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 this restoration 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...
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 without any metal properties. It is electrochemically inert causing no galvanization or electro current disturbance effects at an inter and intraocular level. It is the most bio inert and biocompatible material currently available in the market, with no detected allergies or intolerances. The material exhibits lower surface free energy that leads to hydrophilic reduced plaque (biofilm) accumulation, so, less inflammation is expected leading to superior soft tissue health.

Zirconia fulfills highly desirable aesthetic results: healthy, pink and beautiful tissue can be created around an implant, with no-tissue transalucency. Its high aesthetic resembles natural tooth. Unlike titanium, it may stimulate bone growth in the long-term with ultimate osseointegration for both bone and gum. In addition to the white colour, a low modulus of elasticity and thermal conductivity have made zirconia implants a very attractive alternative to titanium in implant dentistry. With its interesting macrostructural properties, zirconia is the material of choice for the "new generation" of implants. Hashim et al. (2006) made a systematic review and evaluated the clinical success and survival 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 the alternative to titanium for a non-metallic implant solution. This is also shown in the review made by Cincia et al. (2007), that through the material used for implants. It is of major importance for the implant to be kept in the tetragonal phase to keep its mechanical and physical properties over time. It is well established that the stability of this phase is affected by several compositional parameters, including grain-size, processing conditions and quality control.

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 potential of the material as 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 needs to be fabricated that would fulfill all the necessary requirements in order to be successfully implanted for dental implants.

ZrO2 is stable at room temperature in a monoclinic phase. Doped by yttrium oxide, when it cools down from 1,173°C, a tetragonal phase stabi- lizes at room temperature (mortastra- bilitate) is produced. This is the material used for implants. It is of major impor- tance for the implant to be kept in the tetragonal phase to keep its mechanical and physical properties over time. It is well established that the stability of this phase is affected by several compositional parameters, including grain-size, processing conditions and quality control.

Purity or rather contamination with impurities, density and porosity of the final product as well as pre-sintering and sintering process and time are also some of these parameters. Environment or conditions (loading temperature-humidity) in which the product will be used can make a difference whether zirconia is produced for a hip prosthesis or for dental implants) are to be kept in mind. And last but not least, handling of the material is of utmost importance. Lughi et al. (2009) sug- gested engineering guidelines for the use of zirconia as dental material.

Producing zirconia implants

There are two ways of producing zirconia implants: through moulding and through milling of pre fabricated rods. The first method produces im- plants with specific shape and speci- fic low roughness on their surface. Milling of the rods on the other hand, is done either on partially or fully sintered zirconia. The fabrication of an implant through soft machining of partially sintered ZrO2 provides the advantage of easier milling than the fully sintered ZrO2. It requires less milling time and causes less wear of the cutting tools.

In hard machining of fully sintered ZrO2, no sintering shrinkage is ex- pected and there is no need for a sin- tering oven. However, micromacs may be introduced to sinter diamond zirconia is known as the toughest material existing, only diamond tools are used for cutting sintered zirconia. The grinding of the fully sintered ZrO2 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 to the hard machined ZrO2, it is expected that the former will have a more consistent final state, 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. 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 osseointegra- tion. 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 opti- mal roughness as well as the mo- mentum that should be realised with respect to the material’s prop- erties is also not established. Finally, depending on the procedure, the roughened surface needs to be to- tally clean, free of all foreign bodies.

Ageing of titanium vs zirconia

Aging of titanium implants is a not widely known phenomenon and starts four weeks after their produc- tion which decreases dramatically the osseointegration potential 17-18. Aging of zirconia (Low Temperature Degradation LTD, i.e. slow trans- formation of the metastable tetrago- nal crystal to the stable monoclinic structure in the presence of water or water vapour) on the other hand is quite well investigated.

Fig. 21

Fig. 22

Fig. 26

Fig. 27

Fig. 28

Fig. 29

ZrO2 is a highly biocompatible material needed to osseointegrate and withstand masticatory force without fracturing.
Degradation rates at room or body temperature of Y-TZP ceramics are currently not available, and acceler- ated tests at elevated temperature (e.g., 1,000°C) have the only basis for extrapolating an estimate of the transformation rate and, hence, of the product lifetime. This approach results in overestimation of the transformation rate. Unfortunately, such extrapolation could lead to a significant error in estimating residual body temperature. Still this is the method that is used in in vivo and in vitro testing. So far, only 36 zirconia implants of different brands and thus of different composition, structure, and surface finishing have been examined. They suggested that in vivo studies are needed to investigate the effect of degradation on the extent of stress changes due to 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 3- to 4-per cent volumetric expansion. An implant which exhibits stress in the area of the crack and results in a 3 to 4 per cent volumetric expansion is called “self-cementing.” As a consequence from titanium knowledge, screwing an abutment made from the same material as the implant can be termed 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 current one failure, one should estimate the consequence of removing the abutment screw.

