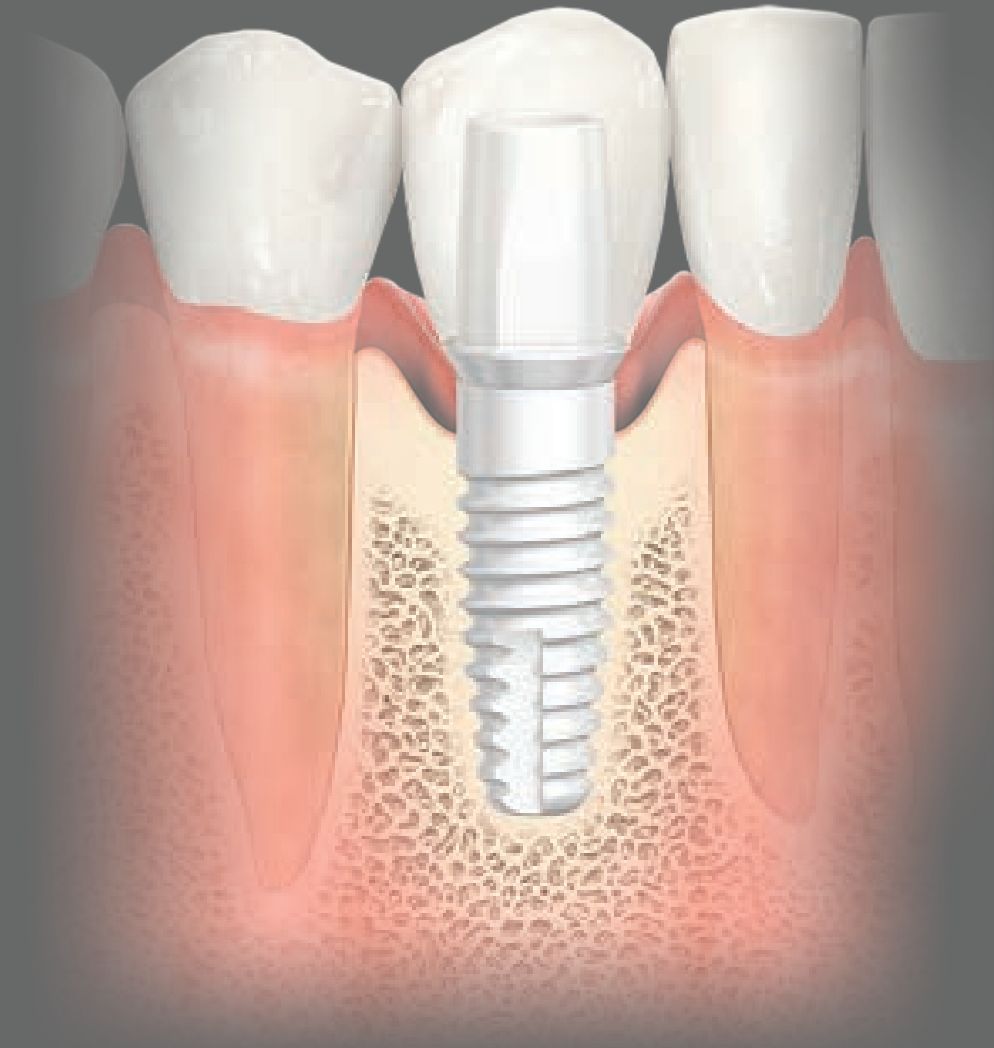


ceramic IMPLANTS

Vol. 14 No. 3 - June 2023



Replacement of a Maxillary First Premolar with a One-piece Zirconia Ceramic Implant: A Clinical Report

Dr. Sammy Noumbissi

Guided Bone Regeneration Associated With A Ceramic Implant In Aesthetic Area With Four-Years Follow-Up. Case Report

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Zirconia Implants And Their Restoration: Esthetic Advantages With Old And New Problems

Dr. Emil L.A. Svoboda

The Quest For Safe And Sterile Implants

An interview with Dr. Dirk Duddeck



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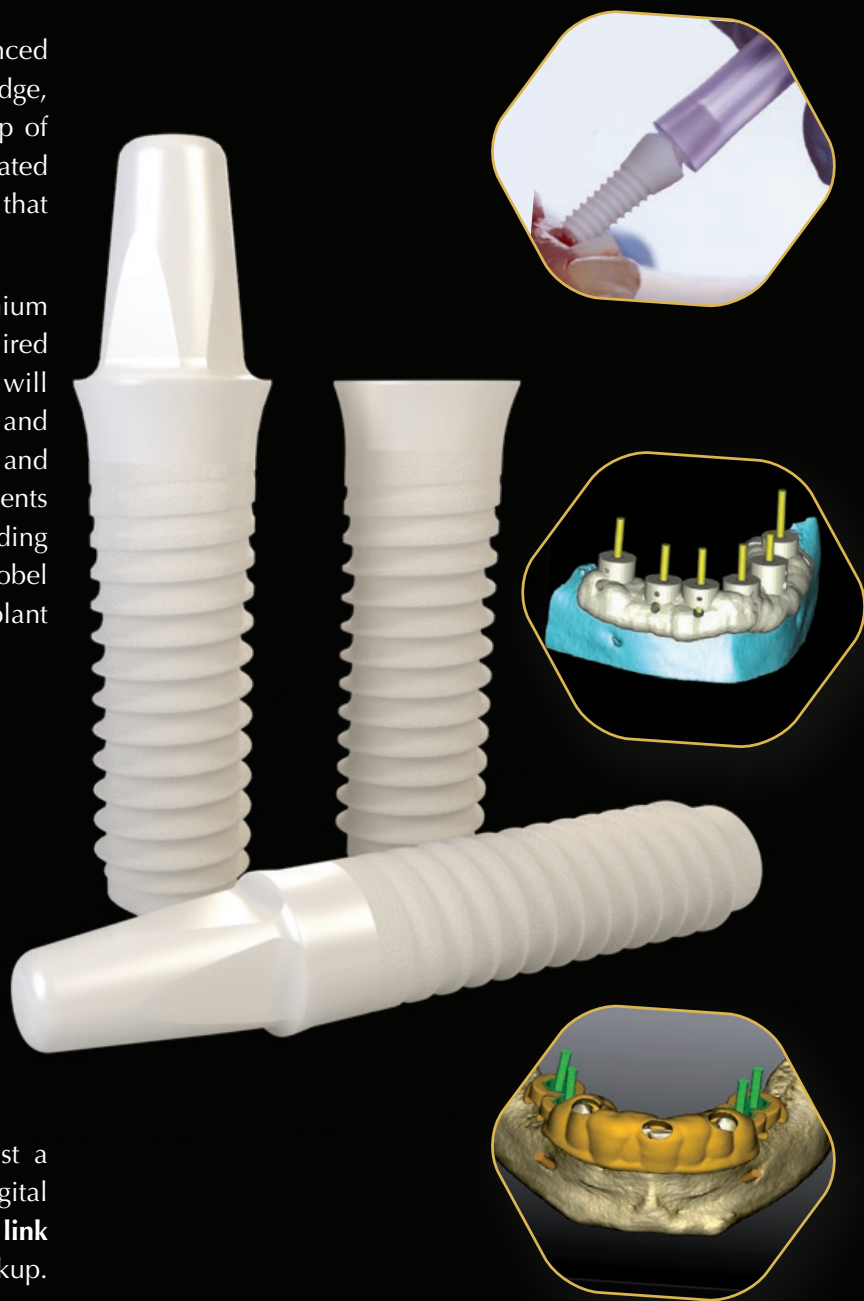
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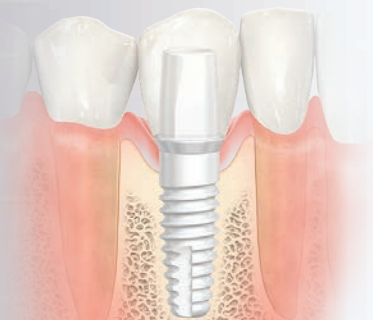
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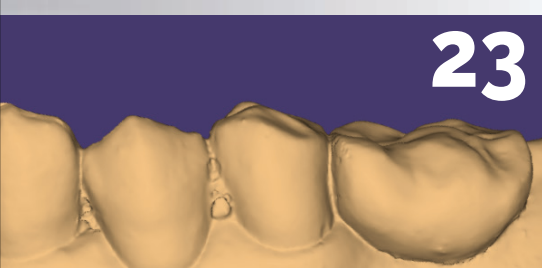
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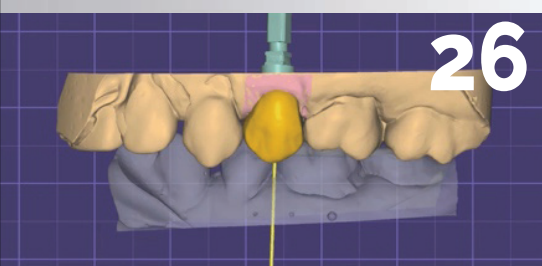
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THE JOURNAL OF CLINICAL & PRACTICAL ORAL IMPLANTOLOGY

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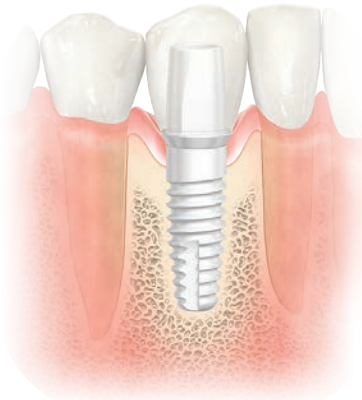
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Ceramic Implants – A Viable and Increasingly Versatile Alternative in Implant Dentistry

Dental implants are now entering their sixth decade since osseointegration was discovered. Since then, development and design of dental implants have evolved and led to the predictability of dental implants in everyday clinical settings so much so that they are widely regarded as one of the optimal teeth replacement solutions. Dental implants have evolved macroscopically, microscopically, even down to the nanoscopic level in their structure and surface characteristics. The materials that have emerged as the most suitable implant materials are mainly metals, more specifically titanium and its alloys.



