Implant Restorations with CEREC

By Dr Simon Chard, United Kingdom

Dental implants are a fantastic addition to the repertoire of any restorative dentist and allow us to provide a tooth replacement in a way that minimises damage to remaining dentition. The restoration of dental implants requires a sound knowledge of restorative dentistry, prosthodontics and periodontology.

Traditionally, this has been carried out with an analogue impression taken with an impression coping either via an open or closed tray impression technique. A skilled technician then fabricates these restorations over a 2- to 3-week period. The time and skill required for these restorations both from the clinician and technician command high fees for the patient.

This case report highlights a novel method of restoring implants utilising the modern advances in digital intraoral scanning and chairside milling. It illustrates how an aesthetic single implant retained crown can be provided chairside without the need for analogue impressions (Figs. 1 & 2: Pre-operative condition).

Following a discussion of the options for replacement of LR6, the patient elected for an implant retained solution. A MegaGen AnyRidge 4 x 10 mm implant was placed utilising a surgical guide for position of the pilot hole. An immediate temporary crown was fabricated using the MegaGen fuse abutment and DMG Luxatemp. A silicone index of the diagnostic wax-up was fabricated and the temporary crown was polished and taken out of occlusion while the implant fully integrated (Fig. 3).

Following 3 months of integration, the patient attended the practice for the restoration of the implant with a definitive crown. During this period, the soft tissue had been given time to mature and a beautiful molar soft tissue profile had formed (Figs. 4 & 5).

Traditionally, capturing the detail of this soft tissue profile with analogue methods is complicated and time consuming; however, utilising a digital intraoral scan (CEREC Omnicam) a “gingival mask scan” can be taken to accurately replicate this soft tissue and use it to guide the subgingival emergence profile of the restoration (Fig. 6).

Following removal of the temporary crown, a TiBase was placed into the fixture head and a scan body used as a reference point for the scanning of the implant (Figs. 7 & 8).

Following digital intraoral scanning (DIOS) of the opposing arch and buccal bite, a digital design was created using the biogeneric individual design mode. In this design mode on the CEREC Omnicam, the software evaluates the other teeth captured in the DIOS and tries to recreate what it believes to be the...
Elasticity and thermal conductivity are key properties of bone and gum, making titanium a suitable material for dental implants. Unlike titanium, zirconia fulfills highly desirable aesthetic and mechanical properties. Zirconium oxide (ZrO₂) is known as the toughest ceramic material, with a modulus of elasticity and thermal conductivity comparable to that of bone and gum. Its surface treatment options are crucial for achieving optimal integration.

ZrO₂ is highly biocompatible and can be used as a dental material in various applications, such as dental restorations, crowns, and bridges. The material's ability to bond directly to tooth structure and its excellent esthetic properties make it a preferred choice in implant dentistry. The restorative approach involves milling from blocks and shaping the material in a dental furnace for precise restoration fitting. The final restoration is then placed in a furnace for 15 minutes to crystalize the ceramic, turning it from purple to tooth-colored.

The restoration is finally torqued down to 25 Nm. Following this, occlusion is checked, and no adjustment is required at this stage. The restoration is then bonded onto the tooth (Figs. 18–21).

In conclusion, as you can see in the final result (Figs. 27–29), an aesthetic, biologically designed, and durable restoration has been fabricated. The patient has been delivered the final restoration in a single visit without the need for traditional analogue impressions.

From titanium to zirconia implants

By Sofia Karapataki, Greece

Zirconium is a metal with the atomic number 40. Zirconium dioxide (ZrO₂) or zirconia is a ceramic material used in dental implants without any metal properties. It is electrochemically inert and exhibits excellent corrosion resistance. Zirconia is the material of choice for new-generation implants. Hashim et al. (2006) made a systematic review and evaluated the current clinical survival and success rates of zirconia ceramic implants after at least one year of functioning. They concluded that in spite of the unavailability of sufficient long-term evidence to justify using zirconia oral implants, zirconia ceramics could potentially be alternative to titanium for non-metallic implant solution. This is also shown in the review made by Cionca et al. (2007), that through is used in vitro and in vivo studies, zirconia has managed to earn its place as a valuable alternative to titanium.

