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Realising the benefits

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Welcome to ortho magazine! I’m happy to announce the relaunch of the international magazine of orthodontics, which staring from now will have a firm position in the DTI portfolio. ortho covers the most significant developments in the field, with the intention of providing comprehensive knowledge and information on the latest technology that can profitably be integrated into treatment concepts. We aim to serve as an educational tool, as well as present innovative treatment mechanisms as they are developed.

In the past 20 years, the orthodontic industry has experienced tremendous change followed by massive growth of the market. This expansion can be observed especially in the adult market. Usually when people think about orthodontists they think about children wearing braces, but nowadays it is changing. The overall number of adult patients has increased by over 20 per cent and today one in every five orthodontic patients is an adult.

How is this trend influencing modern orthodontics? And how will it affect your dental office?

We will try to find answers to these questions in this issue of ortho magazine, inside which you will find very well-illustrated and documented articles on clear aligners, vibration therapy, rapid maxillary expansion (RME) as well as new product information and events previews.

Dr Luis Carrière, developer of the Carrière Motion Class III Appliance, explains advantages of this new approach, Dr TaeWeon Kim presents possibilities of orthodontic treatment with eCligner System, and Dr Amit Lala describes benefits which vibration therapy could bring to orthodontics. RME screws are the main topics of two industry reports, as well as the intra-oral photobiomodulation (PBM) which could decrease orthodontic treatment time. The interview with with Dr Graham Gardner, President of the European Aligner Society (EAS), is also informative; he explains the principles of aligner therapy and EAS’s objectives.

I hope you will find this issue illuminating and that the knowledge you gain is applicable in your daily practice. Enjoy reading our first issue of 2016!

Yours faithfully,

Magda Wojtkiewicz
Managing Editor
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Short-term gains... long-term problems?

The emergence of STO and its future implications in general practice

Author: Aws Alani, UK

The provision of orthodontics can be a life-changing experience for young patients whose “crooked” teeth can affect their confidence and self-esteem. Indeed, where mature patients present with a history of malalignment, equally beneficial and fulfilling results can be achieved. In government-funded systems, patients with congenital abnormalities receive treatment that is essential to their ongoing oral health. Restorative dentists work closely with orthodontists, who can appreciate how small details can aid in achieving positive restorative outcomes.

As a young dentist, I corrected a tooth in crossbite with a simple T-spring appliance. It was enjoyable and brought a different type of delayed gradual satisfaction to the more cerebral but tenuous molar endodontics or the more artistic and instant composite build-up. I was not a specialist, but I managed to do some orthodontics. In contrast to my experience, general dental practitioners are now more routinely providing tooth movement with the emergence of short-term orthodontics (STO). This has resulted in some conjecture as to the methods of...
achieving "straighter" teeth. Indeed, some may consider STO as an emerging entity competing with specialist orthodontics, but should it be?

The specialist training pathway for orthodontics involves a competitive-entry three-year full-time course linked with the achievement of a master’s level qualification that many may feel daunted by. Indeed, navigating the pathway from start to finish can be difficult academically and financially when factoring in fees and loss of earnings during training. Once qualified, the majority of these specialists reside, like the majority of all specialists, in the south-east of England. With this skewed distribution of specialists and assumed need for access, it might seem prudent for general dental practitioners to contribute to meeting the need for orthodontics.

Indeed, the long-cited managed clinical networks have yet to be fully realised, although all planning and documentation related to managed clinical networks identify general dental practitioners as integral to the function of the network. The number of orthodontic therapists has gradually increased over the last ten years or so since inception of the first courses in Wales and Leeds. Therapists are allegedly more cost-effective to train and employ in a large orthodontic practice; however, unlike their hygiene or therapy colleagues, they cannot practise without a specialist’s treatment plan and supervision.

Patients who qualify for orthodontic treatment under the UK government-funded system need to be assessed according to the index of orthodontic treatment need. There will be an obvious shortfall of adults or adolescent patients with minor malocclusions who do not meet the criteria who would like their teeth straightened. This cohort may have to seek treatment privately from orthodontic specialists or general dental practitioners. As such, these minor or straightforward cases may be managed in a number of different settings utilising various techniques with the advent of STO. This may have resulted in some territorial paranoia between the two camps of traditional orthodontics versus STO systems. Conversely, it may be that differing scientific, technical and ethical ethos on managing the same problem is the source of the debate.

Quick and easy?

Commercialisation has modified the provision of orthodontics in the UK. Indeed, there are now orthodontic brands with courses attached and a faculty of individuals who promote their particular product. Companies tend to boast that their product is the best with limited complications and treatment being low risk, predictable and easy. Somewhat surprisingly, courses are being run on how to convert patients into orthodontic clients. There are books describing strategies on promoting and increasing revenue. They outline detailed strategies on attracting more patients than one’s local competitor—or is that colleague? Sounds more like capitalism than commercialism to many interested observers.

The rapid development of STO has not escaped the venture (or some may say vulture) capitalists. In the same vein as DIY whitening and sports guards, one can now have one’s teeth straightened via online companies using products delivered by Her Majesty’s Royal Mail and so cut out the middleman (i.e. the dentist). To my knowledge, STO has yet to make it on to the price list of Samantha’s, a beauty salon in Peckham.

What may cause fear and worry is that the provision of tooth movement set against a backdrop of a focus on increasing revenue and patient conversion may detract from the real reasons we are providing the treatment. The risk and benefit of treatment must remain balanced or be rebalanced in favour of the patient.

The best things in life are rarely quick, easy and without reflection. While learning or training, one gains stature from one’s mistakes and learns by way of osmosis from those of individuals one hopes to emulate. Becoming an expert in many a field requires time, effort and experience. Orthodontics is a complicated discipline that is difficult to deliver optimally and efficiently. Treatment planning should be performed in person not only to appreciate the challenges the patient presents with but also to develop a lasting patient rapport. Equally important, patients need to be diligent during treatment and forever more for purposes of retention. Is it possible that a one- or two-day course with a treatment plan lasting half a year or less can provide equally optimal results to a specialist orthodontist utilising traditional means?

In any case, placing a time limit on any treatment could be considered contentious. Patients ask me all the time ‘How long is this treatment going to take Doc?’ I always reply ‘I’ll tell you when its finished’. As such I am rarely wrong.

“Orthodontics is a complicated discipline that is difficult to deliver optimally and efficiently.”
Advertising cosmetic treatments the fair dinkum way

The Australian health ministry recently examined the provision of cosmetic procedures and in particular the modes of promoting the treatments. The working group found that advertising and promotion more often than not focused on the benefits to the consumer, downplaying or not always mentioning risks. The group went on to identify advertising practices that were not driven by medical need and where there was significant opportunity for financial gain by those promoting these. They identified the need to regulate promotion and advertising ethically with factual, easily understood information from a source that is independent of practitioners and promoters. This is unfortunately not always readily available. In some Australian jurisdictions, there are specific guidelines that need to be adhered to for promotion of cosmetic treatments and they specifically cover before and after treatment adverts, which we know in the UK is a popular practice among the cosmetically driven. This is commonly one ideal, perfect case showcased on the front end of the practice website with no mention of any problems, either acute or chronic. Another aspect of the report detailed prohibition of time-limited offers or inducing potential customers through free consultations for the purposes of treatment uptake. The latter is something that has seen STO promoted by way of voucher deals on the Internet or via smartphone applications. Others may consider such a practice as loss leading; one could ask who is losing and who is gaining and at what price?

One important aspect of the report identified the wider social impact of cosmetic procedures in that people may become increasingly dissatisfied with themselves and their appearance, culminating in deeper concerns for the person and reducing scope for individuality. Many dentists throughout the country may have a slipped contact here, a rotation there or a space distal to a canine who are unlikely to be waiting in earnest for the next voucher deal alert on their iPhones. Inducing misgivings or raising concerns about the patient’s tooth position where the teeth are otherwise healthy and the patient presents with no concerns could be considered unethical and worryingly dishonourable.

Relapse of confidence

In a recent publication from an indemnity provider, orthodontics was identified as an emerging area for claims against their clients. This is likely to be the tip of the iceberg, whose size will probably continually grow as more and more orthodontics is provided and the repercussions of which may only become apparent gradually in the future.

In the now highly litigious arena of UK dentistry, the failure of orthodontic treatment against the backdrop of Montgomery v. Lanarkshire Health Board is likely to result in increased litigation. The movement of teeth into what the patient and the dentist feel is the correct position may be possible in the short term, but in the long term complications may arise owing to a variety of soft- and hard-tissue factors that cannot accommodate this new and supposedly “right” position. Indeed, orthodontics requires the appreciation of detail where symmetry and alignment are “king”, but long-term stability is the likely “empress”. Relapse of position is a common complaint and where patients have paid handsomely for a result they may have been happy with at the time of the cheque clearing, over time tiny tooth shuffles can result in disproportionate and vehement dissatisfaction. Where teeth are moved indiscriminately, recession in the labial segment is a complication difficult to explain and remedy in the high lip line of a conscientious and ambitious corporate female patient. Indeed, more haste, less speed may result in a case being etched longer in the memory of the patient and the clinician for the wrong reasons.

Clear steps to business building

A cornerstone of a successful business is the repeat customer who values the dentist and his or her service and returns with no qualms or misgivings about what the dentist feels should be provided. A successful business relies on patients returning in the long term owing to their positive experiences. Focusing on short-term gains without due consideration of quality or reliability of the treatment provided has potential repercussions for patients, the business of dentistry and perception of the profession.

contact

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“An elegant and efficient approach”

An interview with Dr Luis Carrière, Spain, developer of the Carriere Motion™ Class III Appliance

Dr Carrière, how long has the Motion appliance for Class III malocclusions been on the market?

We presented the appliance for the first time at the American Association of Orthodontists meeting in 2015. The approach is not entirely new and we have been working on it for a couple of years. The Class II appliance was invented for Class II cases, but many participants in several courses I taught on Class II, especially in Asia, asked whether it could also be used in Class III cases. In response to this, we decided to explore this to see if it was a good option. The results we achieved with the use of the Carriere Motion Class II Appliance in Class III cases were amazing.

This made us realise that this appliance was really changing the relation between the mandible and the maxilla, harmonising soft tissue and balancing the patient’s face. We were completely surprised by the fantastic facial outcomes that we achieved with this minimal approach. We thus decided to create a special design according to the needs of the mandible, the Carriere Motion Class III Appliance.

Could you please describe in short the design features of the Carriere Motion Class III Appliance?

Why does it only have a simple molar bonding pad with a small step in the arm and why did you abandon the joint design you have with the Class II Motion Appliance (rotation of the molar)?

If we look at the occlusion of the lower arch in relation to the upper, normally there is an inclination of the posterior segments owing to the fact that the buccal side of the mandibular molars should fit between the buccal and the lingual aspects of the maxillary ones. This means that the design of the traditional Class II pad ball is too bulky. Often, it can interfere with the occlusion at the start of bonding, so we decided to create a flat surface on the posterior segment in order to avoid unnecessary collisions in Class III mandibular positioning with the appliance. What we have created is a design that is very clean and simple with only those features that are needed. We have also adapted it to the requirements of Class III malocclusions. While we used Motion Class II Appliances in Class III patients initially, we needed to create something that was really suited to Class III cases. We achieved this by flattening the profile, which is now very slim and straightforward.

