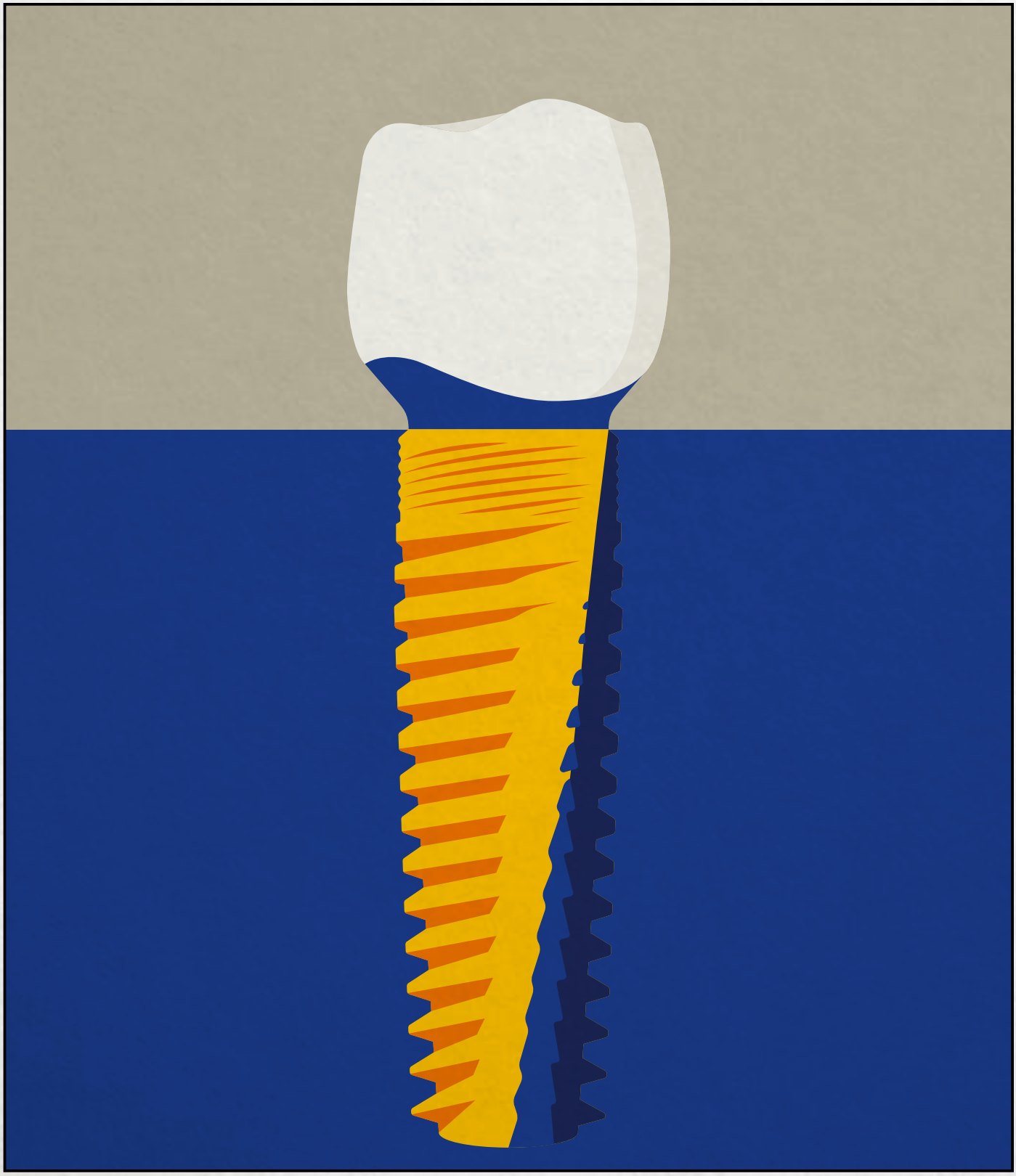


Europe is holding its breath

Dear colleagues,

Another year of fighting Corona is coming to an end. The pandemic should actually be over by now. Just a year ago, Europe's politicians were hoping to achieve sufficient herd immunity, i.e., collective immunity to the pathogen in the population. Any chain of infection can be interrupted or slowed down by a correspondingly high vaccination rate. As we now know, herd immunity is probably no longer achievable. Various variants of the SARS-CoV-2 virus hit us hard – supported by the hesitant action of politics, society and individuals. For various reasons, there are still too many unvaccinated people. Now, the fourth Corona wave has reached us. The incidence numbers are skyrocketing. The WHO is reporting that especially Europe is in the midst of a renewed Corona wave, due in part to under-vaccination rates and premature loosening. Europe accounted for 60 % of Corona infections and deaths worldwide by mid of November, according to WHO. More than 2.5 million cases of infection and nearly 30,000 deaths were recorded in Europe within a week, based on official data, said a count by the AFP news agency. Thus, the continent is the world's most severely affected region by the pandemic.

It seems like a race between hare and hedgehog. We might have won the race against the wild type of SARS-CoV-2, but not against the mutants. That is, unless there is a revolutionary new drug or an improved vaccine. The corona virus, by the way, is in good company: The influenza virus arrives in a new composition every year as well. COVID-19 will remain with us for a long time.

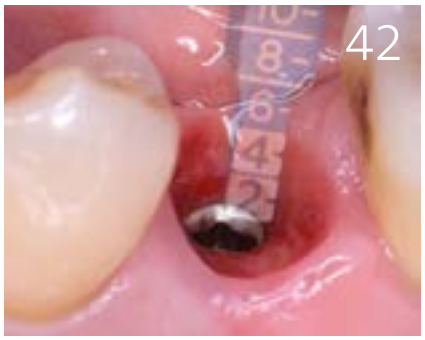
We dentists in Europe have not jumped the gun in the Corona pandemic – on the contrary. We work in the number one risk zone – and yet the dental practice was and is hardly in any danger: not to us, not to our team, and certainly not to our patients. We have taken the initiative and not left it to a third party. We can be proud of that.

We at the BDIZ EDI launched our information and online campaigns in March 2020 and regularly reported on the situation in Europe via EDI Journal. Online training became well established at a time when there were no or hardly any face-to-face events. To date, we have offered and conducted no less than 46 webinars and reached 12,000 participants. The EDI Macedonia European Symposium and this year's USSI EDI Congress were also held online with the support of BDIZ EDI and its partner associations.

I would like to thank you very much on behalf of the newly elected BDIZ EDI Board for your support and feedback. You have given us enormous encouragement in our work as an association. I promise you that we will continue the webinar program in 2022 and extend it to Europe – and we are already planning our face-to-face events.

I wish you a peaceful Christmas and a good start into the year 2022.

Sincerely,
Christian Berger
President



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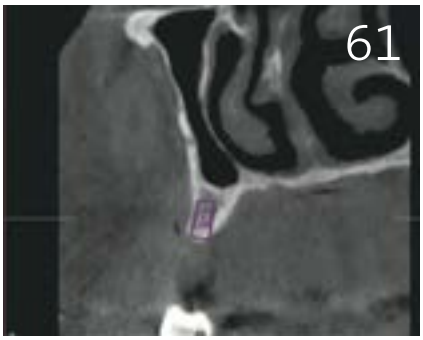

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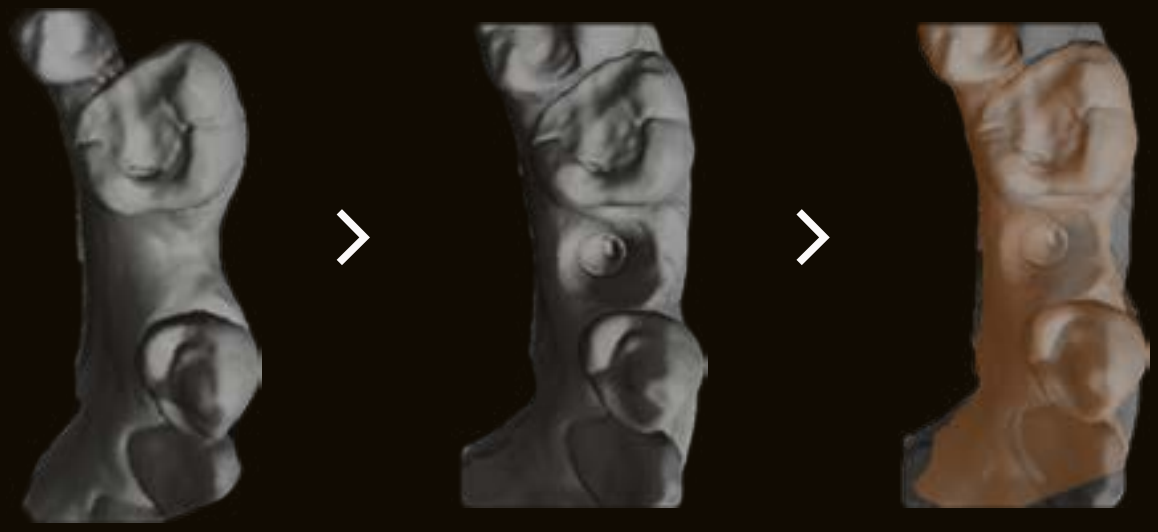

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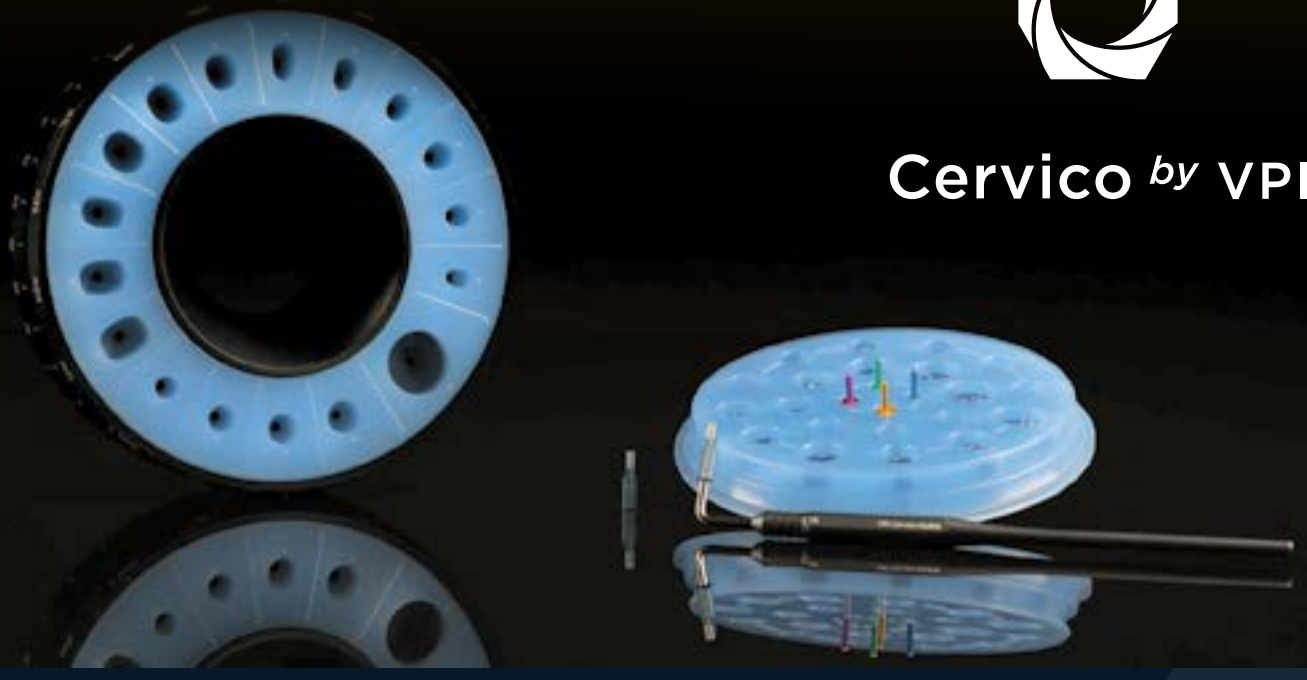

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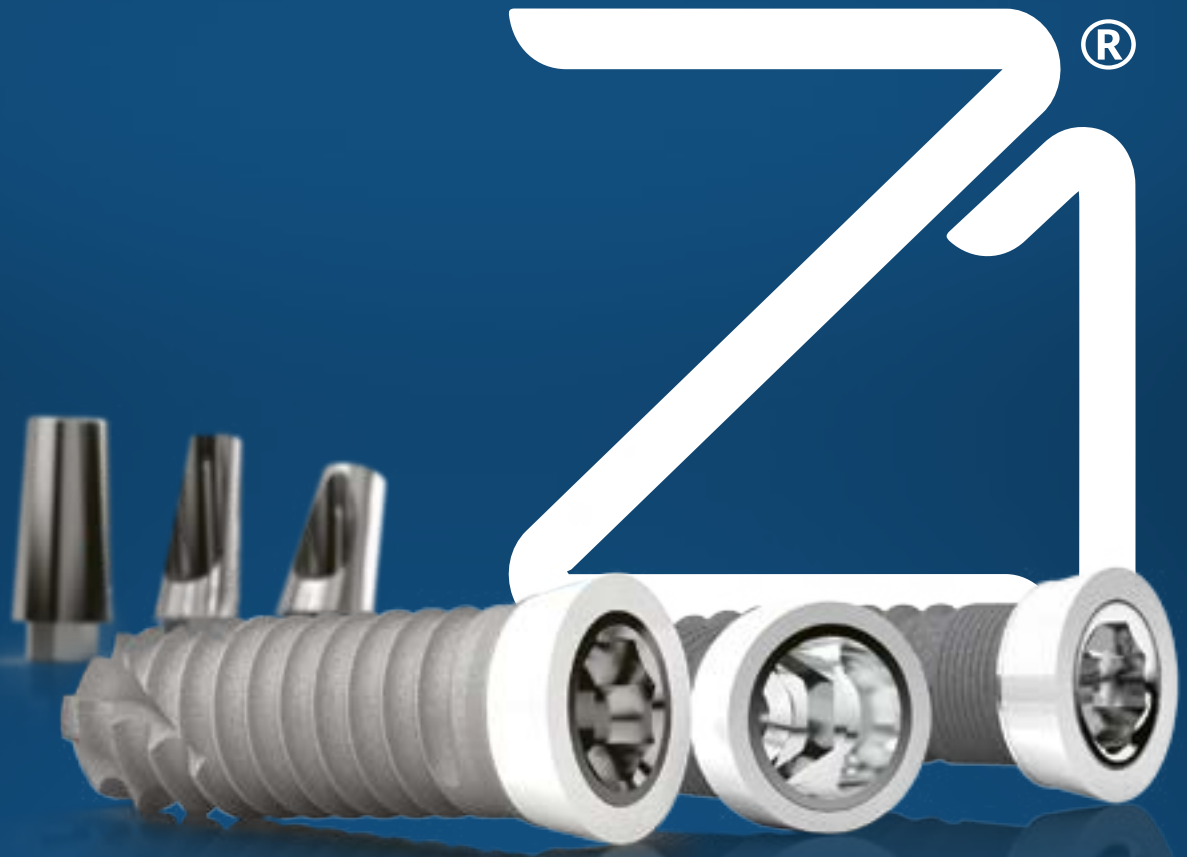

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Partner Organizations of BDIZ EDI

Association of Dental Implantology UK (ADI UK)

ADI UK, founded in 1987, is a registered charity committed to improving the standards of implant dentistry by providing continuing education and ensuring scientific research. It is a membership-focused organization dedicated to providing the dental profession with continuing education, and the public with a greater understanding of the benefits of dental implant treatment. Membership of the ADI is open to the whole dental team and industry, and offers a wealth of benefits, education and support for anyone wishing to start out or develop further in the field of dental implantology.

Ogolnopolskie Stowarzyszenie Implantologii Stomatologicznej (OSIS EDI)

OSIS EDI, founded in 1992, is a university-based organization of Polish scientific implantological associations that joined forces to form OSIS. The mission of OSIS EDI is to increase implant patients' comfort and quality of life by promoting the state of the art and high standards of treatment among dental professionals. OSIS EDI offers a postgraduate education in dental implantology leading to receiving a Certificate of Skills (Certyfikat Umiejętności OSIS), which over 130 dental implantologists have already been awarded.

Sociedad Espanola de Implantes (SEI)

SEI is the oldest society for oral implantology in Europe. The pioneer work started in 1959 with great expectations. The concept of the founding fathers had been a bold one at the time, although a preliminary form of implantology had existed both in Spain and Italy for some time. Today, what was started by those visionaries has become a centrepiece of dentistry in Spain. SEI is the society of reference for all those who practice implantology in Spain and has been throughout the 50 years, during which the practice has been promoted and defended whereas many other societies had jumped on the bandwagon. In 2009 SEI celebrated its 50th anniversary and the board is still emphasizing the importance of cooperating with other recognized and renowned professional societies and associations throughout Europe.

Sociedade Portuguesa de Cirurgia Oral (SPCO)

The SPCO's first international activity was the foundation – together with their counterparts in France, Italy, Spain and Germany – of the European Federation of Oral Surgery (EFOOS) in 1999. The Sociedade Portuguesa de Cirurgia Oral's primary objective is the promotion of medical knowledge in the field of oral surgery and the training of its members.

Udruženje Stomatologa Implantologa Srbije-EDI (USSI EDI)

USSI EDI was founded in 2010 with the desire to enhance dentists' knowledge of dental implants, as well as to provide the highest quality of continuing education in dentistry. The most important aims of the organization are to make postgraduate studies meeting the standards of the European Union available to dentists from Serbia and the region; to raise the level of education in the field of oral implantology; to develop forensic practice in implantology; and to cooperate with countries in the region striving to achieve similar goals.

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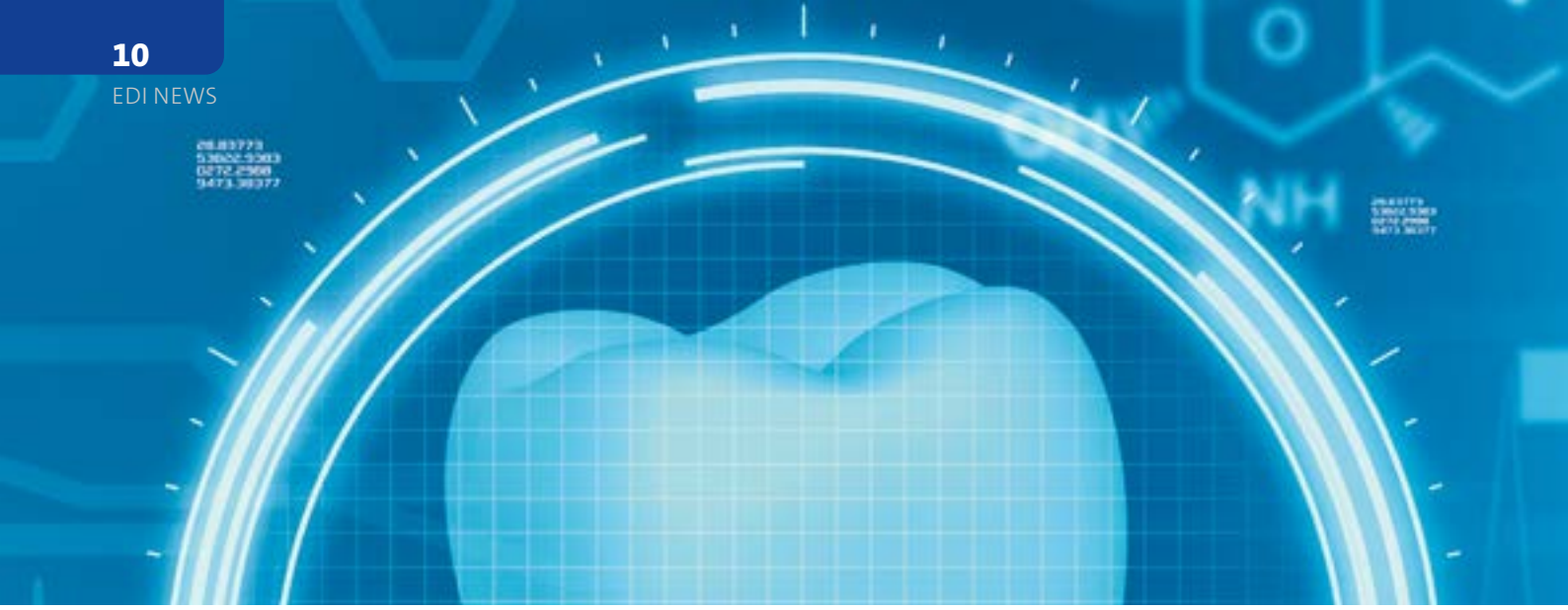

Interview with Markus Tröltzsch and Matthias Tröltzsch, maxillofacial surgeons in Ansbach, Germany

How much medicine does dentistry need?

Medicine and dentistry must be more closely meshed – say two young oral and maxillofacial surgeons from Ansbach, Germany. Not enough general medical knowledge is present in our dental practices today – and conversely, general practitioners and medical specialists know too little about dental medicine. Markus Tröltzsch, Dr med, Dr med dent, and Matthias Tröltzsch, PD, Dr med, Dr med dent, are two of the three authors of a reference volume entitled "Medizin in der täglichen zahnärztlichen Praxis" ("Medicine in Daily Dental Practice"). In a number of free-standing chapters, their book presents fundamental facts about cardiovascular disease, diabetes mellitus, bisphosphonates and oncological topics.

Oral and maxillofacial surgeons like you are physicians as well as dentists. As far as I know, the two fields were kept apart very carefully for the longest time in medical and dental school. Has this changed at all at our universities today?

Matthias T.: Things are no different at university medical and dental schools today, in that maxillofacial surgery is implemented as a link between general and dental medicine. Collaboration between the two is intense, and oral and maxillofacial surgery is the link. At universities and at the largest hospitals, maxillofacial surgery defines itself primarily as a medical speciality, related as it is to traumatology and to otorhinolaryngology and head and neck surgery. This establishes a certain distance from dental medicine, e.g., prosthodontics and restorative dentistry. This is also the case in emergency medical services. As far as student education is concerned, the 1970s and 1980s saw the option to study medicine and dentistry in parallel. Later, when we received our dental and medical education, pursuing two courses of study in parallel was an absolute no-go, and if you tried anyway, one department would terminate your enrolment. The principle was clear: one thing at a time. If the university or department was generous, well, then maybe they would let you take an extraneous course or two. But the older we got, the more difficult this became – that probably also had something to do with the allocation of funds.

Then there was a time, in the early 2010s, when universities such as Freiburg, Munich and Heidelberg let you study medicine and dentistry in parallel – and aggressively promoted this option. Some students earned a double degree when they were no older than 26, which was truly revolutionary. But that development was rolled back. But today, once again, only one degree program can be completed at a time.

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How would you describe the importance of general medicine in current dental practice?

Markus T.: We see it is growing again. Partly on account of the prevailing demographics, and also because of the forensic complications that can arise if we disregard general medical expertise. Moreover, we have seen that an interdisciplinary approach can be quite helpful in some – not so few – areas. Take headache relief and treatment, for example. Here we have a close overlap between dentistry and neurology. Or take the cluster of periodontitis, diabetology and cardiology. A condition that is coming back into focus right now is Lyme disease. Not all that rarely, patients will arrive at the practice presenting with diffuse facial swellings, and then it turns out that the problem is actually Lyme disease. Regarding your question, I believe that the trend will continue as people are getting older and therefore sicker, meaning that there will be more drug interactions to consider. We will see more and more patients whose underlying medical condition has an impact on their dental treatment. Take patients on bisphosphonates. How can I still do a periodontal treatment or professional tooth cleaning for them at all? These are questions we increasingly face.

Together with your colleague Philipp Kaufmann, you have authored a reference work to describe the role of general medicine in daily dental practice. What was your starting point?

Markus T.: We actually started from point zero. The term "reference work" sums it up quite well, because it describes how the book is structured. It is not a book you would expect to read from cover to cover; rather, it features dedicated chapters that address various issues facing dentists. If, for example, I have a patient with dementia, kidney disease or diabetes, I can turn to the corresponding chapter and receive a relatively brief overview of all the relevant medical information on the topic – covering the theory and providing advice for the dental practice, structured to match a given condition. There are sections on anatomy and pharmacology presenting the tools we need on our everyday practice – in terms of theoretical insights, but also application-specific information for the respective condition.

Markus Tröltzsch, Dr med, Dr med dent

Matthias Tröltzsch, PD, Dr med, Dr med dent

Various reviewers have praised your book for this very reason. What was the driving force behind your writing this book?

Markus T.: Dentistry has a problem. Because of the constraints of the curriculum and because of the rigid semester term structure, it is almost impossible for dental students to imbibe all of the medical knowledge they will need in real life. Accordingly, our intention was to write a standard practical work for the dental practice, providing quick access to clinical conditions in a way that makes the information relevant for practising dentists.

Is there something you would you like to add from a scientific angle?

Matthias T.: Dentists who have enough knowledge to discern what is scientifically relevant, this will always be greatly appreciated. There is an unwritten law in medicine: You only see what you know. So if you have never seen a condition or problem before,

you probably will not notice when confronted with it. This is as true of the dental practice as it is of larger clinics. The person in the field it is not always the person who has the most professional experience. I know this is a sad thing to say, but the reality is that it is mostly relative newcomers who work the front lines in our clinics. There are people with a lot of experience who supervise the procedures, but before they can make their voices heard, they first have to actually see the patient. It is simply crucial to establish certain diagnoses right away in order to provide relief for the patient while evaluating the situation scientifically and establishing correlations.

Markus T.: This applies to dental as well as to medical professionals. We have the same problem the other way round – not enough dental knowledge within medicine. We had started offering "Dentistry for physicians" courses for our local colleagues just before the COVID-19 pandemic. Next spring, we plan to revive that topic.

Hardly any doctors see their patients more frequently than dentists do. Naturally, their focus is on their patients' mouth, jaws and face. So what diseases beyond their immediate area of expertise can, or could, dentists detect at an early stage?

Markus T.: There is no simple answer to that. Very many conditions can be associated with mouth, jaw or facial symptoms due to a patient's deteriorating general health. Lymphomas are an example in kind. In 25 % of cases, the initial manifestation of a lymphoma will be some swelling above the clavicles, and patients will not infrequently consult a dentist – who, however, will not find any dentogenic cause. The situation is aggravated if a dentogenic cause is present but did not trigger the lymphoma. That makes it difficult to differentiate.

Actually, your question basically covers the entire range of what contributes to general health – or disease. We already mentioned diabetology, cardiology, nephrology – all of which might present with milder symptoms if co-treated by a dentist. These overlaps are immense and well beyond the scope of this interview to try to answer them in full.

Matthias T.: Dentists must see themselves as specialists for oral medicine and be perceived as such, and not as dentists who "merely" address supragingival phenomena. In Europe, this development is still in its infancy; the US has already progressed beyond this point. The best example is sleep medicine – the guideline discussions here not only include ENT specialists, but also dentists on a regular basis. We still have a lot of work to do in Europe to ensure that physicians perceive dentistry as an independent, vital and important field. I think it is also important that dentists embrace this role.

In addition to anatomy and physiology, your book also addresses pharmacology. How important is, or should be, a knowledge of drug actions within dental care?

Matthias T.: In dental school, pharmacology is a minuscule niche. There are maybe one or two pharmacological classes during the entire programme. That is not enough for such a complex topic. The courses we teach start with the very basics. How do drugs work in general, in tablet form, intravenously, in terms of quantity, etc.? We find that certain agents are prescribed because they are the ones the prescribing dentist or physician at one time learned or read about. Many are also unaware that medication levels must depend on body weight and that there is no one-size-fits-all dosage. Especially when it comes to antibiotics, our problem today is that as we talk a lot about viruses, bacteria are becoming increasingly resistant. We have quite a dangerous wave of resistances ahead of us, which researchers are not moving fast enough to catch up with. We are reaching the limits of antibiotic therapy. Many pathogens have become resistant to all antibiotics because those antibiotics have been overprescribed, and improperly prescribed. The key phrase here is "antibiotic stewardship". We have to understand exactly why we prescribe what, and for how long, and for which indication, otherwise we will fail. This is just one example, but maybe the most succinct one. Analgesics, for example, which we use and prescribe daily, are particularly relevant within dentistry. We need to know all about the entire range of active ingredients.

Can you give specific examples of diseases and medications that have a direct impact on oral health? What do dentists need to consider?

Matthias T.: We – hopefully – all know about anything to do with bone metabolism and antiresorptives by now. Particularly great uncertainty prevails in the case of antirheumatic agents. Rheumatology now uses many new drugs – biologics, antibodies, low-molecular-weight substances. It is hard to keep up with them, even if you are sufficiently interested.


Foto: stock.adobe.com/APhotoSG

Another area is psychopharmaceuticals, for patients with depressions for example. There are interactions between the classic antidepressants, the serotonin reuptake inhibitors, and bone metabolism. There are interactions between gastrointestinal drugs and bone metabolism.

Markus T.: And you can also go one step further and look at analgesic drugs. When we prescribe a pain medication, it will quite often be ibuprofen. Hardly anyone knows that in patient who take low doses of aspirin as part of a cardiological treatment, the aspirin effect will disappear in the presence of ibuprofen. If we want to keep both drugs effective, we must administer them at separate times. Early in the pandemic, you had described the management of COVID-19 for the dental team. Where does your knowledge of infection control come from?

Markus T.: We were out early in getting up to speed because we saw the coronavirus wave in the making. In February 2020, we were still in Chicago talking to with Italian friends – while the first wave was already underway in Italy. We noticed that there is already a lot of evidence available going back to the SARS epidemic. The first wave of SARS was in 2003. SARS is also a Corona virus, so we were able to rely on the science that already existed.

In an interview at the beginning of the pandemic, you, Markus, talked about the dentist being the medical specialist for the oral cavity. In your opinion, should dentistry move closer to medicine? And how can that be accomplished?

Markus T.: Both sides must make an effort to close the gap between them. So how did we end up with a situation where oral medicine is excluded from much of the rest of medicine? I think the reason lies in their different historical developments. Medical subjects had achieved university status as early as 1280, while dentistry may once have been an academic subject, but most of the time it was practiced at fairgrounds and the like. Antipathies of class and status have existed for a long time. And since we are all creatures of habit, it takes us a long time to break down our mental barriers. There is also another aspect: medicine in the oral cavity is quite different from medicine in the abdominal cavity, to cite one example. We have completely different organelles moving around, and therefore we need very specific knowledge and very special skills – which is only positive, I think. We have our own disease patterns in the oral cavity that are not always like those in the rest of the body. As people are living longer and want to maintain a certain quality of life, we are getting to the point where what happens in the mouth can affect the entire body – and vice versa. Dentistry must develop in the direction of specialist oral medicine – but without neglecting its artisanal roots.

How important do you think general medicine should be in every dental practice?

Markus T.: What will our patients look like in 2030 – assuming we still have a healthcare system that is comparable to today's? It is hard to predict where we will stand in 20 years, and political environments can change rapidly. If we look at what is happening in the UK with the National Health Service (NHS), or at similar developments in Sweden, we have to realize that the structure of the healthcare system has a significant impact on patient care. If the system in Germany holds up, that is, if it can sustain the level of care we have today, then the main question will be how to treat patients with co-morbidities and special medical needs in the dental practice.

A general medical screening will increasingly be required – of course not trying to cover the entire medical but looking at those the areas where we know critical conditions may exist; in my opinion, these will in future be part of the admission screening. Of course, we will not be able to do this within current budgets. The dental practice must be economically viable.

Thank you two very much for this interesting interview.

This interview was conducted by *Anita Wuttke, Editor-in-Chief.*

This interview on video

If you want to watch Anita Wuttke's whole interview with the Tröltzsch Brothers, you can do so here. The video in German language is available on the BDIZ EDI YouTube channel: https://youtu.be/rTCTTQL8Hxc

Corona virus in Europe at a glimpse

Winter wave has arrived

According to the World Health Organization (WHO), Europe is currently in the midst of a renewed Corona wave, in part due to inadequate vaccination rates and premature loosening. By mid-November, Europe accounted for 60 % of global Corona infections and deaths.

Photo: Yingyaipumi/stock.adobe.com

Corona vaccines reduce only 40 % of the transmission of the highly contagious delta variant of the virus, states WHO. "Data suggest that before the emergence of the Delta variant, the vaccines reduced transmission by about 60 %. With Delta, that value has dropped to about 40 %," WHO chief Tedros Adhanom Ghebreyesus said in Geneva in late November.

He therefore urged people to keep wearing masks and take protective measures. "We are concerned about the false sense of security that the vaccines have ended the pandemic and vaccinated people do not need to take further precautions," the WHO chief said. "The vaccines save lives, but they do not completely prevent transmission."

According to a count by the AFP news agency based on official data, more than 2.5 million infections and nearly 30,000 deaths were recorded in Europe within a week. This puts the continent as the most severely affected region in the world by the pandemic. WHO Emergency Director Michael Ryan criticized Europe for being back at the same "level of social interaction" as before the pandemic, despite a "very, very strong resurgence of cases."

Is Austria a role model for Europe?

In most countries, there is talk of a fourth, in Portugal of a fifth, and in Spain even of a sixth wave of Covid. Across Europe, calls for measures to be tightened once more are being heard. The press is at odds as to whether curfews, business closures and other harsh restrictions are necessary or sensible. Several countries are once again reacting to surging COVID-19 infections with drastic restrictions. This is exacerbating social tensions between the vaccinated and the unvaccinated, as well as between supporters and opponents of new lockdowns.

As of 1 February 2022, vaccination will be compulsory in Austria. The country currently has one of the highest COVID-19 infection rates worldwide. Up to now, vaccination has been made mandatory only for certain professions in various EU states such as France or Greece. Several commentators argue that Austria's lead should be followed – or at least seriously discussed – elsewhere in Europe.

Whether it's mandatory vaccination, Covid passes or lockdowns – almost all European countries are introducing tighter measures in the fight against a new winter wave of the virus. And almost everywhere, a considerable part of the population considers the measures too harsh. The European press is also divided on this issue:

Is Vienna to blame?