Starting in the late-nineties, ceramic materials manufacturing have continued to evolve in a significant manner and today we have ceramic composites such as Yttria-Stabilized Tetragonal Zirconia (Y-TZP), Alumina Toughened Zirconia (ATZ) and Zirconia Toughened Alumina (ZTA) which have taken ceramic implants to levels of reliability never observed before. Furthermore, thanks to the inert properties of bioceramics, they do not have chemical breakdown events such as corrosion, they are hypoallergenic, their surface energy allows for minimal plaque adhesion, and they show superior soft tissue attachment and health compared to any other commercially available implant material.

The discovery of metal oxides led to the development of new materials which could transition from metal into inert crystalline form when exposed to oxygen under highly complex industrial protocols losing their metallic properties in the process. In other words, a special group of metals also known as transitional metals were industrially transformed into metal oxides which have a crystalline structure and different chemical and physical properties. What is less known is that right around the same time osseointegration was discovered, studies were conducted with bioceramic materials such as Alumina (Aluminum oxide) and Zirconia (Zirconium di-oxide) and they had to overcome two main challenges in the early stages. First the manufacturing protocols and techniques of the bioceramics and second the resulting physical and mechanical properties of those bioceramics which were developed to function under loads and mechanical stress; thus, their description as load-bearing ceramics.

Alumina and zirconia initially emerged as the two early load-bearing ceramic materials of choice for the manufacturing of metal-free ceramic implants. However, zirconia tends to lose its physical properties in a humid environment and alumina has a low modulus of elasticity therefore it is brittle and prone to mechanical failure. Furthermore, early ceramic implants surfaces were not optimally roughened because the roughening processes available was sandblasting and would induce preload cracks into the ceramic thereby increasing the potential and incidence of fracture once the implants were placed under function. Furthermore smooth surfaces allowed for lower osseointegration levels compared to roughened metal alloy surfaces.

Macroscopically ceramic implants have rapidly evolved from one-piece with shallow rounded threads to two-piece cementable and screw-retained with aggressive thread design for enhanced primary stability. Microscopically by virtue of their composite content load bearing ceramics which have self-repair mechanisms have become far less susceptible to pre- or post-load crack propagation. With regards to their surfaces, they are now being optimized at the nanoscopic level with characteristics specific to soft and hard tissue.

The range of applications of ceramic implants has and continues to expand, less than a decade ago they were mainly indicated for single teeth and for the most part anterior teeth replacement in the aesthetic zone. Today ceramic implants have osseointegration levels comparable to titanium implants, some studies with nanoscopically treated implant surfaces show faster and higher bone-to-implant (BIC) contact.

Ceramics implants have come a long way in terms of applications and versatility, their prosthetic components and options still remain limited therefore a good understanding of the material and their limitations. Modern ceramic implants can now be used in a broad range of clinical situations, from single tooth replacement to full arches and full mouth. Meticulous and thorough planning protocols must be observed for successful rehabilitation with ceramic implants. ■



Sammy Noubissi DDS, MS



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About IAOCI

The International Academy Of Ceramic Implantology is the first professional organization worldwide established around the concept that ceramic dental implants are a viable, safe and predictable option of teeth replacement.

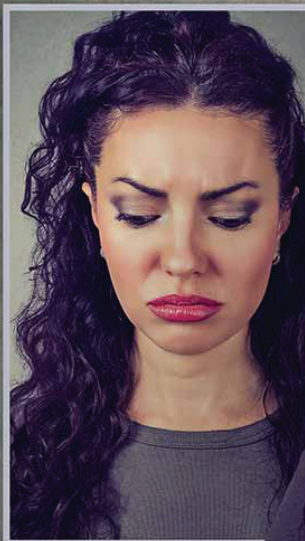
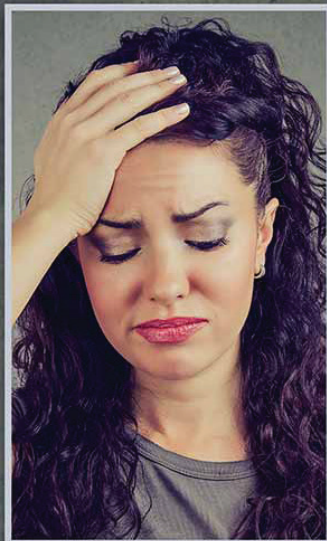
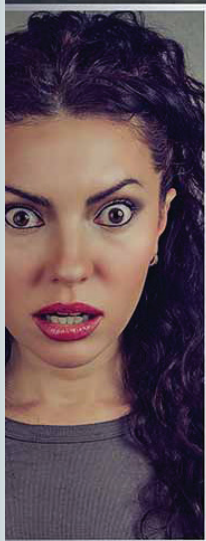
The IAOCI seek to achieve its goals with state of the art education, research and scientific evidence. It regards itself as a comprehensive resource for dental health professionals within which the latest research, innovations, news, and articles on the topics of ceramic implants and dental bioceramics is studied and disseminated. Our educational activities and collaborations serve our mission to educate, support and broaden the reach of metal free implantology.

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Emotion-Led Dentistry: Injecting Life Back Into Practice



In this article, **Nicki Rowland** discusses the importance of building human connections in your dental practice to drive new footfall and business growth. To this end, finding your 'purpose' is vital

Getting back to basics

In this day and age, the world of dentistry is driven by compliance, legislation and technology. Dental teams are fearful of the General Dental Council, the Care Quality Commission (CQC), and other powers that can come crashing down on them at any time. Patients have extremely high expectations that are fuelled by the media and legislative organisations expressing themselves in the public domain. Dental teams are exasperated by systems, technology and the hype for compliance perfection.

I am not saying that governance is a bad thing as it raises standards and provides guidance for best practice. But what about the human element? Where has that gone? The drive to raise governance standards and comply with legislation is detracting from the delivery of care, a genuine connection with the patient

and their fundamental needs. I meet dental teams day in, day out, who are highly frustrated with the current dental climate. They just want to get back to the basics of delivering dignified, respectful dental care in an environment where patients' feelings and emotional requirements are top of the priority list, not compliance.

In many cases, dental teams are so busy that contemplating any change can be daunting. This can be a 'I can't see the wood for the trees' situation. However, there is a way forward and that is to strip everything back to basics and build it from the bottom up. The keyword to the rebirth of your practice is 'purpose'. What is your purpose? What is your practice's purpose? What is your team's purpose? How can we demonstrate our purpose? Read on and you will see how the word 'purpose' is the most powerful spanner in your toolkit.



What is your purpose?

As a practice owner or a dental professional, you know you stand for more than just making money or being compliant. You know that you need a higher order' in your practice, and a greater reason for delivering dentistry. This sounds very evangelistic but as healthcare professionals, we entered the profession to make a difference to our patients' lives. Patients want our brands to stand for more than just making money. They want us to have a purpose.

This means our practices need to have a belief system and ethos that staff adhere to Your team needs to find a greater purpose to guide their decision-making and follow it through to the delivery of care. This may feel like profits are taking a back seat but finding a higher purpose and demonstrating your integrity will ultimately drive footfall and sales in your practice.

Mission	Purpose
What we do	Why we do it
Operating a business	Sharing a dream
Strategic	Cultural
Motivational	Aspirational (true north)
Creates 'buy-in'	Instills 'ownership'
Provides focus	Fuels passion
Building a company	Building a community
Laying bricks	Building cathedrals
Parking cars	Creating happiness

Table 1. Disney's differences between mission and purpose

What is your business's purpose?

Your business purpose is the reason that you set up your practice in the first place. The title of this article is my business's purpose - "Emotion-led dentistry - injecting life back into practice". Essentially, it should be one sentence or phrase that states what you stand for. Think about your purpose as what people say about you and what you wish to be remembered for. It should be transparent, tangible and consistently demonstrated to each patient every time that they visit your practice. Your purpose creates emotional connections with your people, be that with staff, patients or stakeholders.

Mission versus purpose

To understand your business purpose, it is crucial to distinguish it from your vision and mission. Your vision is your destination that is your definition of success. You may envisage your vision in terms of money or by your reputation within the community. Your mission, however, is the journey that you take your team on to achieve your vision Generally speaking your mission is the strategic part of your business and the goals KPIs that you set yourselves. Your purpose is very different for many reasons. It is how you deliver what you saw on the tin' with veracity, emotion and trustworthiness. Table 1 shows the differences between Disney's mission and purpose.

How can you demonstrate your purpose?