It is very important to understand that in 95% or more of our fixed cases, we start treatment with the Carriere Motion Appliance, which is not only restricted to Class II or III malocclusions but also extremely useful for those cases in which we have minor crowding. We need to open limited space between the
maxillary or the mandibular incisors in order to easily align the maxillary teeth or the mandibular anterior teeth without protrusion while accomplishing what we term a “Super Class I posterior occlusion”. For me, this is an elegant and efficient approach to cases that dramatically reduces the period for which brackets are worn by our patients. Reducing the time for which the patient has to wear brackets is a very important factor for many patients nowadays.

With clear systems like Invisalign this appliance works amazingly well for simplifying treatment and dramatically shortening the aligner period. This way, many complex Class II or III cases can easily be resolved with Invisalign Lite treatment with less than fourteen aligners. This also makes treatment cheaper for patients and boosts the reputation of clinicians, as they are able to treat complex cases using very simple procedures.

The combination of the Motion appliance with our new passive self-ligating bracket Carriere SLX and archwire sequence truly makes complex treatment simpler while creating a dynamic and efficient scenario in our treatments. We are very pleased with the new Carriere SLX. Technically speaking, it was a challenge, as we needed to create a masterpiece of precision. Our engineers did their best work and we achieved the highest level of technical bracket outcomes. It is a real game-changer.

**How many cases have been treated with the appliance so far?**

In our office, around 100 cases have already been treated with the Motion Class III Appliance. It is astonishing to see the extraordinary change to the patient’s face every time, changes that one could imagine have been accomplished surgically, yet were achieved without a single extraction. I think the reason for this effect is the balanced combination of distalisation of the mandibular posterior segments, change of the posterior occlusal plane, and anticlockwise rotation of the mandible that completely changes the relation between the mandible and the maxilla. Distalisation in the mandible is extremely fast and efficient mainly because there is an almost empty channel between the external and internal cortical bone. That is the reason we need very low force elastics in terms of traction. We only use 6 oz, ¼ inch, and we normally never use 8 oz in Class III cases, which is what we normally use in Class II cases.

Looking at the occlusal plane, in Class III cases, we intrude the mandibular molars with the Motion appliance and extrude the canines. This intrusion of molars and extrusion of canines is necessary in Class III cases to change the occlusal plane. This way, we bring the mandible into a better functional and aesthetic position. The change between the mandible and the maxilla that occurs in Class II and III cases is the main reason that we renamed the appliance from Distalizer to Motion. Not everything can be attributed only to distalisation.

The Carriere Motion Appliance changes the relation between the mandible and the maxilla to some extent by altering the posterior occlusal plane, thereby moving the mandible and the maxilla into a better functional position while balancing the face in Class II and III cases.
In retrognathic Class II patients, we combine maxillary distalisation, controlled maxillary molar distal rotation, and uprighting with mandibular repositioning for a better functional relation, giving stability to the case while balancing the position of the temporomandibular joint (TMJ) anatomical structures and harmonising the soft-tissue facial aesthetics. In Class III patients, we promote posterior mandible repositioning, changing the posterior occlusal plane, combined with distalisation of the posterior segments from the canine to the molars. This approach is often combined with a certain upper arch development with the Carriere SLX passive system to compensate for the typical premaxillary hypoplasia related to this type of malocclusion. Our main objective is to establish a stable and solid occlusion while balancing the patient’s face.

Have there also been cases in which the Class III malocclusion could not be corrected? Have you observed any TMJ problems during Class III treatment?
We are normally confronted with two types of Class III patients, dental and skeletal Class III patients. The Motion Class III Appliance is a treatment option for both. Skeletal discrepancies are normally treated with a combination of surgery and orthodontics. Many patients reject the option of maxillofacial surgery for many reasons however and remain as they are.

With this new approach, we can provide a minimally invasive treatment alternative to change their decision and provide them with a substantial facial change that still maintains their facial features.

We do not change the patient’s face completely, but we move the features into a more aesthetically pleasing position. We seek to achieve facial harmony, bringing self-confidence to the patient through compensated occlusion, facial improvement and spiritual equilibrium.

No TMJ problems have been found at this point and not a single patient has had any problem or symptomatology in the TMJ with this approach.

In many cases, Class III cases show an additional functional shift of the mandible. While balancing the occlusion, we balance the TMJ anatomical structural and functional relations. This achieves harmony in the area.

Are there any studies that have shown the proportion of the mesialisation effect in the upper jaw and of the distalisation effect in the lower jaw in the total correction of Class III cases?

This is a relatively new approach. We have conducted no studies at this point, but in relation to the effect of the Carriere Motion Class II Appliance, together with Prof. James McNamara from University of Michigan and Prof. Lorenzo Franchi from University of Florence, we are studying our records in order to determine answers to this. They are tracing our cases to establish what is going on. Results are expected very soon.

We have observed clinically good and stable occlusions over many years. For example, you can see in my lectures several cases that have been out of retention for more than ten years and are completely stable. What we need is an explanation for the experts.
What force elastics do you recommend for children and adults, and what is the recommended wearing time?

Wearing time of elastics with the Motion appliance is 24 hours normally, except for eating. Fresh elastics are required after each meal. In Class III cases, there is a channel between the external and internal cortical bone in the sagittal direction, from mesial to distal. There is no resistance, so substantial force is not required. Instead, we only use 6 oz elastics.

In mixed dentition cases, such as those of 7-year-olds in which we place a Motion Class III Appliance from the mandibular first molar to the mandibular canine, we slightly minimise the force. For 4 oz, ¼ inch will suffice. We can increase this to up to 6 oz, ¼ inch, if required. With this technology, significant changes to the patient’s face are achieved, resulting in a beautiful balance. This occurs in Class II and III patients with mixed dentition. You may ask why that is. The answer is that we change the posterior occlusal plane and stimulate the orthopaedic effect in a new functional relation. I think this is key.

What degree of dental Class III malocclusion can be corrected with the appliance in children?

We can completely transform the scenario by controlling the posterior occlusal planes and changing the relation between the mandible and the maxilla. There are things that we cannot change in our patients, such as the genetic capacity of the patient to grow. What we can do from our side is everything to direct the growth, to modify the position of the structures and to bring structures into another position in order to try to modify the direction and to change the scenario completely in a way that we really ought to.

To what degree can a dental Class III malocclusion in adults be corrected with the appliance?

We can completely change full-step Class III cases in adult patients. We treat patients of all ages with this system, from teenagers to 60-year-olds. Skeletal repositioning does not mean skeletal changes but a skeletal repositioning of the mandible in relation to the maxilla, as the mandible, specifically the TMJ, is a dynamic anatomical structure. It is very important that we balance that and bring it into a better position.
The changes we can achieve in adult cases are amazing. It is a great alternative to surgery in adult cases and something that is going to establish a new treatment option for Class III patients.

You call your new series of lectures “facially driven treatment for Class II and III.” What are your key facts in this matter, and why should the facial, skeletal and dental factors not be isolated during treatment?

In orthodontics, we focus on good occlusion of the molars and the canines, looking out for midline correction, overbite, overjet and whether there are too many teeth. The patient’s face, teeth and bone position have to be correctly adjusted and balanced. The patient has to be left with an attractive face, as well as facial proportions and relations. We should never forget that behind the face there is a human being who wants to be successful in life, form natural social relationships and have the opportunity to establish a relationship with the person he or she has fallen in love with. We as orthodontists are fully responsible for the patient’s face and this is very important to consider.

The Carriere system is all about this and together with Henry Schein Orthodontics worldwide we are trying to spread this message. We, the orthodontists, are able to manage the patient’s soft-tissue profile in a positive way. How do we do that? Instead of using synthetic material like an aesthetic surgeon, we concentrate on bone and teeth and bring the soft tissue into a better and more natural position. We are also able to balance the relation between the mandible and the maxilla. By balancing the patient’s face, we are also balancing his or her life, bringing him or her self-confidence and restoring happiness.

However, we could also totally ruin the patient’s life by extracting teeth unnecessarily. I am convinced that nowadays we cannot consider orthodontics only as treatment of the teeth. Our patients are human beings and we have to give recognition to that.

With the Carriere system, the Motion appliance, the Carriere SLX bracket, the wire sequence, respect for the tissue and the physiology of the orthodontic movement, and considering the patient’s face, we aim to benefit our patients. Many profiles have been affected in the past, so our objective is to create tools to be added to the orthodontic armamentarium that help us in this direction.

So you are saying that the orthodontist should place much more emphasis on harmony of the patient’s face.

The orthodontist is responsible for the patient’s face. In my understanding of the specialty, he or she has to be an expert on moving teeth into the correct position, as well as on balancing profiles. He or she is responsible for the harmonisation of the soft-tissue and, if necessary, for sculpting the lips with dermal fillers. Nobody understands better than an orthodontist the anatomy and proportionality of the lips. Orthodontists also have to be experts on the use of Botox for excessive gingival display in those patients with a particularly gummy smile, blocking the levator labii superioris alaeque nasi muscle to retain the correct arch for a beautiful smile.

However, we are not only responsible for the face. I think we also have to train society on the correct way to gain a beautiful facial appearance. Instead of seeking treatment from an aesthetic surgeon, they would do better to visit an orthodontist. He or she will be able to give them a natural and elegant aesthetic outcome, including an attractive facial profile. If they are not satisfied, they can always visit an aesthetic surgeon later.

If society comprehends the importance of orthodontics for the face, far more patients will opt for orthodontic treatment. That is why we have to start upgrading our specialty. Orthodontics is all about aesthetics, art and science.

Thank you very much for the interview.
Over the last two decades, transparent removable orthodontic appliances have been developed to treat patients who desire a more aesthetic and comfortable treatment option compared to traditional metal braces. There have been many published journal articles declaring the effectiveness of clear appliances, and one of the major advantages of these appliances is the patient’s ability to remove them for eating, brushing, and other reasons.

The eCligner System is a clear plastic removable orthodontic appliance produced by a vacuum former. It is made of non-toxic and biologically acceptable PET-G material, similar to PET milk bottles and elastics. In crowding cases of 2–3 mm, orthodontic treatment with eCligner clear aligners can be as short as 4–5 months (Figs.1–3).

In late autumn of 1998, the inspiration for moving teeth with transparent removable orthodontic appliances came to me while I was observing soap bubbles in my bathroom. I successfully started using these appliances to treat simple relapse cases and named them Clear Aligners. Although several appliance companies use the term ‘clear aligner’, it was the name I originally created for marketing this technology worldwide.

Development of Clear Aligners and the eCligner System

Making clear aligners in the laboratory requires precise tooth movement control in the model set-up. CAPRO (IV-Tech, Korea) software was used to overlap two digital photos for checking the range of move-
As effective as handmade aligners are, there are limits in the clinical application. The quality of the aligner depends upon the expertise of the technician, even using technology like the CAPRO software. Some of the limitations include the tendency for tooth necrosis due to heavy orthodontic forces, as well as inefficiencies in tooth movement or misdirection. To overcome these challenges, it was necessary to develop a new method for each tooth. Using a heat-generated vacuum former and 0.5 mm, 0.62 mm, and 0.75 mm laminate foil, three thicknesses of aligners (soft, medium, and hard) were created for each movement or 'step' of treatment. Starting with the soft, then medium, and then hard, each aligner is worn for one week before moving on to the next step (Figs. 4 & 5).

Fig. 6: 3-D eCligner programme enables precision digital tooth movement in full 3-D movement control. Each tooth segment is separated and patterned in a hexahedron, controlled by adjustable CR (centre of rotation) point.

Fig. 7: eCligner diagnostic data for multitasking function, simulation for facial profile change.

Fig. 8: Multi-overlapping (superimposition) among each 3-D digital set-up model enables measuring the distance and angle directly on the monitor. Each tooth shows current torque and angulation as to progress. Also it is possible to make animation function to compare each movement pattern. Colour and tone change function is helpful to recognise complicated tooth movement among the steps.