Der Standard uses an example from Austria's past to illustrate how half-hearted the vaccination campaign in the country has been: "Older people remember how, from 1992 to 1994, the red-black government prepared the referendum on Austria's accession to the EU: top politicians like Foreign Minister Alois Mock and Chancellor Franz Vranitzky tirelessly appeared at all kinds of events; the social partners were involved; the top agencies designed catchy campaigns. [The current government] hasn't mounted a single concerted, intelligent campaign for vaccination and simply let everything take its course since last spring. The new government is rushing around like a headless chicken, forced to resort to coercive measures such as a lockdown and mandatory vaccination."

Are the rich in Spain blamable?

Tax fraud, the climate crisis and the new wave of the pandemic are all interlinked, argues Eva Joly, a lawyer and member of the Independent Commission for the Reform of International Corporate Taxation (ICRICT), in the Spanish El País: "While the virus is on the rise again with the arrival of winter in the northern hemisphere, the boomerang effect of the vaccine monopolies no longer needs to be shown or explained. … If we are failing to meet our commit-

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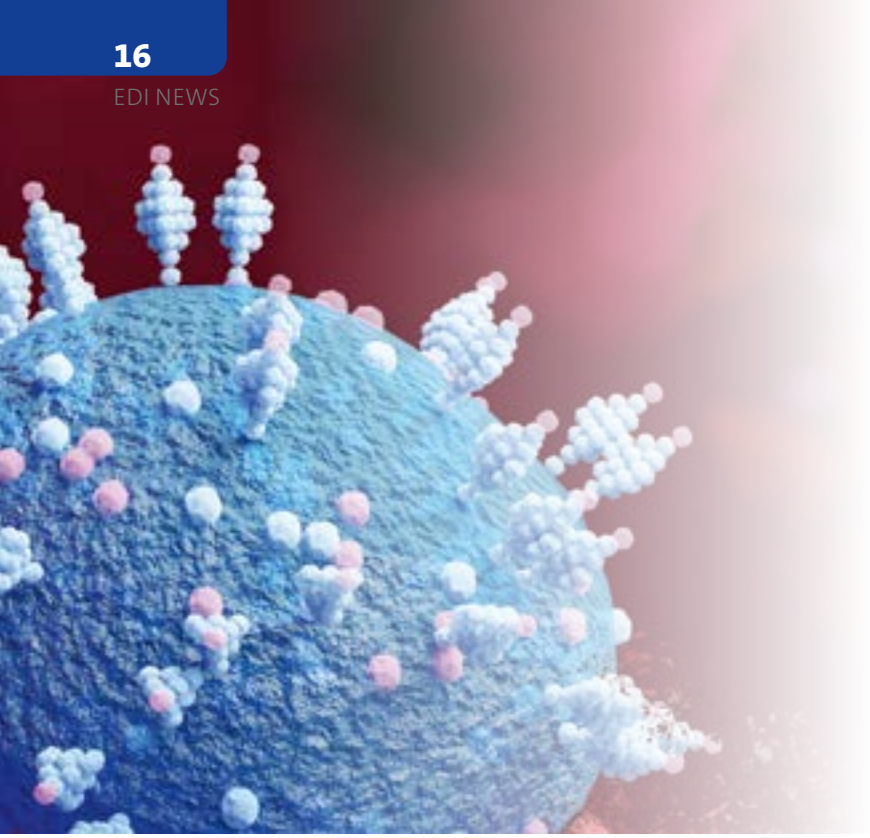

ments, it is because of a handful of the richest people, the same people who do not pay their taxes. It is time for our elites to realize that fighting inequality on all fronts – health, climate, and tax – is our only way out. Otherwise, there is no salvation for humanity – and it is no longer a hyperbole."

Lack of medical care in Hungary – beyond Covid

The overburdened Hungarian healthcare system is also neglecting its duties towards non-Covid patients, physician Zoltán Nagy points out in Népszava: "In an EU comparison, Hungarians have the second-longest wait for operations, with an estimated 50,000 people currently in this situation. In Italy, Denmark, Sweden, Germany, and the UK, for example, waiting times are at most half as long. ... Of course, I'm aware that hundreds of people are currently dying every day from Covid. However, I would like to draw attention to those who have remained chronically ill for lack of medical treatment. We cannot pretend that they do not exist. They are also among the victims of the fourth and who knows how many subsequent waves."

War on many fronts

There is no panacea against vaccination scepticism, Swedish Dagens Nyheter writes: "Efforts to increase vaccination coverage must continue. The results speak for themselves: the higher the coverage, the fewer deaths, and serious cases there will be, and the faster we will be able to return to a completely open society. France has put pressure on the unvaccinated. Austria has imposed a questionable policy of mandatory vaccination. Others have used rewards as incentives. In Romania and Bulgaria, the most vaccine-sceptical countries in the EU, the road is long and steep. A single solution will not be enough. The fight against COVID-19 must be fought on many fronts."

Demonstrations against restrictions

In contrast, demonstrations against tighter Covid restrictions in several European cities including Rotterdam, Vienna and Zagreb turned violent on November weekends. In Brussels, police used water cannons and tear gas when an initially peaceful demonstration of 35,000 people escalated. Europe's press fears a complete breakdown of social consensus and discusses positive examples.

The virus is more dangerous than the riots

Politicians must not let the violence at the demonstrations in Brussels distract them from decisions that are vital for many people, De Standaard of Belgium insists: "Many also know people whose operations have been postponed (due to the healthcare system being overstretched) or who are particularly threatened by the most recent wave of the epidemic. Such concerns are less visible than the images from Brussels. The protest is certainly a wake-up call. Conspiracy theories are contagious, and polarisation is dangerous. But even more contagious and dangerous is the virus itself. Fear of angry anti-vaxxers should not influence politics, but concern for angry cancer patients should."

A different approach in Italy

The example of Italy shows that a different approach can succeed, touts La Repubblica: "What is maturing within the No Vax-movement is the most intolerant and dangerous version of the populist rejection of democracy: it rejects the vaccine that protects collective health, identifies it with an oppressive state in order to delegitimise representative institutions. ... In this rejection of knowledge, in this sowing of hatred and in this spread of physical or digital violence lies the greatest danger to Europe's security and prosperity. ... As one of the best protected from the virus countries, Italy must continue to take courageous decisions and lead the way as an example of political stability and health credibility in the EU."

New variant discovered in South Africa

Meanwhile, the WHO is monitoring a new variant with numerous mutations to the spike protein, scheduling a special meeting end of November to discuss what it may mean for vaccines and treatments, officials said. Accordind to the WHO, the variant called B.1.1.529 has been detected in South Africa in small numbers. There will be more on this topic in the next issue of EDI Journal.

Sources: WHO, various European media

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General assembly confirms the board and the programme until 2025

BDIZ EDI relies on continuity

The board of BDIZ EDI stood for re-election at this year's general meeting in Munich and was almost completely re-elected. The general meeting on 22 October 2021 cast a resounding vote of confidence in president Christian Berger, vice-president Professor Joachim E. Zöller, and the team. The new member of the advisory board will be DDr Markus Tröltzsch.

The general assembly confirmed Christian Berger, Kempten, as BDIZ EDI president for an additional four-year period. He was the only candidate and was re-elected unanimously. The other core of officers of the board were also confirmed: Professor Joachim E. Zöller, Cologne, as vice-president, Dr Wolfgang Neumann, Philippsthal, as treasurer and Dr Stefan Liepe, Hannover, as managing director. Professor Jörg Neugebauer, Landsberg, became new secretary-general, whereas the previous secretary-general, Dr Detlef Hildebrand, Berlin, transferred to the advisory board at his own request.

But while the core team remains almost unchanged, there was a change in the person of one of the advisors. Replacing Dr med, Dr med dent Peter Ehrl, Berlin, who left the board at his own request after many years of service, Ansbach maxillo-facial surgeon Dr med, Dr med dent Markus Tröltzsch was elected to the board as advisor. Markus Tröltzsch is an experienced lecturer, online and in presence on

The Board of BDIZ EDI 2021 to 2025 (from left to right): Secretary-general Professor Jörg Neugebauer, legal advisor Professor Thomas Ratajczak, managing director Dr Stefan Liepe, vice-president Professor Joachim E. Zöller, president Christian Berger, Dr Renate Tischer, Treasurer Dr Wolfgang Neumann, Dr Nathalie Khasin, Dr Detlef Hildebrand und Dr Freimut Vizethum.

About ...

Dr med, Dr med dent Markus Tröltzsch
Physician and dentist
Specialist in oral and maxillofacial surgery

Dr med, Dr med dent Markus Tröltzsch studied dentistry and medicine at the University of Erlangen, where he earned his doctorate in both subjects. After periods of work and study at the Westmead Medical School in Sydney, Australia and at the University Hospital Zurich, Switzerland, he joined the Department of Oral and Maxillofacial Surgery at the Ruhr University Bochum (Professor Kunkel). Thereafter, he moved to the University Medical Center in Göttingen (Professor Schliephake), where he completed his residency in oral and maxillofacial surgery and was appointed senior physician at the University Clinic for Oral and Maxillofacial Surgery. He has been in private practice in Ansbach since March 2017. Since 2016, Dr med, Dr med dent Markus Tröltzsch has been Chairman of the Academy of Practice and Science (APW) of the German Society of Dental, Oral and Maxillofacial Medicine (DGZMK).
His scientific focus lies in the field of augmentation (bone reconstruction of the jaw bones).

a national and international basis. All other advisors were re-elected and will stay in office: Dr Renate Tischer, Bad Salzungen, Dr Freimut Vizethum, Rauenberg, and Dr Nathalie Khasin, Berlin.

Over the next four years, the board will continue the associations' strategical direction as defined by the general assembly. The goal remains a combination of practical training, services and support for members' practices, and assistance related to legal issues and in particular European directives.

AWU

Less exhibitors and visitors, instead more communication at the International Dental Show in Cologne

IDS 2021: hybrid, decelerated and intensive

One record followed the next: more exhibitors, more visitors from more and more countries. By 2019, the International Dental Show IDS was in the Champions League of the leading dental trade fairs. Then, the corona virus struck and brought all the ambitious plans to an end. For a long time, the 39th IDS was on the back burner. In September, however, it finally happened: four instead of five days of dental show with a lot of space, decelerated and intensive. As Martin Luther King once said: "In every crisis there is not only an opportunity, but also a possibility".

According to the organizers – the Association of German Dental Manufacturers (VDDI) and Koelnmesse GmbH – 23,000 professional visitors from 114 countries were recorded, 57 % of them from abroad. 830 exhibitors from 59 countries presented their products and services. By comparison, in 2019, 160,000 visitors had streamed through the halls of Messe Köln, which was an increase of 3.2% compared to IDS 2017. Those who have witnessed the development of the dental show in recent years could now audibly breathe a sigh of relief, had space, time and the opportunity for intensive discussions – both as exhibitors and visitors. Responding to hygiene and distance regulations, the organizers created the IDS hybrid – with a virtual tour of the trade fair, an electronic contact exchange and presentations via IDS-connect. The latter was used quite modestly. 77 exhibitors from 16 countries showcased their products via this platform.

The absence of major manufacturers at IDS was conspicuous – and this is not exclusively due to the Corona pandemic. Many big players – especially in the implant sector – have long since organized their own world congresses and they are already planning for 2022. Nevertheless, the Chairman of the Board of the Association of German Dental Manufacturers (VDDI), Mark Stephen Pace, was satisfied with the course of the 39th IDS. In his opinion, the trade show presented a complete reflection of current trends as well as proven and innovative products from all areas of dentistry. He is also convinced that the face-to-face exhibition is important in this industry. Dentists and dental technicians are haptics and kinesthetes, he says: "They need to be able to hold the innovations in their hands, literally touch procedures, and visually examine prosthetic work and treatment results."

Dynamics in conservative dentistry

IDS delivered innovations in the field of filling therapy. In the future, composites will be faster and easier to use. Universal composites for all techniques and bulkfill composites for filling "in one go" make it possible. For example, IDS visitors learned more about thermoviscous composites. After heating, they first become flowable and can then be immediately shaped. Initially used in the bulkfill technique for posterior teeth, they are now also available for esthetic anterior restorations.

In general, direct fillings are being made more and more frequently; the boundary to the indication for an indirect restoration is becoming increasingly fluid. Milling systems with extremely small space requirements help when a prosthetic work must be manufactured. Nowadays, they can nevertheless offer a high level of functionality. These include powerful high-frequency spindles (for speed and precision), quick-clamping systems (for convenient changing of holder systems while maintaining precision) and machining angles suitable for demanding tasks.

New, automated processing strategies are increasing the efficiency of production in practice. The prerequisites are created by software releases introduced at IDS, partly in combination with new networking between different sub-workflows. In practice, this affects all indications and materials, especially in the areas of "glass ceramics" and "preforms".

Photo: Koelnmesse GmbH / IDS, Uwe Weiser

IDS 2021 opening with ribbon cutting: Professor Christoph Benz, Mark Stephen Pace, Gerald Böse, Mayor of Cologne Henriette Reker, Dr Markus Heibach, Dr Gerhard Seeberger, Oliver Frese, Lutz Müller

Strong: Hygiene and infection control

This IDS reflected the dental practice's core competence in hygiene and infection control. This area includes, among other things, powerful suction systems for aerosol reduction. As a new option, IDS visitors experienced headphones to which special suction cannulas are attached. They are designed to suction the potentially germ-laden aerosol cloud at the exit of the patient's mouth, thus helping to reduce aerosol formation in the treatment room by up to 99.9 %.

A study from the Université Claude Bernhard in Lyon, France, confirmed that mouth rinsing can reduce the risk of transmission of COVID-19 by reducing the number of viruses in the mouth by 71 % after just one rinse and by helping the immune system to resist infection.

In the classic area of home prophylaxis, some toothbrushes attracted particular attention, such as sonic toothbrushes with a sophisticated 10-degree angle in the brush head for cleaning hard-to-reach areas.

Product innovations in the special disciplines

In analogy to the well-known backward planning in implantology, the digitalization of treatment planning in endodontics is gaining momentum. This starts with 3D diagnostics. Digital volume tomographs with a special endo mode now enable a particularly detailed representation of the root canal morphology.

With the widespread use of digital procedures (e.g., intraoral scanner, X-ray, CT and other imaging procedures, CAD), backward planning in implantology is becoming more and more routine. In addition, many improvements are also occurring in classic areas. For example, regenerative plasma activation (Bio-RAP) enhances the osseointegration process. Using a suitable device, hydrocarbons can be removed from implant surfaces. This enlarges the surface area available for implant-bone contact (BIC) and simultaneously increases its hydrophilicity.

The bone augmentation procedure has been simplified by using only one instrument instead of two (retractor and forceps) to hold the flap. And in implant prosthetics, a new type of multilayer zirconium oxide with particularly high light reflection in the tooth neck area ensures a vital look.

In orthodontics, chewing force measurements complement the classic occlusion control (with shimstock foil or digitally supported). Direct biofeedback of bruxism splints should help to prevent damage. Positioning shells ("indirect adhesive shells") for orthodontic brackets, whose positions have been digitally planned, can now be manufactured from adequate plastics. More differentiated workflows based on digital technology between laboratory and practice support a better division of labor than before.

In the field of aligner therapy, IDS visitors got to see a novel two-splint concept with transparent aligners to treat a wide range of tooth malocclusions: For each treatment step, two foil thicknesses are used to optimally transfer the forces to the teeth. Soft and hard aligners are replaced weekly and are thus intended to contribute to a gentle tooth realignment.

Conclusion

The German Federal Dental Chamber and the Association of German Dental Technicians' Guilds are satisfied with how the trade show ran. "The hybrid concept with which IDS 2021 had to be held due to the corona pandemic was a complete success," said Professor Christoph Benz, President of the German Federal Dental Chamber. The exhibitors were satisfied despite shrunken visitor numbers. Discussions were more intensive and purchasing decisions more focused, they said. However, there are many who believe that the IDS will not achieve the size of past times in the future but will increase in quality.

AWU

Impressions from IDS 2021

National and international members, guests, and association presidents – including experienced and upcoming implantologists, the next generation of dentists and chamber presidents from Germany and abroad – visited the BDIZ EDI booth at the 39th IDS in Cologne.

The BDIZ EDI's online continuing education courses and, of course, especially the new takeaway 2021 Practice Guide „Update Ceramics in Implantology" in German and English were in high demand. From Wednesday to Saturday, the team answered questions about the BDIZ EDI's continuing education offerings in the form of online seminars, curricula and symposia, as well as about the focus of activity implantology andbecoming an Expert in Implantology by European Dental Association (EDA).

Guests included: the outgoing FDI President Dr Gerhard Seeberger, President of the German Dental Association Professor Christoph Benz, the President of the Croatian Dental Chamber Dr Hrvoje Pezo and his board, and members of the BdZA – Federal Association of Dental Alumni in Germany and many more. ■

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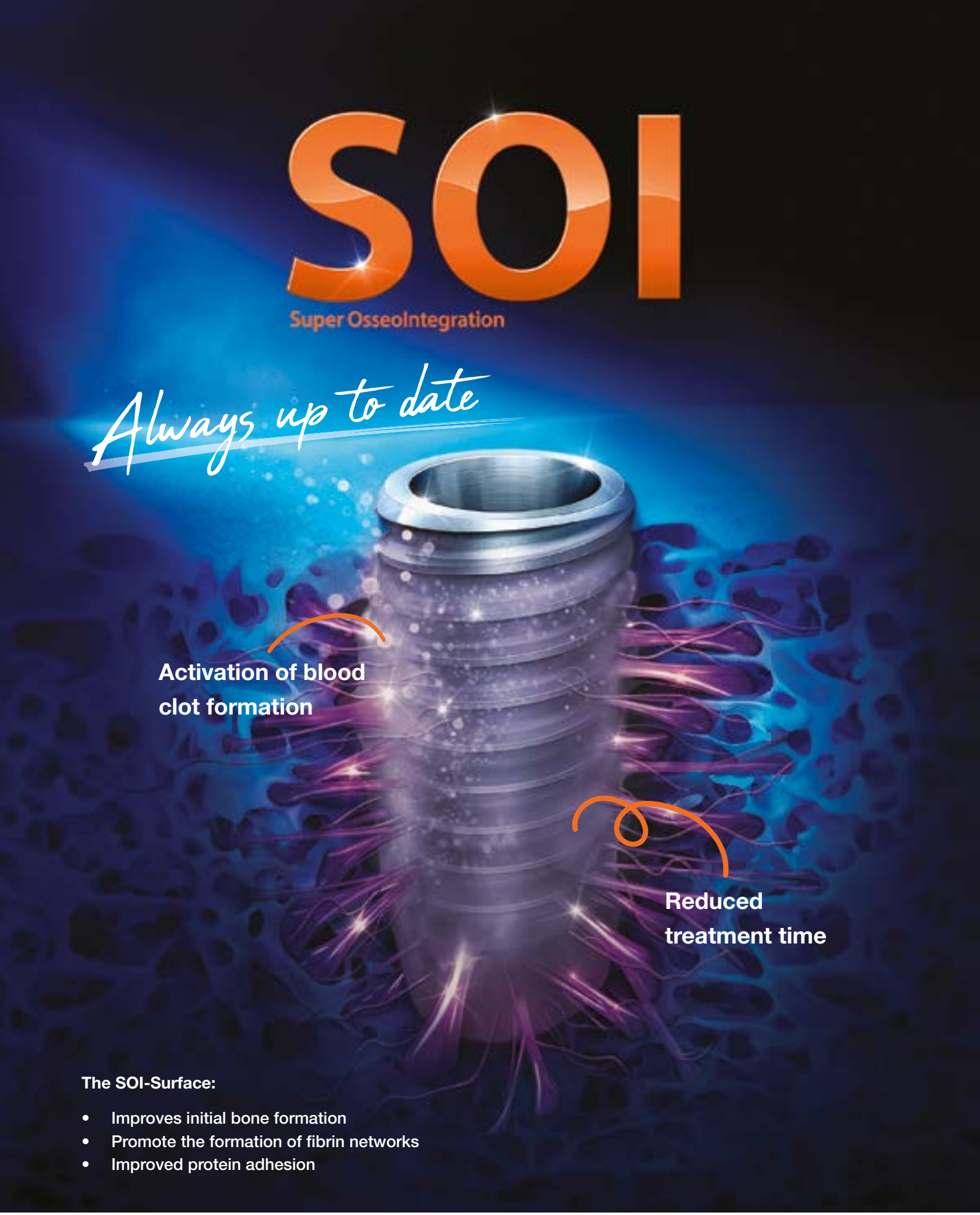

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Impressions

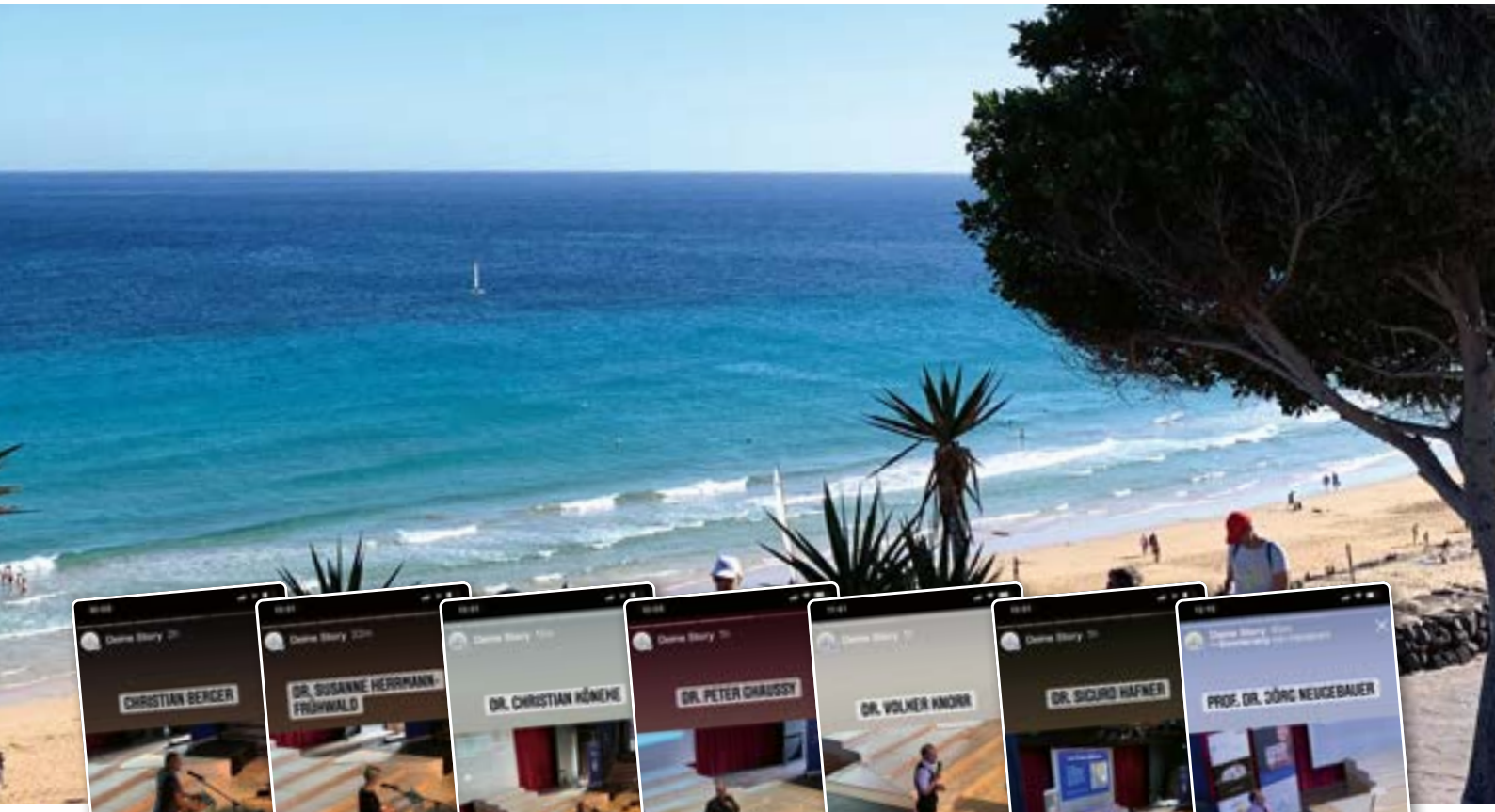
30th Anniversary: Expert Symposium for regenerative procedures

A blaze of innovations in the field of medicine and dentistry showered down on the approximately 300 participants who came to Fuerteventura this year. The 30th Expert Symposium for regenerative procedures exceeded the high expectations of the anniversary program. The event was supposed to have taken place last year, but had to be cancelled due to corona. Professor Joachim Zöller and his co-presenters Professor Jörg Neugebauer and Professor Hans-Joachim Nickenig had put together such a varied program with top-class speakers that no wishes were left unfulfilled. "30 years of implantology – safe innovations and proven concepts" was the motto of the one-week continuing education program at the Robinson Club Esquinzo Playa. Many of the speakers from Germany covered a period of 30 years: Stem cell research with Professor Jürgen Hescheler, but also digital implantology with Dr Detlef Hildebrand, Dr Uwe Jaenisch, MSc, Dr Gerhard Werling, to name but a few. The kick-off lecture was given by Professor Axel Karenberg who spoke about 100 years of dentists in German cinema. At the end of the eventful week, Joachim Zöller received a special honor: he was awarded the golden plaque of the Robinson Club for his special commitment over 30 years.

We will report on some of the lectures and their speakers in the next issues of the EDI Journal.

AWU

Award for Professor Joachim Zöller – given by the Club President and BDIZ EDI President Christian Berger.



The lectures were held daily in the Theatro – workshops followed in the afternoon.

EU Medical Device Regulation MDR: PMS vigilance system

How to deal with incidents

In this series, BDIZ EDI provides some documents to meet the European Medical Device Regulation MDR step by step. In this issue, we provide you with the vigilance report within the post-market surveillance (PMS).

The MDR (Art 2 (60)) defines post-market surveillance as a proactive and systematic process which manufacturers implement and carry out (with other economic operators) in order to take corrective and preventive action (CAPA) in accordance with information on medical devices and their performance. The surveillance and reporting of incidents involving medical devices allows identification of problems with the design, manufacture or use of medical devices and, ultimately, enhances patient safety.

The aim of the post-market surveillance system is to actively and systematically gather, record, and analyse relevant data on the quality, performance and safety of a device throughout its entire lifetime. This allows manufacturers to continuously update the risk-benefit assessment and to initiate necessary measures without delay. Manufacturers are obliged to collect and assess all information about their medical devices and related devices from competitors.

Difference between post-market surveillance and vigilance

Vigilance is only one part of the post-market surveillance system, as it refers to the reporting of (serious) incidents, field safety corrective actions (FSCAs) and recalls. It is a reactive system that deals with incidents, rather than the proactive collection of PMS data. Section 2 of Chapter VII of the MDR on vigilance defines the incidents that manufacturers have to report to the relevant competent authorities and how to submit these reports. Also, it requires manufacturers to analyse their vigilance data.

Note: The following model is by courtesy of BDIZ EDI and does not claim legal certainty and completeness. It is for illustrative purposes only. For more information, please contact the EU commissions website: https://ec.europa.eu/docsroom

Sources: various

MDR forms online

To download the forms, please scan the QR code or visit: https://bdizedi.org/en/mdr-transitional-period-runs-out-on-may-26th/

Bundesverband der implantologisch tätigen Zahnärzte in Europa

European Association of Dental Implantologists

European Medical Device Regulation MDR

Post-market Surveillance (PMS) – Vigilance System

_____

Name of owner of the dental/practice lab

To be monitored:

-- Complaints and goodwill
-- Manufacturer's response relating to material
-- Patients' complaints officially recorded by relevant competent authority

Relevant product groups:

Dentures and therapeutic appliances within the following sub groups

❑ fixed prosthesis
❑ CAD/CAM
❑ removable prosthesis
❑ splints
❑ orthodontics
❑ extensions fabricated in the dental/practice lab
❑ restorations fabricated in the dental/practice lab

Review will be done:

❑ within the 2-year-routine inspection

or

❑ incident-related

Define incident (e.g. complaints, feedback from the manufacturer etc.)

_____

_____

Responsible person for compliance of this programme according to article 15 MDR

_____

Full name of person responsible

Evaluation of the monitoring measures

Annual period _____

Total number of complaints within this period _____

Information considered from relevant competent authority _____

Feedback considered from manufacturer _____

Serious material-related incidents _____

The following action options result from above evaluation

– Does a new hazardous situation arise?	❑ yes	❑ no
– Is a replacement of selected devices necessary?	❑ yes	❑ no
– Is a recall of devices necessary?	❑ yes	❑ no
– Are there any notifiable incidents?	❑ yes	❑ no
– Is the recorded data sufficient?	❑ yes	❑ no
– Is there a change of risk analysis necessary?	❑ yes	❑ no

Conclusion

– Is the risk assessment sufficient?	❑ yes	❑ no
– Have the specified measures been implemented?	❑ yes	❑ no
– Is the benefit greater than the risk?	❑ yes	❑ no

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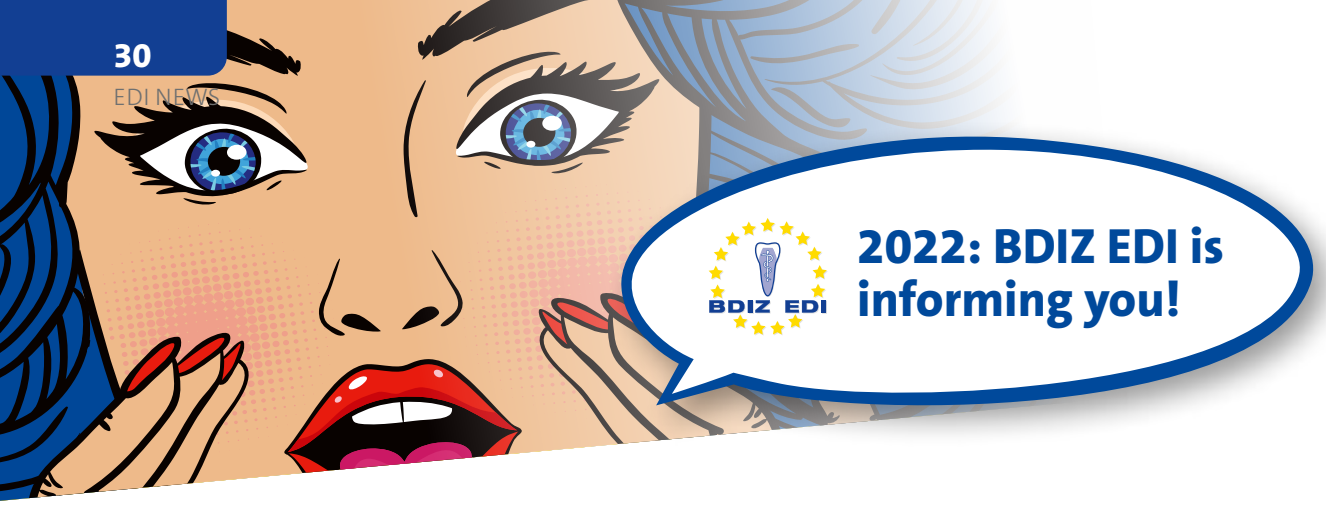

The seminar series „BDIZ EDI informs 2021“ covers the wide spectrum of BDIZ EDI work. Those participating in the online seminars can join in the discussion and after the specially labelled lectures will also receive the script for a nominal fee. The seminars can be accessed as videos afterwards.

Since March 2020, 12,000 participants enjoyed watching the webinars of BDIZ EDI so far with topics from A to Z in dental implantology and beyond: How to deal with diabetes, cardiovascular diseases and bisphosphonates in the dental practice? What's new in the digital dental world? How do deal with the EU Medical Device Regulation MDR and many more.

The online seminars are free of charge for members. Non-members please pay 50 Euro.

The program in English language is coming up soon!

From left: Professor K.A. Schlegel, Dr med, Dr med dent Markus Tröltzsch, Kerstin Salhoff, Professor Jörg Neugebauer, Christian Berger, Professor Thomas Ratajczak, Professor Michael Stimmelmayr, Dr Freimut Vizethum

---

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I am interested in becoming a member of BDIZ EDI. Please contact me.

Name First name

Street Zip code / city

Phone Fax E-Mail Date of birth

Date Signature

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USSI EDI report on their international congresses 2021 from Novi Sad, Serbia

Online continuing education has proven its worth, but...

The associated partner of BDIZ EDI from Serbia, USSI EDI, traditionally organized two international congresses this year. Due to the global COVID-19 situation, both events were held online. They were sponsored by the Provincial Secretariat for Health. In a personal statement, USSI EDI Vice President Dr Zoran Marjanović summarized the highlights of the event.

The 9th International Congress of USSI EDI was held from 9 to 10 April 2021 and was broadcast online from the USSI EDI headquarters. Dr Dušan Vasiljević, President of USSI EDI was the Chairman of the Organizing Committee. The moderation on the first day was performed by Dr Vojislav Letić.

The congress was opened by Christian Berger from Kempten (Germany) with the topic: Long term success in dentistry – consensus recommendations. He is a longtime friend, winner of a special award from the Ministry of Diaspora for merits in the development of Serbian-German friendship in 2010, the president of the Bavarian Dental Chamber, and the president of the European Association of Implantologists BDIZ EDI.

From the Medical University of Warsaw, Poland, Professor Andrzej Wojtowicz, President of OSIS EDI and Head of the Department of Oral Surgery, spoke on the predictability and safety of the machined surface of hybrid implants and zygoma rescue procedures, and Dr Cornell Krasny spoke on volume preservation of allograft blocks in ridge augmentation for implants. Dr Pawel Aleksandrowicz of the Department of Periodontology, Lublin Medical University, addressed the topic of zygoma implants.