I have a 12-point plan that strips the fundamentals of your practice back to basics. This is a purpose-proof recipe that followed methodically, will drive your practice to the destination that you first envisaged:

1. Ink your purpose - sit down as a team and genuinely determine what every individual's

- purpose is and how they fit with your greater business purpose. Every team member needs to buy into your practice's ethos
2. Recruit the right people - make your purpose very clear on all recruitment material. During interview, present applicants with your purpose and ask them how they will contribute to the bigger picture. Likeminded individuals will give you an answer as to how they fit into your culture readily. Those that do not will strupee. This exercise sorts the men from the boys.
 3. When interviewing, always have a personal specification form that you can score applicants against. These forms list the attitudes, attributes and characteristics of an individual that you are looking for. This is not a discriminatory process if it is systematic and scored in the same way for each individual
 4. If you have short-listed applicants, invite them into practice to work for the day. This can be very revealing and disclose how the individuals communicate, integrate and interact with your current team members. It is much easier to appoint someone to the post once you have seen how they integrate into our culture
 5. Induct rigorously - once recruited team members need to have a full understanding of your expectations. This is where your induction and probationary procedure comes into play. Ideally, the induction should run across the whole probationary period (usually three months). Expectations can be system based but also on how you culturally and emotionally deliver your service
 6. Use an inner view - really get to know every member of your team and what makes them tick Make that human connection. An inner view is a list of questions that should be asked in a relaxed environment that allows you to dig deeper and find out what motivates, excites and drives the individual at work and at home It will also help flush out any anxieties or issues that the individual maybe fearful of Only then can you really start to manage and support people gain their commitment and get the best out of them
 7. Appraise your team members - annual appraisals are an obligatory activity within the CQC's remit. However, one to ones across the year maintain opens communication and supports individuals to focus on their own aspirations and the objectives of the practice. An open-door policy is essential to supporting your practice's purpose
 8. Lay down your expectations to patients - any relationship needs to be set on firm foundations and your relationship with your patients is no different. Consistently spell out your practice's purpose in all your practice literature and website and what you expect in return ie publish your zero-tolerance violence and aggression policy and your payment policy
 9. Know your demographic - assess your demographics and ensure that you are promoting your services to the right people with the right needs. For example, if you are located in a university town, you need to be delivering services that meet the need of the student population. Do not always assume that this demographic is short of cash. It is prudent to have a three-tiered pricing structure that caters for all budgets and requirements. Give your patients choice and they will thank you for it
 10. Maintain a human connection with each patient - show each patient that you mean what you say on your promotional material. It is essential to build on the human connection that has drawn them to you in the first place. The customer care experience is vital. "People buy people so you need your best people on reception to create a first and lasting impression. As humans, we want to feel needed, wanted and appreciated and the best way to connect emotionally with patients is to make them feel important Allocate a named person to each new patient who they can call up at any time during working hours. Ideally, this should be the person that spoke to them in the very first instance such as your patient care coordinator or a member of your reception team. These team members should have personal business cards that they hand to their patients. This resture strengthens the human connection by leaving the patient feeling significant and special. Courtesy calling following a dental procedure further cements the bond between the patient and the practice
 11. Get to know your patients - just as you need to be able to relate to each team member you need to be able to connect with each patient. Exceeding patient expectations is the driving force behind word of mouth referrals. More than that, it promotes long-standing relationships and generates repeat business. I am a great advocate of having a treatment coordinator patient care coordinator in your practice. This team member is perfectly positioned to nurture the human element, build a trusting relationship and demonstrate the integrity of your brand
 12. Reward patients for their recommendations when your patients generate word of mouth referrals, reward them for it. This is not blackmail but a sincere demonstration of gratitude for promoting your business on your behalf I would suggest a gift unrelated to your services, eg a gift voucher for a local store

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- Temporize using the three B.S.C techniques

1:00PM – 3:30PM

- Identifying the Three Smile Patterns
- The Ten Artistic & Scientific Principles of Smile Design
- Rate a smile using the Modified Dental Aesthetic Index(MDAI)

DAY 2 — BOND IN YOUR OWN CUSTOMIZED VENEERS

8:30 AM- 12:00PM

- Insertion checklist
- Bond in your own customized veneers

1:00PM – 3:30PM

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- Conclusion Q and A Session

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13. Publish testimonials - as I said above, people sell people and there is no better way of promoting your service than publishing written or video testimonials. There is a psychological concept called the 'we too' effect. People connect with the humanness of a testimonial and usually think 'if its good enough for them then its good enough for me'
14. Introduce corporate social responsibility (CSR) - CSR refers to the efforts made by a company to give back to the community and demonstrate that they operate in an ethical manner. This is so important at a time when dentistry's public persona is viewed very negatively Embrace charitable campaigns such as National Smile Month and Mouth Cancer Action Month and take

your skills out into the greater community. You may even decide to support a local campaign to care for the homeless CSR can cost small amounts in time and money but the return on investment is significant

A New Era

Patients have come to expect dental practices to protect them, whether it is their oral health, privacy, data or safety. They are willing to follow their emotions and complain if necessary. In this new era of authenticity you need to examine what you are doing to protect your patients and deliver your purpose to them. Bring integrity to your service and exceed patients expectations and your business will flourish through powerful testimonials and word-of-mouth referrals.



Nicki Rowland BSc. (Hons)

Nicki Rowland BSc (Hons) holds a diploma in leadership and management and has lived and breathed practice management since opening Perfect 32 Dental Practice in East Yorkshire with her husband in 2005. Over the past 10 years, she has nurtured her team to achieve exemplary standards in both clinical and customer service areas. Nicki has recently set up Practices Made Perfect by Nicki Rowland, primarily as a dental consultancy and training organisation. She is impassioned about sharing her knowledge and enthusiasm with other practices to help them survive and grow. Website: www.pmp-consulting.co.uk

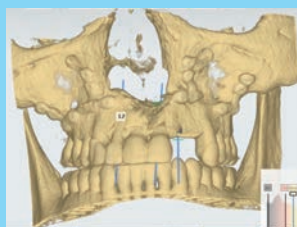
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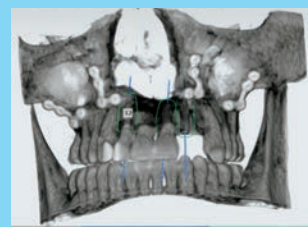
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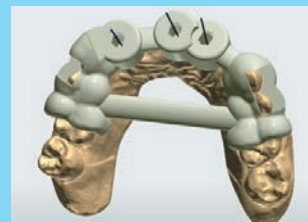
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Replacement Of A Maxillary First Premolar With A One-Piece Zirconia Ceramic Implant: A Clinical Report



SAMMY NOUMBISSI,
DDS, MS

Dr. Noubissi obtained his Doctorate in Dental Surgery from Howard University in Washington DC. He was then selected to attend the prestigious Loma Linda University Graduate Program in Implant Dentistry. There he received three years of formal training in dental implantology which culminated with a certificate in Implant Dentistry and a Master of Science degree in Implant Surgery. He is a researcher, author and has published abstracts and articles on ceramic implants in peer reviewed dental journals. He lectures nationally and internationally and is the current and founding president of the International Academy of Ceramic Implantology which is an independent association and education provider exclusively focused on metal free and ceramic implantology. Dr. Noubissi has been practicing and educating dentists on metal free implantology since 2009. His practice and the academy are both located in Silver Spring, Maryland USA.

Background

Titanium and titanium alloy implants have for five decades been the materials of choice used for the manufacturing of dental implants. Titanium alloys have enjoyed great success and continue to do so thanks to improvements in design and surface treatment technology. However, the popularity of metal alloy implants has come with increased reports of problems ranging from poor aesthetics to soft tissue discoloration, to immune reaction to the implant and their prosthetic parts^{1,2,3}. Implanted orthopedic and dental metal alloys have been reported to result in a range of responses both local and systemic. Observations and reports in implantology have been local soft tissue irritation, osteolysis, aseptic implant failure, skin rashes and even bone necrosis. Many studies that have brought to light the fact that titanium implants can be vulnerable to corrosion attack therefore releasing metal ions and particles in the peri-implant tissues^{4,5}. Daubert et al in a recent study were able to establish the connection between release of metal ions, a rise in inflammatory mediators and peri-implantitis. Such findings have led to an increased use of bioceramics in dentistry and in dental implantology in the last few years. Today there is definitely a paradigm shift in the types of materials used for implantation and restoration of dental implants⁶. Bioceramics and other truly bioinert, biocompatible ceramic composite materials are rapidly replacing metal alloys. As such Yttria-Stabilized Tetragonal Zirconia Polycrystal (Y-TZP), Zirconia Toughened Alumina (ZTA), Alumina Toughened Zirconia (ZTA) among others which have as their main component zirconia (ZrO₂) are fast becoming the material of choice for dental implantation and fixed prosthetics^{7,8}. Their superior biomechanical properties, absence of galvanic activity⁶, low plaque and bacterial accumulation⁹ and resistance to oxidation are additional advantages load-bearing bioceramics have on metal alloys. The clinical case presented here is that of a patient who previously had a few titanium alloy implant placed. One of the titanium implants in the maxilla lost its osseointegration and she expressed the desire to have it replaced with metal free implants and non-metallic prosthetic materials.

Key Words

Zirconia - Implants - Bioceramics – Biocompatibility

Introduction

A 58-year-old female patient presented with a failing implant in the maxilla right. Her implant had been restored and in service for five years. Radiographic and clinical exam were completed; the implant had a type II mobility and the x-rays showed that the implant might have been placed along with an internal elevation of the sinus floor. After discussing treatment options, the patient for removal of the titanium and replace with a ceramic implant. The implant would be placed in a delayed protocol after implant removal and ridge preservation. Upon clinical exam it was also determined that there would be enough occlusal space to safely accommodate the abutment during the time of osseointegration.

Preoperative Considerations

A cone beam computed tomography (CBCT) scan was performed for more accurate evaluation (Fig. 1a,b).

The device used was the Prexion 3D with its planning interface which was used to assess the prospective implant site. It was projected after analysis that the most suitable implant size would be the tissue level one piece 4.0 x 11.5mm Zibone® implant (COHO, Taiwan). Given the size of the tooth (Canine), the 4.1 mm shoulder would allow for a favorable emergence profile of the permanent prosthetics. The implant vertical position was calculated taking into consideration the implant design, manufacturer specifications and the clinical observations. The interocclusal space was 8mm, the abutment height is 5mm and the implant has a smooth collar which is 2.5mm in height.

Once the treatment plan was finalized the patient gave their consent, the implant removal procedure was completed under local anesthesia and the implant socket was grafted with allogenic cortico-cancellous bone. Four months later the patient returned for implant placement; two implants of the same length (11.5mm) but of 3.6 and 4.0mm diameter respectively were ordered. Both implant diameters have the same prosthetic platform diameter (4.1mm) and based on the fact that the implant is tissue level with a 2.5mm height countersinkable collar, this value would be added to the subcrestal length of the implant in order to determine the depth of the osteotomy.