Mechanical and physical properties

Zirconia though, is a totally different material than titanium. The thorough knowledge of implantology using titanium is not so easy to be transferred to zirconia, simply due to different physical and mechanical properties of the materials. Knowledge of the potentials of the material is the key of success and the only chance to minimise failures. Zirconia (ZrO₂) is a highly biocompatible material, but it needs to osseointegrate and withstand masticatory force without fracturing. A good product makes a difference whether zirconia implants to be successfully osseointegrated. Question arises what is the optimal roughness and surface that is produced after it, in order for zirconia implants to be successfully osseointegrated in any of the aforementioned production methods. It seems that the rougher the body, the better the odds for osseointegration. The material's properties are crucial for achieving optimal integration.

In hard machining of fully sintered ZrO₂, no sintering shrinkage is expected and there is no need for a sintering oven. However, micromacroms maybe introduced to achieve diamond-like zirconia as the toughest material existing, only diamond tools are used for cutting sintered zirconia. The grinding of the fully sintered zirconia causes a certain degree of transformation (from tetragonal to monoclinic phase) in the surface of this material. When comparing the final surface of the soft machined ZrO₂ in the hard machined ZrO₂, it is expected that the former will have a more consistent final surface, given that it is left intact (no sandblasting or grinding) after the final sintering.

The implants that are produced need to be roughened in order to be osseointegrated. Questions arises what is the optimal roughness and surface that is produced after it, in order for zirconia implants to be successfully osseointegrated in any of the aforementioned production methods. It seems that the rougher the body, the better the odds for osseointegration. This though should not be the goal for the head of the implant in case that it is visible in the mouth—it could favour bacteria colonization. The best method to achieve the optimal roughness as well as the morphology that should be realized with respect to the material's properties is also not established. Finally, depending on the procedure, the roughened surface needs to be totally clean, free of all foreign bodies.

Ageing of titanium vs zirconia

Aging of titanium implants as a not widely known phenomenon and starts four weeks after their production which decreases dramatically the osseointegration potential 15–18. Ageing of zirconia (Low Temperature Degradation LTD, i.e. slow transformation of the metastable tetragonal crystal to the stable monoclinic structure in the presence of water or water vapour) on the other hand is quite well investigated.
Degradation rates at room or body temperature of Y-TZP ceramics are currently not available, and acceler- ated degradation tests are an approximation (room to 50°C) of the only basis for extrapolating an estimate of the transformation rate and, hence, of the product lifetime. This approach results in a rather low transformation rate and is thus not practical. Unfortunately, such extrapolation could lead to a significant error in estimating retains body temperature in vivo. Still this is the method that is used in vivo, as with a large number of patients examined 36 zirconia implants of four different brands and that this has been done in a non-ideal manner since 2012. They suggested that in vivo studies are needed to investigate the effect of mastication force on the extent of LDD and the influence of surface changes such as the delamination of the grains on surrounding hard- and soft-tissue.

Still a certain degree of transformation from tetragonal to monoclinic phase can actually improve the mechanical properties of Y-TZP. Under stress, i.e. at the tip of a crack, the Y- TZP undergoes a phase transformation from tetragonal to monoclinic phase. This phase transformation results in a 0.3 to 0.4% volumetric expansion inducing a compressive stress in the area of the crack and expansion inducing a compressive stress. As a consequence from titanium knowledge, screwing an abutment made from the same material as the implant was a “natural” step. Screwing though zirconia inside a zirconia unlike titanium, cannot result in a tight connection, because of the stiffness of the material. This loosening could possibly result in fracture and if this happens to the implant, it could jeopardize everything. In case of an abutment failure, one should estimate the consequence of removing the abutment screw.