A recent in vitro study by Preis et al. (2016) has shown that the aforementioned phenomenon of different implant abutment con- nections, was investigated in six zirconia implants. This in vitro study by Preis et al. (2016) shows a marked tendency of ceramic abutments to fail when screwed with a carbon fibre reinforced polymer screw on an alu- minium-toughened zirconia implant. The authors reported that the fracture of the abutments were screwed with tita- nium screws on tetragonal zirconia polycrystals. A standard screw-retained titanium implant served as control. The bonded zir- conia 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. 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 hexagon- al implant/abutment attachment. Despite the differences, the temper- ature abutments were fixed to implants using different fixation 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 a risk, 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 nature and can easily be treated surgically. It can either be used to bypass the need for further investigation on reversible zirconia abutments or to eliminate the need for a second surgery. The final decision should be made during the design of the implant, the available space to be installed, and the prosthetic rehabilitation that follows.

Implant-abutment connection
Consequence 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 successful. As a consequence from titanium knowledge, screwing an abutment made from the same material as the implant can be termed 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 current failure, one should estimate the consequence of removing the abutment screw.

One vs two-piece zirconia implants
Zirconia appears in two varieties, one being fully dense while the other is porous. The porous zirconia implant offers the absence of a microgap between implant and abutment which seems to be of benefit. The surgical placement of the im- plant though may not always meet the prosthetic requirements and angled abutments in order to corre-ct the implant position, is not common. Secondary corrections of the shape by grinding must be avoided, as this severely affects the fracture strength of zirconia.\(^2\) Protection by use of splints is also required, though not absolutely. So, two-piece im- plants were designed. Designing a zirconia abutment, the implant should be based on material properties and should sim- ply surgically and prosthetic steps for the doctor. The size limitations should be considered, in order to produce an implant that is not prone to frac- ture. A clinical study by Habert et al. (2012) showed a marked tendency of one-piece implants with a narrow di- ameter (3.5 mm) to fracture, with a percentage that reached 91 per cent of the fractured implants.\(^2\) Threads and shape of implants should be designed according to the need, al- lowing for an improved abutment connection and in order to avoid the risk of creating microgaps during implantation. The implant head if positioned at the gingival level or even higher, could improve the need for a sec- ond surgery, as well as to bypass the bacterial growth in the gap between implant and abutment. The decision of choosing between a one- and a two-piece implant could be influ- enced by the design of the implant, the available space to be installed, and the prosthetic rehabilitation that follows.
of implants. The prevalence of peri-implantitis according to the review of Zitzmann and Berglund (2008) varies between 12 and 43 per cent of implant sites. Many aetiological factors have been implicated, bacterial contamination among them. In peri-implantitis, the lesion extended apical to the pocket epithelium contains large proportions of plasma cells and lymphocytes but also PMN cells and macrophages in high numbers. Peri-implantitis though has hardly been 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. This hypothesis is strengthened by the results of the study conducted by Nazifabian et al. (2014), where cast and polished titanium were presented with the highest incidence and total count of bacteria, while zirconia showed the lowest.

Rosenberg et al. (1990) 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 periodontopathogens, along with a predominance of Gram-positive organisms, similar to what is observed in periodontal health. These observations were supported by Quinten 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, LPS as a major component of their cell membrane increases even more the negative charge.

Titanium is also negatively charged, thus 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 thus acting repulsively to bacteria. 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 when zirconia is implanted in a contaminated environment. Studies are needed to clarify whether the latter could affect the osseointegration.

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 space near the releasing site, or systemically 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.
Introducing Dr. Naif Almosa - Chairman of the Digital Orthodontics Symposium Dubai

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

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

By Dental Tribune MEA / CAPMmea

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 Odontologen, 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 was 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 Uni- versity (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 2012. 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 Orthodontic 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 coming 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 way for us to be updated and gain more insight and critical thinking in the face of all these new products and technology, it is necessary to attend 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 goal of excellence in the orthodontic field, we have invited speakers from different parts of the world to bring to us their experience and knowledge. Being a member of the SOS, you get the opportunity to be among the peers and stay up to date in orthodontics. In my opinion, to learn from and interact with these 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 preferential rates on some activities as well as ac-

Do you remember the experience of bridging the gap between your education and your first working experience? The very first patient I treated as a fully independent and registered professional dentist was one of my friends and it was a great and unfor-tgettable moment. The reason it im-

What advice would you provided to your students who look up to you as a mentor and role model for their future life? During my time as the Director of Internship Program, I endeavored to prepare 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 possibilities 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 been graduated from different schools around the world. We are also seeing more companies being established here that are enhancing innovations 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 into your working profession?

Digital dentistry has revolutionized dentistry. There are unlimited possibilities. Prosthodontics 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 scan-ners have brought about so much progress. Again, even with all the ease that technology brings 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 plan options moving away from the old notions that the dental clinic is “a place to be feared”, changing into “a place to be experi-

We appreciate your valuable insights and wish you the very best in your future endeavors.
The orthodontic patient - From hell to heaven

Tabitha Acret explains how Guided Biofilm Therapy has revolutionised how she treats orthodontic patients.