Online lectures by internationally renowned speakers: Dr Zoran Marjanovic and Christian Berger

The speakers from Italy are future members of the Italian EDI and all dentists in private practice: Dr Giuseppe Gariffo from Palermo covered the topic: Post-extraction implants in aesthetic area and immediate loading – biology rules, decision tree and complications; Dr Fabio Bernardello from Lugano talked about the new perspectives in the crestal sinus lift: decision tree and hydrodynamic grafts and Dr Sergio Spinato from Sassuolo discussed the abutment height and mucosal thickness: an intriguing combination to limit peri-implant bone loss.

On the second day, the morning session was moderated by Prim. Dr Marinel Subu. The first speakers were guests from Hungary from the Faculty of Dentistry, Semmelweis University, Budapest: Dr Árpád Joób, President of the Implantology Association of Hungary – MAFIT and Head of the Dentoalveolar Surgery Clinic, with the topic: our latest knowledge on the role of the implant surface in osseointegration; and Dr György Komlós, with the topic: The effect of radiotherapy on dental implant survival.

From Slovenia came Professor Cedomir Oblak from the Department of Prosthodontics at the Medical University of Ljubljana. He presented intraoral scanning in prosthodontics. From the Netherlands, Dr Jan Willem Vaartjes, who has a private practice in Utrecht and is chairman of the Dutch Dental Association (ANT), presented Immediate Implants in Esthetic Dentistry. Dr David Alfaiate of CIRO – Centre for Education and Research, Porto, Portugal, who also has a private practice, spoke about full-arch rehabilitation on implants, from diagnosis to final restoration.

Croatia was represented by Professor Asja Celebic, from the Department of Prosthodontics from the Dental University of Zagreb. He spoke about the

importance of assessment and management of attached mucosa of the denture-bearing area and attachments of surrounding movable tissues for the success of implant retained overdentures. From the Department of Oral Surgery at the Clinic for Dentistry of the Clinical Center of Vojvodina Novi Sad, Serbia, Professor Sinisa Mirkovic introduced the lateral approach of the sinus lifting.

The 9th USSI EDI Congress closed with this lecture.

We have traditionally organized two congresses in a four-day sequence. Online we separated them, so the 11th International Congress of Dentists of Vojvodina was held again online on 3 – 4 September 2021.

Dr Zoran Marjanović, President of the Dentistry Section of DLV-SLD and Vice President of USSI EDI, opened the Congress and moderated the morning session on the first day. The afternoon session was chaired by Dr Draško Karađinović, private physician and founder of the NGO Doctors Against Corruption. The second day started with the morning session chaired by Dr Emilija Josić, Supervisory Board DLV SLD, while the afternoon session was led by Dr Teodora Marjanović, Secretary General of USSI EDI, Active of Dentistry DLV-SLD.

Invited speakers

From the Prosthetic Department of the University Hospital Belgrade, Serbia, Ass. dr sci. Aleksandra Popovac gave a lecture on the importance of the correlation of dental and cognitive status for the choice and outcome of prosthetic therapy. Two lecturers came from the Military Medical Academy in Belgrade: Doc. Dr Bojan Jovicic from the Department of Periodontology, covering the importance of tissue biology and soft tissue management in modern dentistry, and Professor Stevo Matijević from the Department of Oral Surgery who spoke about the use of proteolytic enzymes in dental practice. From Novi Sad, Professor Ksenija Bošković from the Clinical Center of Vojvodina, Department of Rehabilitation and Physical Medicine, President of the Medical Society of Vojvodina DLV-SLD, introduced the role of vitamin D in the treatment of rheumatic diseases.

Professor Asja Čelebić from the University Clinic of Zagreb, Croatia, analyzed the magnetic resonance imaging for the diagnosis of disc displacement in patients with TMD and Prof. Dr sc. Sanja Peršić Kiršić lectured on the topic: compromise solutions in dental prosthetics – why and to what extent?

From the University Clinic of Skopje, Northern Macedonia, Professor Mira Jankulovska presented preventive-restorative materials in modern pediatric dentistry and Professor Sonja Apostolska lectured on contemporary aspects of conservative reconstruction of endodontically treated teeth.

The organizing team of the 4-day congress.

From the University Clinic of East Sarajevo, Faculty from Foča, Serbian Republic Bosnia and Herzegovina, Professor Jelena Krunić introduced regenerative endodontics – where are the limits of therapy? Prof. Nikola Stojanović focused on mistakes and complications in endodontic therapy – the path to success or failure.

Coming from the Oral Surgery Department of the Belorusian Academy of Postgraduate Education in Minsk, Professor Irina Pohodenko-Chudakova unveiled a new approach to surgical treatment of chronic odontogenic maxillary sinusitis and flow prognosis. Quality of life associated with oral health of patients with dental anomalies was Professor Tamara Terehova's topic.

Dr Zoran Marjanović
Vice President USSI EDI
President Dental Section DLV-SLD

Personal conclusion

In addition to the invited talks, there were six poster presentations and one in-person presentation. Despite all the shortcomings, the new trend of online education has proven to be possible.

We will never forget the elation we felt at the professional symposia organized by the BDIZ EDI in Munich during the Oktoberfest and the Carnival days in Cologne. It was a feeling of coming together with colleagues through the discussion of implantology topics and the evening social gathering with joy.

Obviously, I hope that we are all optimistic in the desire that our old lifestyle will return as soon as possible! Our compassion goes to all colleagues who tragically lost their lives in the past time.

Our special thanks go to Christian Berger, Anita Wuttke and the BDIZ EDI for their continuous support in organizing the scientific conferences as well as the media presentation. The EDI Journal is certainly one of the most renowned journals in the field of implant dentistry worldwide.

Last but not least, we would like to thank our main sponsors Alessandro Ribolla, Switzerland and Damjanka Kostić.

Zoran Marjanović

Europe Ticker +++

Europe's refugee management

EU leaders slammed by UN refugee leader

UN High Commissioner for Refugees Filippo Grandi

EU leaders cannot justify xenophobia, pushbacks, and violence amid the current refugee crisis. UN High Commissioner for Refugees Filippo Grandi told European Parliament on 10 November, stressing that they should be an example to others on "doing better" and upholding the rule of law. His address comes at a time when countries that form the EU's external borders are struggling to manage an unusual influx of refugees and migrants. Reports of extreme violence inflicted upon migrants, as well as illegal and often forceful pushbacks, have been multiplying, while several states are building or plan to build walls to keep people out. The High Commissioner did not mince words when he stated that to solve humanity's challenges, political leaders must not focus on rhetoric that wins elections but is impractical, but on collaborationwhich provides a sense of purpose. *Source: Euractiv.com*

Commission work programme 2022

Making Europe stronger together

On 19 October 2021, the European Commission adopted its 2022 Commission work programme designed to rebuild a post COVID-19 Europe, accelerate the twin green and digital transitions, and build a fairer and more resilient society. The political strategy of this Commission is to set Europe on a path to successfully achieving climate neutrality by 2050, shaping the digital future, strengthening the unique social market economy, building a Union of prosperity, and making Europe stronger in the world. This Commission is taking action to address the challenges ahead and put the necessary building blocks in place for a better future for all Europeans. This work programme sets out targeted action to complete delivery on the ambitions the Commission set at the start of the mandate and further steer the Union towards sustainable recovery. It also lists the key legislative proposals that should get priority in the legislative process to ensure swift implementation on the ground across all six of the Commission's headline ambitions.

Source: EU Commission

Germany first "traffic light" coalition unveiled coalition agreement

Olaf Scholz to succeed Angela Merkel

Germany's first "traffic light" governing coalition comprising the SPD ("red"), the Greens and the FDP ("yellow") has unveiled its coalition agreement. The future German cabinet is also taking shape. Germany's Social Democrats (SPD), the Greens and the business-friendly liberal FDP have finalized their coalition agreement for a new government in November, two months after the general elections, with Olaf Scholz to succeed Angela Merkel as the new chancellor in December. The current finance minister Scholz will not only be Germany's first social democrat chancellor in 16 years, but also lead the first three-party coalition in the country's history. The next federal government has its ambitions specifically set on climate protection, making the industry climate neutral, modernisation and digitization, Scholz said. The Greens' chancellor candidate, Annalena Baerbock, stressed that the coalition agreement would mean a "paradigm shift" for German politics, while Green party leader Robert Habeck said the country is now on the path "to reach the 1.5 degree target."

Source: eurotopic, euractiv

Switzerland's population voted for 3G policy

Swiss say yes to measures

For the second time, Switzerland has let its population vote on coronavirus measures – the only country in the world to do so. Around 62 % voted in favour of retaining the COVID-19 certificate and hence the 3G policy [vaccinated, tested, recovered] for visits to restaurants, public buildings and events. The vote should give opponents of the measures food for thought, the nation's press believes.

Source: eurotopic, Aargau-Zeitung

Photo: lado2016 - stock.adobe.com

New technique helps researchers

To understand how acid damages teeth

The University of Surrey and the School of Dentistry at the University of Birmingham have developed a new technique to improve understanding of how acid damages teeth at the microstructural level. The researchers performed a technique called "in situ synchrotron X-ray microtomography" at Diamond Light Source, a special particle accelerator facility with which the University of Surrey has a strong working partnership. There, electrons were accelerated to near light speed to generate bright X-rays that were used to scan dentine samples while they were being treated with acid. This enabled the team to build clear 3D images of dentine's internal structure with sub-micrometre resolution (a micrometre being one-thousandth of a millimetre). By analysing these images over the six hours of the experiment, the researchers conducted the first-ever time-resolved 3D study (often referred to as 4D studies) of the dentine microstructural changes caused by acid. The study, published in Dental Materials, highlights that acid dissolves the minerals in different structures of dentine at different rates. Dentine forms the main bulk of human teeth and supports the enamel, which covers the crown surface, helping to make teeth strong and resilient, but acids from dental plaque can cause tooth decay which affects the integrity of the dental structure. This research aims to develop knowledge that leads to new treatments that can restore the structure and function of dentine.

Reference: Nathanael Leung, Robert A. Harper, Bin Zhu, Richard M. Shelton, Gabriel Landini, Tan Sui. 4D microstructural changes in dentinal tubules during acid demineralisation. Dental Materials, 2021; DOI: 10.1016/j.dental.2021.09.002

Source: University of Surrey, UK

Moderna chief predicts

Existing vaccines will struggle with Omicron

The chief executive of Moderna has predicted that existing vaccines will be much less effective at tackling Omicron than earlier strains of coronavirus and warned it would take months before pharmaceutical companies could manufacture new variant-specific jabs at scale. Stéphane Bancel said the high number of Omicron mutations on the spike protein, which the virus uses to infect human cells, and the rapid spread of the variant in South Africa suggested that the current crop of vaccines may need to be modified next year. "There is no world, I think, where [the effectiveness] is the same level . . . we had with [the] Delta [variant]," Bancel told the Financial Times in an interview at the company's headquarters in Cambridge, Massachusetts. He added: "I think it's going to be a material drop. I just don't know how much because we need to wait for the data. But all the scientists I've talked to . . . are like, 'This is not going to be good'." The Moderna chief executive's comments come as public health experts and politicians have tried to strike a more upbeat tone about existing vaccines' capacity to confer protection against Omicron.

Source: Financial Times US

Photo: stock.adobe.com/Simon Lehmann–PhotoGranary

Statement on e-evidence proposal

CED calls for exemption

At their meeting of 17 September 2021, the board of directors of the Council of the European Dentists (CED) examined the developments related to the European Commission's Proposal for a Regulation on European Production and Preservation Orders for electronic evidence in criminal matters COM(2018) 225 (e-Evidence Regulation).

They concluded that the draft of the Regulation as it stands violates patient privacy and presents a serious threat to the ability of dentists to abide by the principles of professional ethics and medical confidentiality which form the core of the patient-dentist relationship.

The CED states in a press release to fully support the Standing Committee of European Doctors (CPME) in their position on the draft e-Evidence Regulation as laid out in the CPME Statement. The consequences of the draft Regulation for dentists would mirror the consequences faced by the medical profession.The CED joins the CPME in calling for an exemption to the scope of the Regulation for professions subject to professional secrecy.

The European Parliament's position on the cross-border gathering of "e-evidence" is confusing, unclear and inconsistent, according to the European Judicial Network, which is made up of EU member states' national contact points for criminal justice cooperation.

About EDRi

EDRi is calling itself the biggest European network defending rights and freedoms online.
The EDRi network is a dynamic and resilient collective of 45+ NGOs, as well as experts, advocates and academics working to defend and advance digital rights across Europe and beyond. Together, they build a movement of organisations and individuals pushing for robust and enforced laws, informing and mobilising people and promoting a healthy and accountable technology market. Among them is quintessenz and amnesty international.

The proposed rules on "e-evidence" are intended to make it simpler for national authorities to obtain digital or electronic information held in another jurisdiction for use in criminal proceedings.

It is widely recognized that new rules on this issue are needed, but only with strict safeguards to ensure that data is only handed over in duly justified and necessary cases, and that strong safeguards exist – for example, for doctors, lawyers, journalists, and others with professional secrecy and confidentiality requirements.

The European Parliament adopted its position for negotiations with the Council of the EU in December 2020, making numerous amendments to the Commission's original proposal. Secret negotiations between the Council and the Parliament began recently.

The outcome of the parliamentary procedure was criticised by EDRi for potentially putting at risk the rights of journalists, doctors and lawyers, amongst other things. Meanwhile, the organisation warns, it is likely that the text will be further watered down, as "the Parliament will now have to accept further compromises in its negotiations with the Council."

Judicial practitioners are not happy either – although not necessarily for the same reasons. The European Judicial Network thinks that the Parliament's amendments "are not consistent within the Regulation and in the context of other legal instruments applicable in the EU Member States," and contains potentially confusing, unclear and inconsistent terminology.

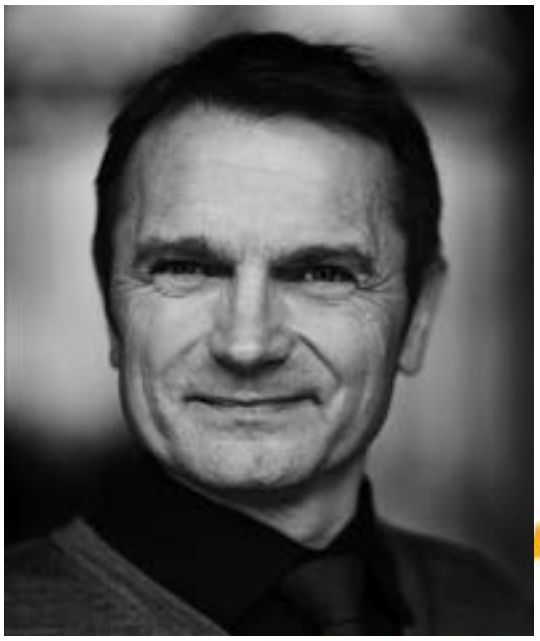
Sources: CED press release, Statewatch, EDRi

General meeting of the Council of European Dentists

New president from Denmark

On 19 November 2021, representatives of the members of the Council of European Dentists (CED), affiliated member associations and observer associations met in Brussels, Belgium, under the chairmanship of President Dr Marco Landi, for the CED General Assembly.

During the plenary session, the CED members were invited to vote for a new president and four new board directors. Dr Freddie Sloth-Lisbjerg (Denmark) was elected as president. Dr Anna Lella (Poland), Dr Robin Foyle (Ireland) and Dr Henner Bunke (Germany) were elected as directors for the term 2021 – 2024 and Dr Ioannis Tzoutzas (Greece) was elected as director for the term 2021– 2022. They join the current CED directors Dr Doniphan Hammer (France), Dr Paulo Melo (Portugal) and Dr Henk Donker (the Netherlands). The new CED board assumed its power on 20 November.



New president of CED: Dr Freddie Sloth-Lisbjerg (Denmark)

CED Statement on dental tourism and cross-border healthcare

CED members adopted the statement on dental tourism and cross-border healthcare. The document sets out CED's position regarding dental tourism in the context of the Directive 2011/24/EU on patients' rights in cross-border healthcare and assesses how the directive's objective to facilitate access to safe and high-quality cross-border healthcare in another member state has been met. Dental tourism, which prior to the COVID-19 pandemic was a major growth area, is a significant concern as regards the provision of dental care and treatment and may impact patient safety.

Updated CED resolution on continuing professional development of dentists

CED members unanimously adopted the updated CED resolution on continuing professional development (CPD). The document aims at providing a timely update of the CPD status quo in Europe, outlining the latest topics of interest in dentistry, such as antimicrobial resistance, digital skills and public health threats.

Source: CED

CED

The Council of European Dentists (CED) is a European not-for-profit association which represents over 340,000 practising dentists through 32 national dental associations and chambers from 30 European countries. Its key objectives are to promote high standards of oral healthcare and effective patient-safety centred professional practice across Europe, including through regular contacts with other European organisations and EU institutions.

Aid project of the Academy Oral Health International (AMI) in Mozambique

Dentists support “PAUL”

At IDS 2021, the Academy Oral Health International, (Akademie “Mundgesundheit International” or AMI for short), which was launched in 2018, presented its Mozambique project. The project involves dental aid, as well as a solution to the urgent drinking water problem.

Dr Gerhard K. Seeberger checks the quality of PAUL’s outcomes.

Malehice is a village with about 5000 residents located 250 km north of the capital Maputo. It is the birthplace of Joaquim Alberto Chissano, the first elected president of Mozambique. There is a health center there with an outpatient clinic, maternity ward, vaccination center, base for infectious diseases such as HIV, tuberculosis, worm diseases, etc. with a catchment area of about 30,000 people. A Mozambican doctor and about 30 nurses, caregivers and other specialized personnel work there. There is also a “dentist’s room” with sparse equipment but without a dentist. The extractions are done by a clinical dental technician.

Promoting oral health

The Mozambique project was founded in 2017 by dentists Dr Dietmar Klement (Germany) and FDI Past-President Dr Gerhard K. Seeberger (Italy) with the aim of providing access to oral health for people in Mozambique. This primarily includes dental treatment of patients in pain through conservative and surgical procedures, instruction in oral hygiene using donated dental care utensils brought to the clinic, nutritional counseling, and supplying clean and germ-free water. To avoid water germs, sugary drinks are often consumed and the risk of caries increases enormously. Even primary school children are exposed to this risk and a good school education requires intact general and oral health. Therefore, the two dentists are very involved in an oral health literacy program to educate the population about oral diseases and their impact on general health, to discourage them from consuming sugary convenience foods and beverages, and to lead them to active disease prevention.

“PAUL” provides drinking water

This is where “PAUL” (Portable Aqua Unit for Lifesaving) steps in. With the support of Professor Dr Eng. Franz-Bernd Frechen from Germany, the inventor of PAUL, AMI built the PAUL station in Malehice. This is how PAUL works: an ultra-porous nanofilter, filled by hand, provides 99.9999 % germ-free water. It would be desirable that by constantly filling the water purifier with well water via the one water tower from the times of the Portuguese administration, purified water would be permanently available over 24 hours in a large water tank below the PAUL base as drinking water for the population. Operation and maintenance is financed by donations from AMI.

Training in health counseling

The training of female dental health consultants is another project to improve the quality of life of the population. This allows young women to learn a profession, thereby earning a living and providing permanent widespread preventive health care to the people. The project is carried out in kindergartens, schools, and community centers to reach all sections of the population. Support for the project is provided by the dental industry with toothbrushes and toothpastes for all age groups.

Link to the video “PAUL”:
https://www.youtube.com/watch?v=M-Y2RnUJdps

Source: AMI/AWU

Call for donations

The registered association AMI needs donations and helpers for the dental station in Malehice to implement its projects. Furthermore, donations for the support of the initial training of prophylaxis assistants are also welcome.
If you are a dentist interested in the project or would like to become a member of the association, please contact AMI: www.akademie-mundgesundheit.de

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Did you ever know ...

... that

... that BDIZ EDI offers information for practitioners in its professional magazines?

In the professional magazines BDIZ EDI konkret and EDI Journal, the editorial team analyzes at an early stage new legislative projects and guidelines from Brussels and Berlin that could have a regulatory effect on the dental practice. Specialist articles that discuss new treatment approaches in the field of implant surgery and implant prosthetics complete the benefits for dentists throughout Europe. And last but not least: the new ECJ verdicts.

EDI Journal:
https://bdizedi.org/en/edi-journal/

BDIZ EDI konkret:
https://bdizedi.org/bdiz-edi-konkret/

... that

... that BDIZ EDI provides download documents for practice owners and/or dental laboratories to meet the requirements of the European Medical Device Regulation MDR? The forms can be found online at: www.bdizedi.org/en/.
The latest post-market surveillance form is provided in this issue.

... that

... BDIZ EDI supports the Academy of Oral Health International (AMI) and its aid projects? AMI's goal is to pool knowledge to promote oral health worldwide and improve the quality of life of people who lack access to adequate dental care. BDIZ EDI treasurer Dr Wolfgang Neumann (on the right with Friedrich Herbst and Chairman Dr Dietmar Klement) joins the board as a founding member since 2018.

ECJ ruling

Product liability for health care tips?

The Product Liability Directive (85/374 EEC) keeps the ECJ busy. In its decision of 10 June 2021 (C-65/20), the court ruled on the question of whether a daily newspaper or its content may qualify as a defective product under certain circumstances. The specific case concerned a publisher's potential product liability for published erroneous health care tips.

The case

The decision was based on a legal dispute between an Austrian national and a publishing company based in Austria. On 31 December 2016, an article on the treatment of rheumatism-related complaints was published in the regional edition of one of its newspapers as part of a daily health column written by a monastic priest, "Herbalist Brother Benedict". On 31 Dec 2016, the column recommended, among other things, treating areas of the body affected by rheumatism with a layer of grated horseradish. The published text as translated into English read as follows:

"Alleviating rheumatic pain

Fresh coarsely grated horseradish can help to reduce rheumatism-related pain. First, rub some fatty vegetable oil or porcine lard onto the affected areas. Then apply a layer of grated horseradish to these areas and apply pressure. You can leave this layer on for two to five hours before removing it. This application has a positive draining effect."

The application time for the herbal product was incorrectly stated to be two to five hours. The correct recommendation should have been for two to five minutes.

Misled by the erroneous content of the health tip, the original plaintiff applied freshly grated horseradish to her ankle on the very day the article appeared. She did not remove the dressing until three hours later, following a severe skin reaction. She brought a claim for damages in the amount of 4,400 Euros against the publisher as compensation for the physical injuries she had suffered.

Her claim was rejected at first and second instance. On her appeal, the Austrian Supreme Court wondered whether the publisher could be held liable for damage incurred as a result of the publication of the erroneous health tip under Directive 85/374/EEC. It stayed the proceedings and referred the following question to the ECJ for a preliminary ruling on 21 January 2020:

"Is Article 2 together with Article 1 and Article 6 of Council Directive 85/374/EEC [...] to be interpreted as meaning that a physical copy of a daily newspaper containing a technically inaccurate health tip which, when followed, causes damage to health, can also be regarded as a (defective) product?"

The judgment

The ECJ answered this question in the negative: the relevant articles of the Product Liability Directive were to be interpreted to the effect that a printed newspaper was not to be classified as a "defective product" even if an incorrect health tip on the use of a medicinal plant had been published in it and compliance with it had damaged a reader's health.

The ECJ differentiated between the incorrect health advice per se and the newspaper as the publisher of the erroneous article.

According to the court, both the wording and systematic legal considerations would indicate that services, at any rate, do not fall within the scope of the Directive, since the latter is limited to movable objects – most prominently those which have been industrially produced. The Product Liability Directive aims to distinguish between products and services by establishing a special-liability regime. According to this, a piece of advice – which represents a purely

Photo: By Cédric Puisney from Brussels, Belgium – European Court of Justice – Luxembourg, CC BY 2.0, https://commons.wikimedia.org/w/index.php?curid=34942382

intellectual achievement, i.e., a service – cannot itself be classified as a defective "product" for the purposes of that Directive. The question of the liability of a publisher or a printer can be based only on any defects of the physical carrier (here: the newspaper) that is important.

In ruling so, the ECJ also rejected an opinion expressed in the legal literature that advocates extending EU product liability to cases in which damage is caused by defective intellectual achievements. Protagonists of this opinion find their view justified by the fact that consumers generally purchase a printed medium on the basis of its content, meaning that the consumer's expectations would be directed not only at the medium itself but, above all, at what it contains. Having been conceived as a means to provide consumer protection, European product liability law would have to take this into account.

The ECJ then dealt with the question of whether the printed newspaper itself had become a defective product within the meaning of the Directive due to its defective content. This claim, too, was rejected by the court, since the defectiveness of a product would have to result from factors inherent in a product, and in particular related to its presentation or use. Printed incorrect health advice does not per se render a newspaper defective.

Summary and outlook

In summary, publishers and printers are not subject to the no-fault liability principle for any incorrect content or any resulting damage. From the ECJ's perspective, this is only fair. The court explicitly states that comprehensive liability, of a nature that can hardly be circumvented, would not constitute a fair distribution of risks between the injured party and the "product manufacturer". At the same time, the ECJ does not fail to point out that other liability regimes may apply in situations such as the one discussed. Liability based on the principle of the seller's legal warranty against hidden defects or any fault-based liability on the part of the publisher cannot be ruled out. However, the ruling also makes it clear that the author of an article is primarily responsible for any incorrect advice given.

For dentists, physicians and other health care professionals, the ECJ's decision can therefore be of dual significance. On the one hand, the – invariably existing – responsibility for erroneous health recommendations cannot be shifted to or even shared with the publisher. On the other hand, there is no reason to fear that publishers will in future shy away from publishing health advice for fear of incurring liability.

In this respect, the ECJ's decision is good news for the scientific discourse and future non-scientific publications. But as a result, the relevant liability will remain with the author of the health advice who did not notice an error (in this case, citing an exposure time of several hours rather than minutes) if a reader is harmed as a result. This is likely to have implications for the evaluation of liability for health information on the internet and on medical websites.

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A case report highlighting a novel method using customized anatomical healers in a single surgical step

Soft tissue emergence profile reconstruction

MINAS LEVENTIS[1, 2], IOANNIS VERGOULLIS[3, 4], KONSTANTINOS VALAVANIS[5, 6]

Peri-implant soft tissue conditioning is a fundamental step in providing an anatomically shaped, natural-looking and hygienic prosthesis that allows efficient plaque control for the patient with standard oral hygiene measures. The use of anatomically shaped healing abutments at the time of surgery may result in improvement of soft tissue dimensions and conditioning of the soft tissue topography in an efficient, yet simple, fast, and cost-effective manner.

The following case report illustrates a simplified method and protocol for the selection and fabrication of an anatomical healing abutment and a duplicate impression post to improve the dimensions and topography of the peri-implant soft tissue in one step and to accurately record the latter. The process of selecting and customizing stock prosthetic components to anatomically shaped components is performed chairside using a special system of tools.

Dental implants are a complex system consisting of mechanical components (implant, abutment and prosthesis), human tissues (peri-implant hard and soft tissue), and the oral biofilm.

According to current knowledge, the key to long-term maintenance of clinical health and structural stability of the supracrestal complex of peri-implant tissues lies in the symbiotic anatomical and functional interaction between the mechanical components and human tissues in the presence of oral bacteria.

Considering the foregoing, the importance of properly conditioning the dimensions and topography of the peri-implant soft tissue has recently become evident. This can be achieved by precise prosthetically guided implant placement and the fabrication and installation of a customized anatomical healer on the implant [1–3].

Several techniques using provisional restorations have been proposed for gradual soft tissue conditioning in the surgical or restorative phase [4–9]. These techniques have proven effective in enhancing lateral soft tissue dimensions and conditioning the soft tissue profile [6].

However, these methods involve outsourcing to the dental lab, numerous appointments that potentially require multiple connections and disconnections of prosthetic components on implant level, and high clinical dexterity on behalf of the operator. In return, this increases the difficulty of the process, the required time and the cost of treatment, potentially negatively impacting the peri-implant tissue. As a result, the aforementioned factors have deterred these techniques from becoming routine for all clinicians.

This article presents a simplified protocol for prosthetically guided implant placement, prosthetically assisted soft tissue dimensional improvement, and anatomic conditioning of the soft tissue profile using an anatomically shaped healing abutment at the time of surgery.

Moreover, by utilizing a duplicate impression post, the proposed protocol allowed an accurate recording of the generated soft tissue topography, so that an anatomically shaped prosthesis was designed, fabricated and delivered. The selection and fabrication of the ana-

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[4] Private Practice, Rhodes, Greece
[5] DDS, Oral Surgery Department, University of Naples Federico II, Napoli, Italy
[6] Private Practice, Athens, Greece

1 I The Cervico system for emergence profile management; Cervico Guide (left) and Cervico Mold (right). The Cervico Guide is used intraorally to select the proper shape, dimensions and orientation of the suitable emergence profile to be generated and assist with implant positioning and orientation in relation to the information above. The Cervico Mold is used for the fabrication of the appropriate anatomical healing abutment and its duplicate impression post.

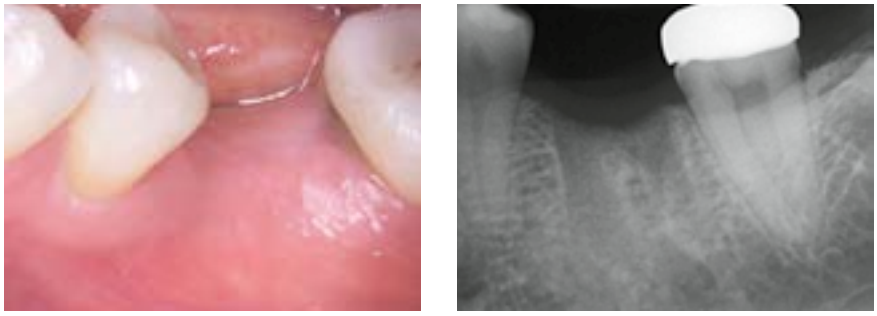
tomically shaped prosthetic components (healing abutment and impression post) were performed chairside by the clinician using a novel, easy-to-use system of tools that has been previously described (Fig. 1) [10].

Case report

A 51-year-old female patient, non-smoker, with no contraindications for implant therapy [11], presented with a missing lower left first molar. The tooth was extracted by the patient's referral dentist six months earlier due to vertical root fracture and periapical pathology. The site healed by secondary intention without any complications. No provisional restoration was used. At presentation, the extraction site was completely epithelialized and showed moderate horizontal resorption of the residual ridge, coronal displacement of the mucogingival junction and resultant distortion of the vestibule. A periapical radiograph revealed uneventful bone healing (Fig. 2). Based on the above clinical and radiological findings, the edentulous site was planned to be rehabilitated with implant placement and an implant-supported prosthesis delivered at a second stage. Immediate provisionalization was not proposed since the patient presented signs of bruxism and did not have any esthetic concerns for the period required for healing. The treatment plan and all alternative approaches were presented to the patient, who agreed to proceed with the proposed plan and gave written consent for all surgical and restorative procedures and the use of the data for publication.

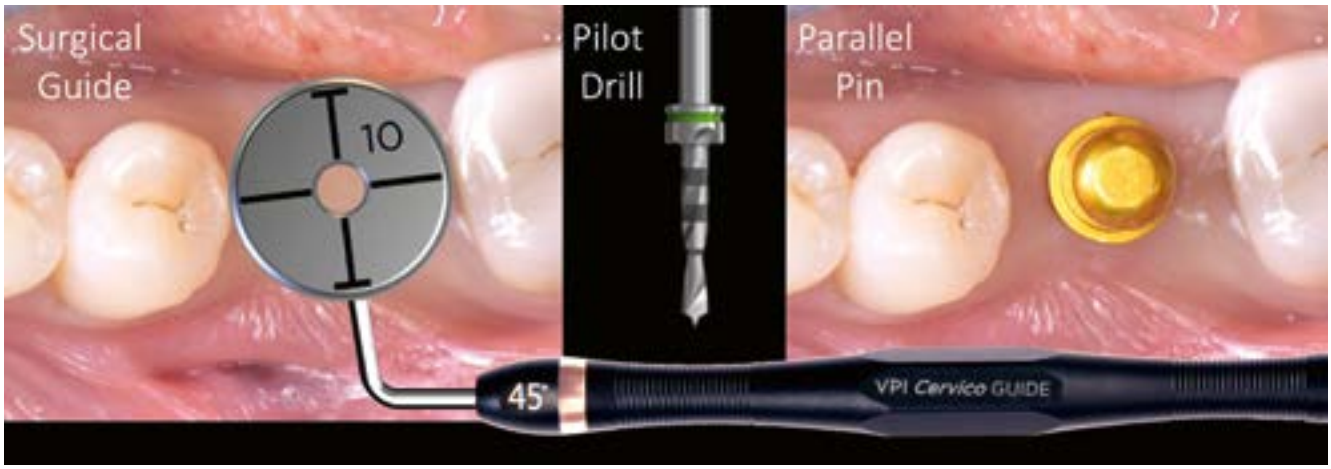
On the day of surgery, the patient was premedicated with Amoxicillin 2 g (Amoxil, GlaxoSmithKline, UK) one hour prior to surgery [12]. The edentulous space was firstly evaluated utilizing the cylindrical tabs of the Cervico Guide (CG) of the Cervico system (Fig. 3). The cylindrical tab no. 10 (10 mm diameter) fitted best in the edentulous space, being in light contact with the proximal surfaces of the adjacent teeth. Local anesthesia (Ubistesin forte, 3M ESPE, Germany) was administered, and the pilot trephination was carried out in a flapless manner. More specifically, the tab no. 10 attached to its handle was placed on the edentulous ridge with the central reference line on its upper surface aligned with the occlusal lines of the adjacent teeth.