Fig. 1a: Pre-Op Panoramic

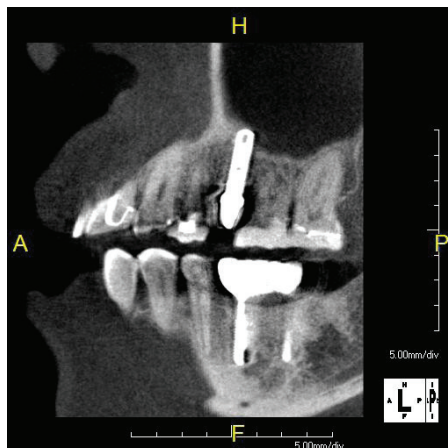


Fig. 1b: Pre-Op 3D Sagittal

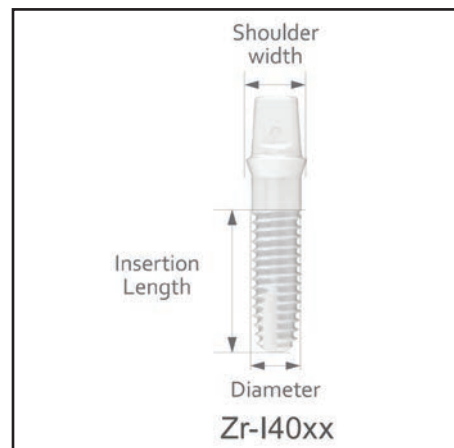


Fig. 2a: Implant: 3.6mm

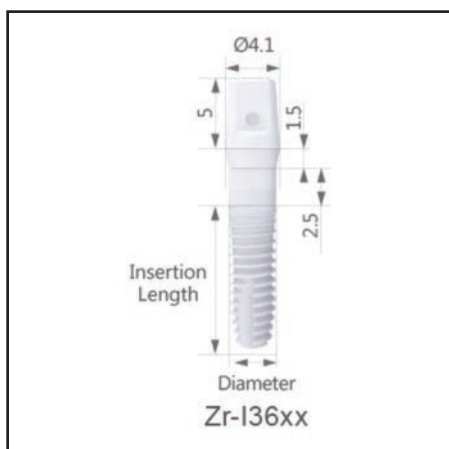


Fig. 2b: Implant: 4.0mm



Fig. 3: Guide pin

Surgical Procedure

The patient presented unpremedicated and the surgery was performed under local anesthesia. Pre-surgical bone sounding of the previously grafted site was done with a periodontal probe; the observed value was approximately 2.8 mm of gingival thickness at the deepest point on the palatal and 2.6mm on the buccal. The osteotomy was performed flapless and freehanded, bone density was subjectively assessed to be type

II-III, and a few particles of the graft material was still identifiable. Zirconia guide pins were placed in the osteotomy after each drill assess and verify the three-dimensional position and the depth of the osteotomy (Fig.3). It had to be kept in mind that the implant was a tissue level implant with a 2.5 mm height soft tissue collar. The implant selected was the 4.0 X 11.5 mm in diameter and was inserted at 25 rpm and with a torque of 35



Fig.4: Flapless Implant placement

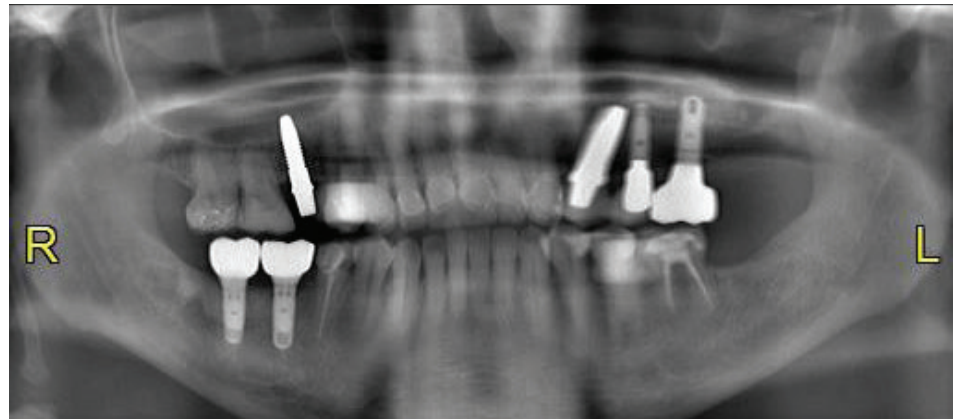


Fig.6a: Post-Implant panoramic

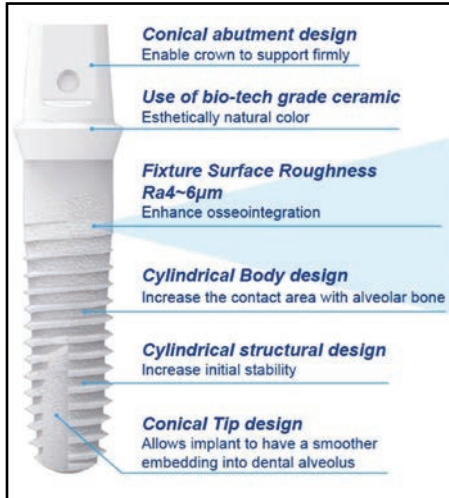


Fig.5: Macroscopic characteristics

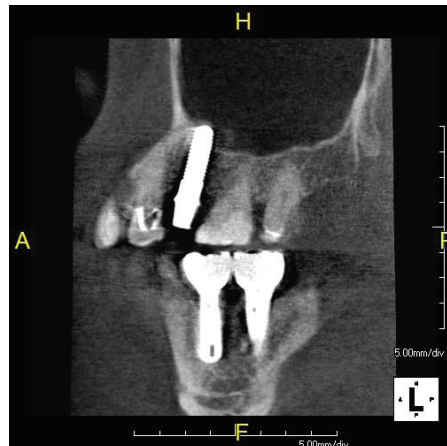


Fig.6b: Post-implants(agittal view)



Fig.7: Periostest

Ncm. The roughened non-threaded portion of the implant (Fig. 4) was countersunk approximately 0.5mm in relation to the buccal soft tissue margin (Fig. 5).

Primary stability was achieved, the implant stability values of the periostest (PTV) (Fig. 7) immediately after placement was measured at $PTV = -3.2$. A post-surgery CBCT was taken to confirm proper implant placement (Fig. 6a,b)



Fig.8a: Soft tissue (4 months)



Fig.8b: Margin exposure

Postoperative Considerations And Prosthetics

The postoperative period was uneventful and without complications. Implant stability was periodically evaluated up until the four-month mark when the patient returned for the prosthetic phase; the implant stability value at four months was assessed and measured at -4.6 . Such a value confirmed that the implant was stable, had osseointegrated and was ready for prosthetic loading.



Fig. 9: Ivoclean



Fig. 10: Zirconia primer

There was excess soft tissue which was removed circumferentially using a diode laser to expose the supragingival prosthetic margin of the implant (Fig. 8a,b).

There was no need to reduce the abutment, a conventional abutment level impression of the implant was made, and the prosthetic requested from the laboratory was a full contour zirconia cementable crown. The zirconia crown was bonded to the abutment by first decontaminating its intaglio and the abutment with Ivoclean (ivoclar Vivadent, Germany) (Fig. 9).



Fig. 11: RMGI cement



Fig. 12a: Decontaminated & primed abutment



Fig. 12b: Crown cemented (5 years)

The decontaminant was rinsed off, priming was done using Z-Prime (BISCO Inc, Schaumburg, IL USA) (Fig. 10) and bonding of the crown to the abutment was done using a resin modified glass ionomer cement (Fig. 11). The patient was satisfied with the aesthetics and function of the implant crown (Fig. 12a,b). ■

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Guided Bone Regeneration Associated With A Ceramic Implant In Aesthetic Area With Four-Years Follow-Up. Case Report

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*Private Practice,
Curitiba, PR, Brazil.*

Introduction

The prerequisites of implant placement are more than just replacing missing teeth or stabilizing dentures. Patients' and experts' demand, particularly in the aesthetic zones, can lead to changes in treatment protocols and choices over implant materials. When compared to conventional implants, zirconia dental implants have emerged as a more aesthetic option because they also present great biocompatibility, high fracture toughness, increased flexural strength, enhanced hardness, lack of metal, and good corrosion resistance. Also, there is reduced bacterial biofilm deposition, which means there are lesser chances of peri-implantitis and bone loss.

In dental implant therapy, it is crucial to obtain an adequate volume of bone and keratinized mucosa to maintain the health of the peri-implant tissues. The guided bone regeneration (GBR) procedure is routinely performed to reestablish missing hard tissue, and to increase bone volume before implant placement. However, there is no clinical study with zirconia dental implants placed in conjunction with GBR reported in the literature.



Figure 1



Figure 2

The aim of this case report was to show some results installing metal-free implant associated with simultaneous GBR in anterior upper jaw.



Figure 3



Figure 4



Figure 5

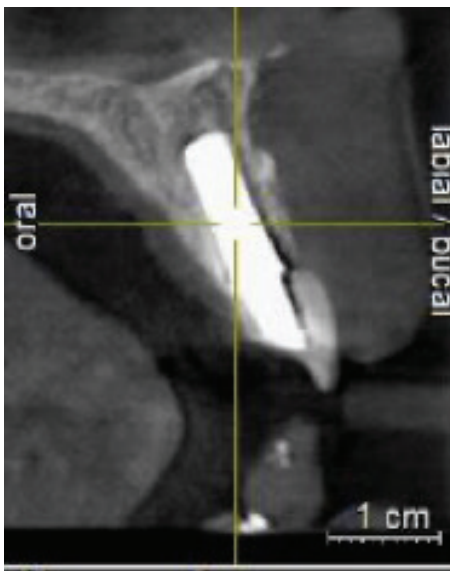


Figure 6a

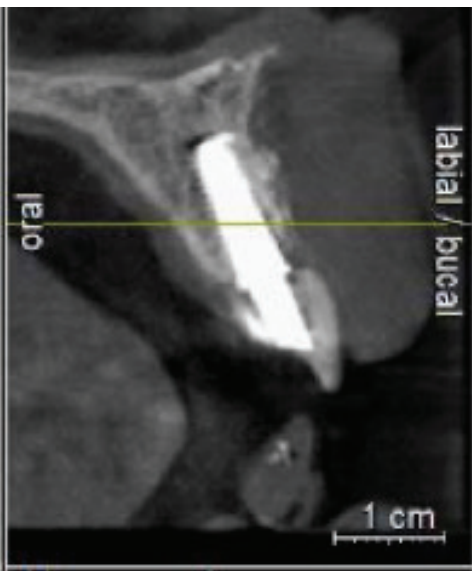


Figure 6b



Figure 7

Clinical Case

A healthy 30-year-old female patient, non-smoker, was involved in an accident that resulted in the traumatization of tooth #9. This trauma resulted in a huge buccal bone loss as well the tooth loss. During the dental examination, it was observed that an absence of keratinized mucosa and a thin gingival phenotype, combined with a buccal bone defect in tooth #9 area (Figure 1).