A recent in vitro study by Preis et al. (2016) to strength the aforementioned performance of different implant-abutment connection, was investigated in six groups of different two-piece zirconia implant systems. In group 1, the abutments were cemented using a carbon fibre reinforced polyetherketone screw on an alumina-toughened zirconia implant. In group 2, the abutments were screwed with a carbon fibre reinforced polyetherketone screw on an alu- mina-toughened zirconia implant. In group 3, the abutments were screwed with tita- nium screws on tetragonal zirconia polycrystal (TZP) and an alumina-toughened standard screw-retained titanium implant served as the control. The bonded zirconia system and the titanium refer- ence survived without any failures. Screw-retained zirconia systems showed fractures of abutments and/or implants, partly combined with screw fracture/loosening failures concerning the abutment/implant region around the screw. Indicate that the connecting design is crucial for clinical success.

Additionally, a study by Neumann et al. (2014) compared the fracture resistance of abutment retention screws made of titanium, poly- etherketone (PEEK) and 30 per cent carbon fibre-reinforced PEEK. Using an external hexagonal im- plant/VITA-type abutment interface or one internal socket of zirconia implants. Two-piece temper- ate abutments were fixed to implants using screw-retained screws (group 1), polyetherketone screws (group 2), and 30 per cent carbon fibre- reinforced PEEK screws. They found that the titanium screws had higher fracture resistance, compared with PEEK and 30 per cent carbon fibre- reinforced PEEK screws.

Screwing abutments can be the trend, but cementation on the other hand could be a simpler and less time-consuming procedure as it is also shown in the study by Brüll et al. (2014). It is closer to the den- tist’s basic education, resembles the procedure of cementing a post in natural endodontically treated teeth and requires no extra instruments. A combination of both screwing and cementing though, could make the procedure more complicated. More studies are required to determine the proper abutment material, cementation method and procedure.

Implant-abutment connection
Connection of the abutment with the implant is performed by three ways: either by screwing, cementing, or even as a combination of both. When screwing, the material of the abutment and the connecting screw is of crucial importance for the implant to be intact. As a consequence from titanium knowledge, screwing an abutment made from the same material as the implant was a “natural” step. Screwing though zirconia inside a zirconia unlike titanium, cannot result in a tight connection, because of the stiffness of the material. This loosening could possibly result in fracture and if this happens to the implant, it could jeopardize everything. In case of an abutment failure, one should estimate the consequence of removing the abutment screw.

One- vs two-piece zirconia implants
Zirconia appears in two varieties, one-piece implants and two-piece implants. These implants offer the absence of a microgap between implant and abutment which seems to be bene- fit. The surgical placement of the im- plant though may not always meet the prosthetic requirements and angled abutments in order to cor- rect anatomic or functional impairment is not common. Secondary corrections of the shape by grinding must be avoided, as this seems to affect the fracture strength of zirconia. Protection by use of splints is also required, though not always possible. So, two-piece implants were designed. Designing a zirconia abutment could be of benefit, since the implant should be based on material properties and should sim- plify surgical and prosthetic steps for the doctor. Size limitations should be considered, in order to produce an implant that is not prone to frac- ture. A clinical study by Cahal et al. (2011) showed a marked tendency of one-piece implants with a narrow diameter (4.5 mm) to fracture, with a percentage that reached 92% of the fractured implants. Threads and shape of implants should be designed according to the need, al- lowing the design of the implant to be adapted for the individual patient.

One-piece implants have a solid connection to the zirconia abutment and the implant to be intact. As a consequence from titanium knowledge, screwing an abutment made from the same material as the implant was a “natural” step. Screwing though zirconia inside a zirconia unlike titanium, cannot result in a tight connection, because of the stiffness of the material. This loosening could possibly result in fracture and if this happens to the implant, it could jeopardize everything. In case of an abutment failure, one should estimate the consequence of removing the abutment screw.

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The restorations materials that will be used together with their limitations should be studied.

Mostly fixed prosthetics on single crowns or small bridges have been presented. The fracture resistance of two-piece and titanium implant prototypes under forces repre- sentative of a period of five years of clinical loading was tested, during a fatigue test in vitro by Kohal et al. (2009). In this experiment the crowns materials had no influence on the fracture strength of the zirconia implants. Still, in certain cases such as treating a patient with parafunc- tional chewing, a softer prosthetic material could be a wise choice. The need for further investigation on re- movable prosthetics on zirconia im- plants should be kept in mind, too.