The initial osteotomy was performed through the central open bore of the tab using a 2 mm pilot drill. The tab was then removed, and a parallel pin was

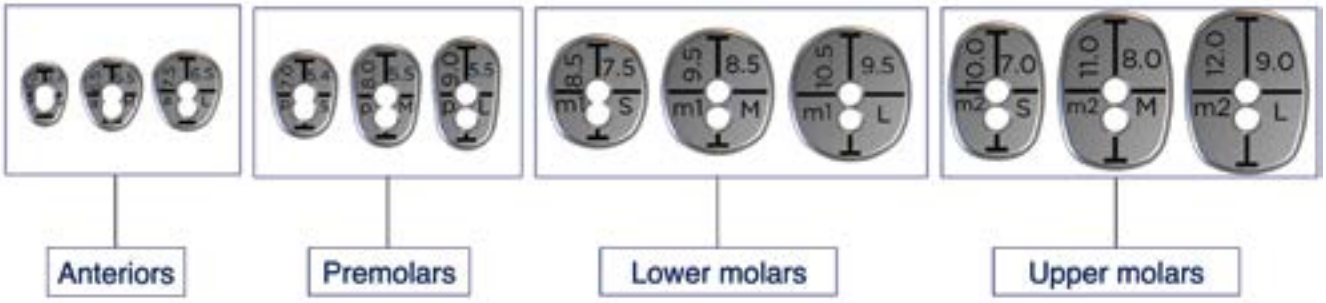


2 I Initial situation at presentation; evident horizontal resorption of soft and hard tissues. Clinical view and pre-operative periapical radiograph.

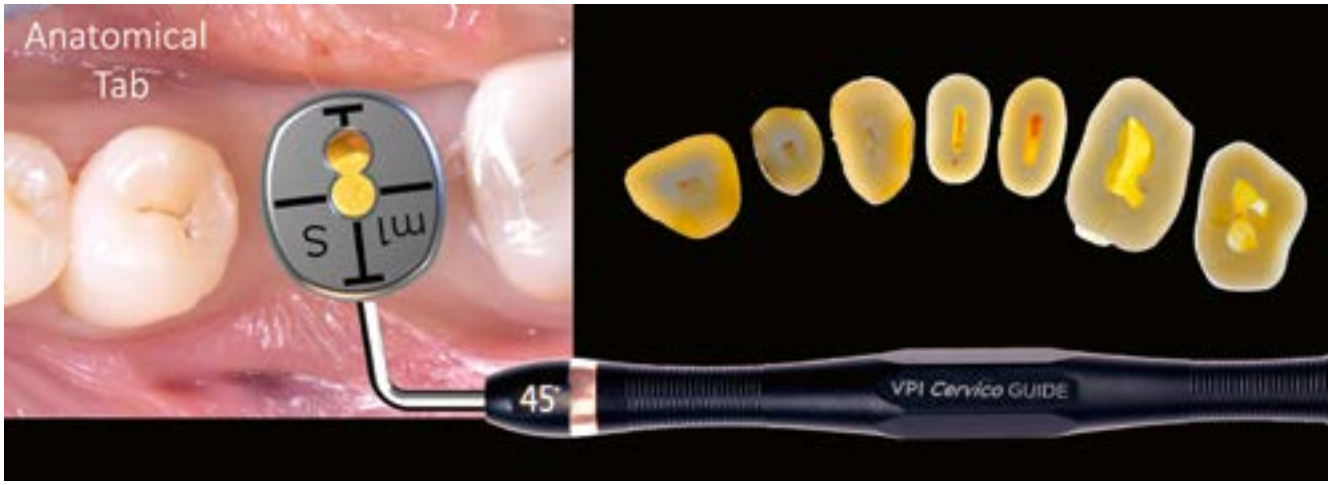
3 I The cylindrical tabs of the CG. The number on the tab corresponds to its actual diameter.



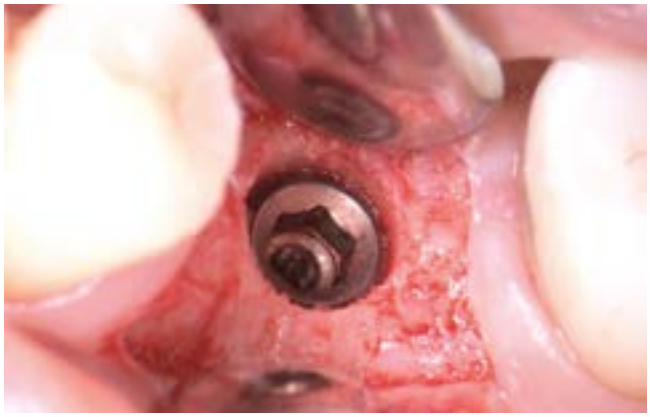
4 I The cylindrical tab no. 10 (10 mm diameter) of the CG, positioned in place, being in light contact with the proximal surfaces of the adjacent teeth; the osteotomy was initiated through the tab to ensure its centered position in the edentulous space.

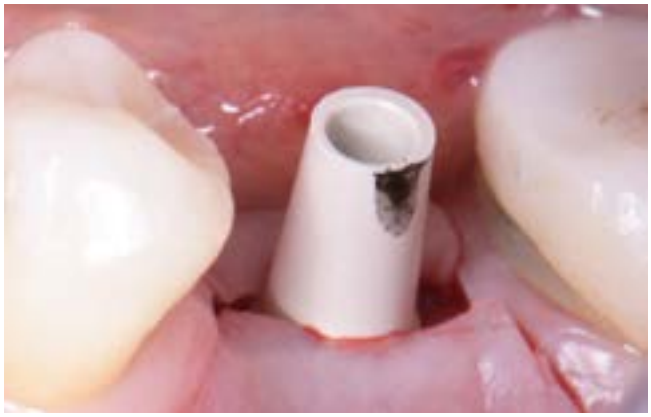


5 I The anatomical tabs of the CG. The anatomical tabs are coded in different groups (anteriors a, premolars p, lower molars m1 and upper molars m2), and their shapes and sizes (small S, medium M and large L) relate to the known shapes and sizes of the root trunk of different groups of teeth.

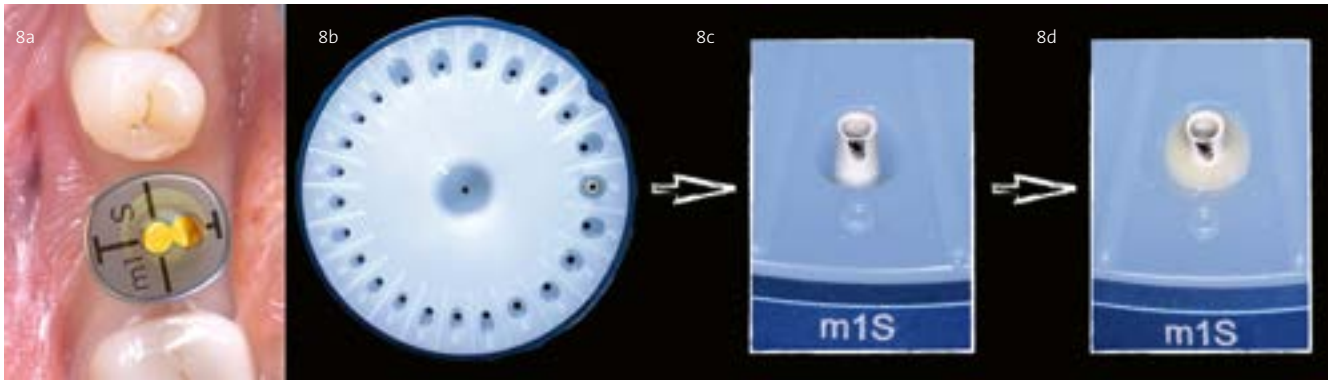


6 I Intraoral evaluation with the appropriate anatomical tab of the CG. In this case, the small size (S) anatomical tab of the lower molar group (m1) relates best, on the cervical plane, to the shape and size of the root trunk of the missing tooth.





7 I A papillae preservation full-thickness flap was raised. The implant was placed in the optimal 3-dimensional position ensuring a 4 mm distance between implant platform and zenith point of future implant prosthesis using as a reference the CEJ of the adjacent molar. Fitting of the provisional PEEK abutment and marking of the buccal side.



8 I Selection and fabrication of the anatomical healing abutment in need. Composite image showing the anatomical tab #m1S of the CG installed onto the pin, dictating the needed shape and size of the anatomical healing abutment (m1S) (8a). Panoramic view of the CM with the different available groups of shape and size wells (8b). The abutment mark alignment with the tear mark of the silicone well (8c). The well filled with the composite resin material (8d).

inserted into the osteotomy to confirm centered positioning and proper angulation (Fig. 4).

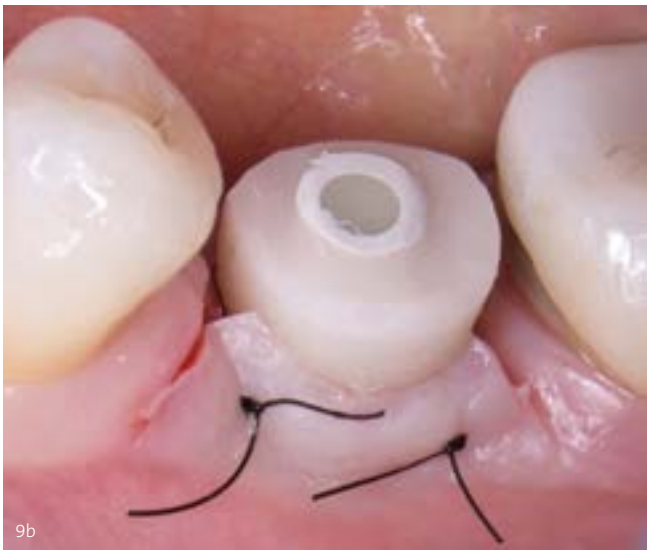
The anatomical tabs of the CG from the lower molar group were used to select the shape, dimensions, and orientation of the proper anatomical healer in need for the ideal soft tissue profile to be generated (Fig. 5). The small size – lower molar anatomical tab (no. m1S) was the one selected as most appropriate, as this corresponded best to the cervical zone of the tooth to be replaced by the implant (Fig. 6). The buccal and lingual cervical borders of the adjacent teeth were used as reference points for this selection process.

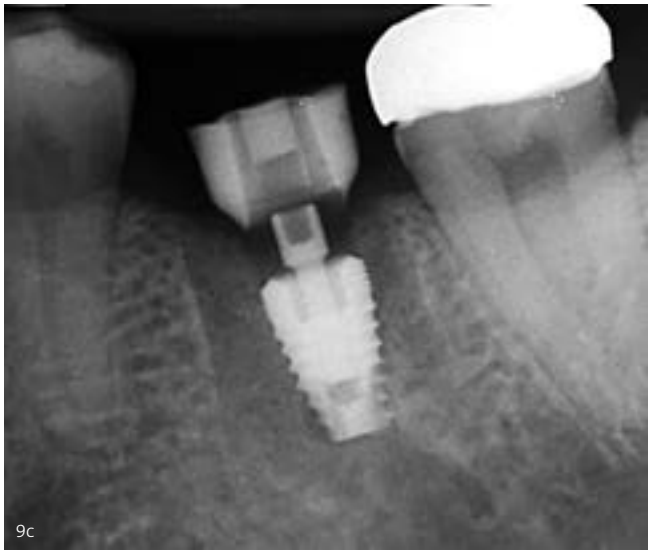
Subsequently, a papillae preservation, full-thickness flap was raised using a midcrestal and two vertical releasing incisions, and the initial osteotomy was visualized. The implant bed preparation was completed according to the implant manufacturer's recommended drilling protocol, and a tapered 5 × 8 mm implant (Paltop Dynamic, Keystone Dental Group, USA) was placed (Fig. 7a). The insertion torque value of implant placement was 30 Ncm, allowing the option for one stage healing protocol.

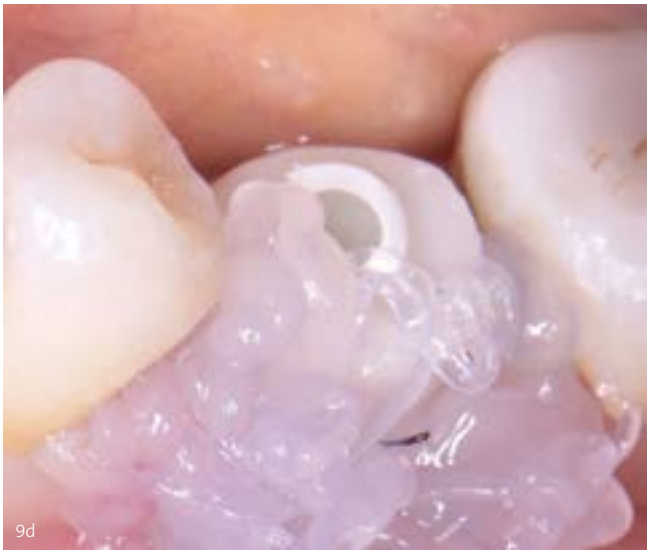
At this stage, the deficiency of the ridge was evaluated; the hard tissue evaluation revealed adequate dimensions of peri-implant hard tissues (>1.5 mm) [13], while peri-implant soft tissue evaluation revealed the presence of a sufficient amount of keratinized mucosa on both buccal and lingual directions (> 2 mm) [14, 15]. Thus, the clinical decision was to treat the horizontal ridge concavity with only soft tissue buccal displacement by the pre-operatively selected anatomical healing abutment (no. m1S). The Cervico mold (CM) was used to fabricate the corresponding no. m1S customizable anatomical healing abutment chairside. Firstly, a stock temporary polyether ether ketone (PEEK) abutment with 2 mm in height concave shoulder (Paltop, Keystone Dental Group, USA) was fitted to the implant, and its mid-buccal aspect was marked with a surgical pen (Fig. 7b).

The PEEK abutment was placed in the silicone well of the CM with the coding number m1S, as this well was predetermined by the intraoral assessment with the corresponding anatomical flap no. m1S of the CG.

The abutment was oriented into the well of the CM so that its mark became aligned with the tear mark present on the frontal aspect of the well (Figs. 8a – 8c). Then, nano-hybrid flowable composite resin material (Purefill Bio+, ELSODENT, France) was gradually introduced into the open space available in the well around the abutment and light-cured incrementally until the space was filled (Fig. 8d).





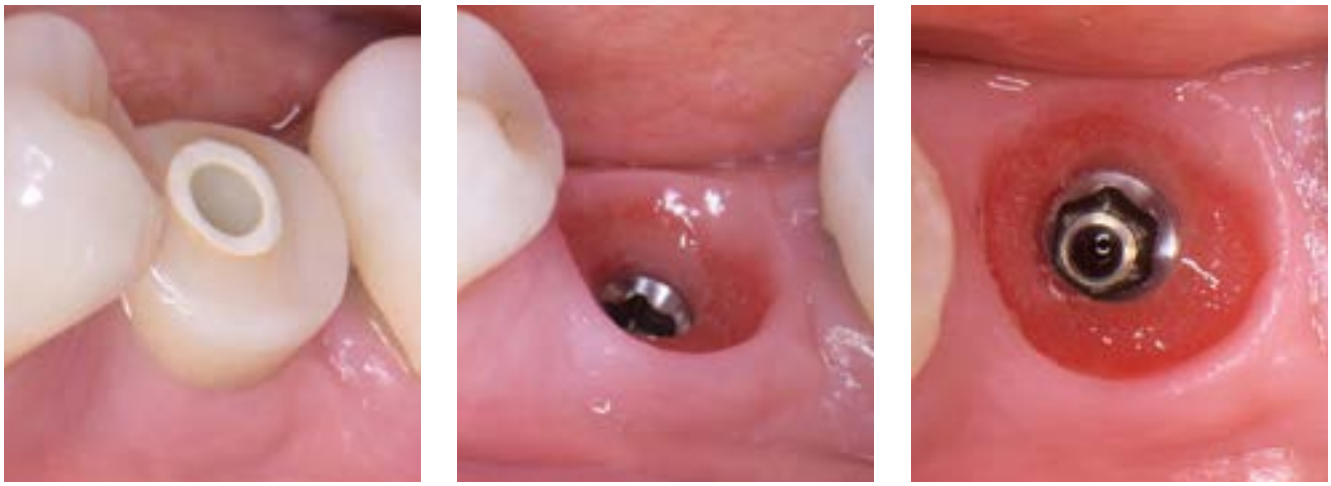


9 I The Cervico anatomical healing abutment (9a) was installed to the implant, and the flap was replaced and secured with two vertical mattress sutures (9b). Periapical radiograph immediately post-operatively (9c). Oxygen-releasing bluem oral gel was applied topically (9d).

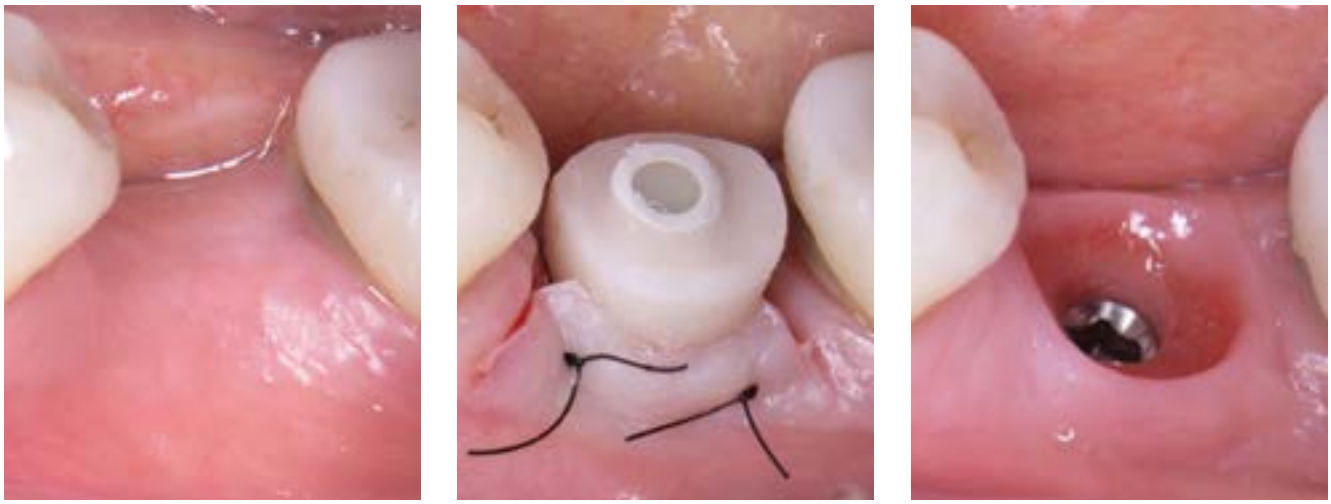
The composite resin surface of the generated healer was highly polished using the dedicated polishing brushes and paste, available with the Cervico system (VP InnovatoHoldings Ltd, Cyprus) (Fig. 9a). The occlusal surface was trimmed down to reduce its height and minimize the chances for unintentional overloading during the masticatory function by the patient. The healer was steamed and then introduced in an ultrasonic bath within a sterile saline solution for 5 minutes to ensure proper disinfection [16].

Subsequently, the healer was fitted to the implant and torqued to 25 N/cm according to the manufacturer's recommendations. The flap was then approximated and sutured around the Cervico healer, using non-resorbable 5–0 monofilament sutures (SKD MONO, Miromed, Italy) (Fig. 9b). The abutment screw access bore was sealed using a silver-based polymer cone plug (SilverPlug, Siveraid, Italy) introduced over the prosthetic screw, and a top layer of flowable composite resin material completed the sealing (Fig. 9b). A final periapical radiograph was taken (Fig. 9c). The patient was prescribed paracetamol 500 mg (Panadol, GlaxoSmithKline, UK) every eight hours for three days and then as needed for pain control. For post-operative local infection control and promotion of the soft-tissue healing during the first post-operative week, the patient was instructed to rinse twice a day with oxygen-releasing mouthwash (blue m oxygen liquid, blue m, Netherlands) and apply over the surgical area twice a day oxygen-releasing gel (bluem oral gel, bluem, Netherlands) (Fig. 9d) [17]. The patient was also advised to avoid mastication on this side for the next eight weeks and was then released. One week post-surgery, the healing was uneventful, the sutures were removed, and the site was allowed to heal for an additional eleven weeks.

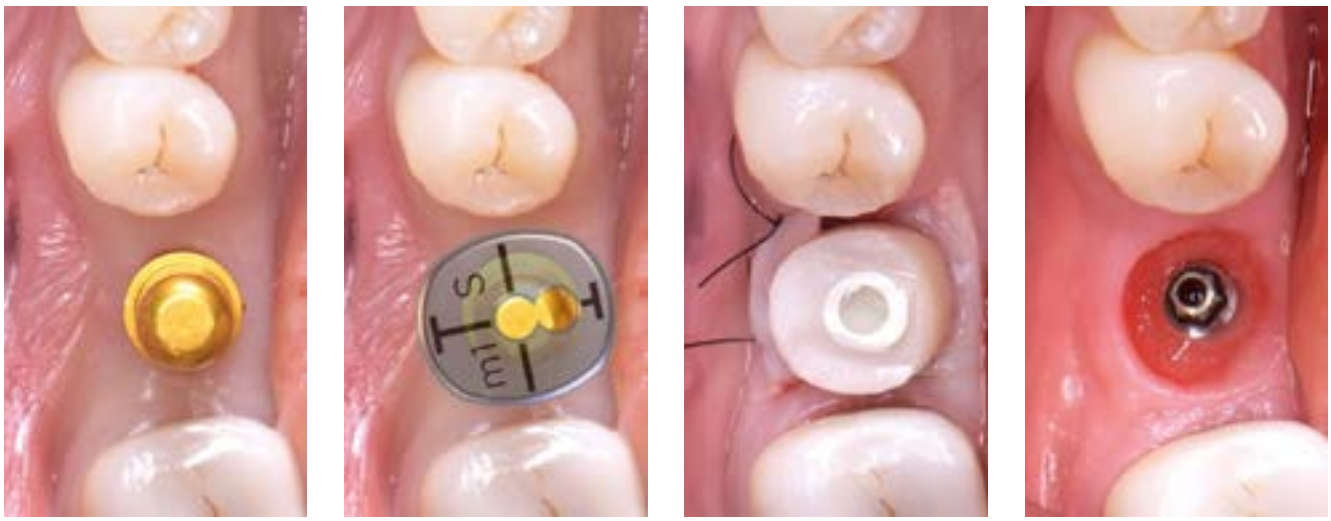
After three months, the healing was uneventful. The Cervico anatomical healer was disconnected for the first time, revealing the successful reconstruction of the horizontal dimensions of the ridge and the generated anatomical contours of the peri-implant soft tissue profile (Fig. 10 – 12).



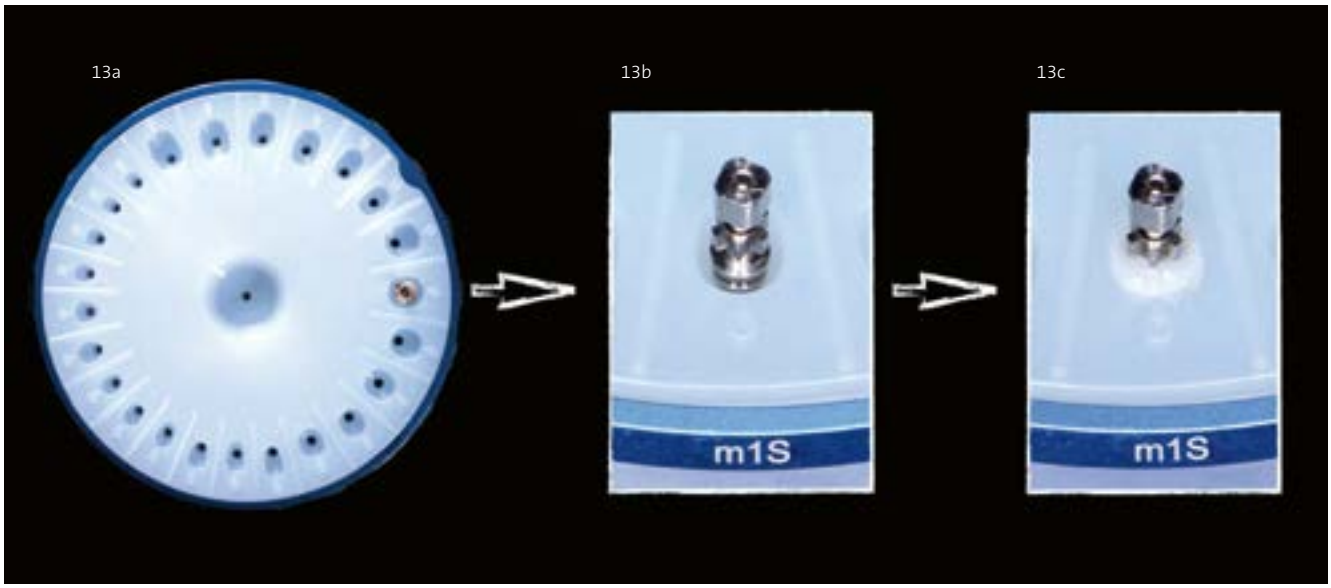
10 I Three months post-op clinical image of the generated soft tissue profile using the Cervico healing abutment. The anatomy of the Cervico healing abutment also allowed the patient to apply proper oral hygiene measures during the healing period, keeping the abutment free of plaque as possible and thus supporting the healing of the peri-implant tissues.



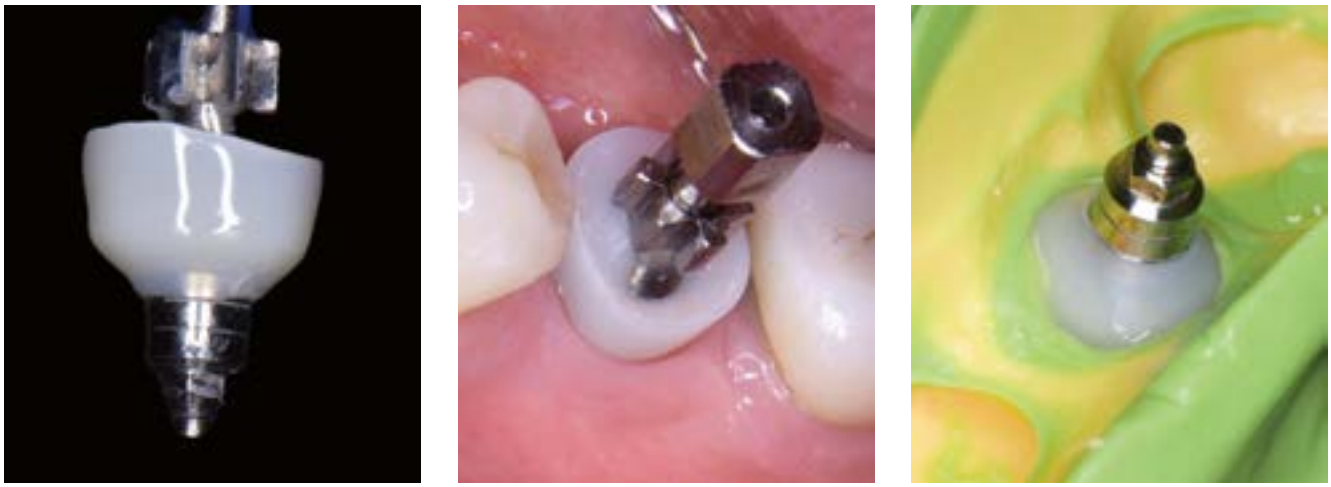
11 I The initial flat soft tissue topography using the Cervico healing abutment was transformed to a properly scalloped and anatomically sound soft tissue profile.



12 I Composite image showing how the selection and use of the appropriate anatomical tab of the Cervico Guide dictated the selection and chair-side fabrication of the proper Cervico anatomical healing abutment. The Cervico healing abutment, by supporting the marginal tissue, facilitated the enhancement of the ridge dimensions in a buccolingual direction and the generation of the proper, anatomically shaped soft tissue profile.



13 I Fabrication of the duplicate impression post. Panoramic view of the CM (13a). Open-tray stock impression post fitted into the m1S silicone well of the CM (13b). The well filled with the composite resin material (13c).



14 I The duplicate impression post; fitted to the implant and supporting the soft tissue topography; stably embedded into the impression, where the sub-gingival portion of the duplicate body provides for accurate recording of the generated soft tissue profile.

At this point, the corresponding impression post was fabricated chairside by adapting a standard impression post from the implant manufacturer.

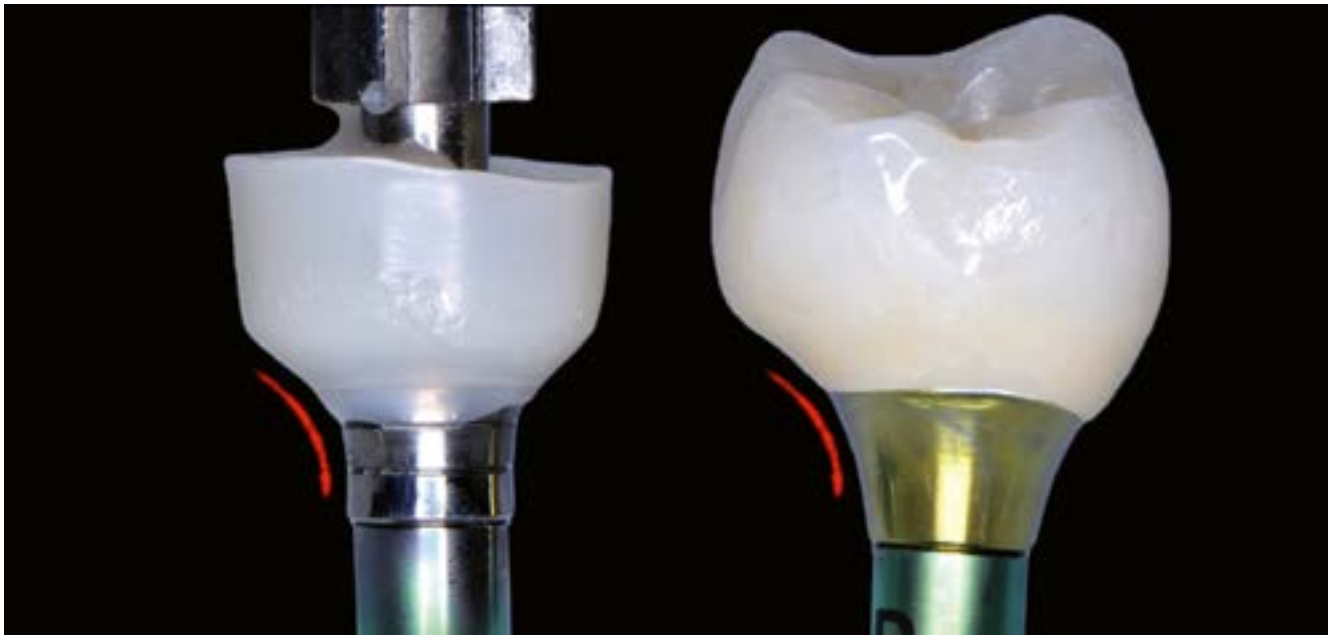
The exact process applied to fabricate the anatomical, customizable, healing abutment was followed (Fig. 13). The generated duplicate impression post was then installed to the implant, its proper fit was confirmed radiographically, and the final impression was taken using the open-tray impression technique (Fig. 14). The impression was sent to the dental lab, where a stone cast working model was created and digitalized. A CAD/CAM custom abutment and crown were designed. The final prosthesis was a screw-cemented design, monolithic, zirconia crown permanently cemented on a milled titanium abutment (Figs. 15 and 16) [18].

On the day of the final prosthesis delivery, the Cervico healing abutment was removed, and the final prosthesis was immediately placed. The correct fit was evaluated clinically and radiographically. The prosthesis was then torqued to 35 N/cm according to the implant manufacturer's recommendation. The screw access bore was sealed with a SilverPlug cone (SilverPlug, SiverAid, Italy) and a top layer of micro-hybrid composite resin material, and finally, minor occlusal adjustments were made. The follow-up examination one year post-operatively revealed the stability of the site (Fig. 17).

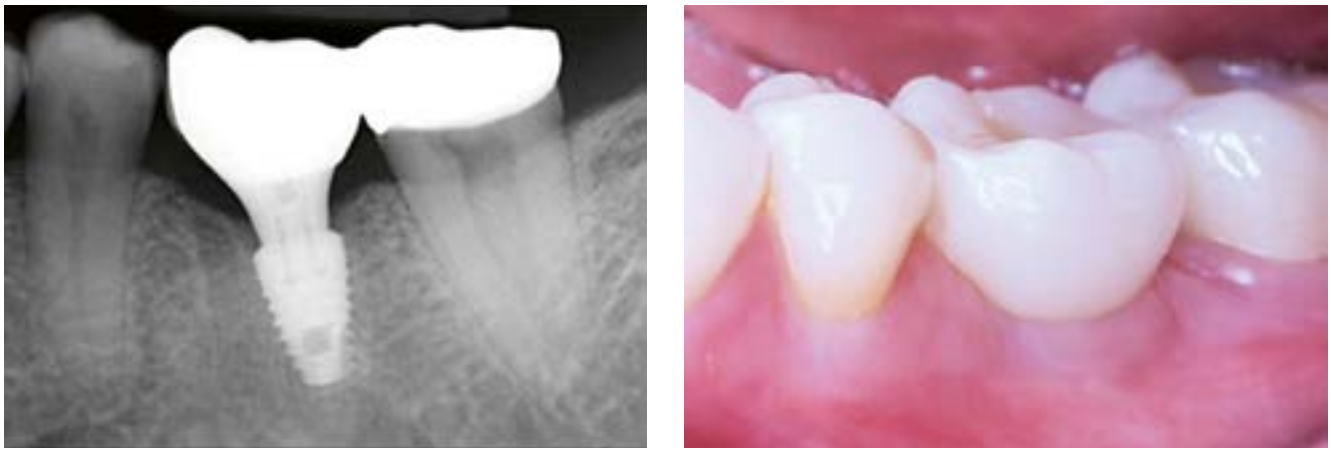
Discussion

The presented case report illustrates a standardized methodology and protocol used for the prosthetically assisted reconstruction of buccal soft tissue deficiency and the establishment of an anatomically shaped emergence profile in a single step, applied at the time of surgery. The Cervico system was utilized for the customization process of the prosthetic components needed. The Cervico Mold

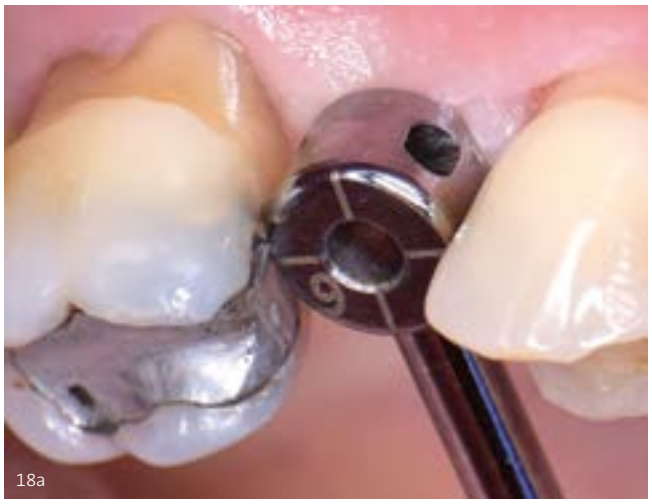
15 I The application of CAD/CAM workflow facilitated an anatomical abutment and crown design with a natural emergence profile and a proper spatial outline at the cervical margin, following precisely the soft tissue anatomy generated using the Cervico healing abutment.