The treatment plan suggested by the dental team and accepted by the patient consisted of a zirconia dental implant installation associated with simultaneously GBR and provisional restoration. After extra oral asepsis procedure with 2% chlorhexidine soap and mouthrinse with 0.12% chlorhexidine, the infraorbital nerves bilaterally were blocked under local anesthesia with articaine 1:100,000 (Articaina®. DFL®. Rio de Janeiro, Brazil). A mid-crestal incision was made from the region of the distal aspect of the right maxillary central incisor to the distal aspect to the left lateral incisor, with a vertical releasing incision in each extremity, elevating

a full thickness mucoperiosteal flap exposing the bone bed (Figure 2).

The bone drilling was performed according to the manufacturer's instructions, achieving the best three-dimensional implant position. The implant (Pure Ceramic®. Straumann. Basel. Switzerland) 4.1 mm monotype with a 12 mm length and a 5.5 mm transmucosal body was inserted into the surgical site with 15N/cm² torque. After implant installation a great bone defect in the buccal area (Figure 3) was filled in with bovine bone substitute (CeraBone®. Botiss®. Germany) mixed with autogenous bone chips covered by a resorbable collagen membrane (Jason®. Botiss®. Germany) (Figure 4).

The resorbable suture 5-0 was used to stabilize the collagen membrane, followed by an interrupted nylon 5-0 suture, used for primary wound closure (Figure 5). A provisional adhesive crown was splinted to the adjacent teeth, positioned at the buccal aspect of the implant to avoid any implant

load. An implant-supported provisional crown was inserted 90 days after surgery, and soft tissue conditioning was initiated to improve the emergency profile for the final restoration.

A CBCT scan revealed an increased bone volume in the buccal area after one year follow-up (Figure 6a). Twenty-seven months after the surgery the final porcelain crown was delivered and a new CBCT scan revealed a stable bone formation at the buccal aspect of the implant (Figure 6b). A clinical examination didn't notice any signal of peri-implant infection (Figure 7).

Conclusion

This case report showed which is possible to obtain a stable result in the long term by applying GBR combined with ceramic implant placement in an aesthetic area. However, more long-term clinical trials are required to establish any further conclusions. ■

Immediate Molar Replacement with a Two-Piece Zirconia Implant and Glass Fibre Abutment



SAURABH GUPTA
BDS, MDS

Dr. Gupta is an experienced oral and maxillofacial surgeon with a Master's Degree in

Oral & Maxillofacial Surgery. He is the Clinical Director at Digital Dental Design Clinic & DVG's lab, Bangalore, and a visiting senior consultant at Aarogya Dental and Maxillofacial Center, Delhi. Dr. Gupta is highly involved in education and research, serving as the Education Director of the International Academy of Ceramic Implantology and being an active member of various dental organizations. He is particularly focused on metal-free implantology, zirconia implant materials, and digital dentistry. With a strong commitment to advancing dental practices, Dr. Gupta lectures internationally and participates in numerous research projects.

Introduction

Growing health concerns of patients have led to an increasing demand of metal-free restorations. The same is true for dental implants. As dental professionals it is our goal to fulfil this demand of our patients in the most predictable way. When it comes to implant treatments the two most crucial aspects regarding a treatment success are the osseointegration of the implant and the prosthetic workflow. The AWI implant system features a novel zirconia implant design with an innovative prosthetic workflow and soft tissue response.

The following case report shows the replacement of a lower molar using the AWI zirconia implant system.

Case Report

A 34 years old female patient presented at our office, asking for a general restoration of her decayed tooth. As a part of this complex

case the lower left molar was removed and replaced with an implant and zirconia crown. The treatment of this area is the subject of this case report. The #36 was grossly decayed and was planned to be extracted (Fig. 1a&b). The patient was informed about this and was willing to replace her tooth with a metal free implant. It was planned to restore the site with AWI two-piece ceramic implant and a monolithic zirconia crown.

Surgical Phase

Following local anaesthesia, extraction was performed and AWI implant was placed immediately. The drilling protocol for hard bone was used, which includes a cortical drill and a screw tap (Fig.3). The implant was placed and a sufficient primary stability of 30 Ncm was achieved (Fig.4, 5a,5b). Sutures were removed ten days post-surgery. Healing was uneventful.



Figure 1a

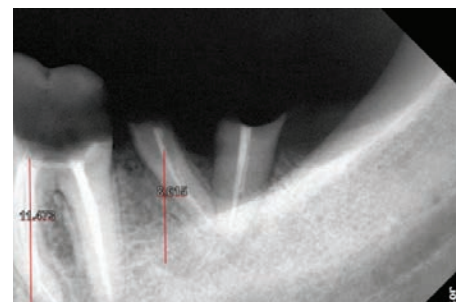


Figure 1b



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Thank you so much.

Dr Don Avidar





Figure 2

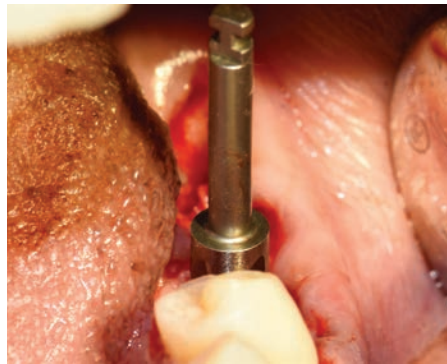


Figure 3



Figure 4

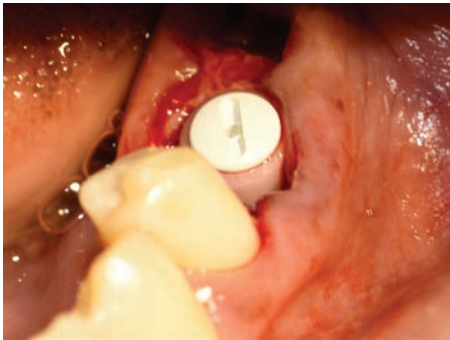


Figure 5a

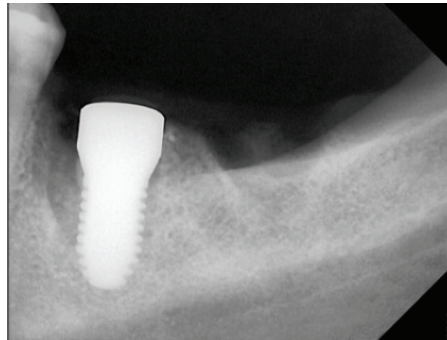


Figure 5b

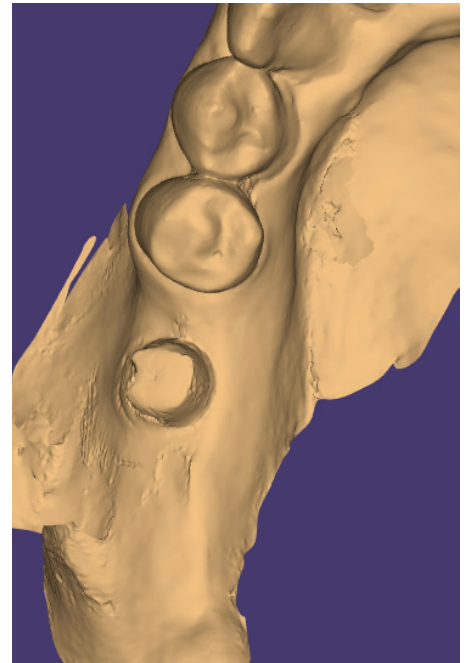


Figure 8a



Figure 6a



Figure 6b

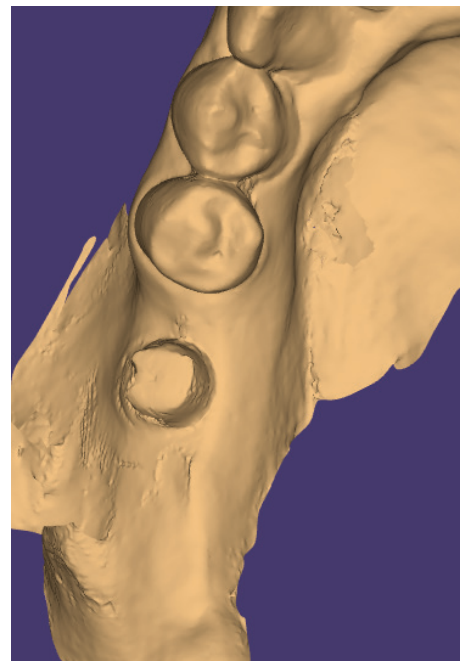


Figure 8b



Figure 6c



Figure 7



Figure 9a

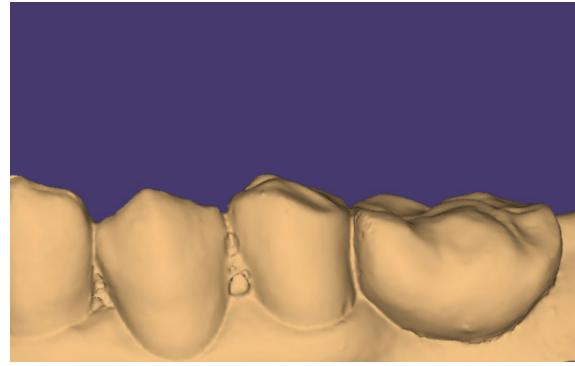


Figure 9b

Prosthetic Phase

The prosthetic phase was commenced four months after the implant placement (Fig.6abc). The cover screw was removed and a glass fibre post and core assembly were adhesively cemented on the zirconia implant (Fig.7). Following this build up, the implant was prepared for a full crown restoration just like a natural tooth (Figs.8a). An intraoral scan was performed and a monolithic zirconia crown was fabricated (Fig.8b). The final restoration was cemented. Fig.9a & b shows the final treatment result.