Peri-implantitis
Peri-implantitis in titanium im- plants is a serious and underesti- mated problem involving millions
Peri-implantitis though has been hardly reported on zirconia implants. Zirconia demonstrates a low affinity to bacterial plaque, small amounts of inflammatory infiltrate and good soft tissue integration. These properties might lower the risk for peri-implant diseases. It has been shown that the inflammatory infiltrate does not differ between zirconia and titanium implants. Failure of zirconia implants due to bacteria should be differentiated against those of technical reasons and the microbiota should be investigated. It should be kept in mind that bacterial cells have a net negative charge on the cell wall, although the magnitude of this charge varies from strain to strain. Especially on the Gram-negative bacteria, UPS as a major component of their cell membrane increases even more the negative charge.

Titanium is also negatively charged. This acting repulsively to bacteria. This could be one of the reasons of success of titanium implantation in a contaminated environment. Zirconia though has no electric charge. Depending on the roughness and the hydrophilic surface of every implant system, contamination may be easier to occur and this could be a reason of early failure when zirconia is implanted in a contaminated environment. Studies are needed to clarify whether the latter could affect the osseointegration result and what is the relative danger against those of technical reasons.

Rosenberg et al. (1991) claimed distinct differences between bacterial profiles of infected and overloaded titanium implants. The latter were characterised by the absence of mobile rods, spirochetes and classical periodontopathogangs, along with a predominance of Gram-positive organisms, similar to what is observed in periodontal health. These observations were supported by Quiñones and Listgarten in 1990. Failures of zirconia implants due to bacteria should be differentiated against those of technical reasons and the microbiota should be investigated. It should be kept in mind that bacterial cells have a net negative charge on the cell wall, although the magnitude of this charge varies from strain to strain. Especially on the Gram-negative bacteria, UPS as a major component of their cell membrane increases even more the negative charge.

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Intolerance to titanium and genetic predisposition to inflammation has been introduced as an additional and independent risk factor (Odds Ratio 12 and Odds Ratio 6 respectively) for peri-implantitis. The authors propose a direct effect of the released microparticles of titanium on the immunological mechanism of the body that could possibly initiate peri-implantitis. Zirconia particles on the other hand have no effect on the release of TNF-α. Titanium microparticles are released as a result either of friction, electrochemical corrosion, or the synergistic effect of both and can either be taken up by macrophages, remain in the interstitial fluid near the releasing site, or systematically migrate in organs such as liver, spleen and lung, as Olmedo et al. (2003 and 2002) found.

Same group of authors made a long-term evaluation of the distribution, destination, and potential risk of both TiO2 and ZrO2 microparticles, in an animal study. They evaluated:

(a) the presence of particles in blood cells and liver and lung tissue,
(b) Ti and Zr deposit quantitation,
(c) oxidant-antioxidant balance in tissues and
(d) O2− generation in alveolar macrophages.

Ti and Zr particles were detected in blood mononuclear cells and in organ parenchyma. At equal doses and times post administration, Ti content in organs was consistently higher than Zr content. Ti elicited a significant increase in O2− generation in the lung compared to Zr. The consumption of antioxidant enzymes was greater in the Ti than in the Zr group.

Conclusion

Scientific studies are promptly needed to fulfill gaps like long-term clinical evaluations of all existing zirconia implant systems. Protocols used to design, manufacture and test titanium implants cannot simply apply to produce and evaluate the zirconia ones. Every step, from production to surgery and prosthetic reconstruction needs to be carefully planned, with respect to the properties of the new material. Accordingly, the advantages of zirconia would be fully beneficial and the risk of failure could be minimised.

Microparticles released by titanium on the immunological mechanism of the body could possibly initiate peri-implantitis.

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Introducing Dr. Naif Almosa - Chairman of the Digital Orthodontics Symposium Dubai

Interview with Dr. Naif Almosa, Chairman of Paediatric Dentistry and Orthodontics, Assistant Professor and Consultant in Orthodontics at King Saud University, Riyadh - Saudi Arabia.