Fig. 9: Doctor view (eCligner Dr Program).

Fig. 10: Various print function, photo galleries. Model analysis data is useful to determine the amount of stripping.

Fig. 11: eCligner diagnostic data, cephalo analysis (Tweed, Ricketts, Jarabak, Grummon), P-A view analysis.
develop new eCligner software utilising a 3-D CAD/CAM system. This system incorporates the same basic principles as handmade clear aligners with the added benefits of improved control over tooth movement, digital diagnosis and treatment planning, as well as consistency in estimating treatment times. It also allows for better patient communication and solutions for lost/broken aligners or relapses. By developing this advanced software in 2009, the eCligner System gained significant clinical enhancements (Figs.6–11).

Mechanics of the eCligner

The eCligner System produces aligners from 3-D-printed resin models, which are created using the eCligner treatment planning software. Each model represents a step and is used to create three aligners of increasing thickness (soft, medium, and hard). The patient wears each aligner for 1 week until that step is complete and then moves on to the next step (3 weeks in total). eCligner aligners are worn for 17 hours a day and removed when eating or when drinking hot drinks. The Treatment Plan is a guide for the entire process and includes estimated treatment times, expected results, profile changes, and the amount and location of IPR (stripping) required. The Treatment Plan can also be used to evaluate extraction or non-extraction options in borderline cases. eCligner aligners are a comfortable fit and the increasing thickness helps promote gradual tooth movement, thus avoiding pain or irritation of the periodontal ligament tissue (Figs.12–18).

Adult patients

For adult patients, aligners should be worn 17 hours every day except during mealtimes or when drinking hot drinks. Patients must wear the aligner each night and clean the aligner with a toothbrush daily. eCligner aligners can be used to create space for prosthetic implants or extrusion for periodontal purposes.
3-D simulations within the programme can enhance treatment acceptance by the patient (Fig. 19).

**Adolescent patients**

Treatment with eCligner aligners is possible with children under 14 years of age for the purpose of interceptive orthodontic treatment. The eCligner System can be used for space maintenance, space creation, eruption guidance, and growth control. Children wear eCligner aligners for only 8–10 hours daily and only at night. Thus, the eCligner System does not disrupt daily routines and takes advantage of peak growth hormone secretion during the midnight hours for maximum effectiveness (Figs. 20 & 21).

**eCligner applications**

The eCligner System is effective for minor tooth movement, crowding and spacing, and for prosthodontic or periodontal treatment. It is also effective for retaining the arch after orthodontic treatment.

Examples of eClinger applications:

1. Minor crowding (Figs. 22–29)
2. Spacing (Figs. 30 & 31)
3. Intrusion (Figs. 32 & 33)
4. Extrusion for detailing & occlusal seating (Figs. 34 & 35)
Fig. 30: Spacing case (18/M) – Before and after.
Fig. 31: Spacing case (59/M) – Before and after 7 months treatment.
Fig. 32: Intrusion force vector is to improve overbite situation. Before and after.
Fig. 33: Figures show improved smile. Notice the upper and lower incisor relationship. Before and after.
Fig. 34: Before: Open bite case.
Fig. 35: After: Corrected by Cow-catch (extrusion movement for finishing and detailing)
Fig. 36: Before: Ectopic erupted canine (14/M). It deteriorated patient’s pronunciation.
Fig. 37: After: Night time wear corrected crowding as well as improved pronunciation.
Fig. 38: Before: Crowding case.
Fig. 39: After: Expansion procedure improved the anterior crowding.
Fig. 40: Before: Relapse case on extracted area both left and right side.
Fig. 41: After: 3 steps of eCligner corrected relapsed space and minor crowding.
Fig. 42: Insufficient space for prosthodontic implant on first bicuspid area. Anterior spacing was shown. Before and after.
Fig. 43: The spaces (first molars) have been regained by uprighting procedure for implant and anterior spacing problem, corrected. Before and after.
Fig. 44: eCligner goal is to improve patient smile view throughout the treatment. Ideal and esthetic incisor position and relationship lead to change in the smile. It must be considered before eCligner treatment to determine the treatment goal.

Before and after.

Fig. 45: Before: Gummy smile (20/F).

Fig. 46: After: Improved smile. Incisor position and relationship were improved with stripping and intrusion procedure.

Fig. 47: Whitening tray from each set-up model. Orthodontic treatment and whitening treatment simultaneously.

How to start

1. Register as a provider via the website
2. Upload patient info and photos
3. Submit PVS impressions or an intraoral scan
4. Receive and review the Treatment Plan
5. Consult with the patient using 3-D simulations
6. Accept the case
7. Receive the eCligner aligners and resin models (Figs. 48–50)

Patient management

Confirm the proper fit of the current aligner when the patient visits. If not fully fitting, the patient needs more time to wear the current aligner (Figs. 51 & 52).

Solution for lost/damaged aligners and relapse

The eCligner System provides all the aligners and resin models. If the patient has lost or damaged aligners, simply use the resin models to create replacement aligners. If the patient stops wearing the aligners, find the resin model that matches the current arch form and remake the required aligners to restart treatment. For relapses after treatment,
find the resin model that matches the patient’s present arch form and create all the aligners from that step to the final step. It is recommended to show the full series of resin models to the patient to demonstrate the entire process before starting treatment (Figs. 53 & 54).

Retention

For the first year after orthodontic treatment, the patient must wear the retainer every night. After the first year, 3 nights per week is sufficient to prevent relapse. Thereafter, the patient must wear the retainer at least 1 night per week. The retainer should be replaced every year at the patient’s annual visit (Fig. 55).

about

Dr TaeWeon Kim DDS, MSD, PhD, graduated from the YonSei University Faculty of Dentistry in 1988, and completed his MSD and Doctorate in the same university in 1991. He served as a faculty member in the Tokyo Faculty of Dentistry in Japan between 1994 and 1995, and held office as the Head of the Department of Orthodontics in the Ewha Womans University between 1995 and 1996. Since 1996, he has had his own private practice and research centre.

In 2001, he received his PhD from the Showa University in Japan. Currently Dr Kim is the President of World Federation of Aligner Orthodontics (WFAO) and an honorary Professor in Binzou Medical College in China. Dr Kim has been a pioneer in orthodontic treatment systems with transparent removable aligners known as Clear Aligners since 1998. He has made significant contributions to orthodontics with a new concept envisaging 3-D treatment planning and the digital production of clear aligners at three different levels of thickness using very sensitive technology. Dr Kim has presented at numerous conferences across the world on lingual orthodontics, micro implants and eCligner, and provides courses on these subjects at an international level. He is an author of numerous articles and books.

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Vibration therapy in orthodontics: Realising the benefits

Author: Dr Amit Lala, USA

Introduction to vibration therapy—multiple potential benefits

Accelerated orthodontics and vibration therapy to fast track orthodontic tooth movement (OTM) have been hotly debated topics in the orthodontic industry in recent years. Periodontally Accelerated Osteogenic Orthodontics (PAOO) techniques such as osteotomy, open flap corticotomy, and piezocision have been shown to decrease treatment time. Unfortunately, these classical approaches have had limited patient acceptance because of their invasiveness and side effects. In the last several years, micro-osteoperforation, which takes advantage of the same biological regional acceleratory phenomenon as these classical techniques, has been gaining rapid clinical adoption because of the simplicity of its chairside microinvasive nature.

There is also growing evidence that the application of mechanical energy-based therapies such as vibration can stimulate and accelerate bone formation and possibly bone remodelling. Orthodontic tooth movement, caused by the application of light continuous forces that induce bone formation and remodelling, could logically be accelerated by the application of vibrational force, with the benefit of reducing the overall treatment time. Since 2008, AcceleDent (OrthoAccel Technologies) has offered a daily use vibration device, offering the promise of accelerated orthodontic treatment based on delivering mechanical stimulation to the dentition. At this point, research on the efficacy of this device in accelerating OTM has been mixed, and clinicians debate its value.

The debate on vibration therapy as it applies to accelerated orthodontics in general, and the effectiveness of the AcceleDent device specifically, should consider other factors in evaluating efficacy. First, there is a distinct possibility that frequency optimisation of the devices concerning bone formation/remodelling has not been established. AcceleDent operates in a low frequency range, however, research points towards the benefit of high frequency in bone modulation. Secondly, current research indicates that high frequency low magnitude (HFLM) vibration therapy as applied to orthodontic treatment may have multiple potential benefits, including, but not limited to, accelerated OTM.

This article will discuss these additional benefits, including faster more efficient aligner therapy when used as a nightly seating tool, relief of normal orthodontic discomfort from new tight fitting aligners and routine adjustments to fixed appliances, and enhancement of orthodontic retention. Additionally, it will touch upon evidence that HFLM vibration is useful in increasing bone density and trabecular bone thickness suggesting applications in implant dentistry and prosthodontics.

Current vibration devices used in orthodontic therapy

As mentioned previously, the most common, commercially available, vibration device for orthodontic treatment is AcceleDent manufactured by OrthoAccel Technologies. This device delivers a vibrational frequency of 30 Hz and requires 20 minutes per day user wear time.

Several early studies on the AcceleDent device seemed to demonstrate higher rates of OTM than the established norms. However, there are other more recent studies that have failed to establish the advantages of the same therapy. A study by Woodhouse et al. (2015) analysed the AcceleDent device to demonstrate its effect on OTM in extraction cases. They found that the supplemental vibrational force did not significantly increase rates of orthodontic alignment with a fixed appliance. Another comprehensive report on vibration therapy by investigators Yadav et al. (2015) concluded that low frequency mechanical vibration using AcceleDent had no significant effect in accelerating tooth movement.

The recent studies regarding the apparent ineffectiveness of AcceleDent may be explained by the
relatively low vibrational frequency of the device. For purposes of this discussion low and high frequency are defined as:

Low frequency—less than or equal to 45 Hz;  
High frequency—greater than or equal to 90 Hz.

In a 2010 study by Judex and Rubin, ovariectomised rats were subjected to either low or high frequency vibration. Bone formation rates for subjects treated with high frequency were 159% greater when compared to controls, whereas bone formation for low frequency rat subjects were not significantly different than controls. Trabecular bone volume and thickness were also significantly higher for subjects treated with high frequency. Similarly Alikhani et al. found a statistically higher rate of alveolar bone formation (+190%) at higher frequencies, with a 5 min/day application. In short, the most pronounced osteogenic effects of vibration seem to occur well above the AcceleDent’s low vibrational frequency.14, 18

Practically speaking, five minutes of daily wear time may be beneficial, as it will reduce the dependency on significant patient compliance. In order to realise the maximum benefits of vibration therapy, shorter wear times would logically increase compliance, and improve results. Given all other factors being equal, the studies suggest that a higher frequency device would deliver equivalent amounts of HFA Energy to the dentition in a significantly reduced timeframe.

The future of vibration therapy:  
Expanded application, multiple benefits

The apparent limitations of current commercially available vibration devices should not diminish the potential importance of vibration therapy. Setting aside applications such as implant dentistry and prostodontics suggested by the osteogenic properties associated with vibration therapy, there are at least four important clinically beneficial orthodontic applications that can be anticipated. These potential applications are: 1) as a nightly clear aligner seating device; 2) analgesia; relief from normal discomfort associated with orthodontic treatment; 3) accelerated orthodontic tooth movement; 4) and enhancement of retention to minimise orthodontic relapse. What follows is a brief examination of each of the four applications of HFLM vibration as an orthodontic therapy.