Clinical outcomes

The result was outstanding with excellent tissue healing, and the patient was highly satisfied. No inflammation or any prosthetic problems occurred during the follow-up time period. The result in this molar replacement case was a 100% metal-free implant and crown.

Conclusion

The AWI dental implant system is designed for a broad range of indications, from single units to multiple units. It performed extremely well in the case presented, with immediate implant placement in the infected socket. The surgical and prosthetic protocols are comparable to those of titanium implants. These are important factors for the successful integration of a new dental implant system in the daily dental practice. Our main reasons for using the AWI dental implant system in the case presented were as follows: –

- AWI dental implant system is designed to support a natural soft-tissue appearance, especially for patients with a thin mucosal biotype.
- Zirconia generally shows lower plaque accumulation and bacterial adhesion than does titanium.
- The surface of these implants is micro-rough and hydrophilic for successful

osseointegration, while the implant collar is partially machined, designed for excellent soft-tissue attachment and a low inflammatory response.

- These implants also provide a mechanical strength advantage. It is made out of Y-TZP zirconia, which yields improved hardness, bending strength and toughness.
- They offer great restorative flexibility owing to its two-piece, cemented internal connection design.
- Conical micro threads in the area of the cortical bone allow a better primary stability and axial loading, and the clinical protocol is comparable to that of titanium implants.
- It is a metal-free solution, as even the screw threads are incorporated on abutment with strong ceramic-to-ceramic connection, which is highly biocompatible. ■



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Immediate Ceramic Implants With Immediate Loading In Posterior Regions: Two Case Reports

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Eduardo José Veras Lourenço

Introduction

The demand for aesthetic and metal-free treatments has been increasing exponentially over the last few years¹. In this context, ceramic implants play a leading role in oral rehabilitation treatments². Yttria-stabilized zirconia (Y-TZP) implants have favorable biomechanical properties, with high resistance to bending and fracture, in addition to an osseointegrative potential, like titanium implants³. It should be noted that the color (white) of the ceramic implants made them even more attractive, avoiding the transparency of the grayish color of titanium, especially in patients with thin gingival biotype⁴. It is worth noting that there are reports in the literature of patients who are allergic to titanium⁵. This study was submitted to the ethics committee of the State University of Rio de Janeiro (UERJ-RJ) and approved under number 5.598.463. The participant was previously invited and informed about the study and signed an informed consent to participate, and all ethical aspects were followed. It's about two patients who received ceramic implants and both attended the dental clinic in search of a metal-free rehabilitative solution, but no allergy to any type of material was reported.

Clinical Cases

Case 1

A 52-year-old male patient with no comorbidities, came to the clinic complaining of pain and mobility in tooth 36. The imaging exam (Cone beam computed tomography CBCT) showed unsatisfactory endodontic treatment, with a periapical lesion associated with the apex of the mesial root (figure #1). Given the clinical and radiographic situation, the proposed treatment consisted of the extraction of the element in question with immediate installation of a zirconia ceramic implant and prosthetic rehabilitation through an immediate provisional crown.

The extraction was performed atraumatically using manual periotomes and forceps and a two-piece ceramic implant (Neodent Zi Ceramic Implant®- Curitiba - Brazil) was placed into the fresh socket 4.3mm x 13 mm (figure #2). The insertion torque was 60 Ncm and this primary stability allowed immediate loading. It should be noted that the installation of the implant was conducted according to manufacturer's recommendations and was placed at the crestal bone level and the fresh socket and

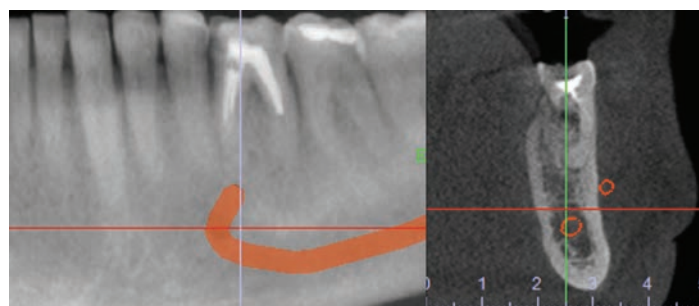


Figure 1



Figure 2



Figure 3



Figure 4

was filled with bone substitute graft material (Straumann® maxresorb® 0.5-1,0mm – 0,5cc)(Figure #3). A stock zirconia abutment 4,5mmx5,0mmX2,5mm (CR Zi Pillar®) was installed and a provisional restoration was made with light-curing composite resin and cemented in CR Zi Pillar® (figure #4). Finally, a final radiographic image of the region was taken (figure #5).

The five-month postoperative period was uneventful and after this period the provisional crown was removed. A closed impression transfer was positioned over the CR Zi Pillar® and to copy the gingival emergence profile, self-polymerizable resin was used. Then, a conventional impression was made with addition silicone with putty and regular body, using the closed tray technique. One lithium disilicate crown (Emax®) was manufactured and cemented onto the prosthetic abutment with adhesive cement (Dual RelyX™ U200 - 3M) (Figure #6).

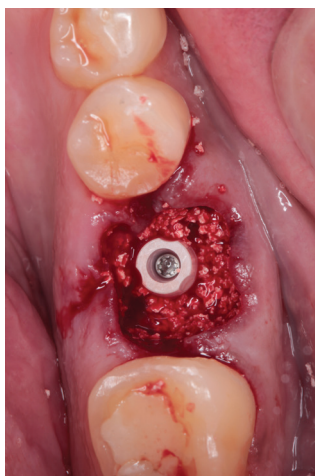


Figure 5



Figure 6

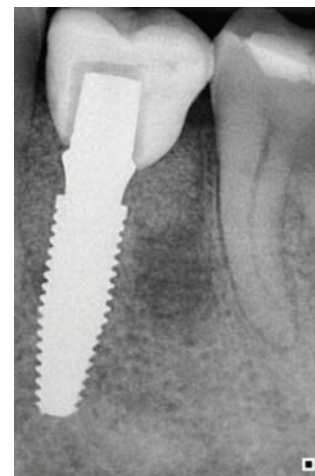


Figure 7

After cementing, a new radiograph was taken, and it is possible to observe the adaptation of the prosthetic work and maintenance of the bone tissue around the implant (figure#7).

Case 2

Female patient, 58 years old, healthy, attended the outpatient clinic due to pain in the region of the upper left first premolar. The clinical examination revealed a fracture extending from the crown to the root of the tooth, which was then confirmed by imaging (CBCT) (figure #8 and #9). Thus, the extraction of the fractured tooth was performed and a two-piece ceramic implant (4.3 x 13 mm Neodent Zi Ceramic Implant® – Curitiba – Brazil) was placed in the fresh alveolus. As in case 1, the implant was installed according to the manufacturer's recommendations and primary stability was achieved (insertion torque was 40 Ncm) allowing the installation of a prosthetic component for cemented

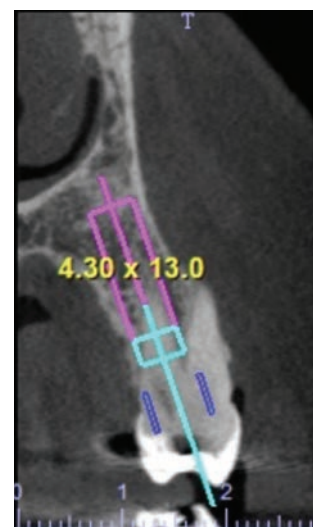


Figure 8



Figure 9

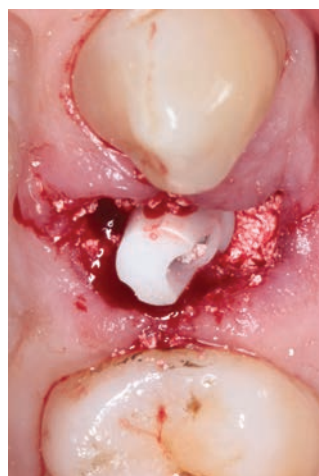


Figure 10

prosthesis with an angulation of 17° was used (CR Zi Pillar® 17°) (picture #10) and making a temporary prosthesis with the buccal face of the patient's own tooth (picture #11). After 4 months the patient returned, and a definitive prosthesis was made using digital work flow



Figure 11



Figure 12

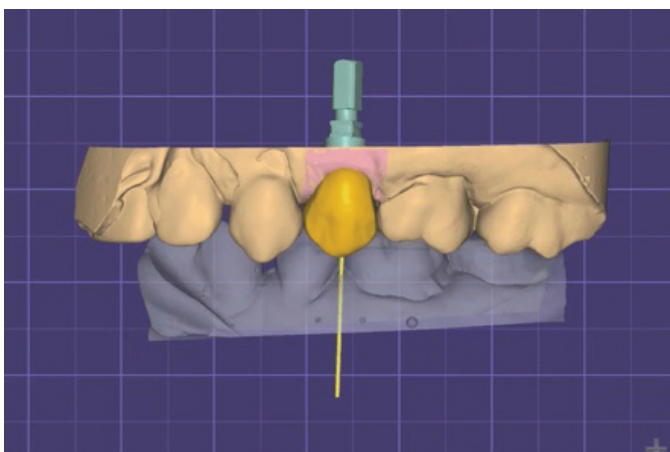


Figure 13



Figure 14

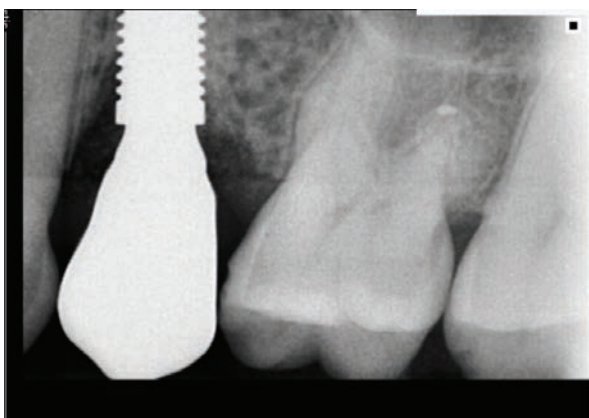


Figure 15

(figure #12 and #13) in monolithic Zirconia (figure #14). After the completion of the case, the patient continued to be followed up and the periapical x-ray shows the stability of the bone tissues after 11 months of follow-up (Figure #15).