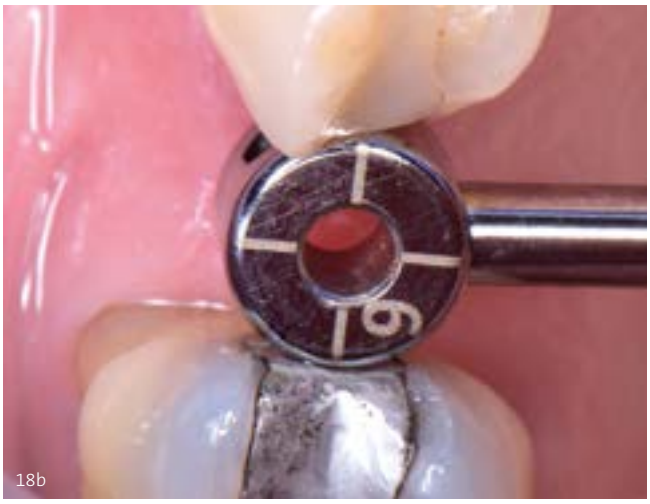


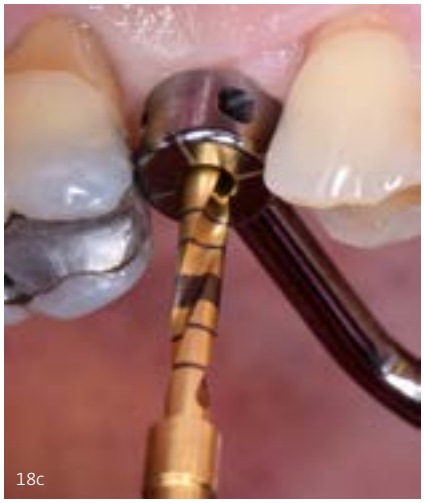
16 I The final prosthesis profile replicates the soft tissue profile established by the Cervico anatomical healing abutment and recorded by its duplicate impression post.

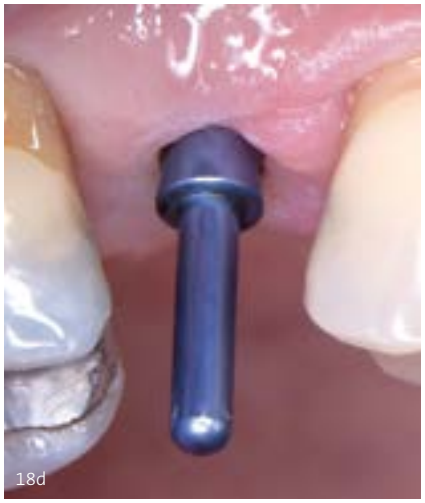


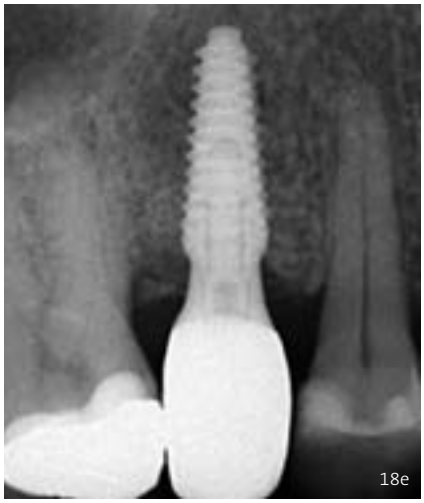
17 I Periapical radiograph and clinical view one year post-operatively. Successful restoration of the anatomy of the site, with soft-tissue contours and topography harmonious with the adjacent teeth, and excellent osseointegration of the implant with no bone loss and proper interproximal heights of bone.









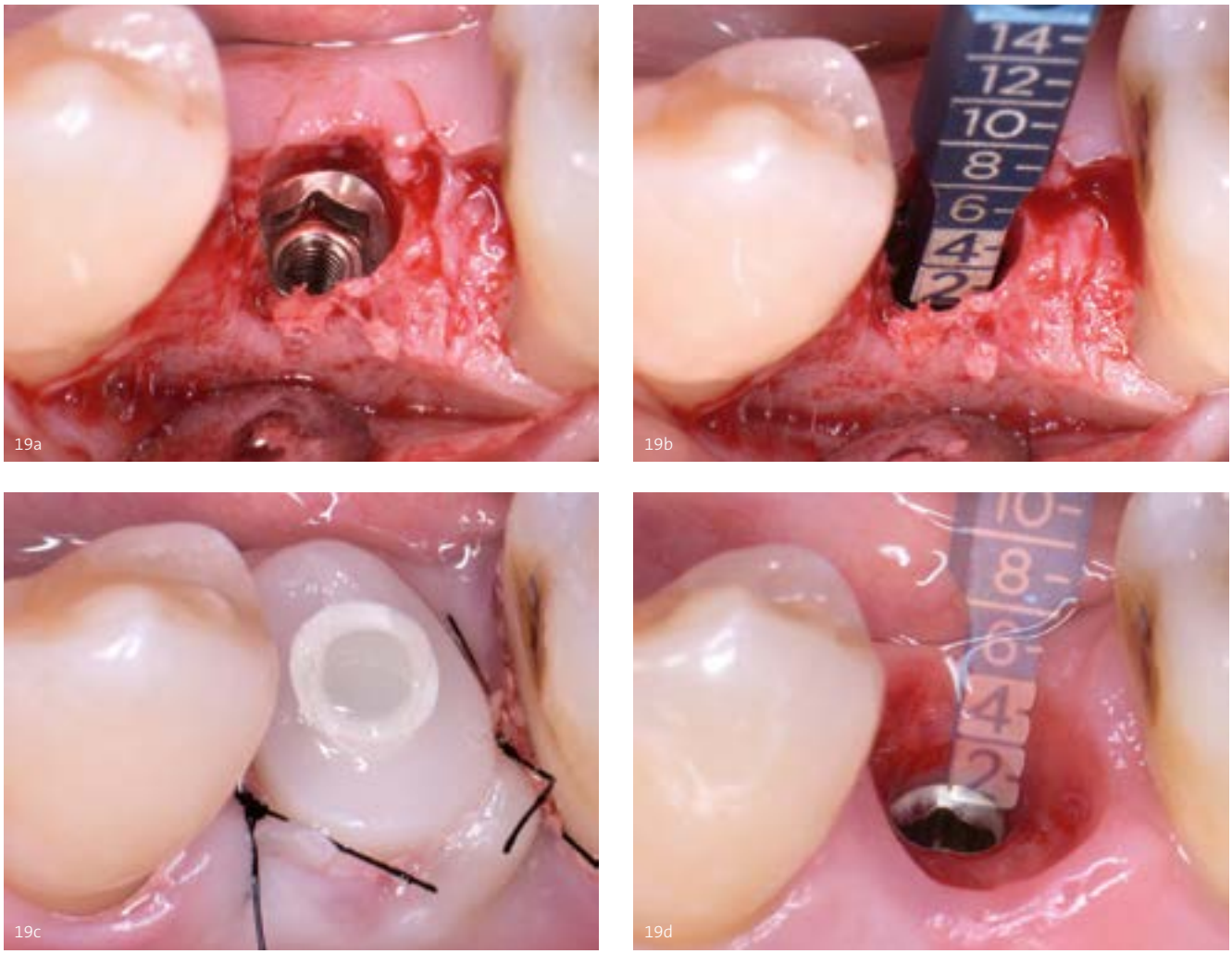


18 I An example case with limited mesiodistal available space (6 mm) where the use of the CG ensured a centered osteotomy preparation respecting the principles of the safety zone. The cylindrical tab No. 6 positioned at the edentulous site (18a, 18b). Initial osteotomy drilling through the bore of the tab (18c). Confirmation of proper angulation and positioning with the use of the guide pin (18d). After the final restoration, radiographic view of the implant (Anyridge, Megagen Implant Co., South Korea) reveals the correct implant positioning in relation to the adjacent teeth (18e).

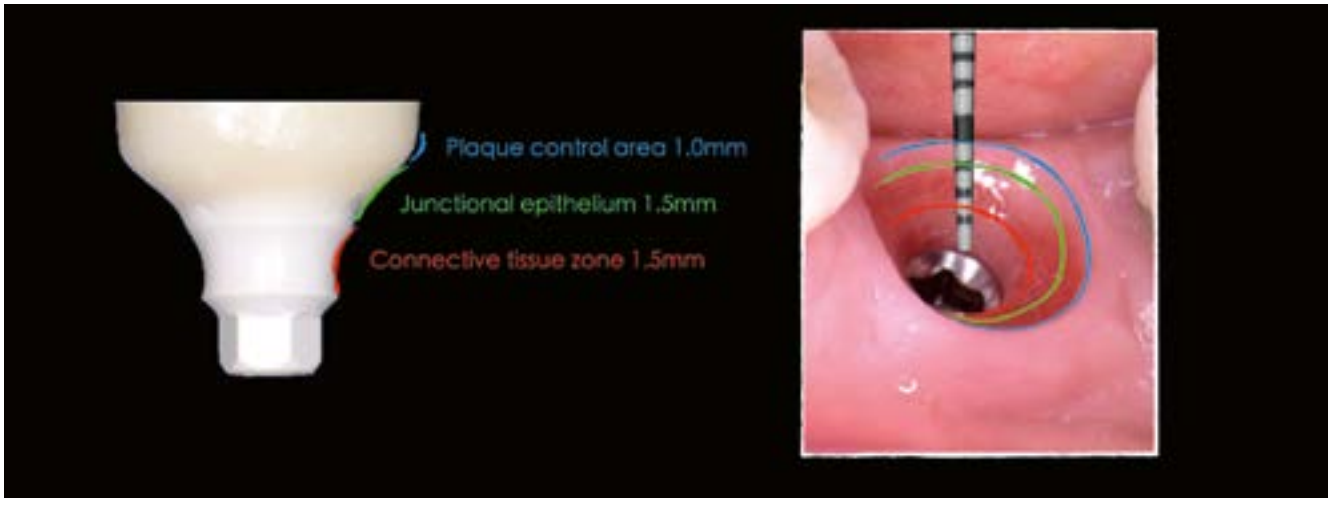
is a universal tool compatible with any implant system (all types of prosthetic connections and platforms) that can customize any prosthetic part, including one-piece or two-piece abutments and impression posts made out of any material (e.g. titanium, PEEK, alumina etc.), as these are provided from the respective implant manufacturer. Moreover, any type of flowable composite resin that can achieve a highly polished surface can be utilized to fabricate the healers.

Prosthetically driven three-dimensional implant positioning is fundamental for avoiding any surgical or prosthetic complications. One of the key benefits of the Cervico system used in this case is that it provides a simplified, yet effective method for prosthetically driven preparation of the initial implant osteotomy. The utilization of the cylindrical tabs and guide pins of the CG allows the clinician to perform the pilot trephination at the ideal prosthetic location. While any corrections of the osteotomy inclination can easily be achieved, any modification of the osteotomy position requires high clinical dexterity and becomes particularly difficult in sites with soft bone type. Thus, proper guidance of osteotomy initiation is critical and overcomes misplacements often seen with free-hand placement protocols that are affected by the parallax effect, especially in posterior sites. (Fig. 18).

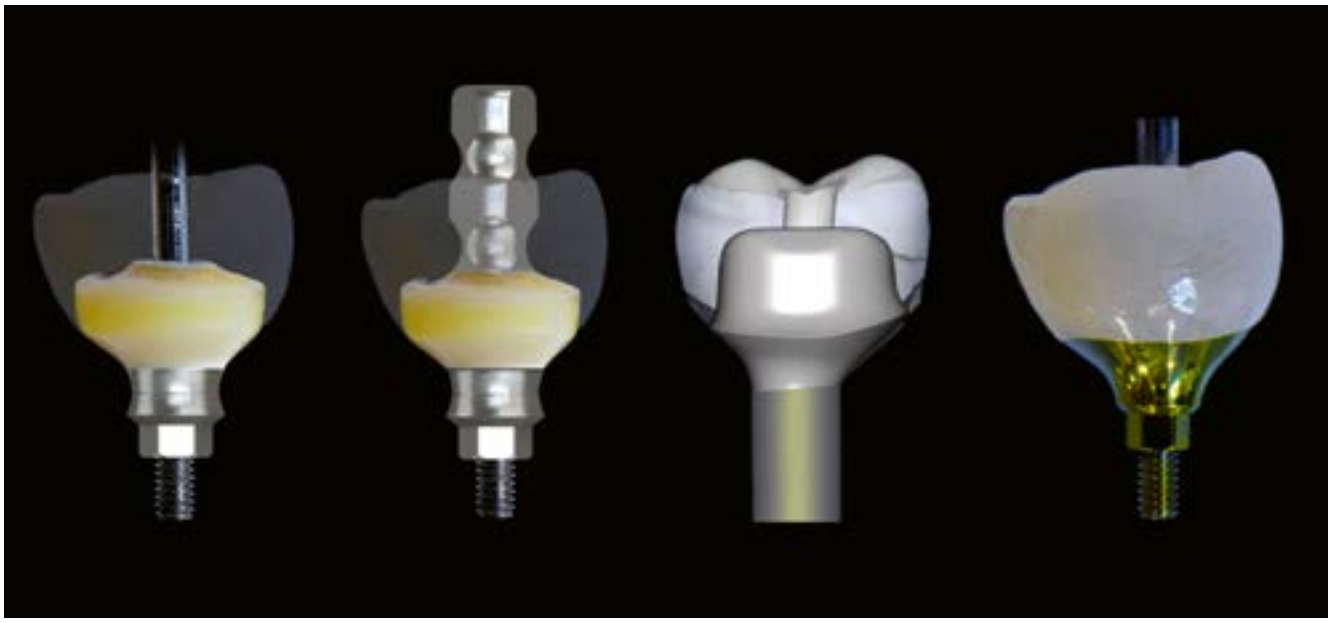
The development of a soft tissue profile that is natural in shape and size is of great clinical importance and one of the fundamental elements for an esthetically and functionally successful implant therapy outcome. (Figs. 19 and 20) [1, 4, 5, 19 – 25]. However, currently, the most common clinical practice of soft tissue management at the time of implant placement or uncovery involves the use of the cylindrical in shape stock healing abutments available from the different implant companies. The possible lateral tissue displacement they can



19 I Four millimeters vertical space between implant platform and zenith point of the future prosthesis is a prerequisite for the favorable development of the supracrestal complex. In this exemplary case, with only 2 mm of supracrestal soft tissue height, a 2 mm subcrestal placement of the implant was deemed appropriate (19a). The caliper of the CG being utilized for the measurement and confirmation of the desired 4 mm distance between implant platform and adjacent CEJ level (19b). Cervico healer installed to the implant and flap replacement (19c). The developed soft tissue profile of adequate anatomy and dimensions (19d).



20 I The correct three-dimensional implant positioning and the design of the anatomical Cervico healer facilitated the proper conditioning of the peri-implant soft tissues to provide the accurate anatomy and adequate space for the favorable formation of the connective tissue zone, the junctional epithelium zone and the sulcular epithelium zone, on suprastructure level. In this way, all anatomical components of the implant transmucosal complex were generated correctly to meet all biological and functional requirements, allowing the biological width to successfully establish around the neck of the implant without excess bone remodeling.



21 I The Cervico treatment concept at a glance. The Cervico anatomical healer, the duplicate impression post, the customized final prosthesis CAD/CAM design, and the final prosthesis from left to right. The cervical and subgingival portion of all the prosthetic elements follows the same design and dimensions aiming at the ideal management of the supracrestal implant complex.

achieve, and thus their ability to enhance lateral tissue dimensions, is limited by their available diameters and their potential interference with the adjacent teeth in a mesiodistal direction. Moreover, these healers lead to the development of a cylindrical emergence profile. When the operator does not further condition this profile, it dictates the design, fabrication, and delivery of a "mushroom" shape crown comprising a ridge lap portion, with areas of undercuts and inadequate contact surfaces with the adjacent dentition. Such prosthesis contour is responsible for several critical clinical problems that develop short and long term. The most common short-term effects being large open triangles on the proximal cervical portions and/or inadequate buccal contour that leads to food impaction, gingival trauma and patient discomfort upon function. Large ridge lap design is introduced to overcome such issues, providing a prosthesis with inadequate access for proper plaque control. The latter is strongly related to future peri-implantitis development. Two studies have reported that 74–77 % of cases affected by peri-implantitis were associated with poor prosthesis design and inadequate plaque control [26, 27].

To overcome these issues, some clinicians further condition the cylindrical soft tissue profile during the restorative stage with a series of temporary prostheses.

However, these methods might be complex, costly, and time-consuming in everyday practice since they involve lab outsourcing and multiple appointments [28 – 32]. Moreover, these methods require numerous connections and disconnections of the prosthetic components. When the latter is applied on an implant level, it can lead to soft and hard tissue recession [33].

As shown in this case, the Cervico anatomical healing abutment was immediately installed at the surgical stage allowing the tissue to rest, heal and mature around the anatomical body of the healer. Thus, soft tissue profile conditioning is immediately initiated, taking advantage of the proliferative stage of the healing process. This, in return, provides adequate time for soft tissue maturation of the conditioned profile without further postponement of treatment at the restorative stage.

The proposed protocol also allowed ridge dimension's enhancement by lateral displacement of the available soft tissue. The latter is facilitated by the defined design of the Cervico healer, which supports the tissue at the cervical plane while providing a sub-cervical protected space for proper blood clot development. The blood clot in this area, being protected and stabilized, meets the requirements to gradually transform to soft tissue and enhance the lateral ridge dimensions [34, 35]. It is essential to mention that this method can achieve the desired results when a minimum band of keratinized mucosa is present so that it can be appropriately manipulated. In any other clinical scenario that does not meet this requirement, the additional use of a soft tissue graft is advisable [14, 15].

The proposed protocol in this article can also be applied under conditions with prefabricated anatomical healers. The latter have been available in the market for many years. However, they have failed to be adopted as the standard of care. The reason behind this relates to the fact that their design and dimensions are defined a priori to specific 3D implant location. However, in everyday clinical cases, different requirements are presented regarding implant position, angulation and soft and hard tissue topography, necessitating further alteration and customization chairside of the healer. This is

a practically impossible process for prefabricated titanium anatomical healers due to the nature of the material. Moreover, the surface topography and properties achieved post-modification and how they affect the interaction with the soft tissue cannot be controlled. Modification of prefabricated anatomical plastic of PEEK healers is feasible, but proper polishing of the affected surface becomes very hard or even impossible. A properly smooth surface is essential for the favorable interaction with the soft tissue and the biofilm present in the plaque zone.

Thus, it is advantageous to utilize a healer that comprises a body made of an easily adjustable material, e.g. composite resin. The latter can be easily customized and properly polished chairside to achieve surface properties that can favorably interact with the soft tissue and allow epithelial attachment and formation of the junctional epithelium zone on its surface [36–41]. Mucointegration has been shown to be essential for an early and long-standing peri-implant soft tissue seal [42, 43] and any temporary material that fulfills these requirements can be utilized. Materials like resins (acrylic, bis-acrylic, composite), PEMA and PMMA have been proven to be effective in this manner if they receive mechanical polishing and thorough cleaning, having a positive influence in cell adhesion and leading to reduced inflammatory infiltrate and enhanced healing of the peri-implant soft tissues. It is important not to treat the surfaces with any varnish material or chlorhexidine solution, since the latter can inhibit the epithelial attachment [16, 44, 45]. Since the latter can inhibit the epithelial attachment [16, 44, 45], it is important not to treat the surfaces with any varnish material or chlorhexidine solution.

An alternative solution to the presented methodology involves the use of customized CAD/CAM anatomical healing abutments. The latter is an excellent solution; however, they require digital pre-planning and equipment that is not easily accessible to most clinicians.

Even when a natural and anatomically sound emergence profile is achieved, another challenge that the clinicians might face is the accurate recording of the anatomy of the developed peri-implant soft tissues during the impression stage. Once the anatomical healer is removed from the implant, the mucosal tissues may spontaneously collapse within a few minutes. The latter is a phenomenon that can occur within a few minutes after healing abutment or prosthesis removal and poses a significant problem for analogic and digital impression techniques that do not utilize custom impression components. This problem becomes even more critical when multiple implants need to be impressed at the same time. For this reason, an accurate impression requires the use of a customized impression post, comprising a subgingival portion being the exact duplicate of the subgingival part of the anatomical healer that was used to develop the anatomical emergence profile [46–50]. The use of the CM can provide an accurate and simplified method for the extraoral chairside fabrication of the duplicate impression post so that precise implant impression may become standard of care for both anterior and posterior cases, leading to improved results. The same principles can be applied with digital impression protocols. The scan post can be customized in the CM leaving the marks visible for the scanning process.

At the dental lab stage, the dental technician now designs the biologically critical, cervical and subgingival, portion of the final prosthesis, following the exact soft tissue topography, as this was created by the Cervico anatomical healer and recorded by the duplicate impression post. This can be proven advantageous since critical clinical parameters like tissue phenotype, implant platform location in relation to the crest, among others, are usually not communicated to the dental technician. Any arbitrary gingival mask modification on the working model and subsequent adaptation of the sub-gingival portion of the prosthesis in relation to the actual soft tissue anatomy present in the mouth can lead to complications upon prosthesis installation to the implant.

Thus, the proposed protocol allows and directs the dental technician to design and fabricate a prosthesis with an optimal emergence profile and a cervical margin that coincides with the cervical margin of the soft tissue (Fig. 21). This, in return, facilitates the formation of the plaque zone three-dimensionally in an area where standard oral hygiene measures applied by the patient can efficiently disturb the biofilm, limiting the risk for peri-implant disease development and establishing the foundation for long term stability [1, 26, 27].

The scientific value of this case report is to serve as a proof of principle that this method and system is efficient for the reconstruction of the lost horizontal soft tissue topography and the conditioning of the emergence profile in a healed posterior site. A new study evaluating the alveolar ridge volumetric changes achieved with the proposed protocol is being performed to assess the degree of effectiveness of the proposed protocol with regards to alveolar ridge dimensions enhancement.

Conclusion

Within the limitations of a single case, the present report suggests that the proposed protocol allowed the prosthetically assisted enhancement of the lateral ridge dimensions, and soft tissue profile conditioning in a one-step, minimally invasive manner, resulting in a successful and stable outcome after a follow-up period of one year.

Further research, including larger samples, comparison of different techniques, and measurements of the ridge changes, is needed in order to confirm and supplement the present findings.

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The references are available at www.teamwork-media.de/literatur

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A novel digital workflow

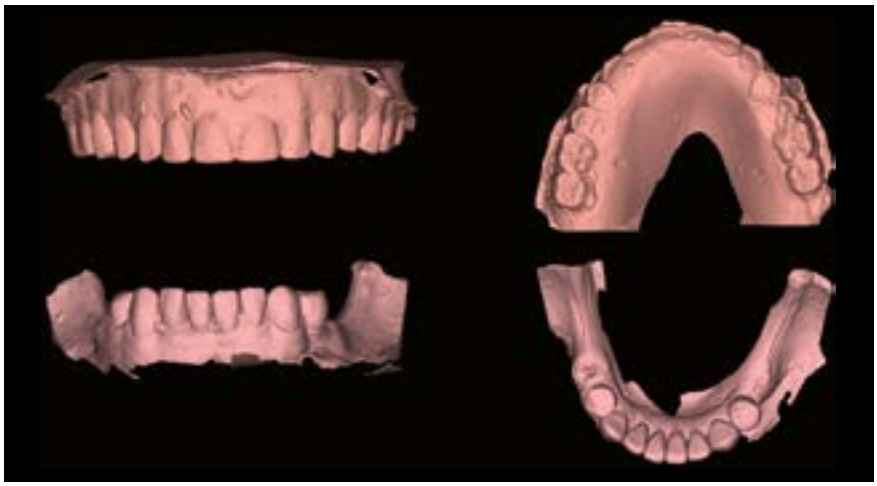
Facially-guided fast and fixed rehabilitation of an edentulous maxilla

MORVARID KESHVARI, PORTUGAL

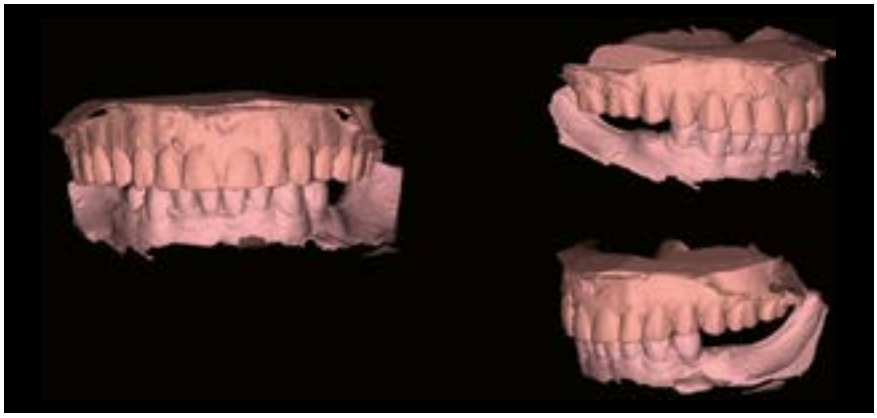
Implant dentistry has recently witnessed a paradigm shift to a complete digital workflow encompassing advanced dental diagnostic and planning software, Digital Smile Design, intraoral digital impressions and scans with Computer-Assisted Designing (CAD) and Computer-Assisted Manufacturing (CAM) of provisional and definitive prostheses. A digital workflow enables the patient to visualize the expected rehabilitation before the start of procedure, hence facilitating communication and management of patient's expectation. A clinician can achieve successful and reproducible reconstruction with minimal treatment and short turnaround time by complete digitization of the process.

There are various 3D smile design softwares available. The evolution of dental designing software over the past few years has made possible the rehabilitation of a patient by combining the files from a CBCT along with STL files of an intraoral scan and images. This three-dimensional data acquisition allows a dentist to create virtual models of the face, bone and dental profile. This data is imported into a CAD software and superimposed upon each other in order to obtain the virtual patient [1]. The dentist and the dental technician using the CAD software plan the surgical template and prosthetic restoration. Finally, these devices are processed by CAM software, milled or 3D printed and made available for clinical use.

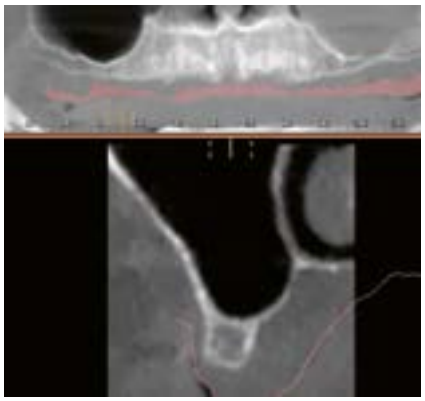
The literature on immediate loading with fixed full-arch prosthesis in the maxilla shows that a successful outcome can be expected if adequate criteria are used to evaluate the patient, choose the right implant with high primary stability and perform the surgical and prosthetic treatment. High implant and prosthetic survival rate, low marginal bone loss and few complications are reported by studies on immediate loading [2].



1 I STL of the upper denture and the lower arch



2 I STL of the bite



3 I Preoperative CBCT

4 I Frontal rest position

5 I Frontal profile showing the patient´s smile with the current denture

The SKY fast and fixed treatment concept presents the possibility for immediate loading of a full arch with a reduced number of implants spread out according to the biomechanical principles of load transfer on the condition that the implants achieve primary stability of more than 30 Ncm. Cross-arch splinting with temporary bridge is recommended to minimize forces exerted and implant micromobility controlled (< 150 µm) for osseointegration of immediately loaded implants. Hence the patient gets a fixed set of teeth on the day of surgery.

The following case report highlights the meticulously planned and esthetically executed case of a female edentulous patient with the SKY fast and fixed treatment concept using a novel digital workflow.

Case report

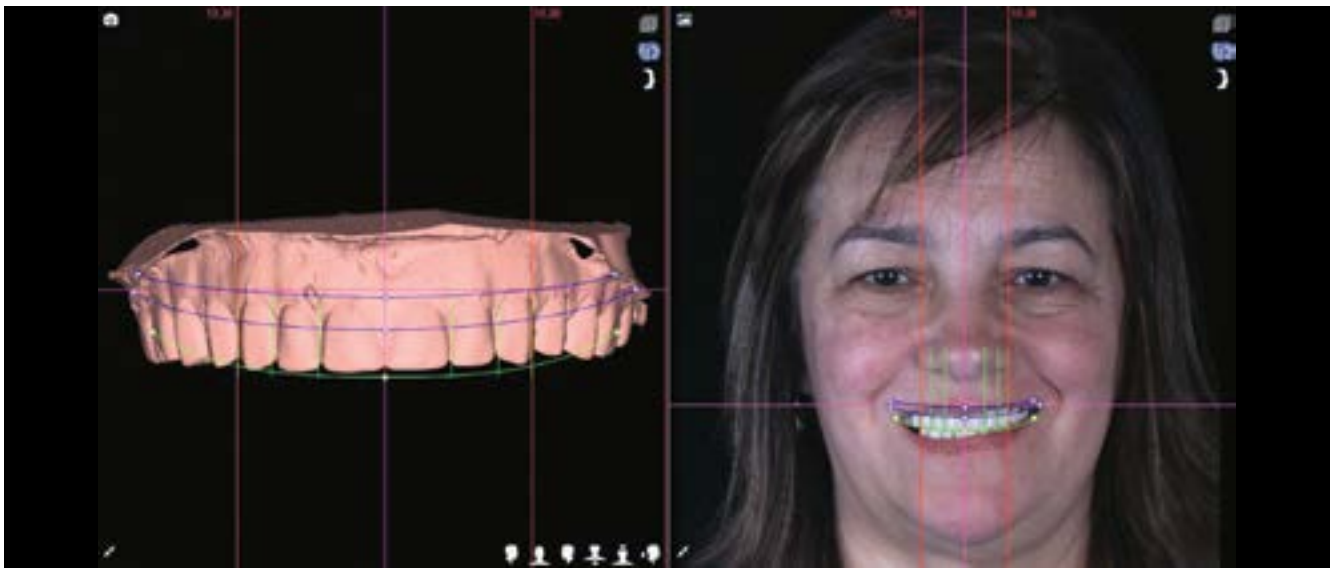
A middle-aged female patient presented with a removable complete upper denture seeking treatment for fixed replacement of her missing teeth.

Following the radiological and clinical examination, a full-arch implant supported rehabilitation with six implants in the maxilla in accordance with the fast & fixed concept using digital workflow and Digital Smile Design (DSD) was planned.

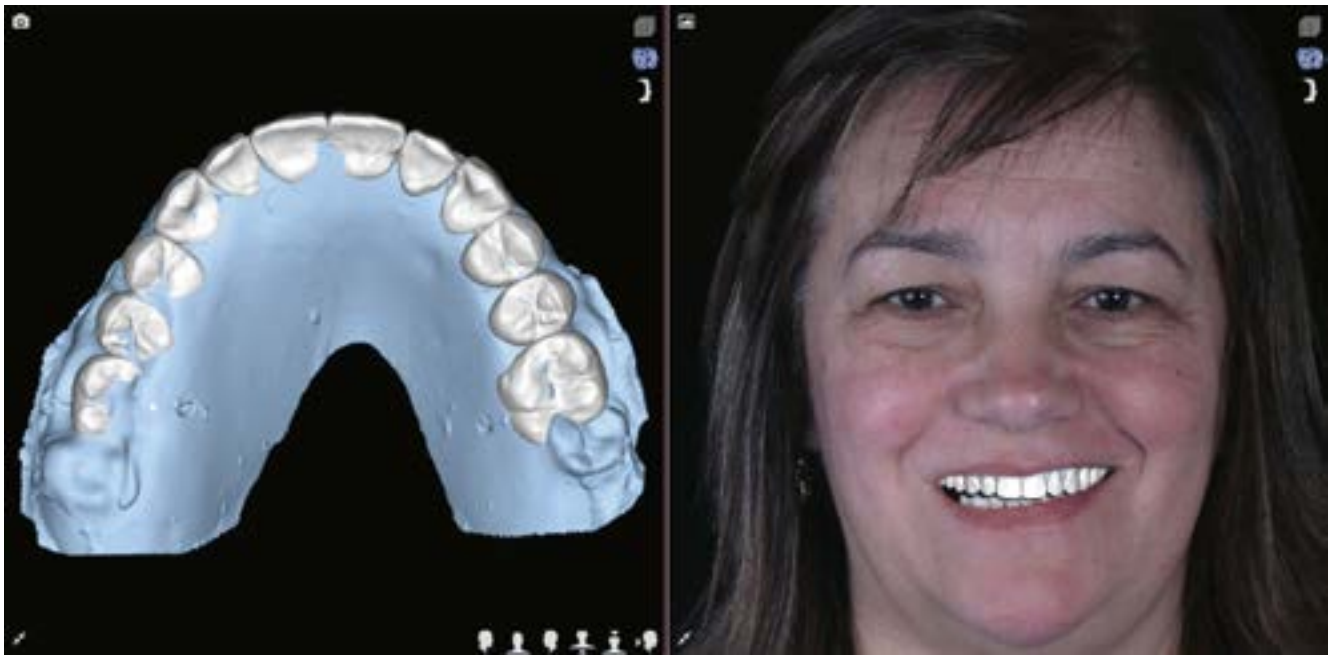
Preoperative procedures

Full-mouth intraoral scans were taken with the existing denture in place and subsequently without the denture to obtain STL files (Figs. 1 and 2). DICOM data was obtained by taking the CBCT of the patient with the old denture in place along with opaque points and without the denture (Fig. 3). A CBCT was also taken of the denture alone with the opaque points. A series of facial images were taken of the patients at rest and in motion (Figs. 4 and 5). The digital smile design, implant placement planning for fabrication of surgical guides and prosthesis was done using Nemotec and exocad (exocad GmbH, Germany) software.