Dr. Naif Almosa, Chairman of Paediatric Dentistry and Orthodontics, Assistant Professor and Consultant in Orthodontics at King Saud University, Riyadh - Saudi Arabia.

By Dental Tribune MEA / CAPPmea

Dental Tribune MEA has the pleasure to interview Dr. Naif Almosa, Assistant Professor at the Division of Orthodontics, and Consultant in Orthodontics. Dr. Almosa received his BDS dental degree from College of Dentistry, King Saud University in 2006 and continued developing further at Ökolodont, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden where he combined a postgraduate orthodontic residency program and PhD degree.

Dr. Almosa joined the orthodontic faculty of the Department of Paediatric Dentistry and Orthodontics at the College of Dentistry, King Saud University in 2014, where he currently serves as a full-time faculty. At the College, Dr. Almosa is involved in teaching both undergraduate, post-graduate students and research. In 2014, Dr. Almosa assigned to be the Director of Internship Program for three years in addition to his full-time academic appointment. Currently, Dr. Almosa is the Chairman of Paediatric Dentistry and Orthodontic department at KSU.

Dr. Naif Almosa, please if you can give us some insights into your background of life, work and education hailing from Saudi Arabia.

I was born in November 1981, married and father of three angels. I received the bachelor’s degree of dental science from King Saud University (KSU) in 2006 and completed the internship program in 2007. After this I joined the orthodontic residency program at Gothenburg University in 2009 and gained the National Swedish Board of Orthodontics in 2010. I started the PhD program while I was resident in the clinical program in 2010 and completed my PhD degree in April 2014. In May 2014, I returned to Saudi Arabia and joined the department of Paediatric Dentistry and Orthodontics at KSU. In September 2014, I was assigned to be the Director of Internship Program until the summer of 2017. In April 2017, the Rector of the University assigned me as the Chairman of Paediatric Dentistry and Orthodontic department to present day.

As an active member and ambassador for the Saudi Orthodontics Society, how important is it to stay continuously up to date as an Orthodontist? Very important, in Orthodontics, there is no excuse to stop learning. Technology is very fast in catching up with new discoveries so it is up to us to keep pace and combine it into our clinical practice. I can never emphasize enough how much we need to take advantage of the information that is readily available to us.

Orthodontics is growing to be an industry-driven specialty, and I strongly believe that as professionals we have the best of ways for us to be updated and gain more insight and critical thinking in the face of all these new products and technology, it is attended the national scientific meetings, workshops, and international conferences. What are some of the activities organized by the Saudi Orthodontics Society? What are the benefits of the members and why should non-members register?

The Saudi Orthodontics Society (SOS) is now in its 12th year, and we have held a fair number of conferences, annual and semi-annual meetings, workshops, etc. Always with the end of excellence in the orthodontic field, we have invited speakers from different parts of the world to bring us to their experience and knowledge. Being a member of the SOS, you get the opportunity to be around the best and stay up to date in orthodontics. In my opinion, to learn from and interact with such colleagues would be enough incentive for non-members to register. Surely, if you go through our website, the SOS members do have the added benefit of preferred rates on some activities as well as access to specific journals.

You are now part of the faculty at College of Dentistry, King Saud University. Could you share more information on the Orthodontics programme being run by the college?

In the KSU Ortho program, we are actively engaged in the education of undergraduate students consistent with the development of competencies in general dentistry. The department offers didactic, pre-clinical and clinical experiences in paediatric dentistry and orthodontics integral to comprehensive patient care. We also offer post-graduate programs for specialty training in Paediatric Dentistry, and Orthodontics. This is a 36-month program leading to a Master’s degree. In addition, three years ago, we started the Doctorate program in both specialties, Peds and Ortho. The doctorate program is a four years full time program, which includes didactic, clinical, and research activity where the students must write a thesis at the end of the program under supervision of our unique faculty members.

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What advice would you provide your students who look up to you as a mentor and role model for their future life?