Improved aligner seating  
The importance of properly seated aligners, to efficient tooth movement in aligner therapy is clearly understood. Improperly seated aligners can slow treatment, forcing patients to back track to previous trays, and create unintended collateral tooth movements, with a consequence being time consuming and costly refinements. Seating recommendations range from using ‘chewies’, to biting on hard objects. Some clinicians advise seating only when trays are new (immediately post change), while others recommend daily seating. With the current seating modalities, it is unlikely that patients consistently seat aligners fully. A seating protocol, that takes only five minutes nightly, delivering a range of other patient benefits, would insure that aligners are fully seated throughout treatment. Consistent proper aligner seating, would likely result in more efficient, faster aligner treatment, even absent biomechanical acceleration caused by vibration itself.

Non-pharmacological analgesia  
Discomfort or pain is a common side effect of orthodontic treatment. The forces applied to the dentoalveolar complex which are required to move teeth, compress the periodontal ligament (PDL) causing inflammation. Pain is most notable when seating a new aligner, or immediately after wire changes and adjustments, when pressure on the PDL is at its greatest, and diminishes as the aligner material expands, and/or the dentition comply. In a study accepted in September 2015 by the Angle Orthodontist for future publication, Lobre et al found in a randomised clinical trial that vibration therapy ‘resulted in significantly lower perceived pain and less OTC medication use’. One theory is that vibration restores normal circulation to the PDL, which is otherwise restricted by compressive forces. Increased blood flow intercepts the ischaemic response and limits inflammation.
trends & applications  vibration therapy

Accelerated OTM

It is well established that bone undergoes formation and resorption in response to external loading such as gravitational forces, as well as to internal loading such as muscular activity. Recent research with both animal and human models have demonstrated anabolic responses such as bone growth and changes in bone mineral density in response to vibration. Since OTM is fundamentally based on bone remodelling (formation and resorption) there is little doubt that HFLM vibration has the potential to favourably impact OTM.

In a recent split-mouth randomised trial involving bilateral maxillary canine distraction after first pre-molar extraction on 15 human subjects, Leethanakul et al. (2015) investigated the impact of vibration on accelerated tooth movement, as well as on cytokine activity related to osteoblast and osteoclast differentiation (specifically IL-1β levels in GCF). The patients applied vibration to the experimental canine using a commercially available electric toothbrush operating at high frequency (125 Hz). This study found significantly increased tooth movement (~+61%) accompanied by a three-fold increase in average IL-1β levels.

Enhanced retention

Vibration therapy warrants the attention of the scientific community to further explore its effect during the orthodontic retention phase. Scientific literature documents that the primary reason for orthodontic relapse is the inability of collagen fibres (Transseptal fibres and PDL) to reorganise quickly after the completion of orthodontic treatment and the delay in new bone apposition. Studies suggest that vibration can have potentially favourable impacts on both bone formation and reorganisation of the PDL fibres.

A study from Rubin et al (referred above) states that vibration therapy by itself has always been anabolic, which means it led to bone apposition and a decrease in bone resorption. Reports have documented an increase in bone density, bone formation, Type-1 collagen and non-collagenous matrix protein expression in response to the therapy.

Recent studies by Yadav et al. (2015) and Alikhani (2012) (both referred above), have demonstrated that vibration therapy improved not only bone density, but also restored the integrity and thickness of the collagen fibres. With evidence suggesting that vibration therapy positively impacts both bone morphology and the PDL fibres, vibration during the retention phase may play a significant role in preventing orthodontic relapse.

Conclusions

1. The current debate over vibration therapy and its impact on accelerated orthodontic tooth movement, should consider other potential benefits of this therapy including applications for aligner seating, relief of normal orthodontic pain, enhanced retention and applications to implant dentistry and prosthodontics.
2. It can be hypothesised that a vibration device operating in the high frequency range would likely be most effective in creating OTM as well as offering shorter wear times impacting compliance. The most commonly available commercial device operates at a frequency that is below thresholds having statistical significance in creating orthodontic tooth movement as documented in several
recent studies, and requires a relatively long, 20 minutes daily wear time.

3. The strong supporting data concerning the positive effects of vibration therapy on bone formation, bone density and collagen fibre reorganization leads us to believe that this modality of treatment may revolutionise the concept of orthodontic retention.

4. The effects of high frequency vibration therapy may be useful in modifying the bone density to the clinician’s advantage in implant placement or to maintain the thickness of bone trabeculae in edentulous patients undergoing prosthodontic treatment._

References


Author: Dr Kamis Gaballah, UAE

The last two decades have seen significant advances in restorative techniques and materials for dentistry. The latter, along with community-based preventive measures that aim to reduce the incidence of caries, have resulted in many patients living with functional teeth for a longer period. Yet, extraction of teeth forms the considerable bulk of the workload in oral surgeries owing to several factors, including the late presentation of patients with advanced dental disease, the presence of symptomatic impacted teeth, such as third molars, and the need to extract teeth for orthodontic or orthognathic treatment.

The extraction of teeth varies greatly based on the type of patient who is undergoing the procedure. For example, elderly patients with significant co-morbidities and on a complex combination of medications as compared with young healthy individuals render the procedure complicated and require much more preparation with modifications during and after patient management. Additionally, extractions can range from a single, fully erupted tooth with favourable morphology to multiple misaligned, impacted teeth or teeth with challenging morphology. Local anatomy, such as tooth proximity to the nerve, maxillary sinus and tuberosity, also plays a significant role. These variations usually dictate who is to perform the extraction, as many general practitioners deal with less complicated cases of dental extraction in individuals regarded as healthy patients and may not feel comfortable operating on medically complex patients.

Complex extraction cases have been linked to a higher rate of postoperative complications; therefore, a cautious and systematic approach should be adopted that includes a detailed preoperative assessment to predict the potential difficulties that might arise during extraction. The documentation of all complicating risk factors along with their potential postoperative morbidities is crucial and should be included in the informed consent. In the following article, other useful tips will be provided that are not usually included in traditional textbooks or lecture notes to help general practitioners to perform safer extractions.

During clinical examination, it has been proven useful to observe the patient’s build. Tall and muscular individuals tend to have a long ramus with a higher mandibular foramen, and this increases the possibility of failure of the inferior dental nerve block procedure if the former is not taken into account when determining the height of the injection site. This can be
aided by tracing the inferior dental canal (IDC) to the mandibular foramen in the preoperative panoramic radiograph. The teeth of such individuals may also have longer and more curved roots and be embedded in highly dense, compact alveolar bone, and thus sectioning of the teeth may be required to ease the resistance. Racial differences should also be taken into account, as extractions of teeth from individuals of Afro-Caribbean descent tend to be more challenging owing to the hardness of their bone and divergence of roots in their molars.

The resistance of hard tissue should be expected, particularly if maxillary second and third molars are being extracted, as the potential for fracture of both the buccal plate and the tuberosity is relatively common when excessive force is applied with dental forceps. Fracture of the tuberosity may produce irregular sharp bony boundaries, significant soft-tissue laceration and potentially an oroantral fistula. If such risk factors are identified, tooth sectioning should be followed by elevation of roots with dental luxatomes instead of traditional elevators or forceps, which are known to deliver much higher force to the alveolar bone.

The indications for the extraction of impacted lower third molars (LM3) have been the subject of long-standing debate. Surgical procedures for the extraction of unerupted LM3 are associated with significant morbidity. This includes pain, swelling and the possibility of temporary or permanent nerve damage, resulting in altered sensation of the lip, chin, gingiva or tongue. Damage to the inferior dental nerve (IDN) is a well-known complication of surgical extraction of deeply impacted LM3. It should be acknowledged that this is not simply a loss of sensation; the damaged nerve can be responsible for a number of abnormal sensations, including sharp pain and abnormal response to stimuli, such as the perception of a light touch as a sharp stab. This can have a significant impact on quality of life for many patients.

Injury to the IDN may occur from compression of the nerve, either indirectly by forces transmitted by the root and surrounding bone during elevation or directly by surgical instruments, such as elevators. The nerve may also become transected by rotary instruments or during extraction of a tooth whose roots are notched or perforated by the IDN. The risk factors for IDN injury during extraction of LM3 are shown in Table I.

Preoperative radiographic investigations may include intra-oral images, such as occlusal radiographs; panoramic views of the jaws; and conventional CT or CBCT scans. It should be noted that risk-predicting signs in radiographs only indicate that there is an increased risk of nerve damage associated with the extraction of the corresponding third molar. However, they cannot actually prevent the nerve injury if the tooth is to be extracted. The effective strategies that may avoid or minimise the risk of injury to the IDN can be collectively categorised into two main sets. The first is the preoperative workup, which should include critical assessment of the need to extract the third molar, clinical examination and radiographic investigation, and the second is intra-operative measures, including proper selection of local anaesthetic agent, the injection technique, modification of the surgical procedure and measures to reduce the degree of potential injury to the nerve.

Most literature published in the last decade has given us sufficient evidence to suggest a significant risk of damage to both the inferior dental and the lingual nerve owing to the nerve block procedure.

This injury may be related to the pharmacological properties of the agent itself or the injection technique. Studies have shown that the lingual nerve is affected approximately twice as often as the IDN, and one reason for this may be the fascicular pattern in the region where the injection is given. It also appears that about half of patients feel an electric shock sensation during injection.

There is a higher incidence of reports of nerve injury after the use of articaine and prilocaine. Although the reason for this remains unknown, it has been suggested that this may be because they are 4 % solutions, whereas the other commonly used local anaesthetics have lower concentrations. Others associate the damage with the neurotoxicity potential of 4 % articaine and 3–4 % prilocaine. Hence, it is rec-
trends & applications tooth extractions

ommended that the use of such anaesthetics be limited to local infiltration. It has been claimed that needle contact with a nerve felt by the patient as an electric shock is related to injection injury. An obvious explanation is that the possibility of mechanical injury to the nerve is more likely in the case of multiple repeated attempts at the inferior dental nerve block procedure. Therefore, it is crucial that the operator achieve optimal pain control with minimal episodes of injection with minimal doses of anaesthetic agent.

The surgery should be planned according to the information obtained from the preoperative assessment process. The procedure itself should aim to minimise the manipulation around the IDC. Both should include the carefully planned access, tooth sectioning and elevation techniques. In many scenarios, the extraction of the whole tooth may carry an unavoidable risk of injury to the nerve, therefore intentional retention of parts of the tooth was proposed via a planned procedure introduced around 20 years ago called coronectomy. This is the removal of the crown of a tooth, leaving the root in situ. It is merely adopted to avoid or minimise damage to the IDN. The rate of complications after coronectomy is comparable to that observed after surgical extraction, except with a significantly low incidence of injury to the IDN.

It should be noted that both sectioning and coronectomy can be performed with a shorter incision, as the amount of bone removal required is minimal, thus minimising the postoperative morbidity. However, it cannot be performed in all cases in which the LM3 is close to the IDC and is certainly contra-indicated when the LM3 is decayed or its roots are associated with a pathology and should be considered with caution in severely inclined mesio-angular and horizontal impaction cases. The author does not recommend distal bone removal or retraction of the lingual flap with the intention of protecting the lingual nerve, as these may increase the risk of damaging the lingual nerve. It should be emphasised that incision may not extend beyond the distobuccal aspect of the tooth.