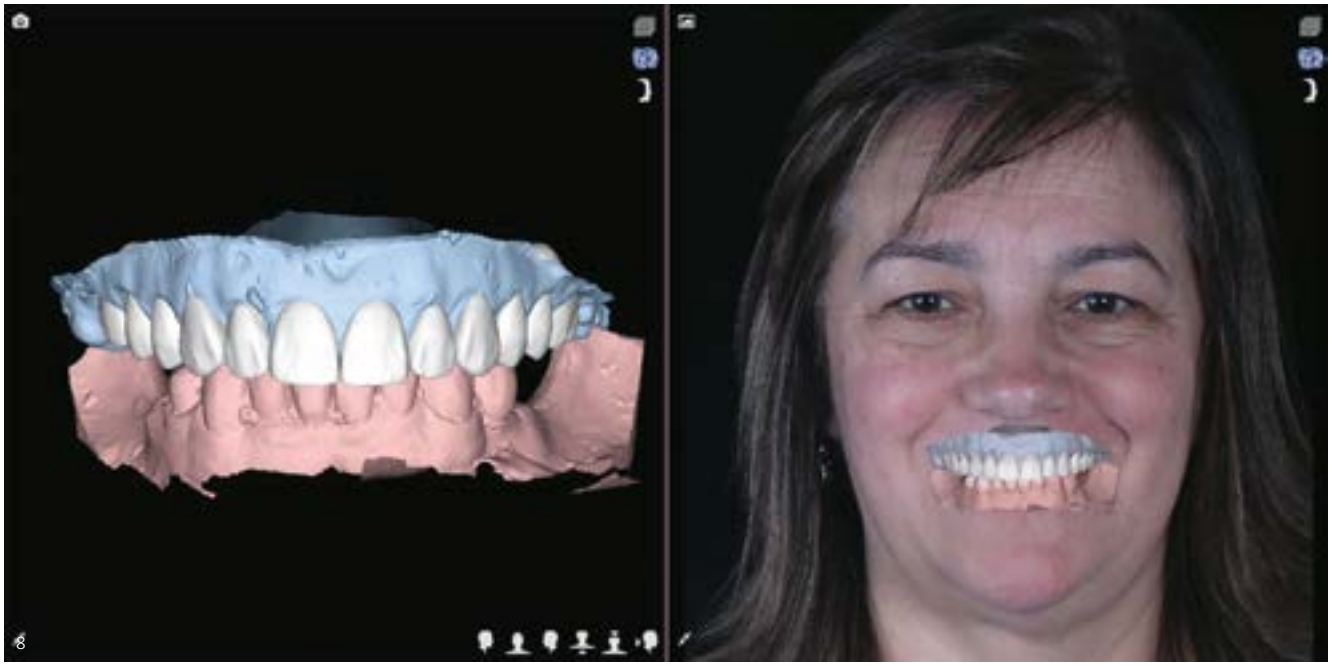
The STL files, CBCTs and images were imported to the software. Superimposition of the same was done for virtual manipulation to enable the fabrication of guides and digitally design the smile of the patient. The Digital Smile Design was done considering esthetics, lip support and occlusal scheme (Figs. 6 to 10) for procuring an ideal immediate hybrid provisional prosthesis in

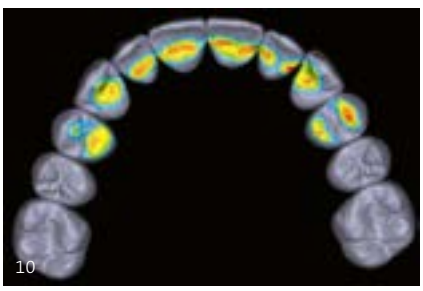


6 I Actual situation with smile frame



7 I Digital Smile Design: 3D ideal smile line post-treatment

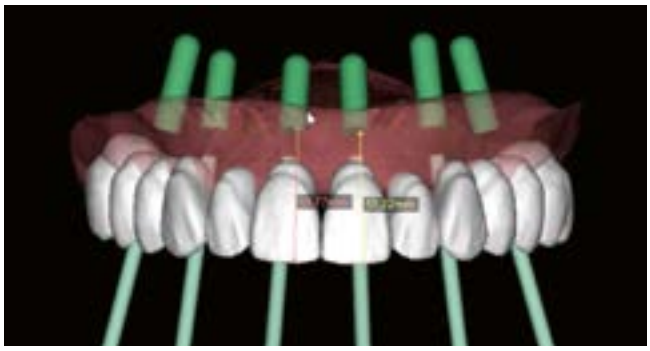




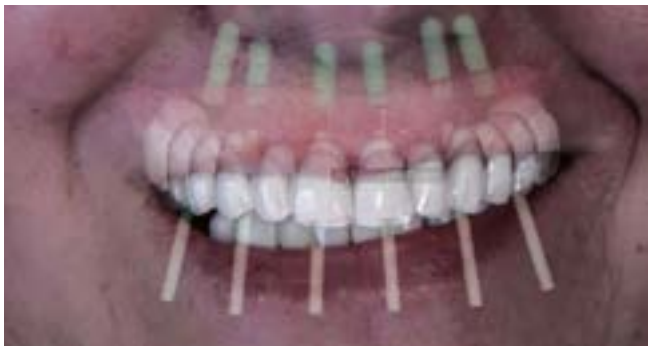
8 I Ideal post-treatment on original model and facially superimposed

9 I Ideal post-treatment, profile view

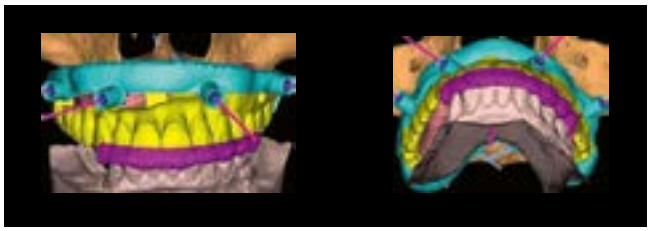
10 I Occlusogram



11 I Facially guided designing of the prosthesis and implant position



12 I Base guide designed

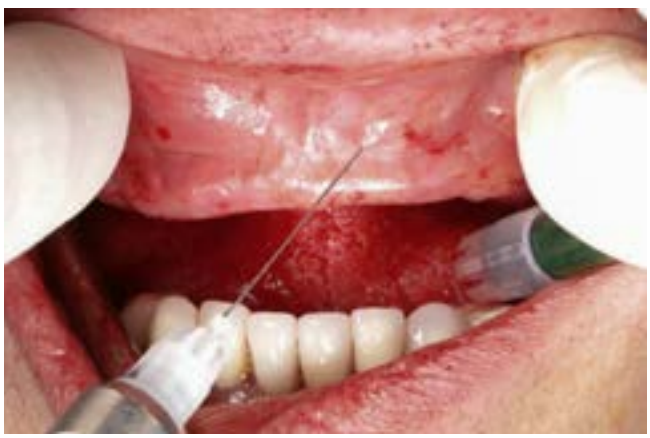


13 I Base guide with multifunctional guide and bite splint designed

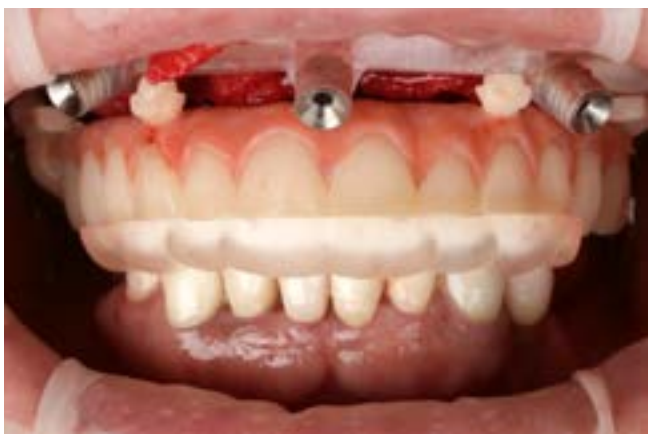
Polymethylmethacrylate (PMMA). Based on the prosthetic planning and the anatomy of the maxilla, the path of implant placement was planned (Fig. 11) for fabrication of the surgical guide and prosthesis. Hence a facially guided approach was used. Since bone reduction was required, stackable guides were fabricated on the base guide (Fig. 12). A bite splint was also fabricated for orientation and position of the first guide (base guide) before fixing it with pins (Fig. 13). The ability of implants to achieve a high primary stability is an important factor in immediate restoration. Hence a back tapered, self-cutting double-threaded implant with a unique surface topography osseo-connect surface (OCS) which enhances osseointegration and soft tissue adhesion at the neck was chosen (copaSKY, bredent medical GmbH & Co. KG, Germany). The SKY planX guide drills and sleeves were intended to be used for the guided implant surgery for precise implant placement.

Surgical phase

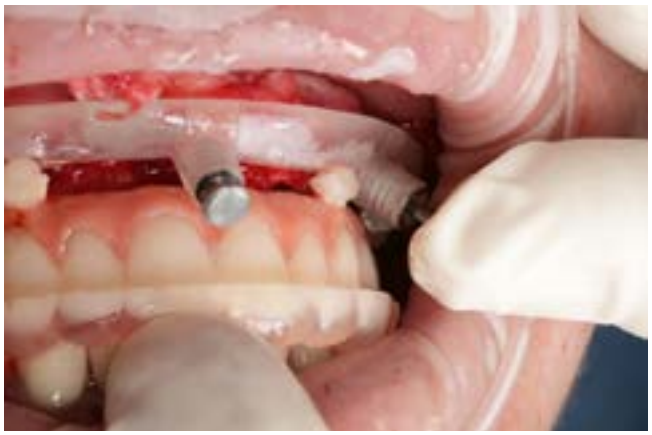
The procedure was performed under local anaesthesia (Fig. 14) and a full thickness mucoperiosteal flap was elevated. The base guide was positioned with the customized prefabricated immediate implant prosthesis along with the bite splint to correctly orientate the base guide before fixing it with pins (Fig. 15). The anchor pins were put into place after using the twist drills (Figs. 16 and 17). Bone reduction and flattening of the ridge was done with ron-



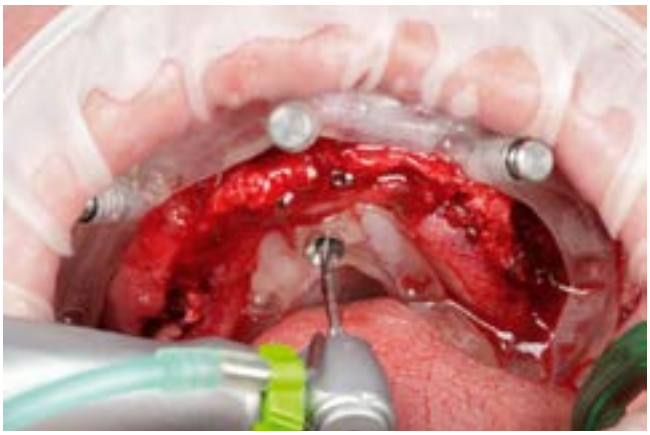
14 I Local infiltration technique for anesthesia



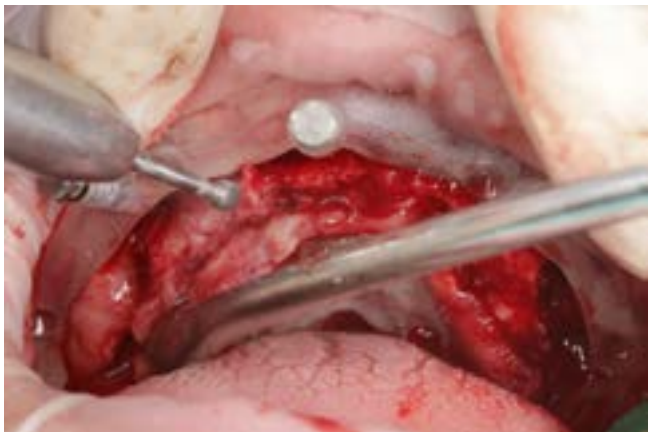
15 I Orienting the base guide in position with the bite splint



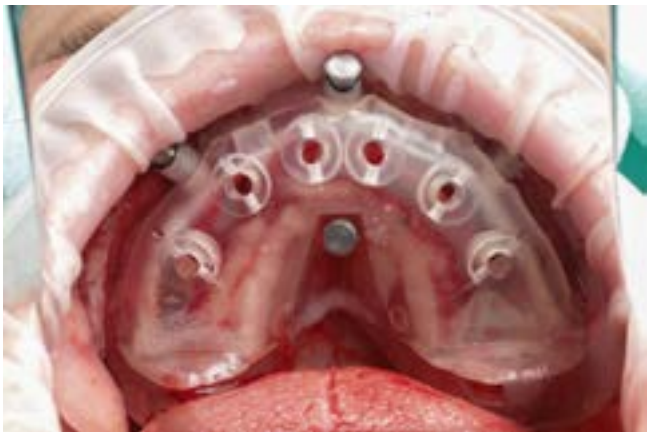
16 I Stabilising the base guide with the anchor pins



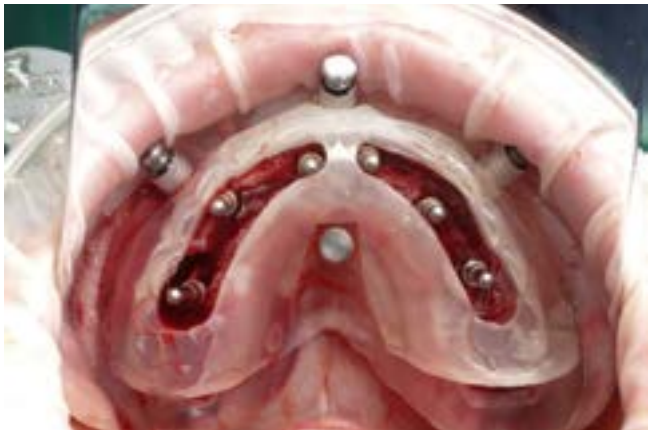
17 I Base guide palatally anchored



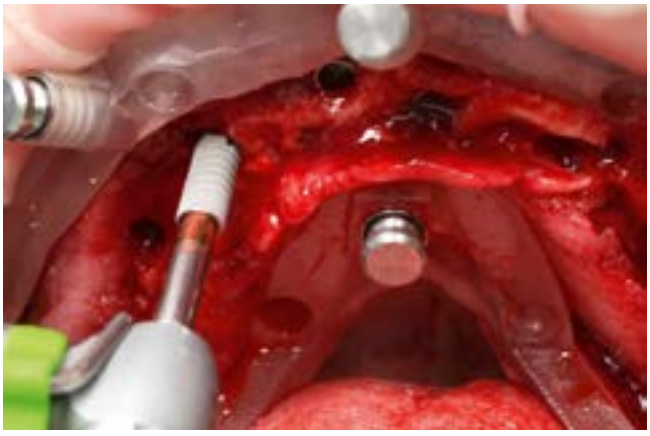
18 I Bone reduction as per the reduction guide for implant head position



19 I Surgical guide for implant osteotomy preparation (Pilot System)

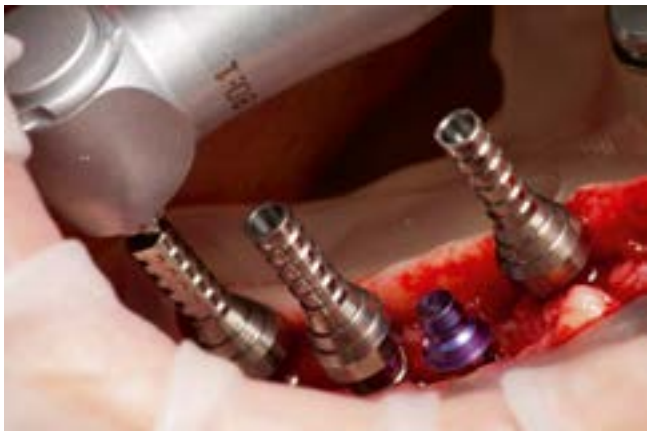


20 I Multifunctional guide with parallel pins

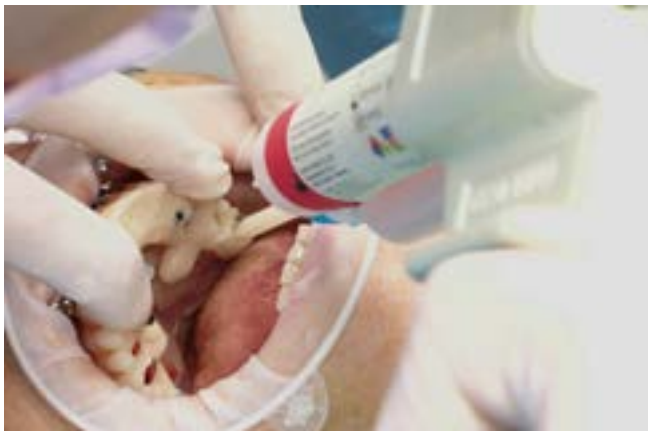


21 I copaSKY implant inserted in the osteotomy site

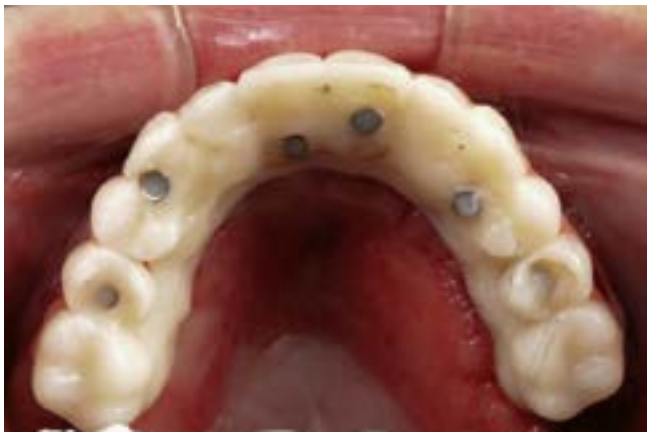
geurs and crestotomy round burs for the final implant head position (Fig. 18). Following the bone reduction, the surgical guide (Pilot System) for the osteotomy preparation was attached to the base guide and osteotomy was completed (Figs. 19 and 20). The SKY planX drills were used for osteotomy site preparation for the subsequent placement of six copaSKY implants (Fig. 21). Resonance Frequency Analysis (RFA) was done (Penguin, bredent medical GmbH & Co. KG, Germany) and an average reading of 70 Implant Stability Quotient (ISQ) was achieved on all implants making immediate loading predictable. The copaSKY unicone abutments were attached to the implants followed by engaging the titanium copings of the immediate provisional prosthesis (Fig. 22). The immediate provisional PMMA prosthesis was activated extraorally with Qu connec-



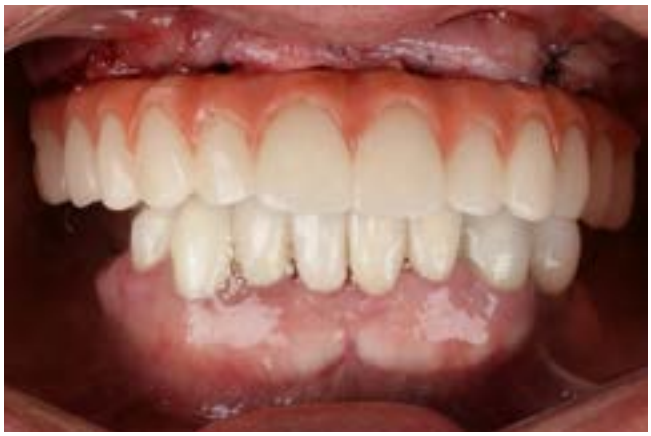
22 I Titanium copings attached to the copaSKY uni.cone abutments



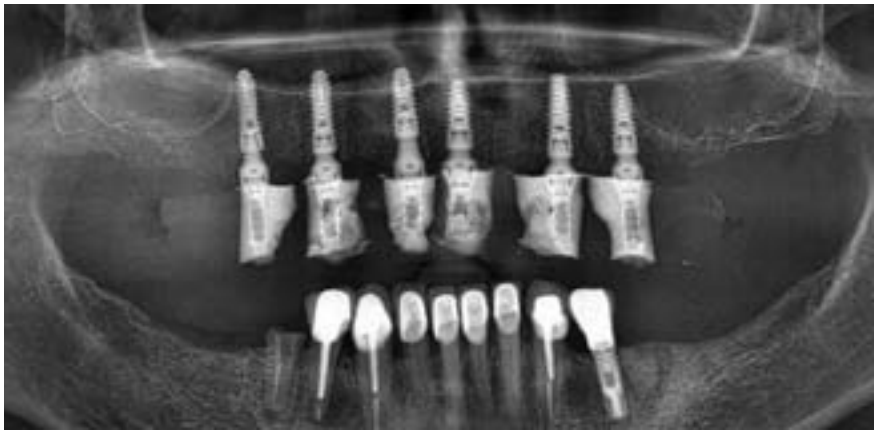
23 I Relining of the immediate hybrid provisional prosthesis intraorally



24 I Immediate hybrid provisional prosthesis in position



25 I Frontal view of the immediate hybrid provisional prosthesis



26 I Immediate post-operative OPG with provisional prosthesis

tor at the luting areas (bredent GmbH & Co. KG, Germany) and puttied intraorally with Qu resin (bredent GmbH & Co. KG, Germany) (Fig. 23). Only centric contacts were given on the provisional prosthesis. The provisional bridge did not have any cantilevers hence preventing high leverage forces which might be a risk for the osseointegration of the implants (Fig. 24). The patient was extremely satisfied with the facially designed immediate provisional prosthesis (Figs. 25 und 26) and the healing was satisfactory (Fig. 27). She immediately got back her lost confidence.

Discussion

The main advantage of planning a full-arch implant reconstruction with the SKY fast & fixed treatment concept is the possibility of getting an immediate fixed interim prosthesis on the day of surgery. This provides esthetics and functional rehabilitation without delay thereby enhancing the patient's quality of life.

Splinting of implants seems to be important in immediate loading, especially when bone density is low [3].

The reduced number of stable implants is cross-arch splinted for occlusal load distribution as a treatment protocol. Hence immediate loading with interim fixed prostheses in the edentulous maxilla is a viable treatment alternative.

Studies have shown that the SKY fast and fixed treatment protocol is successful in restoring edentulous ridges due to the perfectly matched combination of

implants, abutments and dental laboratory materials, which make immediate loading with immediate implants feasible and predictable [4]. A study evaluated the clinical efficacy of the SKY fast and fixed system and reported a 100 % success rate of prosthetic restoration. Patients were satisfied with the esthetics of the prosthesis and with the phonetics and chewing function [5].

Prosthetic-driven implant dentistry is the optimal way to treat patients using dental implants [6]. In the current case, DSD was done to ensure a prosthetic-driven facial approach for planning and designing of the provisional and definitive prosthesis. The same applies for the path of implant placement using a guided approach. DSD is a tool which provides detailed information to the clinician, the technician and the patient. Due to its interoperability with different digital file formats, software and modern dental equipment, the DSD is optimal for planning and leads to predictable restorative outcomes. [7].

A guided approach using stackable stents was used for the osteotomy site. Static guidance systems are defined as systems which communicate the predetermined virtual implant position to the surgical operating area, using a rigid surgical implant template or guide [8].

A systematic review concluded that the accuracy of static computer-aided implant surgery is within the clinically acceptable range in most clinical situations. However, a safety margin of at least 2 mm should be respected [9]. The outcome of implants placed with a static guide and of the prosthetic reconstruction seems similar to that expected from conventional techniques. The number of surgical complications with the guided approach is negligible [10].

The copaSKY implant system was selected based on the reliable attainment of high primary stability and the fast osseointegration due to the implant surface and design, in addition to prosthetic benefits of the conical implant-abutment connection. The copaSKY implant has a unique osseo-connect surface, the neck of the implant supports soft tissue attachment for the prevention of bacterial infiltration thereby protecting the implant. The sandblasted and etched surface enhances rapid osseointegration. It has a back-taper design and double, self-cutting compression threads which is important for the primary stability because only half the amount of the trabecular bone is traumatized during the insertion of the implant. The back taper should always be covered with bone chips to ensure that the implant is completely covered from all sides. The self-tapping double thread also achieves faster insertion of the implant with lower heat generation and bone condensation [11]. Sandblasted and etched implants with a self-cutting thread in a cylindrical and conical mixed design show statistically higher insertion and removal torque values compared with machined implants along with enhanced primary stability [12]. All reviewed studies agreed in regarding primary implant stability as the key requirement for success of immediate loading [13].

27 I Frontal profile three days after surgery

The short conical and parallel walled implant-abutment connection makes abutments easily retrievable, there is no morse taper effect even after loading. The copaSKY uni.cone abutments are soft tissue friendly with no sharp and rough edges. Due to the formfit between the copaSKY uni.cone abutments and copings, there is a high stability of occlusal screw-retained bridge. A systematic review by Papaspyridakos et al reported that the most frequent implant-related technical complication with fixed implant rehabilitation for edentulous patients was screw fracture, yielding a 5-year complication rate of 10.4 % and a 10-year rate of 20.8 % [14]. This formfit technology minimizes complications such as screw-loosening and fractures often witnessed with full-arch implant-supported bridges [15].

The material of choice for the provisional prosthesis was PMMA due to the high fracture rate reported in interim acrylic prosthesis by several studies [16, 17]. PMMA can be easily milled and fabricated with digital workflows. It ensures softer loading without compromise on esthetics.

Conclusion

The current increase in patient demands for esthetics and dentists' quest for precision in implant dentistry require excellent techniques and materials.

The trend toward digital workflows makes this possible, with the patient's well-being at the forefront at every stage. The described workflow showcased a reduction in the surgical time due to the digitalized comprehensive planning and pre-operative laboratory procedures for immediate restoration of function and esthetics. Hence attention to detail and a holistic approach culminate into functional and visually appealing masterpiece aided with new-age biomaterials. Summarized, the digital workflow with SKY fast & fixed is a win-win situation for the patient and the practice.

However, long-term clinical studies are needed to evaluate the clinical superiority of guided implant procedures as compared to conventional methods for the rehabilitation of edentulous jaws.

Acknowledgements: The author would like to thank Mr. Sergej Deutsch for the laboratory support.

The references are available at www.teamwork-media.de/literatur

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Narrow (3.3 – 3.5 mm) short and extra-short implants

Predictable management of combined atrophy

EDUARDO ANITUA [1, 2, 3]

Short and extra-short implants are an increasingly common treatment option for vertical atrophy of the maxilla and mandible with similar or even better predictability than regenerative techniques aimed at regaining lost bone volume in order to place implants of normal length [1-3].

Narrow implants are a similar alternative to short implants, but in this case for the horizontal resorption. Their size and designs have evolved over time. Currently, according to the classification of Klein, Schiegnitz and Al-Nawas (2014) [4], those implants with a diameter of less than 3.5 mm are considered as narrow. Narrow implants can be categorized as:

- category 1 (implants narrower than 3 mm),
- category 2 (implants between 3 and 3.25 mm in diameter)
- category 3 (implants between 3.30 and 3.50 mm in diameter) [4–5].

Systematic reviews evaluating the survival of narrow implants (less than 3 mm) showed a survival rate of more than 90 % with a follow-up period of one to three years and a higher survival rate (93.8 %) for implants with diameters between 3 and 3.25 mm with a follow-up period of one to five years [6–10].

In most studies with these reduced-diameter implants, their length was regular to achieve good anchorage of the apex and thus adequate primary stability. More recently, the use of narrow and shorter implants has been validated in the literature. A review published in 2018 found that implants shorter than 7 mm and narrower than 3.5 mm had similar survival rates compared to regular-length implants. Marginal bone loss was 0.5 mm after three years of follow-up [11].

Other studies published on this topic reported similar results. However, there are only a few studies on this topic [12].

In this paper, we present a series of clinical cases of patients treated with reduced-diameter (3.3–3.5 mm) and reduced-length (6.5–7.5 mm) implants.

Materials and methods

Consecutive patients were retrospectively selected from those treated in a private clinic (Vitoria, Spain) from 2017 to 2018 who met the following inclusion criteria:

- over 18 years old
- horizontal atrophy in the maxillary and/or mandibular posterior region with residual bone volume between 4 and 5 mm, with both buccal and lingual cortical preserved
- vertical and horizontal combined atrophy with a residual bone height between 6.5 and 8 mm.

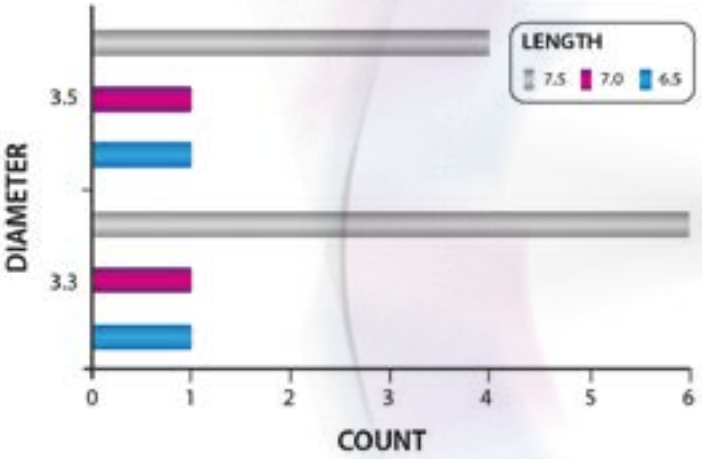
Before implant placement, antibiotic premedication consisting of amoxicillin 2 g (orally one hour before surgery) and paracetamol 1 g orally (as analgesic) was administrated. Subsequently, patients received amoxicillin 500 – 750 mg orally every eight hours (depending on weight) for five days. After intraoral examination, treatment planning was based on diagnostic models, radiographs (CBCT) and special software (BTI-Scan III).

All implants were placed by the same surgeon and subsequently followed up by two dentists. The surgical technique was the same in all patients and consisted of anesthesia, elevation of a full thickness mucoperiosteal flap, and biological drilling of the implant bed with low revolutions (50 rpm).

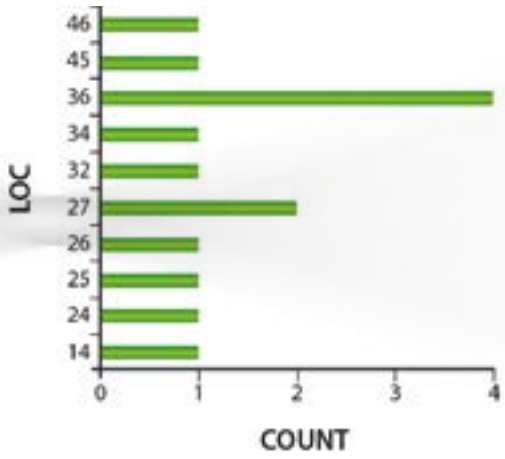
Data collection was performed by two independent examiners (different from those performing the prosthetic or surgical phase). All the data were compiled in a database and analyzed with a statistical analysis software.

Patients were checked every six months using panoramic radiographs or intraoral radiographs with positioner. The bone level was measured after calibration (based on the known implant length) using a special software (Sidexis measure and Digora).