During my time as the Director of the Internship Program, I made it a point to provide the interns with as much exposure as possible to all the career options they could take. Internship is the transitional stage where they change from a guided student to an independent professional and it is critical that they have an idea of all the possible areas they can enter in the dental profession. It is not a one-stop trip, you will go through different experiences. Awareness and learning is very important to me. I would advise the students to never stop learning. Each person you meet will teach you something, whether professionally or as a human being. Professional excellence is a worthwhile goal, but do not forget to live your life.

How do you rate the level of dentistry in the field of Orthodontics in the Middle East region, particularly in the GCC?

Orthodontics in the Middle East is evolving at a rapid pace. I believe that it is improving with the increasing addition of new orthodontists who have graduated from different schools around the world. We are also seeing more companies being established here that are enhancing innovation in digital orthodontics, and of course, we are now able to have global collaborations through e-learning and scientific meetings in different parts of GCC. I must admit that we are still lacking a more comprehensive educational program for our patients in GCC, especially with regards to the importance of oral hygiene and how it impacts orthodontic treatment. Unfortunately, most of the parents in our region have no idea when is the proper time for their kids to visit the orthodontist, because in some cases, this usually results to a very serious and more complicated treatment procedure when their children are already grown-up.

Digital Dentistry is slowly taking over the dental profession, even in Orthodontics. How do you see the future of dentistry, orthodontics and the implementation of digital technology into your working profession?

Digital dentistry has revolutionized dentistry. There are unlimited possibilities. Orthodontics has notably seen a lot of progress with its rapid integration of the digital process like the CAD/CAM, and in radiology, there’s the cone beam computer tomography. Orthodontics, with its multidisciplinary needs, has been a bit slower, but digital photography, CAD/CAM, laser and intra-oral scanners have brought about so much progress. Again, even with all the ease that technology is bringing to our practice, adequate training is still very much a requirement. Never stop learning. Digital Dentistry will save time, enhance patient comfort, allow more accurate impressions and show patients creative virtual treatment options moving away from the old notions that the dental clinic is “a place to be feared”, changing into “a place to be experienced”.

We appreciate your valuable insights and wish you the very best in your future endeavours.
The orthodontic patient - From hell to heaven
Tabitha Acret explains how Guided Biofilm Therapy has revolutionised how she treats orthodontic patients

By E.M.S

If you’re anything like me, my heart would sink a little when I would see that a teenage patient in active orthodontic treatment was booked to see me. Who would walk through the door? Would it be a mouth full of food debris stuck in what looked like mouldy orthodontic brackets and profusely bleeding gums? Would I see impossible to reach staining around the brackets, trying to use a prophylaxis cup to remove tenacious sticky mature plaque from modules and on the gingival side of the bracket. As I frantically worked away, I would be loathing the patient in the chair; blood, sweat and tears from both of us was going into the appointment, trying to use a prophylaxis cup to remove tenacious sticky mature plaque from modules and on the gingival side of the bracket. As I frantically worked away, I would be loathing the patient in the chair; blood, sweat and tears from both of us was going into the appointment, with a lacklustre result!

Good oral hygiene vital for orthodontic patients

Good oral hygiene is paramount to successful orthodontic treatments. Without good oral hygiene, a patient’s outcome will be compromised. This was frustrating me. In a journal article by Lovrov S, et al (2007), it was shown that “despite improvements in materials and preventative efforts, orthodontic treatments continue to carry considerable risk of enamel deminer- alisation. Each patient’s prophylactic efforts, including fluoride use are of paramount importance in prevent- ing white spot lesions”. In another article, by Ren, et al (2014), it showed that “high treatment demand and the occurrence of biofilm-related complication requiring professional care, make orthodontic treatments a potential public health threat”. Knowing how important it is that the professional clean be good and all biofilm be removed just added to my stress. I knew that I could never remove all the biofilm and that there would be areas around the brackets my ultrasonic or prophylaxis cup just couldn’t get to. Then, if you add in the mix that the patient already has some demineralisation of the enamel where the ultrasonic couldn’t be used, then the frustration and difficulty of the appointment just doubled again.