The other important aspect of the dental extraction procedure is the future replacement of the tooth to be extracted. The current trend of tooth replacement for both functional and aesthetic reasons is the placement of dental implants. The success of this treatment largely depends on the availability of healthy bone in sufficient volume. Therefore, it is crucial for the dental practitioner not to compromise the alveolar bone during extraction of the teeth. Changes in the alveolar bone ridge after an extraction are inevitable. After all dental extractions, bone height and width alterations undergo dimensional changes. Bone does not regenerate above the level of the alveolar crest, that is, its height will not increase during healing. The buccal plate tends to shrink, shifting the crest of the alveolar ridge lingually, and often forms a concavity. Such changes are proportional to the amount of trauma to the soft- and hard-tissue during the extraction.

An additional unfavourable change that may take place is the slow remodelling of the bone formed to fill up the extraction socket owing to lack of functional stimulation. The presence of poorly remodelled alveolar bone may compromise the stability and function of the future implant. Furthermore, studies show that the stripping and elevation of mucoperiosteal tissue produce a higher number of osteoclasts within the alveolar ridge and hence greater resorption and shrinkage are seen after the classical surgical or the traumatic extraction of teeth.

The preservation of alveolar bone for future implant placement may be achieved by avoiding unnecessary bone removal and stripping of the periosteum during surgery, as well as performing a surgical alveolar bone preservation procedure. Bone removal can be largely avoided or minimised through modification of the traditional extraction technique.

The first such modification is the use of dental periodontal ligament fibres and widen the socket without causing cracks or fracture of the cortical plates, as commonly encountered when using dental forceps or the bulky elevators. The use of such gentle instruments also eliminates the need for elevation of mucoperiosteal tissue. However, it should be noted that the safe use of these instruments requires adequate training and should be encouraged during undergraduate clinics. Clot stabilisation through light packing of the socket with collagen sponges may help to minimise clot dislodgment, as well as accelerate the healing process and bone regeneration.

The second strategy is the alveolar bone preservation procedure. This includes packing the extraction socket with different fillers, such as osteoinductive or osteoconductive materials, like autogenous, natural or synthetic bone grafting materials that support the alveolar socket walls, thus preventing their collapse and shrinkage. It should be noted that this intervention can only slow down the post-extraction changes to improve the success of the dental implant, but cannot stop them altogether.

Finally, post-extraction care should include an explanation of the healing process and potential symptoms encountered after such procedures. The prescription of medications should be limited to non-steroidal anti-inflammatory drugs in most cases and imprudent use of antibiotics or socket dressing should be avoided.

contact

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Trial of a new rapid palatal expansion screw

Authors: Drs Gabriele Galassini, Elena Marcuzzi & Paulina Natasa, Italy

Introduction

Rapid palatal expansion has been a well-established procedure in orthodontic practice for many years now.

The first expansion was performed in 1860 by Emerson C. Angell, who, in San Francisco, expanded the maxillary arch of a fourteen-and-a-half-year-old girl by a quarter of an inch in 2 weeks and noted the creation of an interincisal diastema, a sign that the expansion of the palatal suture had occurred. This expansion was published in Dental Cosmos San Francisco Medical Press in 1860.

Different types of screws and activation protocols have been developed over the years.

In the following project, we tested an innovative screw, the characteristics of which allow for safe and effective activation, the quantity of which can be easily controlled.

External examination of the screw (Figs. 1a & b)

- Compact in appearance (7.5 x 12 mm) with rounded edges and a very smooth structure.
- The small screw cylinder has four teeth for preventing return.
- Small casing to prevent the screw from unwinding.
- Notches for controlling the amount of activation: each notch corresponds to 2 mm of activation.
- Stopping pins which firmly block the (Expander) once opened.

This device prevents complete separation of the screw, with its subsequent disconnection and accidental opening of the two parts of the Expander.

Bench testing (Figs. 2a & b)

The opening of the screw with the special key was tested. The direction of activation is clearly indicated.
with a very visible arrow printed on the body of the Expander.

The screw is activated by turning the key as far as it will go. At the end of each activation a loud click sound is heard, which is made when it meets the braking ring, provided with the device. The braking ring prevents the screw from unwinding when the activation screw is removed. This ensures the screw has been activated correctly and allows for the simple reinsertion of the key at the next activation, leaving the insertion hole perfectly accessible.

There are notches for controlling how much the Expander is activated.

The first two notches are stamped onto the body of the Expander, while the others are stamped on the concentric sliding guides. The latter notches are therefore visible during activation while the screw is opening.

The notches are positioned 2 mm apart from each other.

Each activation moves the screw forward by 0.2 mm, corresponding to a 1/4 turn of the total circumference of the screw.

The screw is therefore particularly stable for the whole expansion process; this is thanks to the double concentric sliding guide, which is one of the peculiarities of this Expander.

The Expander remains stable until its maximum opening limit is reached, at which point it blocks without disconnecting the screw itself, thanks to a solid stopping device. This means it is possible to take advantage of the full length of the screw in absolute safety.

Clinical test (Figs. 3a–c)

We tested the Expander on a 5-year-old patient with a left-sided cross bite. We wanted to choose a very young patient with a very small palate, given that it is mainly in these patients that difficulties are most frequently encountered when activating the screws. These difficulties are linked to the confined spaces available for operating in. As a result, when the parent removes the key after activating the screw, he/she almost always tends to bring the screw back again, reducing how much they have activated it by. As a result, it is difficult for the clinician to evaluate the real amount of expansion.

Activation protocol

The Expander was bonded to two bands and cemented onto the second deciduous molars and the rapid expansion protocol was implemented, which provides for the activation of the screw twice a day (Figs. 4a & b).

We asked the parents to do this themselves, but remained contactable at all times for anything they needed or in case of emergency.
The patient was examined after one week. The parents reported that they had noted the creation of an inter-incisive diastema on the 5th day, as is generally the case at this age, from our experience.

We discharged the patient after having personally activated the screw to check its stability and the efficacy of the stopping device.

On the 14th day, we terminated activation as the pre-determined amount of expansion of 5.5 mm had been reached (Figs. 5a & b). The correct amount of activation was confirmed by the reference notches. As you can see from the photo, the third notch is about to appear, indicating 6 mm, but is still slightly hidden by the sliding guide, while the two previous notches are clearly visible on the body of the Expander.

The Expander remained blocked in the mouth for 1 month and was then replaced with a Quad helix (Fig. 6), which includes a marker for lingual repositioning.

The Quad helix remained in the mouth for another 4 months, after which no other type of restraint was required. This protocol provides for the replacement of the rapid expander with a Quad helix 1 month after the end of activation. It is a protocol we have been using for more than 20 years and has been tested on more than a hundred cases, proving to be particularly effective and free of any contraindications.

In fact in our opinion, 1 month is more than enough for the consolidation of the midpalatal suture, given that this is the average time required for the consolidation of fractures.

The replacement of the Expander with a Quad helix provided with a lingual marker offers the following advantages: it reduces the encumbrance to the palate. In fact, often owing to its encumbrance, the rapid Expander forces the tongue into a low, forward position, with a subsequent open bite from lingual dysfunction.

As well as maintaining the breadth obtained with the rapid expander, the Quad helix can also increase it, by activating it by the required amount.

Thanks to the lingual marker, together with the modest encumbrance to the palate offered by the Quad helix (note its modelling in the photo), myofunctional re-education can be initiated immediately. This is definitely more important, in terms of the stability of the expansion and the prolonged use of the expander as a maintenance guard, given that the same prevents correct lingual repositioning, an indispensable condition for the stability of our treatment in the long term.

In addition, since it is an elastic device, the Quad helix does not block the two hemimaxillae together, thus allowing the jaw to adapt to the occlusal forces, certainly a useful condition for the cranial architecture, which is also welcomed for osteopathic treatment.

Conclusions

In both bench and clinical testing, the Expander has proven to be extremely precise, assembled with care, solid and without any flexion.

The parents of the patient activated the screw at home with particular ease and precision, thanks to the braking device. In fact this feature enabled them to hear a ‘click’ upon each activation, and above all to not turn the screw back when removing the key, thus undoing the activation they had just completed. This is such a frequent occurrence during the activation of traditional Expanders. The whole process went ahead without any problems and with the maximum level of comfort for the young girl, thanks also to the compact size of the Expander, permitting effective and safe use in very young patients.

The arm and the screw of the Expander were proven to be precise and without any flexion. The reference notches printed on the screw enabled the clinician to check that the activation had been performed correctly. All this resulted in a greater sense of security for both the patient and the therapist, as well as being appreciated as an indicator of a high level of professionalism...
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From straightforward to complex cases

The new NimrodAligner and why it can be the ultimate orthodontic removable aligning system

Authors: Nimrod Tal & Lauren Flannery, UK

Fig. 1–5: Designed to move from 5-5 in all directions, and also widen the molars, the NimrodAligner comprises of lingual and labial arch wires attached to individual cups that seat on each tooth with the aid of a composite anchor, and a connecting bar to seat on the palate or the lingual area, that are attached to molar cups.

As a dental practitioner, helping your patient look to improve their smile by undergoing orthodontic treatment with one of the many aligning systems available can be a very daunting decision to make when it comes to choosing the right system. Whatever their lifestyle, the attributes most commonly sought after are typically comfort, discreetness and for the treatment time to be as speedy as possible. Depending on the case, it can sometimes be quite difficult to achieve all of these aims within one single aligning system, as each are designed to achieve very specific and individual movements, and not all are designed to do this with the whole arch.

As an orthodontic laboratory, we are introduced to hundreds of very individual cases on a weekly basis, where more often than not patients will have specified that the above attributes are key to their decision making process when we assess for the appliances that will be best suited to their particular case. After having been faced so regularly with the task of assisting our clients to make the decision that will benefit their patients in as many aspects as they can, we had a thought—what if the advantages of each of these aligning systems were combined, and the disadvantages eliminated? It was from this that the idea of our brand new NimrodAligner stemmed.

Designed to move from 5-5 in all directions, and also widen the molars (Fig. 1), the NimrodAligner comprises of lingual and labial arch wires attached to individual cups that seat on each tooth with the aid of a composite anchor, and a connecting bar to seat on the palate or the lingual area, that are attached to molar cups. After having spent four years researching the most effective
components and combining them using prototypes with 3-D printers, we have combined the biomechanics of straight wire, Clear Aligners and a spring aligner to reduce the downsides of having treatment considerably and focus more on the positive features.

Typically most common with adolescents, fixed brackets appear to be decreasing in popularity, mostly due to the fact that they are not particularly aesthetically pleasing and can therefore encourage a feeling of embarrassment for adults when in public. Combined with hours of clinical time spent fitting and repositioning the individual brackets, hygienic problems owing to not being able to brush or floss properly, as well as the discomfort of their often sharp exterior both labially and lingually, it is no surprise that they are not as often requested as more popular removable aligners. The NimrodAligner has the fixed brackets arch wires biomechanics incorporated within the removable appliance so clinical time is extremely minimal. The teeth and gums can also be cleaned to the proper standard and at only 2 mm in thickness (Fig. 5)—as opposed to the standard 3 to 3.5 mm thickness of fixed brackets—so the overall feel is very anatomically friendly.

Clear Aligners are the most anatomically friendly appliances on the market today, and are mostly popular because of just how discreet they are. Despite these advantages, the force and pressure induced during the initial days of wear can be very painful. Although a sign that they are working as they should, the aligners tend to become passive as time passes and are typically only at their most active in just the first seven days. On the other hand with the NimrodAligner, NiTi wires ensure that the pressure is gentle, yet provide continuous support.