[1] Práctica privada en implantología oral, Clínica Eduardo Anitua, Vitoria, España
[2] University Institute for Regenerative Medicine and Oral Implantology – UIRMI (UPV/EHU Fundación Eduardo Anitua), Vitoria, Spain
[3] BTI Biotechnology institute, Vitoria, Spain



1 I Diameter and length of the implants included in the study



2 I Location of the implants included in the study

Statistical analysis

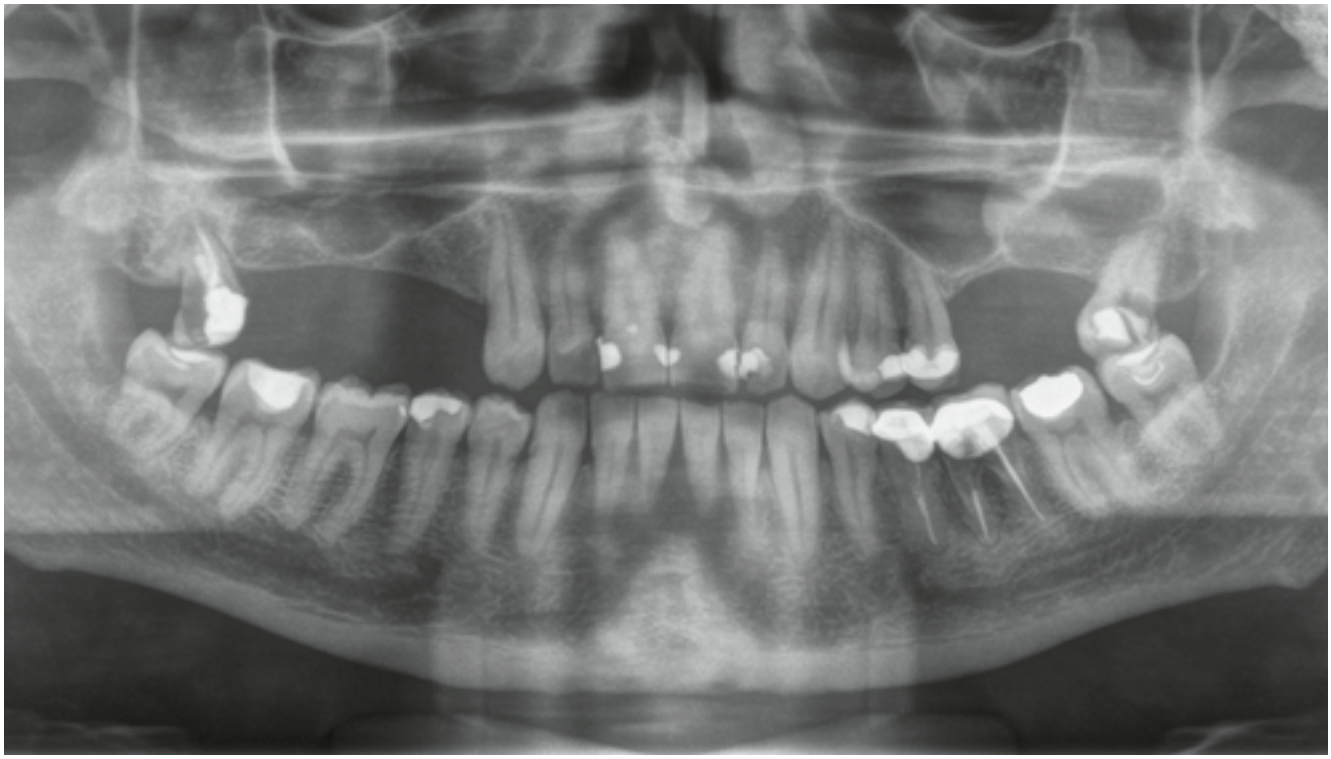
The main variable studied was the implant survival, and the secondary variables studied were the crestal bone stability, the prosthetic complications and the prosthesis survival. The patient was the unit of measurement for the analysis of age, sex, and medical history. A Shapiro-Wilk test was performed to confirm the normal distribution of the sample.

Qualitative variables were described by frequency analysis. Quantitative variables were described by the mean and standard deviation. Implant survival was estimated using the Kaplan-Meier method. All analyses were performed with SPSS v15.0 (SPSS Inc., USA) and the significance level was set at 5 % ($p < 0.05$).

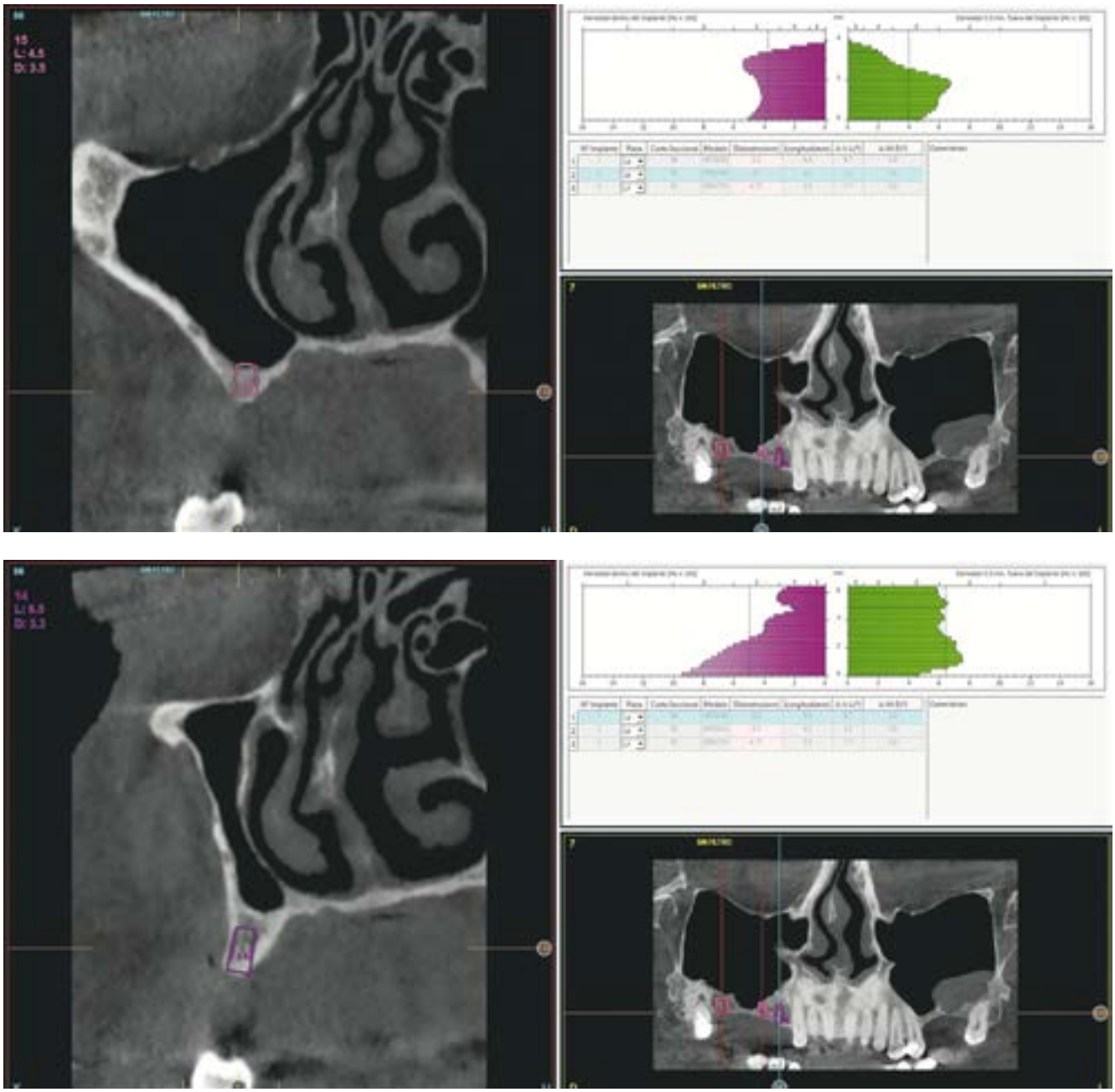
Results

14 patients (all female) were included and 14 implants met the inclusion criteria. The mean age was 63 years (± 3.45). Two patients were smokers. All treatments were performed in two surgical sessions. The diameter of the implants was 3.3 mm in 42.9 % of the cases and 3.5 mm in the rest. In terms of length, the implants placed were 6.5 mm in 14.3 % of the cases and 7.5 mm in the remaining 71.4 %. Graph 1 shows the distribution of the implants included in the study in terms of length and diameter.

The most common location of the implants was the lower first molar (28.6 %), followed by the second upper molar



3 I Initial radiological image of the case. Vertical resorption of the implants in the posterior region of the maxilla can be observed.



4 and 5 I In the planning CBCT, areas of combined atrophy (horizontal and vertical) could be observed. Short and narrow implants were a treatment option in this case.

(14.3 % of the cases). Other positions had a similar frequency as shown in graph 2.

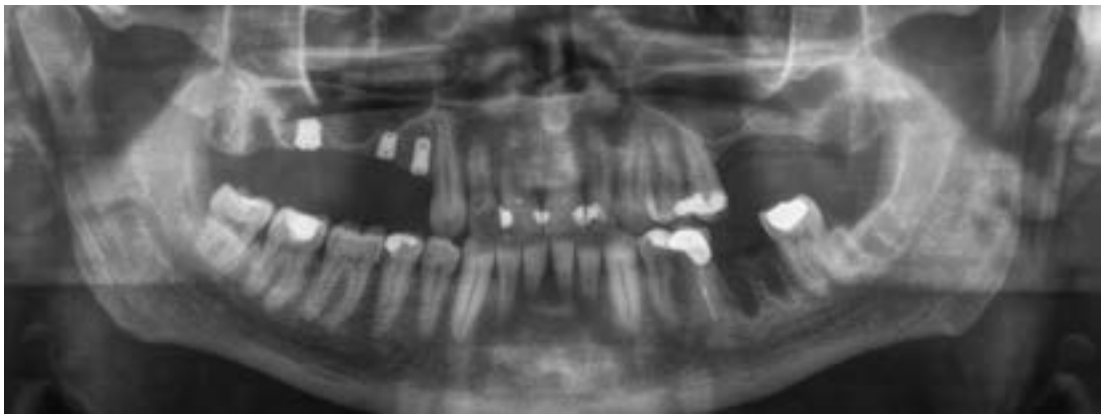
During the follow-up time, none of the implants studied failed. The mean follow-up time was 3.5 years (± 5.2) with a range between 2.5 and 4 years. The mean mesial bone loss was 0.31 mm (± 0.10) and the mean distal bone loss was 0.15 mm (± 0.88 mm). All implants were rehabilitated with screw-retained prostheses using transepithelial and metal-ceramic crowns.

Images 3 to 9 show a case included in the study.

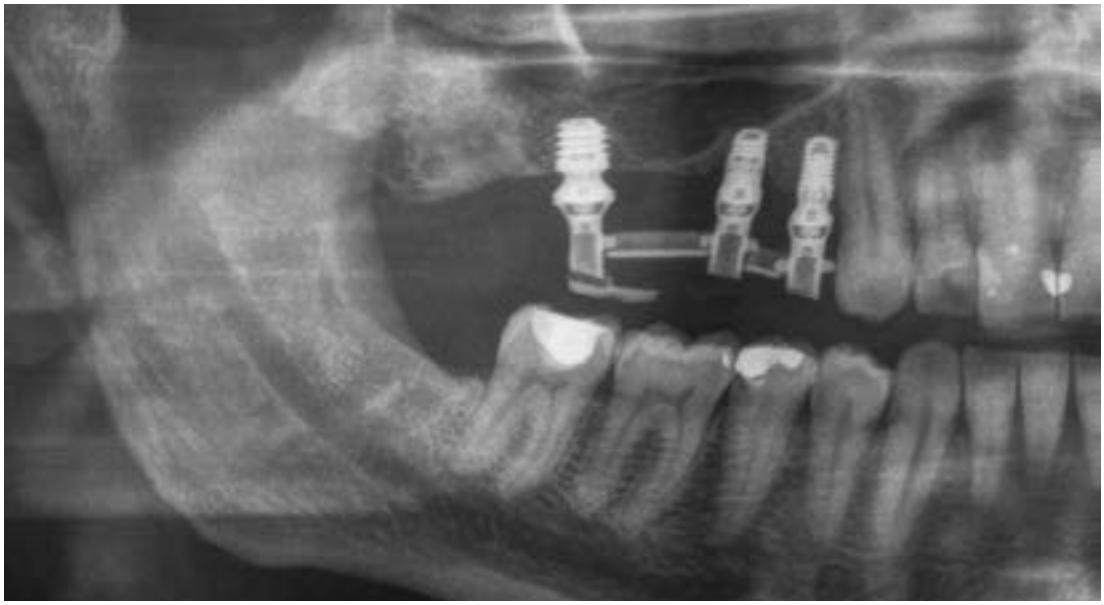
Discussion

In cases of severe vertical mandibular atrophy, where the placement of dental implants is required for the proper functional rehabilitation of the patient, various bone augmentation techniques are used to allow implant placement.

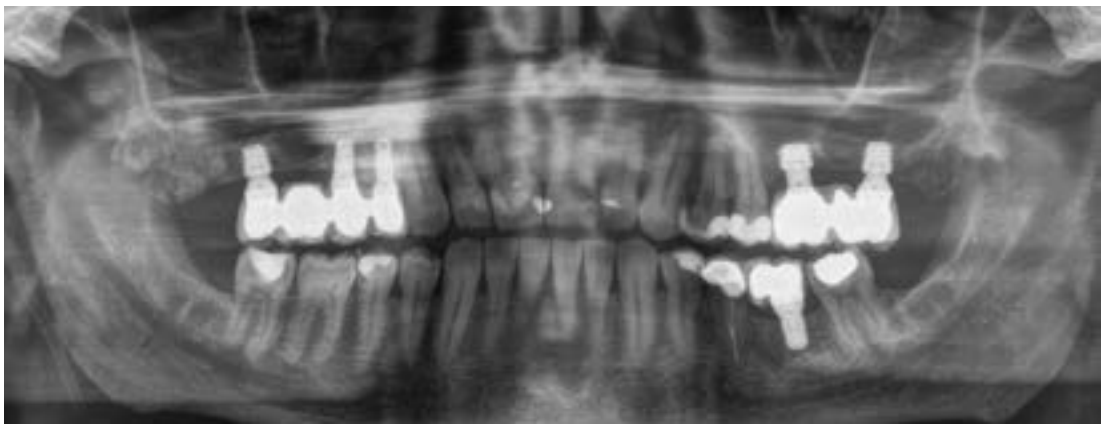
Short and extra-short implants are a safe option for the rehabilitation of the posterior region of the maxilla and mandible as an alternative to more complex bone augmentation techniques with long-term survival rates of over 98 % [13–17]. Even with narrow implants, the survival rate is between 90 and 94 % according to published studies. However, when separated from the expansion and/or regeneration techniques that usually accompany these implants, the survival rate is higher, reaching 100 % in some studies [19–22].



6 I Radiographic image after implant insertion



7 I Radiological image of progressive loading performed five months after implant placement, with structures made with articulated bars



8 I Radiography of the patient after four years of follow-up

As mentioned above, the main advantage of these two groups of implants is that a costly regenerative procedure for the patient can be avoided. Also, it ensures less traumatic surgery and less morbidity for the patients [11].

Conclusion

Short and narrow implants are a minimally invasive alternative for the treatment of combined vertical and horizontal atrophy.

The references are available at www.teamwork-media.de/literatur

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Dental implantology made a strong impression at the International Dental Show (IDS)

Leading dental trade fair places focus on promoting implantology

A total of 23,000 visitors came from 114 countries in September 2021 to the IDS in Cologne, Germany. The first international face-to-face dental event in many months took the visitors a great deal closer to professional normality: informing in detail, seeing innovations, comprehending and deciding about investments – this brought dentists and dental technicians, in particular, up to speed with the main focus of implantology/implant prosthetics.

Conventional augmentation can be improved even further

The proven and innovative solutions presented at the IDS covered the entire range of implantology, beginning with surgical procedures and implants with very different macroscopic geometries, microstructured surfaces and coatings.

Conventional and ostensibly self-evident procedures can be greatly simplified. In bone augmentation, for example, only one instrument is now required instead of two for holding the flap. Previously, it was standard practice to hold the flap at a distance using a retractor and to reposition it again with the aid of tweezers after placing the bone material. The surgeon can now hold the entire flap surface using special tweezers designed by Dr Arnaud Deudon and perform all stages using this instrument alone.

Photo: Koelnmesse / IDS Cologne / Uwe Weiser

Mark Stephen Pace, Chairman of the VDDI (Association of German Dental Manufacturers)

Equipment technology innovations from the field of plasma application appear to be enhancing the osseointegration of implants. The idea behind it: using so-called regenerative plasma activation, as presented at the IDS by companies from different countries, the section of the implant surface that is available for bone-implant contact (BIC) is enlarged and at the same time the hydrophilic property is increased.

Fully digital – this is within reach at the IDS

An important trend is highlighted by increased use of the intraoral scanner. As a result, the following assessment crystallised at the IDS: in five years, this impression option will be the gold standard in implantology. In addition, it is assumed that in ten years implantology will be dominated by fully digital workflows.

For implantological backward planning the information from the intraoral scan is routinely used in conjunction with data from other imaging processes (e.g. X-rays, CT etc.). Furthermore, software engineers in the dental industry link many digital partial workflows with ever-newer interfaces to (complete or almost complete) fully digital workflows.

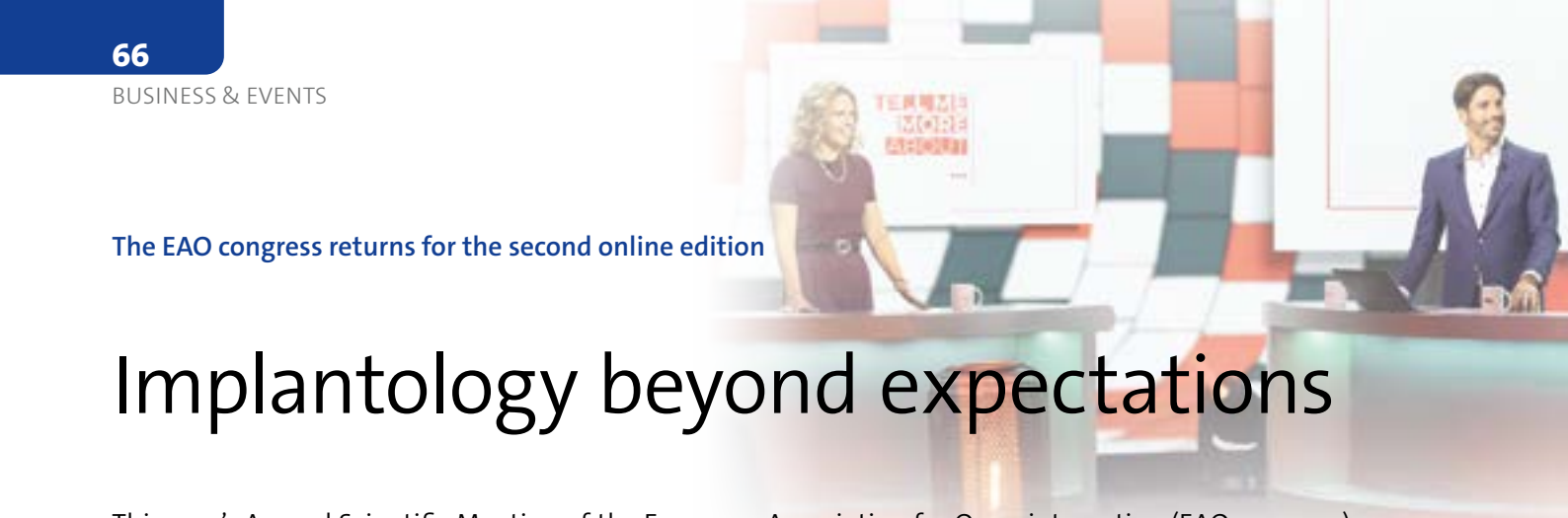
Enhanced luminous reflectance – more room with the angle

In implant prosthetics a new multilayer zirconia with a very high luminous reflectance in the cervical region gives the restorations involved a vital appearance.

An intelligent concept for one-piece CAD/CAM-fabricated implant-prosthetic, single-tooth restorations also caught the eye: the angle of the screw channel to implant position can now be individually selected from 0° to 20°. This allows the optimum occlusal emergence of the screw channel to be achieved, even in clinically difficult and aesthetically demanding situations.

"In general, and specifically in implantology, the IDS 2021 has shown how we can organise a successful world-leading trade fair under the difficult conditions of a pandemic", stressed Mark Stephen Pace, Chairman of the VDDI (Association of German Dental Manufacturers). "This allows us in 2023 to freely build on existing successes and celebrate 100 years of the IDS and take our successes effectively into the future."

Christian Ehrensberger



The EAO congress returns for the second online edition

Implantology beyond expectations

This year's Annual Scientific Meeting of the European Association for Osseointegration (EAO congress), which was scheduled to take place in Milan in Italy, has been transformed into a digital event, owing to the ongoing global COVID-19 pandemic. After the success of its first online event in 2020, the EAO has organized the second edition of its Digital Days, which has been streamed live in October and featured over 30 innovative and interactive shows.

Dr Bjarni Pjetursson, chair of the EAO Digital Days event, said in a press release: "The past months have been very challenging as the world has responded to the COVID-19 pandemic. Despite the challenges, it has also been a period of resilience and innovation." According to the organizer, the online congress "perfectly encapsulated this spirit of innovation and maintains the EAO's longstanding commitment to delivering high-level scientific content and bridging the gap between science and clinical practice".

The second edition of the EAO Digital Days featured a packed online programme of interactive challenges, interviews and Q&As tackling hot topics in implant dentistry. 9 000 registered participants from 145 countries helped make the second edition of the EAO Digital Days another roaring success. Over 70 international experts have been on hand to discuss and debate the most current topics in implant dentistry. The congress team have tapped into the latest technologies to deliver the wow factor that participants expect from the EAO. The programme expanded on last year's format and included even more interactivity.

The event kicked off with an introduction by EAO President Luca Cordaro and Congress Chair Bjarni Pjetursson from the elegant EAO Studio in Paris. They introduced the topic for the evening which was explored across a range of formats featuring world-renowned speakers giving viewers practical tips to improve their daily practice.

A highlight were the "Prime time debates", which showcased more lively discussion amongst leading experts to tackle a controversial topic. Key formats this year included the "Battle of concepts" sessions in which experts went head-

Challenge of the night: Are fixed full arch restorations always an option? Hosted by Helena Francisco (Portugal), speakers: German Gallucci (USA) and João Caramês (Portugal)

Tell me more about: Periodontally compromised patients: when are implants an option? Hosted by Iva Milinkovic (Serbia), speaker: Alberto Fonzar (Italy)

to-head on specific controversial topics defending divergent positions. The practical and informative "Tell me more about" returned this year and featured audience Q & As. The new "Challenge of the night" sessions offered participants the opportunity to vote for those experts presenting the most convincing arguments. "Is it true?" were fact-checking sessions, during which twelve leading experts commented an assumption based on scientific literature and personal experience. Each evening ended with the "Late night show", interviews inspired by American TV talk shows, where world-renowned figure in implant dentistry answered personal and non-scientific questions about their life and career.

The 2021 Digital Days were spearheaded by the Scientific Committee led by Bjarni Pjetursson (chair), Vincent Fehmer, Iva Milinkovic, and Franck Renouard. Thanks to their efforts, the event built upon the foundation of last year's inaugural online event and introduced even more interactivity and audience participation.

The association awarded six prestigious European scientific prizes:

- European Prize for Basic Research in Implant Dentistry
  Awarded to: Ralf Kohal (Germany)
- European Prize for Clinical Research – Surgery
  Awarded to: Rok Gašperšič (Slovenia)
- European Prize for Clinical Research – Prosthetics
  Awarded to: Alfonso Gil (Switzerland)
- European Prize for Clinical Research – Peri-implant Biology
  Awarded to: Nicole Winitsky (Sweden),
- European Prize for Clinical Innovations in Implant Dentistry
  Awarded to: Yue Sun (Switzerland)
- European Prize for Clinical Video on Implant Dentistry
  Awarded to: Ramón Gómez Meda (Spain)

Prime time debate: Periodontally compromised tooth in the aesthetic area: periodontal regeneration or implant therapy? Speakers: Goran Benic (Switzerland), Francesco Cairo (Italy) and Jan Cosyn (Belgium)

Like all EAO events, the Digital Days showcased scientific content of the highest standard and with their top-quality production and presentation, the event was exciting, dynamic, and interactive. Once again, the EAO has delivered on its commitment to sharing cutting-edge and evidence-based research to a global audience.

The next EAO congress will take place in 2022 in Geneva under the Motto: Uniting nations through innovations.

AIO

EAO Digital Days

More information: www.eao.org

Battle of concepts: Adjacent missing teeth in the anterior zone: implants vs traditional restorations. Hosted by Luca Cordaro (Italy), speakers: Oscar González Martín (Spain) and Benedikt Spies (Germany)

Prime time debate: Implants in the aesthetic zone, what is the best timing? Hosted by Stefan Fickl (Germany), Guests: Juan Blanco (Spain), Daniel Buser (Switzerland), and Sven Mühlemann (Switzerland)

Osstem Implant's Central Research Complex, Seoul, South Korea

Osstem Implant

Sustainable growth drivers

Following the firm conviction of its founder, a dentist turned entrepreneur, and its president, who previously managed an implant research and development center, Osstem Implant strategically focuses its resources on research and development activities, investing 11 % of its revenues in these projects.

Osstem Implant's Central Research Complex located in Seoul, South Korea consists of 15 specialized research units and laboratories. These entities develop various dental materials and equipment, including implants, software, digital dentistry, and interiors, and serve as the basis for total solutions needed in the dental office.

Osstem Implant has innovative technologies in fixture design, which enhances the ability for early fixation even in weak bone tissue, and in surface treatment, which results in rapid osseointegration. Osstem's SOI is the world's first dental implant to feature a coating with technologies that enable the fastest coagulation among existing implants. The SOI's surface technology can reduce healing time by more than 35 % compared to other existing implants, increasing the success rate of early-stage osseointegration. Osstem Implant has obtained worldwide patent rights for this proprietary technology.

The quality of Korea-developed implants and bone graft materials is highly evaluated by achieving rigorous and complicated product certification from the European Union, the top-grade recognition from the U.S. Food and Drug Administration, and the certification from the Japanese Ministry of Health, Labour and Welfare.

A recent survey conducted by the Clinical Translational Research Center for Dental Science at Seoul National University Dental Hospital and Osstem Implant showed that the company ranked top in global sales of implants for four consecutive years from 2017 to 2020.

Clinical education, another growth engine of Osstem Implant, was launched in 2001 with the establishment of the Advanced Implant Research and Education Center as an implant clinical education organization and places emphasis both on theory and practical skills. Education courses include theoretical education tailored to each clinical stage and on-the-job training programs such as "hands-on"" and "live surgery" that will be helpful for real-life clinical settings so that trainees – from beginners to skilled practitioners – can grow as clinical professionals.

The "Master Course", in particular, is a premium clinical education program designed to enhance the independent surgical procedure rate of dentists. Systematically composed of entire courses ranging from the Basic of surgery and supplement to Surgery of implant and Prosthodontics of implant, the program covers everything of the implant. As of the end of August this year, more than 98,000 dentists worldwide fulfilled clinical education of Osstem Implant.

In addition, Osstem Implant provides implants as well as dental materials and digital equipment in more than 80 countries with overseas subsidiaries and dealer networks while producing 16.5 million sets annually at its manufacturing facilities in Korea, the United States, and China.

With the goal of growing as the global top dental implant company by 2026, Osstem Implant is exerting all-out efforts in research and development, education, and overseas sales.

More information
www.osstem.de

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CleanImplant Foundation 'Trusted Quality Seal' for the SDS2.2 Implant System

Another ceramic implant with a verified clean surface

For the third time this year, the non-profit CleanImplant Foundation has awarded it's renowned "Trusted Quality Seal" for outstanding surface cleanliness: Swiss Dental Solutions (SDS), a Swiss manufacturer of ceramic implants, received this award for their implant system SDS2.2, successfully passing the independent peer-review standards set forth by the advisory board.

Dr Dirk U. Duddeck, founder and Head of Research of the CleanImplant Foundation, presented the award to founder and CEO of SDS Dr Karl Ulrich Volz at the first Joint Congress for Ceramic Implants (JCCI) in Kreuzlingen, Switzerland, with an international audience of about 300 participants joined live and online. The "Trusted Quality Seal" was created to recognize implant systems with exceptional surface cleanliness*. As the seal builds on documented and clinically relevant data and is thus highly sought after as a qualitative reference, the award is growing in importance for dentists and patients alike. Dr Volz acknowledged: "The CleanImplant Quality Seal is further proof that SDS has reached the highest level of quality in ceramic implant production, as an advocate for biological dentistry".

A current analysis of more than 100 different sterile-packaged implant systems was carried out by the CleanImplant Foundation in close collaboration with the Berlin Charité University Medicine and the Sahlgrenska Academy in Gothenburg. Shockingly, it unveiled that despite sterile packaging, contaminant-free surfaces are not a matter of course. Dr Duddeck found significant quantities of contaminants not only on titanium-made implants but also on the surfaces of ceramic implants caused by the production process. To make matters worse, all implant systems examined had successfully been CE- or FDA-approved.

The "CleanImplant Trusted Quality" award was presented to Dr Ulrich Volz, CEO of SDS, by Dr Dirk Duddeck, Founder and Head of Research of the CleanImplant Foundation, for the SDS2.2 ceramic implant system.

As surface impurities and contaminations are avoidable, the following manufacturers have received the mentioned Trusted Quality Seal for their Clean implant systems: Biotech Dental, bredent medical, BTI, Camlog, Global D, medentis medical, MegaGen, Nobel Biocare, NucleOss, Straumann, Sweden&Martina, Zircon Medical and now SDS, with many others currently in testing procedures. As of 2021, The 'Certified Production Quality' seal is awarded to contract manufacturers for remarkable production excellence. The CeramTec Group first received full Production Quality Certification, with many others currently being assessed.

Now, implantologists and dental clinics can join the CleanImplant Certified Dentist Program, too: "With the certification of dental practices and the Quality Seal for implant systems, we want dentists and patients alike to have more trust in their choice of the right high-quality and contaminant-free implants," declared Dr Duddeck.

* The Scientific Advisory Board of CleanImplant defined the quality guidelines as follows: the implant surface measured from the shoulder to the apex at a 120-degree angle of view should show less than ten foreign particles like remnants of plastic with a measurement of 50 µm at the most (Duddeck DU, Albrektsson T, Wennerberg A, Beuer F. On the Cleanliness of Different Oral Implant Systems: A Pilot Study. J Clin Med. 2019;8(9)). In addition to this, the clinical documentation of the tested implant system must prove a survival rate of at least 95 % over a period of more than two years. The Quality seal is valid for two years and must then be renewed

More information and study results:
www.cleanimplant.org

Stocktaking on the occasion of the BDIZ EDI konkret 25th anniversary

Looking back on 25 years of innovations

Oral implantology has come a long, rocky way, and when its story began is open to speculation. Throughout the ages, a wide variety of attempts have been made to replace tooth loss with implants. To mark its 25th anniversary, EDI Journal's affiliated german publication, BDIZ EDI konkret, looks back at the most important innovations of the past 25 years.

The Maya probably used implantological techniques as early as the 5th to 6th millennium BC. The first attempt to transplant a tooth was apparently achieved by the Briton John Hunter in 1771, when he inserted a freshly extracted human tooth into a cock's comb. As Hunter describes, the tooth is said to have healed in this tissue, which is rich in blood vessels, even with a vascular connection. 30 years later, the results were being questioned.

In 1809, J. Maggiolo started the first serious endosseous, alloplastic implantation attempts. The rapid and successful development of implantology since the first screw implant by Formiggini in 1946 can be seen from the fact that the implant is now the dental restoration of choice for many patients worldwide.

Professor Per-Ingvar Brånemark from Sweden coined the term osseointegration in dental implantology: living bone tissue must firmly grow together with the loaded implant surface without any connective tissue in between. The development of dental implants is based on this principle. In 1952, Brånemark discovered rather by chance that titanium can be integrated into living tissue. In 1965, he performed his first implantation on a human jaw. With this discovery, the metal titanium became the material par excellence in human and dental medicine due to its high biocompatibility and tissue tolerance. Brånemark's story mirrors that of the pioneers in implantology: At the end of the 1960s and beginning of the 1970s, he experienced the same problems as many other inventors and discoverers in the medical field. Swedish dental societies initially refused to recognize Brånemark's research results. It was not until the mid-1970s that osseointegration in dentistry was also recognized by the Swedish health authorities.

Implantology is now an indispensable part of many dental practices and for many dentists it is an innovative discipline in which the end of the line has not yet been reached.

There is no other field of dentistry that is developing as rapidly as implantology. 25 years ago, approximately 380,000 implants were placed per year; today the number is approximately 1.3 million. This course is due on the one hand to the increasing health consciousness of patients, and on the other hand to the improvements in materials and techniques that have emerged particularly in recent years.

The editorial team of BDIZ EDI konkret are taking the 25th anniversary of the specialist magazine for implantology practice as an opportunity to look back on developments in implantology over the past two and a half decades and to name the outstanding innovations.

Shapes and systems

The shapes of implants changed over time: blade, disc, needle, cylinder, coni, cone, hollow cylinder, and screw implants. Today's implants also differ in thread depth, profile, length, width and pitch angle.

At the IDS in Cologne in 2021, Bego presented a new member of the Semados implant family. The Bego Semados S-Implant TG with its much higher machined implant shoulder of 3 mm and the platform switch design is based on the long-standing experience with the S-Implants and had already been used more than 25,000 times in various markets over the past years prior to the presentation in Cologne.

The tapered shape and sharp thread of BioHorizon's Tapered Internal implant family are said to ensure primary stability and maximum bone preservation, as well as good bone and soft tissue attachment. According to the manufacturer, all implants can be placed using the same instrument kit, providing surgical comfort and flexibility for the practitioner.

Straumann's newly developed tissue-level implant system TLX, which is de-

signed for high primary stability, allows immediate restoration concepts to be realized in the posterior region even in difficult cases and avoids bone augmentation. In this regard, the available implant dimensions and the classic design support the implant planning.These new fully conical implants combine proven technology and innovation: they are made of the material Roxolid with the special hydrophilic SLActive implant surface, with the tulip design and the advantages of the BLX implant. Straumann TLX is an implant system optimized for immediate restoration and a well-known solution for all other indications, regardless of the preferred treatment protocol: starting from immediate implant placement up to conventional protocols.

The new Titanbase Vario from Dentaurum Implants enables efficient and flexible working through a new design and is considered an innovative addition to the tioLogic Twinfit implant system. In addition to the abutment switch, the possibility of changing between cone and patform, the different heights and an individually angulable screw channel are easy to realize. The new HLD coating provides a sustainable impression.

The tioLogic Twinfit Titanbasis Vario offers four different lengths and an angled screw channel up to 20° in a single product. With the current design, adhesive cylinder lengths from 3.3 to 7.8 mm are possible in 1.5 mm stages. Shortening is easily done with a cut-off wheel guided by preprepared lines. The pre-formed window can be removed in one step and thus an angulated screw channel can be achieved. All lengths, angulations, and diameters (corresponding to the tioLogic Twinfit abutment lines S, M and L) are available as CAD/CAM files. The dentist can choose between a tapered and a platform version for the Titanbasis Vario. With the tioLogic implant system, there is no need to fix the insertion, as a change is possible at any time. With the Abutment Switch, tioLogic Twinfit can be used for tapered and platform abutments. They remain flexible at all times, even after the implant has been inserted.