In search of a better solution

Combining all of the above problems made me want a better solution. I want to provide my patients with the best treatment possible and I don’t want my patients leaving their appointments with biofilm still trapped in modules. After initially discovering success with AIREFLOW® (EMS) for implant patients, I was interested in what it could offer my orthodontic patients. What I discovered is that by using AIREFLOW in combination with Guided Biofilm Therapy, I was getting amazing results. If you had asked me before AIREFLOW to plaque disclose my ortho patients, I may have thought you were either crazy or you hated me. Before AIREFLOW, I didn’t want to plaque disclose my patients who have orthodontic appliances as it would have provided proof of the areas where I left biofilm behind. Because I couldn’t get it to it, I knew plaque disclosed every single one of my patients as part of the “8 steps” of the Guided Biofilm Therapy protocol. By using the Guided Biofilm Therapy protocol, you achieve predictable biofilm removal with 100% and 960 degree accessibility. It’s safe and effective around the sulcus, there is no change in the surface of the appliance and not only is it more comfortable for the patient with better results! I am happy!

I feel so much happier with my results not only at the time of the appointment but because the long term benefits for the patient in terms of motivation and education are so much better. Not only do the patient and I see better results, but it is also clinically proven that using a plaque disclosing solution to guide biofilm removal shows better outcomes for the patient. In Boni et al 2015,4 Bae- tendorf et al 2016,5 and Vitoria et al 2009,6 all confirm higher efficiency in professional prophylaxis when done with the use of a disclosing agent. In the study by Vitoria et al, Dental Plaque Classification, Formation and Identification, it was shown that “dental plaque diagnosis using coloured solutions is one of the easiest and fastest ways to diagnose..."
More than cleaning brackets

No detrimental effects to the enamel and gingiva. By using AIR-FLOW polishing is impressive for orthodontically bracketed and banded teeth. Barnes et al show that “Air polishing around orthodontically bracketed and banded teeth”.

Fig. 3a-c: Top to bottom: Initial situation; after disclosing; and after Guided Biofilm Therapy.

Guided Biofilm Therapy

References


Our speakers

DR. SONG PALLEK
DR. MATIAS ANGHILIERI
DR. BILL DISCHINGER
DR. SKANDER ELLOUZE
DR. ANMOL KALHA
DR. SERGEY POPOV
DR. BADER BORGAN
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Efficient Bonding Protocol for the Insignia® Custom Bracket System

By Dr. Angie Lee, Dr. Chris Chang & Dr. W. Eugene Roberts, Taiwan

Insignia® (Ormco, Glendora, CA) is a computer-assisted design and manufacturing (CAD/CAM) process for producing a specific fixed appliance system to treat a malocclusion. Custom brackets and archwires to achieve the prescribed alignment are produced by a reverse engineering process, based on the digital set-up of final intermaxillary occlusion. Precise placement of each bracket is critical for producing a threedimensional (3D) alignment to efficiently accommodate the final rectangular finishing wire, with no need for detailing adjustments. Positioning jigs for each bracket are fabricated to assist the clinician in accurately bonding or rebonding the prescribed custom attachment on each tooth. The purpose of this report is to describe a standardized protocol for efficiently placing the custom appliance in the prescribed position. All orthodontic supplies and auxiliaries described in this article were produced by the same manufacturer (Ormco, Glendora, CA), unless otherwise stated.

Preparation for Bonding
Prior to the installation appointment, the clinician and assistant(s) should inspect the following items in the patient’s kit box (Fig. 1).

1. Custom prescription brackets with well fitted application jig (Fig. 1a). The brackets for each quadrant are packed together.
2. Six upper and six lower custom archwires with labels (Fig. 1d).
3. A setup of individual replacement jigs for each tooth (Figs. 1e-f): The first and second molars (Fig. 4) should be dry fitted to dental casts to identify any problems in sequence that they are used.
4. Case paperwork (Fig. 1g): Clinicians are alerted to anticipated bracket interference when adjacent brackets are packed together.

Clinical tip: The custom-fit group jigs should be dry fitted to dental casts of the malocclusion for two reasons: (1) check the bonding positions, (2) determine if there is any jig interference when adjacent brackets are properly positioned.