Multiple Clear Aligner trays can also become very tedious for both patient and dentist, particularly when frequent appointments are necessary and stages of interproximal reduction (IPR) have to be carried out. IPR can be a huge factor in the progress of Clear Aligners as each aligner is made to incorporate the necessary IPR after each stage and the fit of following trays will be affected if not enough has been done. This is not a problem for the NimrodAligner as it will not affect the fit of the appliance if there has been insufficient IPR on the previous appointment. The patient can continue to wear it and IPR can be completed where necessary on the next appointment.

Similarly, spring aligners can also continue to be worn and fit correctly in between appointments if not enough IPR has been done previously, however they’re widely known for limited movement to just four incisors. It may be good for labial/lingual movement using the ‘squeeze’ effect, and some rotation, but Clear Aligners can often be required to finish.

In some instances, a separate expansion appliance may be required prior to treatment, which essentially boosts costs and adds time onto treatment overall. We have reduced this concern by offering this stage for such cases within the NimrodAligner singularly.
The arch can gain molar width by pre-setting the molars in a wider position when it comes to making the movements on our 3-D system, and the connecting bar can act as a spring thanks to its flexibility.

The rest of the teeth will continue to be aligned during this process.

In more complex cases however whereby a separate expansion appliance is unavoidable, two NimrodAligners will be provided. The caps will not fit on the teeth that are blocked in otherwise, so the initial appliance will create space for the blocked teeth. Once they have been exposed, the second appliance would be provided to sit on all of the teeth.

During our research and production stages, we aimed to create the ultimate orthodontic removable aligning system that could potentially be the answer to the prayers of dentists and patients alike. We have reduced clinical time dramatically by removing the time-consuming hassle of fitting appliances such as fixed brackets by providing a bespoke pre-aligned appliance that simply needs to be placed on the teeth. We have taken into consideration the fact that multiple appliances can sometimes be necessary to achieve the desired result, and have eliminated the need for this by designing the NimrodAligner in a way that allows the entire arch to move in any direction. In case expansion is also required, we have this incorporated (Fig. 1).

We have adapted the force and pressure of the movement to be effective for just sixteen hours a day, allowing the patients to remove the appliance for an entire eight hour working day if they wish, to grant the roots a sufficient amount of time to recover.

By combining all of the positive aspects of the orthodontic appliances mentioned above, the NimrodAligner can be suitable for most cases from straightforward to complex.

**Figs. 6–9:** By combining all of the positive aspects of different orthodontic appliances, the NimrodAligner can be suitable for most cases from straightforward to complex.

**contact**

Nimrod Tal is the director of NimroDENTAL Orthodontic Solutions in London. He can be contacted at contact@nimrodental.co.uk.
LEONARDO has several innovative features to be easily used from doctors, technicians and patients. The two telescopic components remain always slotted for a maximal longitudinal and torsional rigidity and stability. Its in-built housing of the arms, ensures the highest resistance and a perfect oral hygiene. Patient’s comfort is ensured by its compact dimensions, even with narrowed palatals. Doctors don’t have to worry about disassembly at maximum expansion, being LEONARDO provided with a mechanical stop to prevent disassembling. The innovative anti-unscrewing system prevents the spin back effect and reduces the treatment time.


Innovative features:

**Stability.** Telescopic components are slotted for the highest stability even at its maximum opening.

**Easy to use.** Chamfered hole simplifies activation key insertion for patients. Doctors can easily read the opening level achieved, thanks to the graduate scale on the telescopic arms.

**Resistance.** The in-built housing of the arms and the laser welding grant resistance and good oral hygiene.

**Compact dimensions.** Body design minimize encumbrance and increase patient’s comfort.

**Safety.** Its mechanical stop prevents disassembling at the maximum expansion and the anti-unscrewing system prevents any spin back effect.
The power of precision

Author: Claus Schendell, Germany

Over the past 25 years of manufacturing, I have been asked many questions regarding design, material and manufacturing techniques of orthodontic brackets. Each time you ask me a question, I realise that the design and manufacturing end of orthodontics must seem like a top secret file kept safely hidden away. That can leave you, the orthodontist, dazed and confused by the varying array of brackets on the market. What makes them different, how do you choose what is best for you and your practice?

The importance of the intimate fit

In orthodontics, placing maximum prescription arch wires in a preadjusted bracket is designed to produce three-dimensional, tooth-moving forces (Fig. 1). These forces can only be created as a result of an intimate fit of the wires into the bracket slot, any gap between these components will result in incomplete transmission of the bracket prescription to the tooth and its supporting tissues (Fig. 1).

We are not all the same

This intimate fit has proved difficult to achieve by many metal injection moulding (MIM) manufacturers. Numerous scientific studies have discovered and reported inaccuracy of the orthodontic bracket slot and the negative influence on orthodontic treatment (Fig. 3).

Every year for the past 10 years, I have selected brackets from around the world and tested them for accuracy, always in an effort to improve my technique or simply to see how others were progressing.

I tested the following simple characteristics (Fig. 4):

A. Is the slot accurate?
B. Are the walls of the slot parallel?
C. Are the corners 90 degrees?

I was always ready to discover that perhaps new manufacturing methods were proving promising. Year after year, measurements of MIM brackets produced consistently unsatisfactory inaccurate results. The majority of MIM brackets during my yearly measurement study continuously measured larger than what was reported by the manufacturers. With a smaller percentage measuring smaller, this proved later in my research to be a twofold problem.

1. MIM manufacturing processes are notoriously difficult to manage and control, precision and consistency of each run varies considerably.
2. Bracket and tube dimensions of +/- 3 degree tolerance are acceptable benchmarks by many MIM manufacturers and are considered as sufficiently adequate (Fig. 2).

These values have been clinically analysed and have proven to have a profound influence on torque expression, as reported in numerous clinical publications (Fig. 3).

It is not by accident that within the world of engineering, CNC Milling dominates high-tech products, high-end watches, Formula 1, and aerospace engineering. Every step can be precisely reproduced over...
and over with the identical velocity, feed and location, without any varying components, including human fatigue. This control enables me to produce bracket slots less than a thousandth of an inch, every run and every year for the past 25 years.

For orthodontists striving for excellence, it is important to understand that different manufacturing techniques produce different results. Avoid the mindset that all bracket systems are more or less the same. Physical principles always stay the same

Inaccurate slots and inaccurate geometry will result in an incomplete transmission of the bracket prescription—it is simple physics. Movement of teeth requires application of forces, and periodontal tissue responds to these forces. Force mechanics are governed by physical principles such as the laws of Newton and Hooke.

Newton’s Laws
- The law of inertia
- The law of acceleration
- The law of action and reaction

What does inaccuracy mean to you?

Inaccuracy within the bracket slot is fully experienced when three-dimensional control is required. For example, during a case when you require incisor inclination correction, additional root torque would need to be added to overcome the inaccurate slot. Sadly orthodontists have come to accept, and fully expect oversized slots and lack of precision within the bracket system they use. However accepting this lack of precision as something that can’t be controlled is incorrect.

You should know how to solve these unexpected tooth movements, but you should not have to due to manufacturing inadequacies. I always liked Alexander’s simple explanation regarding the clinical torque problem, for every 0.001 inch of freedom between the archwire and the vertical bracket slot, approximately 5 degrees of effective torque is lost (Fig. 3). Think about when you apply this explanation to brackets with single digit torque values manufactured with inaccurate slot sizes, they have little, if any, advantage over a standard edgewise bracket.

Physics helps you choose

The principals of physics will never change; if your slot is inaccurate it will produce inaccurate results. This foundation of knowledge will help you navigate your way through the many bracket choices available in the market.

Accuracy within the slot is just one of the benchmarks met during the manufacturing of orthodontic brackets, but we cannot underestimate the significant role it plays for you, the orthodontist.

My role and goal as an engineer and manufacturer is to provide you with true and accurate tools, eliminating the guesswork and need to always compensate for a lack of precision, and enabling you to achieve optimal tooth movement and high-quality predictable results (Fig. 5).__

References
[1] Biomechanics in orthodontics, Ram S. Nanda, BDS, DDS, MS, PHD – Yahya S. Tosun, DDS, PHD.

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Rapid maxillary expansion: small details make the difference

Author: Gabriele Scommegna, Italy

Nowadays, rapid maxillary expansion (RME) is a quite popular orthodontic therapy since maxillary deficiency is probably the most recurrent problem that can be detected among patients.

The history of this therapy goes back to 1860 when Dr Emerson C. Angell wrote, and Dental Cosmos published, an article where he reported a case of a 14-year-old girl with a unilateral cross bite, treated by means of a jack-screw in order to widen the palate. The complete expansion was achieved in only two weeks and the patient showed an interincisor diastema (Figs. 1a & b).

Dr Angell was a real pioneer in dentofacial orthopaedics, and faced great criticism among the dental community even if, 35 years before the possibility of proving it by the use of X-ray, his palatal widening therapy was successfully and clearly proven today; in 1860 he defined the gold standard for actual maxillary expansion therapy.

An interesting fact to know but true as well as little sad, Dr Angell became frustrated with his colleagues’ opinions, so he decided to leave the orthodontic discipline, as well as San Francisco, ending his professional carrier as a medical doctor in the US.

Many years after Dr Angell’s futuristic vision, in the 1970s, Dr Haas reintroduced this therapy by means of an updated design of a rapid palatal expander, the so-called Haas expander (Fig. 2).

From that time, RME has been investigated several times by many authors focusing on the indications, the right timing, the various clinical procedures, initial outcomes and long-term stability, as well as regarding the influence of different appliance designs.

Today the ‘hygienic RME’, so called due to the absence of acrylic contacting with the palatal mucosa that facilitates oral hygiene, is largely more popular than the Haas one (Figs. 3a & b).

Leone, as one of the few orthodontic screw manufactures in the world, has played an important role in this development since the very beginning: in the early ’70s, Leone started the production of the first RME dedicated screw, fully made of stainless steel with four integrated arms (Figs. 4 and 5).

Since then, Leone has continuously improved the quality of the material, the production technology as well as widening the expander range in order to give the orthodontist the best tools to fit their various needs.
MIM
Molded Brackets
the ordinary method
creating the following clinical
DISADVANTAGES.

Affecting stability
due to remaining residuals of wax and polymers in the finished product

Up to +/− 20% slot size tolerance
due to the difficult control of the shrinking process

Rough surfaces facilitate the accumulation of plaque and development of micro corrosion

You only have to look closer to see the differences!

CNC
Milled Brackets
the extraordinary method
providing you with numerous clinical
ADVANTAGES.

High End stability
custom-cuts made from pure solid stainless steel

Dimensional tolerances in a thousandth of an inch achieve a slot accuracy smaller than a human hair with outstanding bonding strength and less failure rates

Absolute smooth satin finish prevents accumulation of plaque and eliminates micro-corrosion

Seeing is believing. MADE IN GERMANY.
clinical needs. Today, Leone offers a wide range of RME dedicated screws, all of them designed and manufactured in our high tech production facilities, fully made by surgical grade stainless steel, with laser welded arms while each of them bears a laser marked identifying lot number that allows for complete traceability.

Knowing that a RME appliance ‘produces the greatest dental and skeletal transverse changes by widening of the upper jaw, by separating the mid-palatal suture with large forces over a short time period, which subsequently allows the creation of more space for the permanent teeth’ (from Dental-pedia, McGill University, Faculty of Dentistry), we have always been positively concerned about the functionality of each screw, thus we have paid maximum attention in all steps from design to the final quality test.

We have conducted extensive tests in order to know the mechanic limit of each RME models: our findings show that the ‘weaker’ component is always the activation key (at over 12 kg of force) that acts as a ‘safety instrument’. In other words, it is highly unlikely that the RME will not produce a suture opening in youth patients, neither will the expansion mechanism be damaged by the counter force produced by the maxilla (Fig. 6).