Conclusion

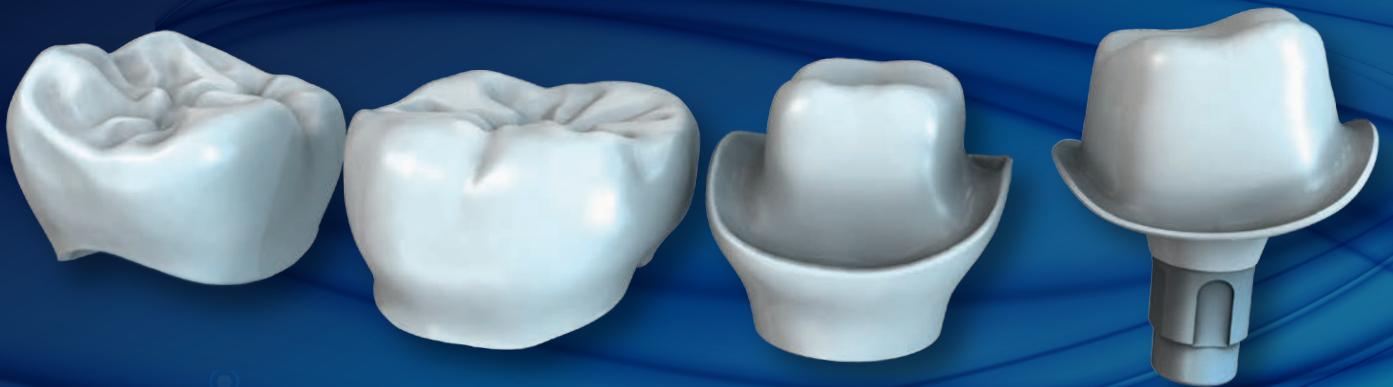
The patients have been periodically followed up over the last eleven months and there have been no complications so far. Two-piece ceramic implants present prosthetic flexibility, however,

rigorous planning must always be carried out in advance. According to the clinical and radiographic results presented in the present case report, this new two-piece zirconia implant presents a favorable performance regarding osseointegration and maintenance of peri-implant health. ■

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Zirconia Implants And Their Restoration: Esthetic Advantages With Old And New Problems



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an Honored Fellow of the AAID and a Diplomate of the ABOI/ID. He has placed and restored thousands of dental implants for over 30 years for his patients and those referred by colleagues. Dr. Svoboda has published and presented widely on his research, and his publications are available for free download at www.ReverseMargin.com.

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Abstract:

Zirconia implants may offer patients aesthetic advantages and a viable treatment for those with confirmed titanium allergies. Their implant and prosthetic options may appear to be rather bulky, due its need for increased thick-ness to enhance resistance to fracture.

In addition, like treatment with titanium implants, the implant industry has not developed an effective strategy for adopting new prosthetic systems that can safely manage the root causes of mechanical problems related to indirect prosthesis manufacture and installation. As a result, implant patients will continue to be exposed to preventable risk fac-tors for complications.

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zirconia dental implants, implant-retained prosthesis, prosthesis retrievability, screw-retained prosthesis, cemented prosthesis, cement-in prosthesis, screw-in prosthesis, misfit joints, poor margins, open margins, subgingival cement.

Zirconia implants have an esthetic advantage over titanium implants because of their colour. Titanium implants are a grey-metal colour that can become exposed and shine through thin overlying gingiva. This grey colour of titanium implants is simply not as esthetic as its whiter zirconia implant counterpart.¹

A problem with zirconia implants is their limited restorative options with fixed prosthetics. One-piece implants with attached retainer extensions and two-piece implant-stock and custom abutment solutions are available. Unfortunately, none of these restorative systems are designed to mitigate the root causes of mechanical problems. They will likely expose patients to peri-implant disease risk factors like misfit parts, open margins, and residual subgingival cement.²

The **one-piece implant** with a prosthetic retainer may be restored with a cement-in prosthesis technique. (Figure 1) The implant retainer and the finish line can be adjusted intra-orally to accommodate the intended prosthesis. This adjustment process may cause structural weaknesses in the implant system and leave zirconia particles¹ and perhaps metal and diamond debris from the drill in the surrounding environment. These debris particles may cause tissue discoloration and inflammatory response to the metal debris.

The adjustment of the zirconia implant is limited. If the implant is placed too deep into the tissues, it may be difficult to safely cement a prosthesis without raising a flap to remove excess cement. This



Figure 1: These are Z-system one-piece and two-piece implant systems. This picture is from the internet.

additional surgical procedure can cause the adjacent tissue to shrink unpredictably.²

The anterior maxilla can be challenging to restore due to the angle of the remaining alveolar bone and adjacent teeth. If the alignment of the placed implant is not ideal, adjusting the retentive element can reduce its dimensions and ability to retain a cemented prosthesis. Making the implant retaining element too short or thin may render the implant useless and require removal. Implant removal can result in difficulty managing the site's damage, making further treatment challenging.

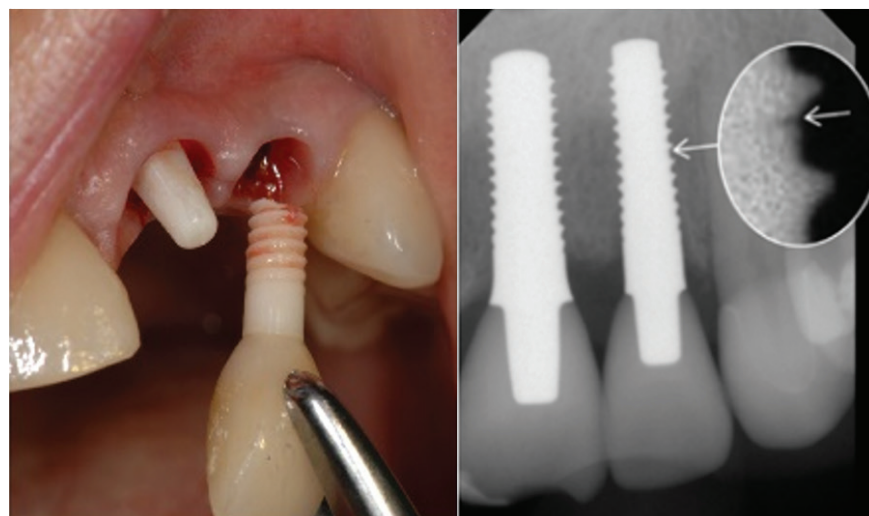


Figure 2: These are pictures of a broken anterior implant. From 7)

The **two-piece implant-abutment configuration** presents the dentist with a few more considerations. (Figure 1) The first challenge will be installing the abutments onto the implant optimally. We already know from the author's research that the **screw-in technique** that includes the abutment-prosthesis complex will likely cause misfit joints.^{2,3,4}

Due to the brittle nature of zirconia, it requires bulk material to make it stronger. Thus dental implants and all

connecting parts must have more material thickness to reduce their risk of breakage. This fact already eliminates some narrow-diameter zirconia implants due to the risk of mechanical failure. (Figures 2,3) Implants may require thinning of implant walls and abutment connector elements to make room for bulky retaining screws. This thinning of zirconia already increases its risk of fracturing prematurely. Installing an abutment in a **misfit** manner can cause unintended stress concentration on the abutment and implant parts. This advent is a recipe for disaster.¹

To optimize the fit of the implant-abutment connections, we must consider installing each abutment individually and then installing the prosthesis by the **cement-in technique**. Why, individually and without the prosthesis attached? When installing an abutment separately, it is free to move and realign with the path of insertion determined by its implant retainer. This is a necessary first step for optimizing the fit of the implant-abutment connection.²

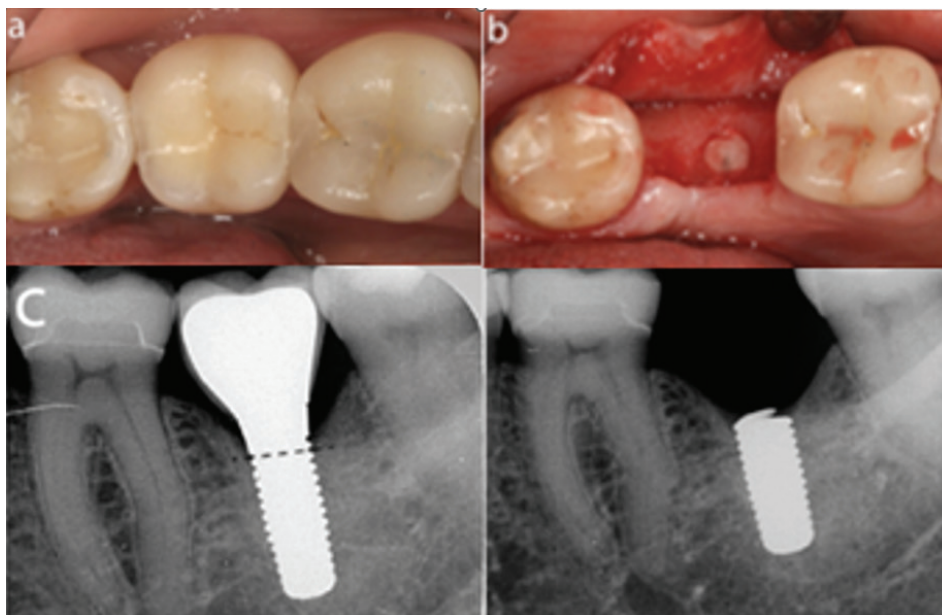


Figure 3: These are pictures of a broken posterior implant. From 7)

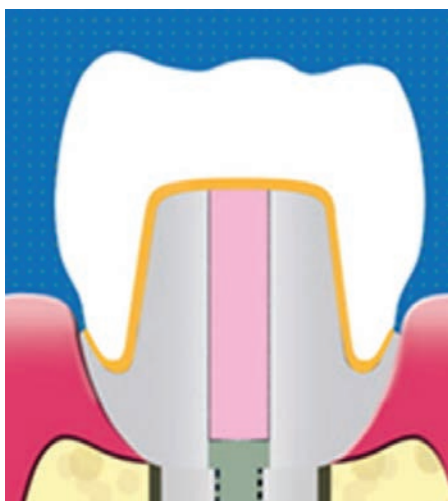


Figure 4: Diagram depicting RMS features: the inflected abutment margin prevents submarginal cement and safely manages expected PDE and ICPOI.