Far too often, I felt under pressure to get their teeth cleaned in the “child” timed appointment slot, never feeling like I had removed everything. I was always feeling frustrated trying to manoeuvre my ultrasonic tip around brackets, trying to use a prophylaxis handpiece and gluggy prophylactic paste 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 demineralisation. Each patient’s prophylactic efforts, including fluoride use are of paramount importance in preventing white spot lesions”. In another article, by Rens et al (2014), it showed that “high treatment demand and the occurrence of biofilm-related complications 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 prophylatic 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 AIRFLOW® (EMS) for implant patients, I was interested in what it could offer my orthodontic patients.

What I discovered is that by using AIRFLOW in combination with Guided Biofilm Therapy, I was getting amazing results. If you had asked me before AIRFLOW to plaque disclose my ortho patients, I may have thought you were either crazy or you hated me. Before AIRFLOW, I didn’t want to plaque disclose my patients who have orthodontic appliances as I would have provided proof of the areas where I left biofilm behind because I couldn’t get to it. Now plaque disclose every single one of my patients as part of the “8 steps” of the Guided Biofilm Therapy protocol.

Guided Biofilm Therapy

By using the Guided Biofilm Therapy protocol, you achieve predictable biofilm removal with 100% and 95% 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 Botti et al 2016; Taudendorf et al 2016, and Viorica et al 2003, all confirm higher efficiency in professional prophylaxis when done with the use of a disclosing agent. In the study by Viorica 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...”
dental plaque, which favours its sub-
sequent removal under permanent
control during the intervention.
Using AIRFLOW, removal of dental
plaque approaches a ratio of 100%.”

More than cleaning brackets
The are two other key reasons why
following the Guided Biofilm Ther-
apy protocol is impressive for ortho-
dontic patients as well as routinely
in all prophylaxis procedures. The
first is the long term health of the
enamel and gingiva. By using AIR-
FLOW technology combined with
AIRFLOW PLUS powder, I know that I
am providing the least damage to
the patients enamel and orthodontic
appliances. In a clinical comparison
of the efficacy and efficiency of two
professional prophylaxis procedures
in orthodontic patients,” Ramaglia
et al show that “In orthodontic pa-
tients, use of AIRFLOW polishing is
a lot safer, efficient and effective to
remove stains and dental plaque
in comparison to rubber cups and pum-
ice”.

The second great thing was that I
now had time to finish within the
appointment time. I wasn’t feeling
so under the “pump”. I used to find
that I was always running late in
these appointments and now I was
finishing easily within the time al-
located. In Effect of an air-powder
polishing system on orthodontically
bracketed and banded teeth, Barnes
et al show how “Air polishing around
orthodontic brackets and bands was
not only effective but time efficient.
There were no detrimental effects to
any composite material or cement in
comparison to rubber cup and pum-
ic”.

Conclusion
By using Guided Biofilm Therapy
with AIRFLOW technology combined
with appropriate home OHI instruc-
tions and motivation, I am provid-
ing the best treatments possible for
my patients. I love Guided Biofilm
Therapy. It’s changed my attitude
about treatment, my treatment
results and my patients’ long-term
outcomes. Guided Biofilm Therapy
is evidence based dentistry. It is the
new standard of care we should all be
looking to reach.

For information on EMS and Guided
Biofilm Therapy, visit www.ems-
dental.com and follow EMS Australia
and New Zealand on Facebook – fa-
tobook.com/emsausnz. To test drive
this revolutionary protocol in your
practice today, book a free in-practice
Guided Biofilm Therapy demonstra-
tion by emailing info@ems-ausnz.
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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 re-bonding 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 jigs (Fig. 1c). 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 have brackets already loaded. 4. Case paperwork (Fig. 1g). Clinicians are alerted to anticipated bracket interference with occlusion, that requires bite turbos or other composite build-up on the occlusal surface to open the bite. If there is substantial crowding, some brackets may be designated for placement later in treatment.

Clinical tips: 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 (Fig. 2).

Bonding Process

1. Tray Arrangement: Place the jigs and bonding instruments in the desired order, usually in the progression that they are used (Fig. 3). 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 block the parotid gland orifice and 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 including the buccal surfaces of the molars (Fig. 4).

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 5 seconds per tooth and air dry.
   (4) Apply the bonding agent (Ortho Solo®) onto all teeth to be bonded. No air-drying or light curing step is required.
   (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(s). (7) Roll the jigs, from the lingual 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 off excess adhesive. (9) Use the jig bracket assembly with water. (10) Use a thong clip to release the jig from the brackets on the mesial and the distal surfaces, and then by rocking it gently to the lingual (yellow curved arrow) to remove the jig(s) from the upper (12) and lower (11) arches.

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

Fig. 2. Group jigs are placed on dental casts to check the fit. Jig 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.