Each part of the RME expansor is produced with tight tolerances and high polished surfaces to obtain controlled and precision expansion, once they are assembled together (Figs. 7 & 8).

Leone RME expansor’s unique feature is the connection of the arm to the screw body: the arm fits perfectly in a blind hole created inside of the housing, then it is held in position by means of external high power laser welding (Figs. 9–10). This exclusive
method eliminates the possibility of arm detachment both during lab arm bending and in clinical use, as well as avoiding the overheating of the joint area, keeping the full strength of the wire thus assuring the required power.

The orthodontist and the technician can choose among various models of Leone expandors and appliance designs in order to fabricate the most appropriate device for the patient (Fig. 11).

Since the RME is an appliance that produces an orthopaedic maxillary modification, the orthodontic lab technician has to pay attention to the position of the screw as well of the arms: there are specific rules to be followed, as shown in Fig. 12.

We have designed specific tools to facilitate the lab procedures, avoiding the unwanted damage of the screw mechanism, as well as the overstress of the arms (Figs. 13–15).

Leone RME screw range with four arms have an expansion capacity ranging from 7 mm to 13 mm (Fig. 16).

Figure 17 (courtesy of Prof. P. Cozza University of Tor Vergata, Rome, Italy) shows a RME Butterfly design.

A smaller expander (Fig. 18) with two arms was developed for use in younger patients with mixed dentition and reduced palatal volume.

Figures 19a–d (courtesy of Dr A. Fortini, Florence, Italy) gives an example of the use of the smaller expanson.

A RME with orthogonal arms has been developed in order to reduce the overall bulkiness, keeping a maximum stability thanks to the doubled guided pins expansion mechanism (Figs. 20–23; Figs. 22 & 23 courtesy of Prof. Franchi, University of Florence, Italy).

A special fan type RME has been developed to enhance the anterior space gaining in cases with intercanine diameter (Figs. 24–26; Fig. 26 courtesy of Dr E. Schellino, Turin, Italy).

Maxillary expansion can also be obtained by means of a spring-loaded screw such as the newly developed Leaf expander that can produce two force levels, 900 g and 450 g, giving the orthodontist the possibility to expand the maxilla dentally and/or basally (Figs. 27 & 28; Figs. 27a & b courtesy of Dr C. Lanteri, Casale Monferrat, Italy).

Thank you Dr Angell for your intuition that has literally ‘expanded’ the orthodontic possibilities!

Reference


contact

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Shortening treatment time by using OrthoPulse

By Biolux Research Ltd.

OrthoPulse uses safe, low intensity near infra-red light (850 nm wavelength) to facilitate bone remodeling on a molecular level without any adverse effects. This is the only device of its kind cleared by the US FDA for use with both fixed appliances or clear aligners.

Case presentation

Patient diagnosis
A 24-year-old female presented with Class I occlusion, a deep bite, and crowding along with a narrow maxillary and mandibular arch form (Fig. 1). Her right muscles of mastication, including the lateral pterygoid, were tender upon palpation. Incisors were asymmetrical due to bruxism.

Treatment goal
The patient was prescribed with Invisalign treatment to align teeth, broaden both arch forms to fill buccal corridors and improve upper cuspid torque. Aesthetic enameloplasty was also proposed to conceal bruxism wear.

Introduction
OrthoPulse is a clinically proven device that uses low levels of light energy to stimulate the periodontium and alveolar bone surrounding the roots of the teeth and facilitate tooth movement which may reduce treatment time.
Adjunctive OrthoPulse treatment of 5 minutes per arch daily was implemented to accelerate aligner progression, which occurred based on self-assessment. In a daily questionnaire, the patient was asked to report the following:
1. pain, a common side effect of orthodontic treatment due to applied forces,
2. air gaps, to monitor fit between orthodontic appointments and
3. pressure, as an indicator of orthodontic force magnitude.

When pressure was given the lowest rating, the patient would switch to her next aligner. The orthodontist, as expected, was in charge of the entire course of the treatment and verified tracking of the teeth in aligners during regular appointments.

Analysis of results achieved
Treatment using OrthoPulse progressed well. Archform development and tooth alignment were achieved in a time period of less than four months. The patient was changing Invisalign aligners every 5.5 days during her OrthoPulse active study phase. An interesting finding was that she was able to change aligners during her refinement/fine-tuning phase at the rate of every 4 days using OrthoPulse. Overall treatment time was less than one year, but it is important to note that several of the 12 months included non-OrthoPulse periods during the study and waiting for additional aligners during the refinement phase.

Clinical case prepared by Dr Todd Dickerson, USA.

**contact**

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www.orthopulse.com

Fig. 4: Final result on a panoramic X-ray.

Fig. 5: Final cephalometric X-ray.

Fig. 6: Final result.
The European Aligner Society is an international organisation established in 2013 that aims to promote education and research in aligner therapy. Trained in South Africa and with 22 years of clinical experience, Dr Graham Gardner has been running his own private practices in the UK since 2008. In an interview with Dental Tribune International, the EAS President shares his ideas and views about the importance of aligners in orthodontics and about the EAS, which he believes will become the society for aligner therapy.

DTI: Dr Gardner, you have been working with aligners for more than a decade now. What convinced you initially of this treatment method and what are the main advantages in your experience?

Dr Graham Gardner: From the beginning of my career in the early 1990s, a time when ceramic brackets and lingual braces became available, I was certainly aware of the fact that aesthetic appliances were going to be the future of orthodontics.

In 2001, I was fortunate to attend a certification course for Invisalign, which was truly a watershed moment in my orthodontic career because I saw the value and potential of aligner therapy for both dental professionals and patients. In my opinion, aligner therapy opened the door for a huge cohort of patients who would not have considered orthodontic therapy in the past mainly owing to aesthetic concerns. In addition to aesthetic benefits, aligners are far more comfortable than fixed appliances, as they are removable and hence facilitate oral hygiene during therapy.

They also move the teeth more gently with less pressure, which is favourable with regard to patient comfort and from a biological perspective too. Today, I treat over 75 per cent of patients with Invisalign in my practices.

In recent years, clear aligners have become a favourable treatment alternative to fixed appliances, and the global orthodontic supplies market is expected to reach about US$3.9 billion (€3.6 billion) by 2020. In your professional opinion, how will this market develop in the near future?

Over the past decade, aligners have become mainstream orthodontics and I definitely see this trend continuing and expanding.

With the technological advancements, including 3-D and CAD/CAM, that allow the clinician to diag-

**“We will be able to treat pretty much everything in the future”**

An interview with Dr Graham Gardner, UK, President of the European Aligner Society
nose, plan the treatment and confirm biomechanics in a far more in-depth way than ever before, orthodontics is now catching up with the high-tech world we live in—it is twenty-first-century orthodontics.

When aligners were first introduced to the market, there were some limitations and we could only treat mild malocclusions. However, aligner therapy has come of age and is now a genuine appliance system with which we can treat the majority of malocclusions.

At the moment, however, aligner therapy is still a fairly expensive form of orthodontics. Thus, I hope that improvements in materials and 3-D printing will render manufacture and the product itself more cost-effective. For example, 3-D printers could allow individual practices to print their own aligners in the future.

Overall, with technological advancements and increasing patient acceptance, we will be able to treat pretty much everything in the future in my view.

How have developments in the European and the overseas market differed?

Dentistry as a profession is very conservative and dentists in the US, for example, are perhaps a bit more progressive. However, with regard to aligners, I no longer really see a great difference between Europe and America. The movement is global and I suspect the advancements we are now seeing in Europe will match those in America and Asia...
Europe will match those in America and Asia, where aligner therapy is also very popular. There are always regional differences, also partly related to legal restrictions, but the trend towards aligner therapy is a global phenomenon.

**How does the EAS address the current trends in orthodontics?**

Aligner therapy has seen huge advancements over the past decade, with an increasing number of manufacturers offering different systems today. Thus, the main motivation behind the foundation of the EAS was to establish a neutral body—an international society that is independent of any aligner company and open to all dentists using aligners for orthodontic treatment.

The work of the EAS is characterised by three cornerstones. The first is education, namely arranging conferences and regional meetings and introducing clinical online forums, through which members can interact and share experiences and ideas. The second column of the EAS’s philosophy is communication. We aim to be a neutral organisation that patients can turn to for comprehensive information about aligner therapy and that members can consult for guidelines. Research is our third column, which is currently lagging behind. Eventually, we hope to have our own aligner journal or magazine and grant annual awards for excellence in aligner therapy.

With the help of our sponsors, the EAS will grow and become an international umbrella organisation to help promote education and research and development for aligner therapy.

The EAS is a fairly young organisation and hosted its first congress on 13 and 14 February in Vienna. What was the idea behind this event?

The EAS’s primary objective is education because, obviously, education underpins every profession and without it we simply stagnate. Therefore, we decided that our first event should be a congress held in the heart of Europe offering a broad spectrum of informative lectures and a showcase of different systems and products. At the first congress in Vienna, internationally distinguished speakers shared their views and expertise about aligner therapy. Moreover, the event offered manufacturers an independent forum for exhibiting their solutions.

Can dental professionals look forward to another EAS congress next year?

Based on the success of the inaugural event over the past weekend, we definitely want the congress to become a regular event in the calendar. While we are planning to hold the EAS congress every two years, we will be organising smaller regional forums on a continuous basis throughout every year.

Thank you very much for the interview.
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The global dental specialist GC corporation has expanded into the orthodontic market and has formed a new company, GC Orthodontics Europe GmbH.

GC Corporation, which is active throughout the world, is expanding its field of expertise and adding another powerful element to its portfolio with the creation of GC Orthodontics Europe GmbH. This move supports the philosophy of the GC group in providing high quality products and excellent service in orthodontics, with the desired aim of offering the greatest possible benefit for dentistry along with optimum practitioner and patient satisfaction. The foundation of GC Orthodontics Europe GmbH (GCOE) brings the GC Corporation closer to its goal of offering comprehensive dentistry services at the highest level. As one of the world’s leading dentistry firms, GC has been providing product solutions to the entire world for over 95 years, and now will be doing the same for orthodontics. Helping improve overall human health is one of the main principles of GCOE, which is committed to the values and philosophy of GC Corporation worldwide. Combining tradition and progress are just as important as high standards in products and services.

GC Orthodontics Europe GmbH is based in the German town of Breckerfeld and will be distributing the new product range directly in Germany and France, and will be working with exclusive official dealers in the rest of Europe, the Middle East and Africa. The company will benefit from close cooperation with its distribution partners in the individual countries with superior knowledge of their own markets and experience they have accumulated over the years.

“Our goal is to offer a comprehensive package of services to orthodontics, and provide our clients with quality management, product advice and training programmes for all orthodontic personnel. We will do this by offering top-quality customised product solutions, supported by innovative ordering options and hi-tech communication”, commented Jacques Peucat, European sales manager of GC Orthodontics Europe GmbH.

GC have partnered with the long-established expertise of the leading Japanese company Tomy Inc., a byword for innovation, efficiency and quality. ‘Made in Japan, assembled in Germany’; while most of the products will originate from Japan, some manufacturing and all distribution activities will take place in Germany, a great advantage for Europe. The use of the most innovative materials and technology will not only ensure that the highest processing and reliability standards are met, but will also allow patients of all ages undergoing orthodontic treatment to enjoy a comfortable and attractive outcome.

Jacques Peucat: “We offer a unique symbiosis of quality, service and know-how, and our objective is to transform the enthusiasm for orthodontics that we share with our clients into joint success. This passion is what drives us towards the global future of orthodontics.”