The next challenge will include the installation of the prosthesis onto its abutment retainers by a cement-in technique. Legacy cement-in prosthetic systems, like those with the typical chamfer margin, were never designed to safely manage expected Prosthesis Dimensional Errors (PDE), Incongruent Paths of Insertion (ICPOI), Resistance to Displacement Effects by adjacent tissues and the Gingival Effects. As a result, using legacy abutment and prosthesis designs will ensure complications related to poor margins and residual subgingival cement.^{5,6}

There is a safer intra-oral cementation system that begins by optimizing the implant-



Figure 5: A picture of a hybrid zirconia RMS abutment-crown complex.

abutment connection and can mitigate all the abovementioned root causes of mechanical and related biological complications. The Reverse Margin System is designed to make prosthesis installation safer.² (Figures 4,5)

Unlike titanium implants, there are no long-term studies to evaluate the clinical behavior of zirconia implants.¹ I suspect future long-term studies will show problems with implant and abutment breakage, misfit implant-abutment misfits, open prosthesis margins and subgingival cement.² Indeed, I certainly do not see any logical reason for replacing well-functioning titanium implants with zirconia implants unless there is some confirmation of titanium allergy or esthetic problems causing grief to the patient.

Conclusions

1. Zirconia implants and connecting parts have special considerations due to their brittle nature. Dentists should use additional caution in selecting parts of adequate strength for their treatment endeavours.
2. Dentists should caution patients regarding expected complications and the absence of long-term studies describing their clinical behaviour.
3. Dentists should become more aware of the root causes of mechanical problems related to implant treatment to enable them to make better treatment choices for their patients. ■

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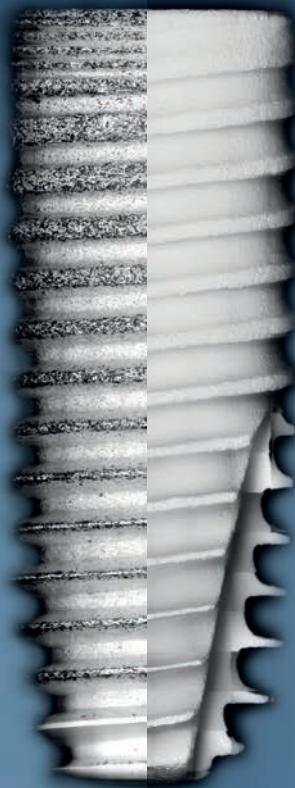


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The Quest For Safe And Sterile Implants

An interview with Dr. Dirk Duddeck, Germany

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Dental implants have revolutionised the way we treat missing or damaged teeth, giving patients a permanent and natural-looking solution. However, reports of substandard and contaminated implants have brought the quality of these devices under intense scrutiny. In this interview, we will be speaking with Dr Dirk Duddeck, the founder of the CleanImplant Foundation, a non-profit organisation dedicated to promoting high-quality, clean and safe dental implants for patients. Through its extensive research and advocacy efforts, the CleanImplant Foundation is leading the charge in ensuring that dental implants are not just safe but also effective in providing the desired results. Lets get a closer look at the work of the CleanImplant Foundation and learn about its efforts in ensuring the highest quality and safety for patients receiving dental implants.

Dr Duddeck, as a non-profit organisation, the Clean- Implant Foundation is dedicated to increasing the safety of medical devices and evaluating the factory cleanliness of dental implants. How many implant systems have you inspected or, to put it more precisely, analysed in the scanning electron microscope (SEM)?

From the inception of quality assessment tests on sterilepackaged implants, we have evaluated the surface cleanliness of over 300 implant systems from approximately 250



Fig. 1: Dr Dirk Duddeck, founder and head of research at the CleanImplant Foundation.



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Fig. 2: Sterile implants mounted on a sample holder waiting for SEM analysis.



Fig. 3: Organic contaminants on the entire implant shoulder – identified as silicone-containing plastic residues (polysiloxanes) byToF-SIMS.

manufacturers. Every two to three years, we undertake a comprehensive study of the implants in the marketplace.

Current batch samples are supplied by manufacturers on request, or if they choose not to participate in the study, the samples are blind purchased.

How can dentists and clinics with a focus on implantology benefit from the work of the CleanImplant Foundation?

On our website (www.cleanimplant.com) dentists can find implant systems that have proven their cleanliness every two years across various batches and have been awarded the Trusted Quality Seal. However, every practitioner can contact us directly. It becomes particularly interesting when colleagues report to us inexplicable early implant failures or peri-implantitis shortly after placement. In these cases, we have found implant samples from the same batch typically demonstrate clinically relevant amounts of plastic particles, residues from manufacturing or packaging, cell-toxic residues of aggressive cleaning substances such as dodecylbenzene sulphonic acid or lubricants such as perfluoropolyether.

How can you identify these contaminants so accurately? The SEM is not suitable for this, right?

Yes, you are correct. We combine two spectrometric methods to analyse unknown substances. In the SEM, we can see where high-carbon particles collect on the implant.

“It becomes particularly interesting when colleagues report to us inexplicable early implant failures or periimplantitis shortly after placement.”

With information about the localisation or accumulation of the foreign particles, subsequent time-offlight secondary ion mass spectrometry can be used to determine the composition of the substances. In several cases, these essential findings enabled manufacturers to eliminate the cause of contamination and deliver residuefree implants after the corresponding quality management improvement.

Do these substances have any effect on healing after the placement of the implant?

It can be assumed that these substances significantly interfere with osseointegration or completely prevent it in contaminated areas. After phagocytosis by macrophages, those contaminants can trigger a storm of pro-inflammatory cytokines, resulting in bone resorption and soft tissue degradation. This year, the CleanImplant Foundation will conduct an elaborate study on this matter with the University of Zurich. Given the increasingly high reported levels of peri-implantitis, it is likely that the effect of

particulate and thin-layered dirt particles on sterile-packaged implants is under-estimated as a contributing factor.

How have companies reacted to your analyses?

Our mandate is to encourage manufacturers and suppliers to engage in a constructive dialogue. Sadly, some companies have not yet cooperated with our efforts, as they have chosen not to believe that foreign particles are clinically relevant, despite evidence to the contrary.

The CleanImplant Foundation will once again be exhibiting at the International Dental Show in Cologne in Germany in March. What can users and manufacturers expect?

At this year's show, we will have an SEM at our booth in collaboration with Thermo Fisher Scientific. Those colleagues who bring sterile-packaged samples of their implant systems of choice for assessment will be able to view the level of surface cleanliness under the SEM. Manufacturers will be shown the nature and scope of our analyses as well as the results from a European-funded project that enables us to count and identify particles using artificial intelligence. On Thursday, 16 March, all manufacturers are invited to the fifth group and expert meeting.

We look forward to sharing insights into the micrometre universe and unknown surface views of implants that colleagues will bring to our IDS booth (hall 14.2, O-042). ■

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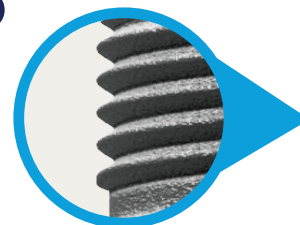
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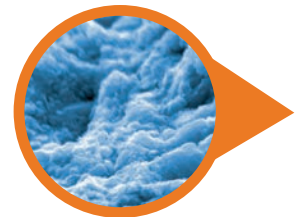
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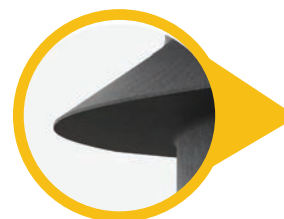
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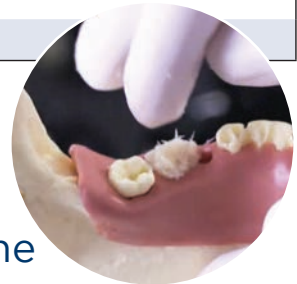
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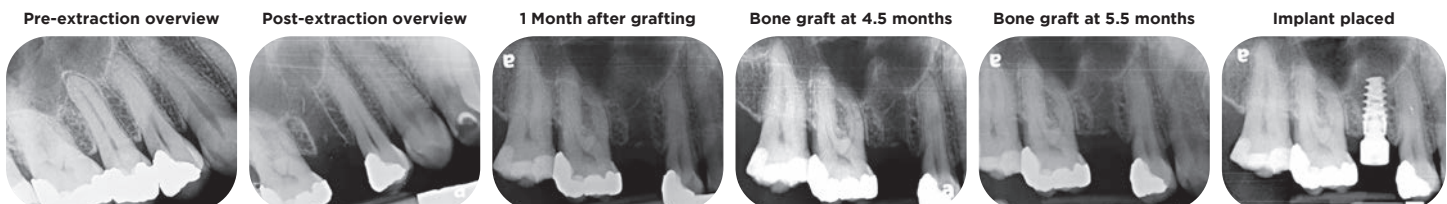


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