Dentaurum has been committed to environmental protection for decades. Dentaurum Implants is also consistently following this path. In addition to resource-saving production and certification in accordance with DIN EN ISO 14001 and EMAS, the reduction of disposable items is an integral part of the concept. Thanks to the innovative HLD coating, it has been possible to make scan abutments and scan caps completely scannable without powder or spray. After use, the parts can be sterilized in the thermal disinfector. The titanium material ensures that the abutments are robust and dimensionally stable. They are therefore durable and environment-friendly altogether.

tioLogic Twinfit Titanbasis Vario has a new design

Straumann's TLX implant is designed for immediate restoration protocols

SIC invent has developed three complementary implant solutions in recent years. According to the Swiss company, SICace is the universal implant with the best long-term clinical results. Based on its design, SICmax is especially suitable for use in soft bone. With their extremely tight implant-abutment connection, SICvantage max and SICvantage tapered set a new safety standard.

Implant surface and osseointegration

The implant surface is considered an important criterion for reliable osseointegration and optimal soft tissue attachment to the implant. The composition, roughness, and topography of the surface of the endosseous implant site play an important role in primary and secondary stability. In recent decades, implant manufacturers have increasingly focused on the optimal implant surface.

B+ is a biological characteristic of MIS implants. This novel monomolecular layer of multi-phosphonates permanently bonded to the implant surface mimics one of the major components of bone, creating a more favorable environment for implant integration and thus effective long-term osseointegration. It also accelerates the healing process, eliminates the microgap between the bone and the implant surface, and strengthens the implant's anchorage in the bone.

Xeal – a tight contact between soft tissue and abutment acts like a barrier protecting the underlying bone.
TiUltra – the ultra-hydrophilic, anodized multi-zone implant surface with gradual topography from the shoulder to the apex.

Nobel Biocare's Xeal and TiUltra are two new surfaces that have been developed using the company's decades of expertise in anodization. The surface chemistry and topography from abutment to implant apex have been redesigned to achieve optimal tissue integration at every level. Xeal is the modern surface technology for mucointegration. Close contact between soft tissue and abutment acts like a barrier, protecting the underlying bone. This is the basis for long-term tissue health and stability. Roughness, porosity and surface chemistry are important factors for tissue integration. Particularly the surface chemistry significantly contributes to improved cell attachment. TiUltra is an ultrahydrophilic, anodized, multi-zone implant surface with gradual topography from the shoulder to the apex. The surface features a gradual change in topography and becomes moderately rough and porous towards the implant apex, thus showing a good tissue integration. The surface chemistry and the hydrophilic characteristics of Xeal and TiUltra are preserved with the help of the protective layer. Thus, it is guaranteed that all implants and abutments are delivered in a high-purity condition.

ICX-Active Liquid developed by medentis medical is a hydrophilic and microstructured implant surface that offers dentists new perspectives. The special micro-roughness of the ICX implant surface is created by high-temperature acid etching. The resulting topography provides an ideal structure for cell attachment. In addition, storage in saline solution generates high hydrophilicity on the ICX-Liquid implants. This combination can shorten the healing time and allow optimized early and immediate loading.

ICX-Active Liquid – an optimized bone-implant contact surface.

Thommen medical's Multiguard Protection Solution has been created by combining innovative design features intended to preserve the mechanical integrity of the implant and to provide optimal biological conditions. The Integuard matrix facilitates optimal bone conditions. Faster osseointegration is enabled by the hydrophilic surface of the tried-and-tested sandblasted and acid-etched implant surface Inicell. The precise Everguard connection with internal hex and stabilization ring ensures the long-term mechanical stability of the implant-abutment connection. The prefabricated Tissueguard implant neck promotes optimal soft tissue conditions and prevents bone loss.

Osstem's implants have been developed according to the latest technologies and enable an early fixation, even in bone tissue with low load-bearing capacity. According to the manufacturer, SOI Implant is the first dental implant with a special surface technology that promotes rapid coagulation. This surface technology can shorten the healing time and thus improve the success of osseointegration in the early stages.

Implant dimensions – is shorter always better?

Short implants are used when bone volume is limited in order to spare the patient a time-consuming and expensive surgical procedure. In the past, they were often associated with a short survival, but recent studies show that the survival and success rates of short implants barely differ from those of standard implants, if at all.

The BTI implant system offers a wide range of solutions for any implantological challenge and claims to be the technological leader in minimally invasive surgery. The short implants allow treatment of tooth gaps with moderate atrophy in a single surgical step, without sinus elevations and risk-free in the mandible despite the proximity to the mandibular nerve.

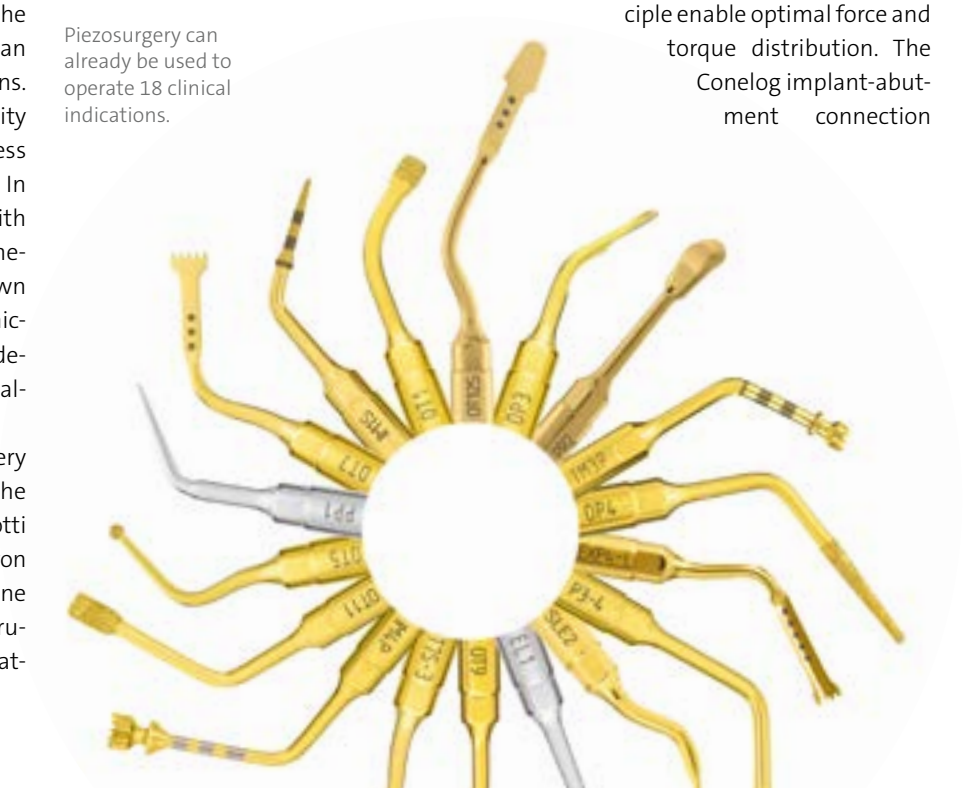
Minimally invasive procedures

Primum nihil nocere (above all, do no harm)! is the supreme commandment of the Hippocratic oath. This principle has long been implemented in dental implantology. In recent years, a variety of methods and surgical techniques have been developed with the aim of achieving an optimal functional and esthetic result as gently and painlessly as possible for the patient.

With the MIMI insertion protocol, Champions Implants is one of the first developers of minimally invasive implantation techniques. The procedure picks the insights of bone physiology, applies them to implantology and does not require any incisions or sutures. Very low-speed drilling is used both in the cortical bone and in the cancellous bone; perforations of the jawbone are therefore impossible.

According to the manufacturer, FairImplant's one-piece implant FairOne is the result of more than ten years of experience and the desire for minimally invasive procedures. The two-piece implant FairTwo was developed in 2009. Since then, all implantological requirements are fulfilled with a single system. FairTwo is the two-piece alternative to FairOne and can be used for a wider range of indications. It has a similarly high primary stability and maximum stability and tightness due to the conical inner connection. In 2015, the series was supplemented with the zirconia implant FairWhite. This one-piece implant offers all the well-known advantages of the FairOne in a ceramic-compatible design if special esthetic demands are required or if complete metal-free treatment is desired.

The story of the original Piezosurgery method took its course back in 1997: the periodontist Professor Tomaso Vercellotti began to work together with the mectron company on the idea of ultrasonic bone surgery. Even then it was clear that a crucial success factor for oral surgical treatment is a procedure that is as minimally invasive as possible, that preserves the surrounding soft tissue and thus enables rapid healing. Vercellotti and mectron saw a solution for this in the use of modulated ultrasonic oscillations. Shortly afterwards, mectron succeeded in building the first prototype and in performing the first extraction treatments. In 2001, the world's first Piezosurgery unit was presented at the International Dental Show (IDS). In 2005, the first implant embedding procedure using Piezosurgery was successfully performed. In the following years, piezoelectric bone surgery becomes a clinical reality worldwide. This procedure not only offers practitioners exceptional intraoperative control, it also reduces the surgical trauma to the surrounding tissue, which thus heals faster than after surgical procedures in which other cutting techniques are used. In 2011, the fourth generation of the Piezosurgery instrument was launched. Another milestone was reached in 2015, when the world's narrowest osteotomy instrument, OT12S, is introduced. In 2019, the REX PiezoImplant, the first implant to be placed exclusively with Piezosurgery, was positioned on the market. The innovative REX PiezoImplant wedge implants are suitable for use in the narrow alveolar ridge. Today, more than 250 scientific and clinical studies prove the positive effects of Piezosurgery.



Piezosurgery can already be used to operate 18 clinical indications.

Implant-abutment connection

In practice, the two-piece or multi-piece implant systems are used more frequently than one-piece implants due to their clinical and dental advantages. When placing two-piece screw-retained implant systems, the peri-implant bone height is influenced by mechanical and microbiological aspects of the implant-abutment connection. Thus, mechanically caused by inaccuracies under masticatory pressure, loosening of the abutment or even fractures may occur. With the introduction of platform switching, abutments with a narrower diameter than that of the implant were used. Thereby, the load on the peri-implant bone is reduced, which leads to less bone resorption.

The implant systems of the Camlog company are well-known for a large number of system components. According to the manufacturer, the tube-in-tube implant-abutment connection is the most important part of the Camlog implant system. Its precision and the special geometric groove-cam principle enable optimal force and torque distribution. The Conelog implant-abutment connection

features a high-precision, deep, conical connection geometry with indexing by three grooves and cams. The system offers excellent stability values, integrated platform switching and supports epicrestal or subcrestal implant placement.

Augmentation and regeneration

Over the past 25 years, a wide range of augmentation procedures have been developed and improved for the treatment of lateral defects or in cases of low bone volume. Today, even in cases of advanced atrophy or defects, patients' requirements to achieve a restitutio ad integrum can be fulfilled with advanced reconstruction techniques. A variety of bone substitute materials support bone regeneration, resorption speed and implant stability.

According to the manufacturer curasan, the β-TCP collagen matrix Cerasorb Foam is an absorbable, osteoconductive and cancellous bone regeneration material made of β-tricalcium phosphate and collagen that was recently recertified with the additional claim for use with antibiotics. The intraoperative combination of Cerasorb Foam with a wide range of commercially available antibiotics provides surgeons with a novel option for filling degenerative and traumatic bone defects. It is also an important milestone in minimizing the risk of reinfection at the wound site.

The manufacturer promises many advantages with the EthOss bone regeneration material. The material consists of 100% synthetic calcium sulfate compounds and thus has no influence from human or animal cells. Therefore, risks of cross-contamination are completely eliminated. EthOss is easy and error-free to mix, as it is applied directly from the mixing syringes. The integrated calcium sulfate compounds give the material its special stability, avoiding soft tissue penetration as well as the additional need for collagen membranes. According to the manufacturer, the material is completely absorbed by the human organism and simultaneously replaced by new, healthy, endogenous bone.

According to the manufacturer, Geistlich Bio-Oss is the world's leading natural bone substitute in regenerative dentistry. The material's osteoconductive properties lead to effective and predictable bone regeneration. Its particles become an integral part of the newly formed scaffold and maintain bone volume in the long term. The additional application of a Geistlich Bio-Gide collagen membrane enables good regeneration in the augmented area. The membrane is naturally resorbable and does not need to be removed in a second operation.

Is there a renaissance of ceramic implants?

Ceramics as an implant material have been rediscovered in recent years. However, the one-piece zirconia implants required the specific experience of immediate restoration, since the one-piece implant body can only maintain a secure osseointegration in a provisional restoration.

bredent medical introduced the whiteSKY zirconium oxide implant system in 2006. Published long-term results prove that whiteSKY zirconium oxide implants can achieve results comparable to titanium implants. The second generation whiteSKY T.L. (Tissue Line) inherits all the advantages of the classic whiteSKY in an improved design. According to bredent, the optimized self-tapping thread reduces the amount of force required for screwing, the surface structure enables the soft tissue to attach, and the rough surface ensures osseointegration.

The metal-free one- and two-piece implants from the Swiss company Swiss Dental Solutions feature the Dynamic Thread, which has proven itself in all bone classes. The upper part of the abutment, the so-called "abutment post", is designed so that one-piece implants can heal very well with a long-term temporary restoration. In the two-piece implant system, both the load-bearing upper implant part and the implant-abutment connection have been designed to be very solid. The connection is not in the implant, but in the lower part of the abutment.

Zircon Medical's Patent Dental Implant System achieves a soft tissue closure that protects the bone and reduces marginal bone loss. The result is a tight closure that supports osseointegration in the early phase of healing and becomes a stable interface between the implant and surrounding bone in the long term. The dense soft tissue closure significantly reduces the depth of periodontal pockets, preventing peri-implantitis in the long term. The firm attachment of the soft tissue to the two-piece patent implant and the resistance of the material to plaque reduces its accumulation and the development of peri-implantitis is prevented. Basically, as Zircon Medical promises, the implant closure protects the underlying bone healing process – to ensure fast and reliable osseointegration in the short term and to prevent peri-implant complications in the long term.

Patent Dental Implant System – The zirconia stabilized with yttrium oxide achieves high strength and optimal surface properties due to the patented manufacturing process.

Digital imaging techniques

Digitization in dentistry enables to plan the implant position precisely in advance. Using a 3D X-ray image, the implant position is precisely determined and recorded in a guide template. The "guided surgery" procedure has proven its worth in dental practice in recent years. Digitalization is not only revolutionizing implant planning, but is also gaining importance in the prosthetic phase. The digital implantological workflow in the dental practice already facilitates new, simplified paths in implant-prosthetic restoration. Digital X-rays are also particularly gentle for the patient: the radiation dose is 80 % lower than with conventional diagnostics.

Dentsply Sirona has over 125 years of experience and has produced many effective and safe procedures in recent years. With the lowest acceptable radiation dose, the imaging solutions promise good diagnostic image quality as well as intuitive and easy operation. The combination of imaging systems and software can be used to support workflows in all dental fields and is governed by three key principles: clinical safety, convenient use, and smart connectivity.

The efficient software solution exoplan is based on the proven software platform of exocad and offers dental laboratories, dentists, implantologists and surgeons maximum flexibility in implant planning as well as in surgical guide design. The smooth digital workflow starting with virtual, prosthetically oriented implant planning with exoplan up to the design of surgical guides with the add-on module Guide Creator is guaranteed by the manufacturer.

The KaVo 3D X-ray/DVT X-ray devices provide dentists with the most detailed information for more accurate diagnostics and more precision in treatment, according to the manufacturer's promise. The devices provide a complete view of facial anatomy from nearly every angle and perspective. The patient is exposed to less radiation.

The intelligent high-tech solutions and algorithms, as well as all dental 3D imaging units by Finnish manufacturer Planmeca, provide a smooth imaging workflow and clear images – at low dose as well. The units are designed to avoid human error in DVT imaging with available options for motion correction, artifact removal and noise reduction.

The Safewater system from Blue Safety secures the dental hygiene concept.

And finally: hygiene in the dental practice

Hygiene is now a matter of course in dental practices. Among other things, there are new requirements for water-carrying systems. The treatment unit should be checked regularly for the microbiological quality of the inflowing water.

The treatment unit is the dentists' No. 1 tool. However, the medical device often cannot be operated unless there are significant legal and infection risks. Blue Safety has been dedicated to the development of (water) hygiene concepts for over eleven years. The Safebottle is the first hygienic, validated reprocessable pressure bottle system made in Germany and thus sets new standards. The specially developed thread closes reliably and simplifies cleaning many times over. With "high-quality materials and an intelligent design," the company aims to achieve a high standard of hygiene and a longer service life. With Safewater, the hygiene technology system, dentists enjoy the protection of their drinking water quality. According to the manufacturer Blue Safety, water germs are reliably eliminated. Existing biofilm is removed with the help of centrally dosed hypochlorous acid and new formation is reduced.

A preview to the next 25 years

The rapid development of the last two and a half decades has led to major innovations in terms of materials and treatment methods in implantology. In the near future, the prevention of implant loss due to peri-implantitis will certainly receive much attention. The implantology of the future will be simpler, faster, safer, less expensive, and minimally invasive. Digitalization and artificial intelligence in implantology are already on the rise and bioengineering and stem cell research on the "regrowing tooth" are already in the starting blocks.

AIO/AWU

Adapting the materials to the tissues they come into contact with

Giving confidence in implantology

Launched in 2000, the Z1 system is the result of 20 years of innovative research in implant restoration. Combining a titanium body and a zirconia collar, the implant offers the advantage of being a tissue level implant as well as using materials optimized for the tissues with which they are in contact.

The tissue level implant requires only one surgery, which saves time for the practitioner and is also more comfortable for the patient. In addition, its transgingival position allows the practitioner to easily see the connection and thus facilitate his work. Moreover, it allows a healing of the soft tissues of first intention as well as a simultaneous healing of the hard and soft tissues, thus saving treatment time and improving final aesthetic. Finally, the absence of mobility between the abutment and the implant at the bone level avoids the bone loss that can be associated with it [1].

Dental implants must integrate with the three surrounding tissues – the bone, the connective tissue, and the epithelial tissue. The main challenge involved with the implant's periodontal integration is the long-term stability of the implant-tissue interface.

The titanium body of the Z1 implant, combined with its sandblasted and etched surface, allows a good integration of the implant into the bone tissue. It also provides good mechanical properties to the implant.

The transgingival zirconia collar protects the bone from bacterial infiltration. Indeed, zirconia reduces bacterial colonization compared to titanium [2]. This is the reason why the zirconia collar can be considered as an antibacterial shield. In addition, the adhesion and proliferation of fibroblasts is improved [3], leading to a strong attachment between the soft tissues and the zirconia collar, ultimately leading to a natural reconstruction of the papillae and thus to an optimal esthetic result. This last item is accentuated by the zirconia color that is similar to the one of natural teeth, which will avoid the grayish coloring of the gingiva so that the final restoration will be close to a natural tooth [4]. ■

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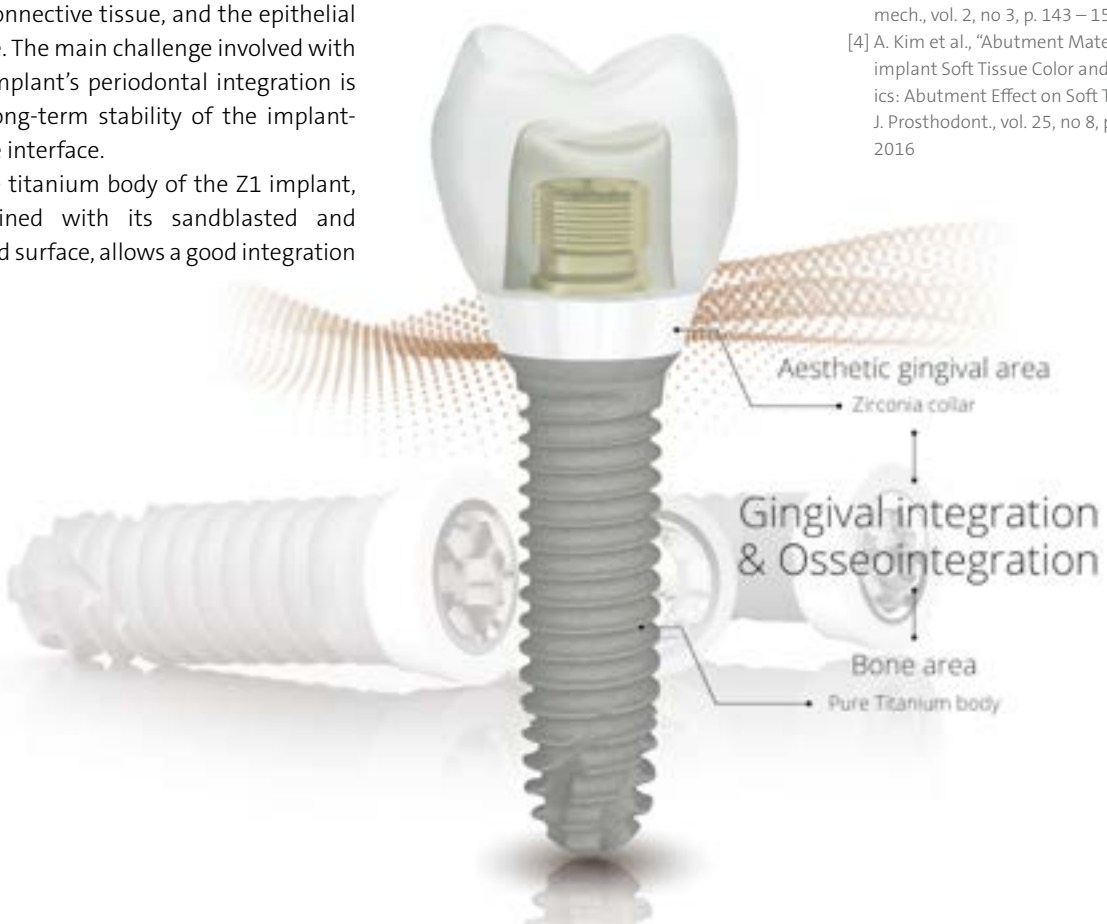


Interview with Dr Peter Schüpbach – a legend in biological imaging

Reflections on bio-integration of a two-piece zirconia implant

Dr Peter Schüpbach spent many years at the Dental Institute of the University of Zurich as a head of a histology group. He is author or co-author of over 130 peer-reviewed publications and 6 book chapters in the fields of cleft lip histopathology, implantology, tissue regeneration, oral microbiology, and general oral pathophysiology. Dr Schüpbach recently closed his lab after 20 years to enjoy his well-deserved retirement. Our editorial team met him to discuss the outcome of one of his most recent animal studies on the bio-integration of a two-piece zirconia implant system.

Dr Schüpbach, you have made a lot of investigations of different implant systems over the years. Which types of implants did you investigate?

Yes, I believe I accumulated around 500,000 histologic micrographs in my archive during my long career. Among them, I studied titanium implants and more recently, also zirconia implants and abutments.

How did the idea to run the study on the Patent Dental Implant System arise?

It all started with two human samples that I was asked to analyze. I performed histology on a retrieved implant that had fractured after trauma. It was fully osseointegrated and had been in function for approximately five months. It looked very good. Then, I prepared a sample where the implant was exposed to human blood for 10 minutes. This reveled that the fibrin mesh of the blood clot (yellow) was attached to the rough implant surface and platelets (green) were activated to release enzymes and growth factors to start the wound healing and bone formation (Fig. 1). In this way, we documented the very early stage and the situation after the complete healing. Then, the question arose, if this very rough zirconia surface is osteoconductive, enabling contact osteogenesis directly on and along the surface, as it is described for the moderately rough titanium surfaces. Based on these results, I was asked to do further investigations.

Dr Schüpbach

You made the study on miniature pigs. Why did you choose them?

Miniature pigs have been shown to have a bone regeneration process that is very similar to humans. It shows more similarities than for example dogs or monkeys that have a significantly faster process.

How was the study designed?

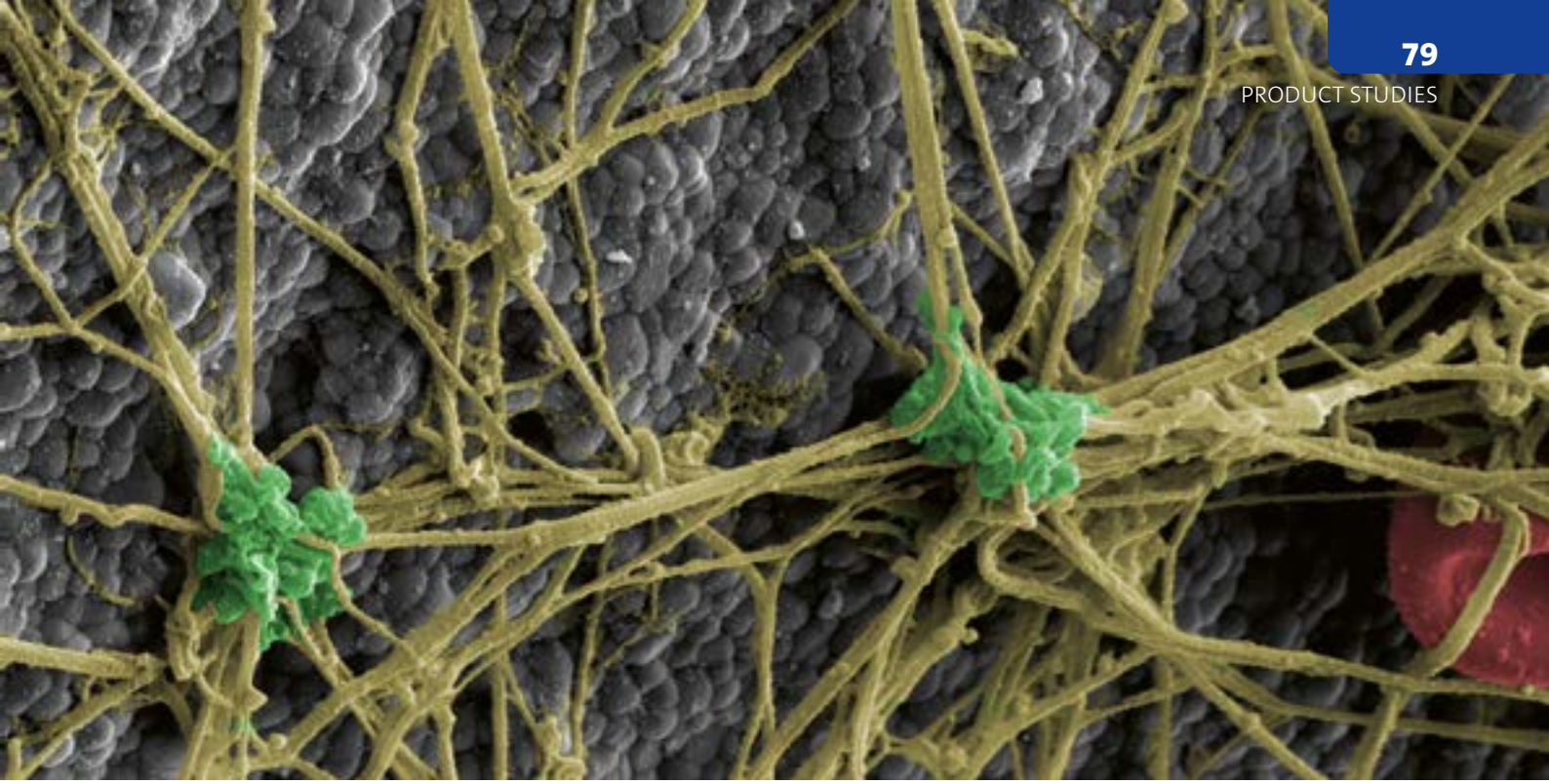
Implants were placed immediately after extraction of three premolars on each side of the mandible. Five Patent Implants and one titanium control implant were placed in each animal and were left for transmucosal healing. The first two animals were sacrificed after four weeks simulating the situation after the healing phase and the other two animals were sacrificed after eight weeks to simulate the situation after the remodeling phase. Histological sections of all the implants were prepared and analyzed by light microscopy.

And what were the major findings?

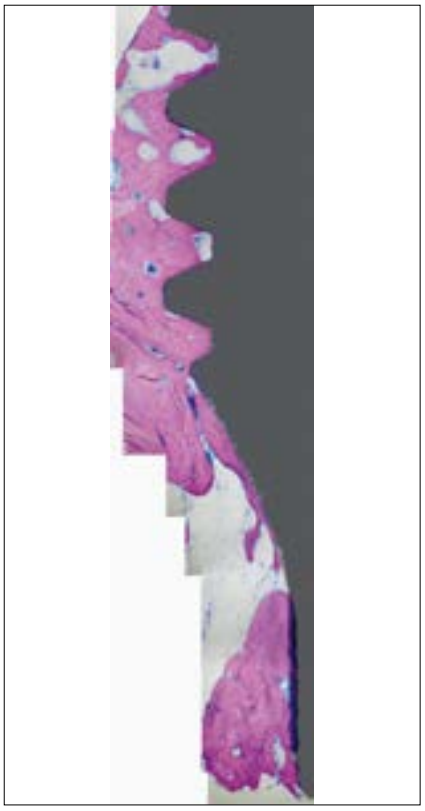
The main objective was to measure the bone to implant contact (BIC). This is a value that indicates how well the implant is osseointegrated at different time points. After four weeks, we noticed that we had very rapid bone formation with 70 % BIC (Fig. 2). After eight weeks, we had over 80 % BIC, which is on par with the most advanced titanium surfaces.

Is there any explanation for this remarkable bone formation?

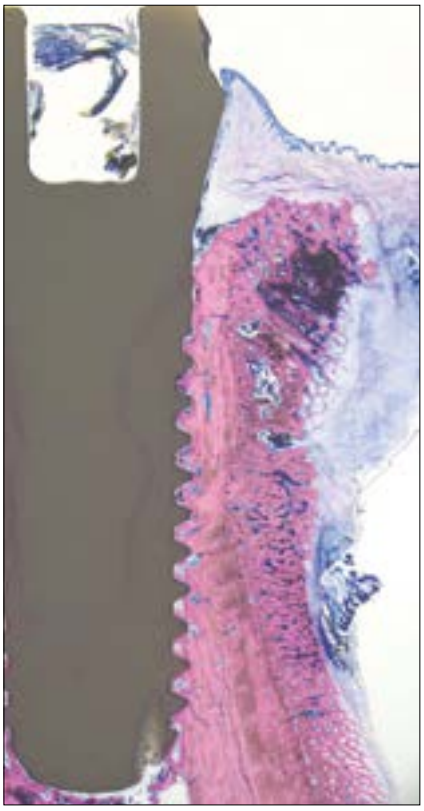
Well, this requires further investigation, but I'll take the liberty of sharing my idea on this. I believe that it is related to the very rough surface of the Patent Implant (Fig. 3). On a microscopic level, the implant surface looks like a sandpaper. When the implant is inserted, bone fragments will be scratched from the bone and be captured on the surface together



1 I Human blood on the Patent Surface – within ten minutes the fibrin network is attached to the surface. This attachment is a prerequisite to contact osteogenesis.



2 I Human histology showing tight bone to implant contact.



4 I Histology showing hard and soft tissue adaptation at four weeks

3 I Patent Implant Surface (magnification 500X)

with blood and bone marrow cells and may serve as a conditioning layer for the bone formation. This, in combination with the hydrophilic and osteoconductive nature of the surface, may be the reason for the rapid bone formation.

What about the periimplant soft tissue?

We observed a very good soft tissue apposition of the soft tissue to the Patent Implants (Fig. 4). We must keep in mind that the minipig model doesn't allow a professional oral hygiene prophylaxis. Thus, we observed quite significant calculus formation on the implant head sticking out of the soft tissue. Interestingly, in many biopsies we found predominantly a mild inflammatory reaction only in the connective tissue, whereas in other biopsies bacteria invaded the space between the implant and junctional epithelium. This was valid for both the test and control implants. The full explanation of this effect will need further investigations.

Finally, what are the next projects you have in mind?

I will no longer actively be doing laboratory work, but my co-worker Bogdana Todorovic will continue this part of my activity. She just opened her own lab and is ready to accept offers to prepare ground sections of biopsies for light microscopy. Her skill is documented in most of my publications during the last ten years. I will support her with the interpretation of the data, meaning we will continue to keep our histology on a very high level.

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*Norton MR, Astrom M. Int J Oral Maxillofac Implants 2020; 35:1099-1111

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Calendar of Events

	Event	Location	Date	Details/Registration
	ITI National Congress 2022	Brazil, Germany and Austria, Italy, North America, Russia, Japan, Southern, Africa, Iberia, Mexico	Please check the registration site for details	iti.org/events/event-search
2/2022	**Academy of Osseointegration Annual Meeting**	San Diego, USA	24 – 26 February 2022	osseo.org/event/2022-ao-annual-meeting/
	17th Expert Symposium	Cologne, Germany	27 February 2022	bdizedi.org/veranstaltungen/
3/2022	**ICOI Winter Implant Symposium**	Atlanta, USA	17 – 19 March 2022	www.icoi.org/events
4/2022	**Euro Implanto 2022**	Nice, France	6 – 8 April 2022	euroimplanto.fr/en/
5/2022	**Mectron Spring Meeting 2022**	Venice, Italy	6 – 7 May	springmeeting2022.com/
	Association of Dental Implantology ADI Team Congress 2022	Manchester, UK	26 – 28 May 2022	www.adi.org.uk/congress22
6/2022	**EuroPerio 10**	Copenhagen, Denmark	15 – 18 June 2022	efp.org/about-europerio

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[2] Hildebrand, H. F., Veron, Chr., Martin, P.: Nickel, chromium, cobalt dental alloys and allergic reactions: an overview. Biomaterials 10, 545-548, (1989)

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1 Cardaropoli, D. et al. IJPRD 2014;34:631-637. (clinical study)