Bonding Process
1. Tray Arrangement: Place the jigs and bonding instruments in the desired order, usually in the progression that they are used (Fig. 2). The arrangement may vary according to the desired tray position relative to the patient, and the handedness of the clinician and assistant.
2. Isolation Procedure: Begin moisture control by placing dry aids on the cheek mucosa to isolate the soft tissue. Super absorbent pads are used between lower molars and the tongue to control saliva secretion by the sublingual glands. An OptiView® lip and cheek retractor is positioned to provide a clear view of the entire oral cavity.

3. Step-by-Step Protocol:
   (1) Dry fit the group jigs to the initial casts to identify any problems in sequentially positioning the bondable pads on each tooth.
   (2) Apply etching-gel for 30 seconds to the facial surface of each tooth.
   (3) Rinse thoroughly with water spray for a minimum of 3 seconds per tooth and air dry.
   (4) Apply the bonding agent (Ortho Solo®) onto all teeth to be bonded.
   (5) Apply a thin coat of adhesive to each bracket pad with an application instrument such as LiquidSteel Poly-Fill Plasmas® (Carl Martin, Solingen, Germany).
   (6) Use cotton tweezers to grip the jig.
   (7) Spread super absorbent pads on the cheek mucosa to prevent disturbing the adhesive layer by sliding the pad along the orthodontic appliance.
   (8) Use a microbrush dipped with bonding agent to clean the facial surface, and dry. (9) Spray the jig-bracket assembly with water, and apply a thin layer of adhesive resin to each bonding pad with a filling instrument. (10) Use cotton tweezers to grip the jig. (11) Use a Weingart plier to release the jig from the brackets on the facial surface, and apply a thin layer of adhesive resin to each bonding pad with a filling instrument. (12) Use cotton tweezers to grip the jig. (13) Roll the jigs, from the lingual cusp to the facial surface, and apply pressure from a 45-degree angle (yellow arrow). (14) Use a microbrush dipped with bonding agent to clean the bondable surface.

Fig. 1: The patient’s kit box shown (a) contains custom prescription bracket fitted to placement jig (b), six upper and six lower custom archwires with labels (c), replacement jigs for each tooth (d), and case paperwork describing special treatment procedures (g).

Fig. 2: Group jigs are placed on dental casts to check the fit. (a) Interference (yellow arrow) is noted between the lower left canine and 1st premolar during the prescribed bonding procedure. Both occlusal (a and b) and the left lateral perspectives (c) are shown. It follows that the lower left 1st premolar and 1st molar group jig must be removed before applying the group jig to bond the lower left canine and adjacent incisors.

Fig. 3: Ensure bonding instruments are laid out in the desired order: (a) mirror and cotton tweezers, (b) custom prescription brackets with custom fit placement jigs, (c) dry aids and super absorbent pads, (d) scaler, Weingart plier and filling instrument, (e) lip and cheek retractor, (f) bonding agent, etching-gel, microbrushes, (g) adhesives and uni-dose applicator. See text for details.

Fig. 4: Compared to conventional retraction (left), an OptiView® lip and cheek retractor (right) is more comfortable for the patient, and improves intra-oral visibility.

Fig. 5: Insignia® bonding procedures are organized in a step-by-step protocol: (1) dry fit the group jigs, (2) apply etching-gel, (3) rinse, spray, and dry. (4) Use etched surfaces with the bonding agent (primer), (5) apply a thin layer of adhesive resin to each bonding pad with a filling instrument, (6) use cotton tweezers to grip the jig, (7) rotate the pad and jig from the lingual cusp or incisal edge to the facial surface, and apply pressure from a 45-degree angle (yellow arrow). (8) Use a microbrush dipped with bonding agent to clean the bondable surface, (9) spray the jig-bracket assembly with water, (10) use a Weingart plier to release the jig from the brackets on the lingual and the distal surfaces, and then by rolling it gently to the lingual (yellow curved arrow) to remove the jig/bracket from the upper (11) and lower (12) arches.

Fig. 6: Bonding Process.