The product portfolio consists primarily of modern solutions for fixed orthodontics, including the self-ligating bracket systems in the Experience line. The brackets in this range include Experience Metal, Experience Ceramic and Experience Lingual, along with the Experience Mini Metal brackets, the attractive rhodium-coated versions of which are a real innovation in fixed orthodontics; scarcely higher than a conventional bracket, they are a highly effective combination of aesthetics, function and comfort.

The clients and partners of GC Orthodontics Europe GmbH will also benefit from one of GC Corporation’s key principles: the company will from the very beginning operate to the highest quality standards in all areas—products, services, environmental protection and sustainability— in this new area of activity—orthodontics.

Find your local dealer at www.gcorthodontics.eu/GC/en/content/european-organization

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diagnosis of bruxism

An easier way to detect bruxism

Bruxism is one of the most common parafunctions, commonly associated with sleep disorders. While existing home testing devices are expensive and not patient friendly, Bruxlab makes it possible to detect bruxism in a cheap and easy way. The Dutch company has developed diagnostic tools to record and quantify any grinding sounds using machine learning, mobile app technology and wearables.

Clinical signs of bruxism include excessive tooth wear, sensitive teeth, headaches and fatigued jaw muscles in the morning. However, sleepbruxism can stop spontaneously and may not be chronic. A dentist can therefore not determine whether there is active sleep and chronic bruxism by using conventional ways of diagnosing sleep bruxism. Dentists can now track patients using Bruxlab’s DoIGrind app to see if there is active bruxism and if it is chronic. The so-called Bruxsticker makes it possible to measure movement of the lower jaw during sleep. An integrated nano-accelerometer and Bluetooth chip, in combination with the app, record and filter tooth-grinding sounds over multiple nights.

The new idea behind Bruxlab is an algorithm that can filter any tooth-grinding sounds and tooth contact sounds. The latter often indicate the beginning of a clenching episode. The Bruxlab software validates the sounds using the gold standard, polysomnography, better known as a sleep test. This test will tell dentists if there was muscle activity at the same time that a grinding sound was detected. The device on which the app is loaded is placed next to the bed and records and filters any tooth-grinding sounds. On average, the Bruxlab technology reduces eight hours of sleep to five minutes of relevant sounds. The sounds are uploaded to the cloud, where the dentist can listen to them. Bruxism can now be easily detected thanks to Bruxlab.

Bruxlab
www.bruxlab.com

bruxism treatment

A cost-effective and custom solution for bruxism

In the U.S. alone, bruxism affects 10 per cent of people and as many as 15 per cent of children, according to the American Sleep Association. Once this oral habit has been identified, dentists usually prescribe a night guard or splint. However, many types of night guards exist on the market that do not fit perfectly owing to the hard acrylic material from which they are manufactured. Furthermore, while custom-made occlusal guards are the best permanent solution, not every patient affected by bruxism can afford such an expensive mouth guard. Insurance may cover a night guard only once in the patient’s lifetime. Therefore, many cases of bruxism go untreated, causing continued permanent damage to patients’ teeth.

U.S.-based Akervall Technologies offers an effective custom-made and cheaper solution: the SOVA Night Guard, the thinnest over-the-counter night guard on the market made of thermoplastic material. While the SOVA Night Guard is only 1.6 mm thick, it has been designed to withstand 30 per cent more impact than a conventional mouth guard. Patients have reported that within the first week of wearing the night guard, the pain caused by bruxism or temporomandibular joint dysfunction (TMD) was significantly reduced or stopped. Moreover, they have remarked on SOVA’s stability and thinness, as well as the ease of drinking and talking while wearing it.

The technology behind the SOVA Night Guard is called Diffusix and it works with unique perforations and special crumple zones that prevent grinding forces from travelling to the teeth, relieving pain and reducing the risk of dental injury. When a SOVA Night Guard is properly fitted, perforations oscillate on impact to diffuse grinding forces and guide those forces into the crumple zones. The perforations also allow for a true custom fit and natural flow of air and saliva.

The night guard starts as a flat horseshoe shape. After immersion in 130 °F (54 °C) water, the material becomes pliable. The night guard is then molded against the teeth until it hardens. Thus, rather than requiring taking an impression and sending it to the dental laboratory, the SOVA Night Guard can be molded in the office in under 5 minutes to provide the patient with an immediate solution. The appliance can be remolded up to 20 times. SOVA also works with orthodontics. As the teeth are moving, the night guard can be easily adjusted.

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clear aligner therapy

ClearCorrect clear aligner therapy discreetly improves crowding and constricted archforms

Today, there are more options available to those seeking orthodontic services than ever before thanks to advances in clear aligner therapy. The rising popularity of ClearCorrect and other clear aligner providers has spiked over the past decade, and is only expected to continue its aggressive growth trajectory. According to a recent Azoth Analytics research report, the global invisible braces market is expected to grow at an annual rate of 12.16 per cent from 2016 to 2021. Now more teens and adults are seeking orthodontic treatment for a wide variety of reasons, such as, improved aesthetics, affordability, and orthodontic relapse.

ClearCorrect aligners are more affordable than leading competing brands, allowing doctors to pass greater savings to their patients. Doctors can easily submit digital intraoral scans and manage their cases on the user-friendly website while also working with a designated customer service specialist. ClearCorrect is suitable for most treatment goals from minor cases to more advanced crowding and spacing complaints.

Dr Mark J. Bentele successfully treated a patient’s chief complaint of adolescent orthodontic relapse with ClearCorrect. The patient had a Class I right, Class I left molar relationship, with a Class I right, end-on Class II left canine relationship. Dr Bentele submitted the case to ClearCorrect and requested an improved upper and lower midline, and also requested an idealized overjet, improved overbite, and improvement of the constricted arch forms while maintaining molar relationship (Figs. 1–3). Proclination of the mandibular incisors was requested and #11 be distained into a proper Class I relationship, and all spaces were to be closed.

The ClearCorrect treatment plan estimated 24 sets of aligners. The patient was compliant wearing each set of aligners for three weeks (at least 22 hours a day). At the start of treatment, facial translation of premolars and canines occurred, and then engagers were placed on teeth Nos. 7, 10, 22 and 27 and 0.3 mm IPR was performed on the mesial/distal #27. After the engager placement, the patient received the fifth set of aligners and was also given his sixth set to take home. Next to complete the patient’s total treatment, a contact check on tooth #27 was performed to ensure patient compliance, and teeth Nos. 22 and 23 were correctly aligned.

The patient progressed more quickly than originally planned, and only needed 16 sets of aligners as opposed to 24 sets. At the end of the ClearCorrect treatment, all objectives were accomplished and the patient was instructed to wear retainers at night time indefinitely (Figs. 4–6). Upon treatment completion, Dr Bentele’s patient was very happy with the results and the effectiveness of ClearCorrect clear aligner therapy.

Founded in 2006 by dentists, ClearCorrect understands the needs of both doctors and patients, and has been proven effective for more than 20,000 doctors worldwide. Doctors find that ClearCorrect is easy to implement into their practice with convenient access to online optional training with marketing kits at their fingertips. The company designs, manufactures and supports its products out of its headquarters based in Round Rock, Texas, USA.

Teens and adults can benefit from clear aligner therapy due to the aesthetic, affordability, shorter treatment period, and lasting results.

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The 4th Scientific Congress for Aligner Orthodontics will take place on 18th and 19th November 2016 at the Cologne Gürzenich. With more than 500 participants and over 30 exhibitors, the DGAO Congress is the world's largest, independent aligner congress.

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OrthoPulse from Biolux Research shortens duration of orthodontic treatment

“How long will it take?” is the ever-recurring question most orthodontists hear during orthodontic treatment, especially with adults. An increasing number of patients are seeking shorter orthodontic treatment times. Various techniques exist to accelerate tooth movement and thereby shorten treatment time. Most of these approaches are invasive and require additional surgical interventions, reducing their acceptance by patients and orthodontists. One method that is gaining traction due to its convenience and effectiveness is the acceleration of orthodontic tooth movement through photobiomodulation with an OrthoPulse, a device from Canadian company Biolux Research Ltd.

What is photobiomodulation?
Photobiomodulation (PBM), also known as low-level light therapy (LLLT), is non-invasive and uses low energy lasers or light-emitting diodes (LED) to modify cellular biology by exposure to light in the red to near-infrared (NIR) wavelength range between 600 and 1,000 nm. This NIR light is almost invisible to the human eye; however it has been shown to provide a therapeutic benefit by increasing the metabolic activity of bone and soft tissues. PBM leads to a non-thermal photochemical reaction in the irradiated cells, of which the effect on the mitochondria should be particularly highlighted. Back in the 1930s, German chemist and Nobel laureate Otto Warburg discovered the effect of specific light frequencies on mitochondrial activity.

This therapy is used in dentistry for pain relief, dentinal hypersensitivity, treatment of cranio-mandibular dysfunction (CMD), improving implant stability, and treating mucositis, as well as in the acceleration of orthodontic treatments.

PBM therapy is painless and free of side effects, as shown in the application of other medical fields, such as acceleration of wound healing, physiotherapy or hair loss.

Since 2003, Biolux Research Ltd. focuses on photobiomodulation in the field of dentistry – or strictly speaking, the acceleration of bone regeneration.

Based on its experience in the areas of bone attachments and bone remodelling, Biolux entered the market with OrthoPulse (Fig. 2), a device for the acceleration of orthodontic treatment that can be used in combination with any fixed appliance, whether it is buccal or lingual, or treatment with aligners. The intraoral device is used daily by the patient and emits via the LEDs a NIR with a wavelength of 850 nm, which irradiates the buccal surface of the jaw towards the periodontium in order to accelerate bone remodeling. The energy density is 19.5 J/cm² for a daily use of 5 minutes per jaw.

After providing the patient with instructions in the practice, he uses the device once a day for 5 minutes per treated jaw. Accidental misuse by the patient is avoided thanks to the automatic start of the session once the device is in the mouth and stops once the treatment has been completed. The OrthoPulse smartphone app has been to provide doctors and patients with OrthoPulse treatment compliance at a glance, by tracking of the overall patient’s treatment consistency and percentage compliance. The continuous monitoring of the treatment by the orthodontist is ensured in the time between inspections.

In addition to shortening the duration of the treatment up to of 50% through the use of OrthoPulse, patients report significantly reduced
pain during the first days after the wire change or adjustment, as well as change of aligner.

Leading research institutions such as The Forsyth Institute, Cambridge, USA, and Kyung Hee University, Seoul, Korea are now examining the effects of PBM.

Research by Chiari et al at Boston University, studied the effect of PBM-induced tooth movement using extrorral transcutaneous phototherapy on the rat periodontium. The results showed a 2.8–3.7 x faster tooth movement.

Clinical research on the effect of PBM during orthodontic treatments provided astonishing results.

**Treatment with fixed appliances**
- No clinically significant root resorption
- 46 % increase in rate of space closure in adults; 28 % increase in rate of space closure\(^1\) in adolescents compared to control
- 54 % reduction in time to achieve anterior alignment\(^2\)
- 2.3x faster mean alignment rate\(^3\)
- No significant changes in root resorption greater than .32 mm\(^4\)

**Treatment with aligners**
- 66 % reduction in the average duration per aligner during OrthoPulse, treatment as compared to the conventionally recommended aligner wear duration\(^5\)
- No measurable root resorption over 6 months\(^6\)

**Editorial note:** Complete list of references is available from the publisher and at www.orthopulse.com.

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**Planmeca ProMax 3D units—Ideal for imaging patients with braces**

Planmeca ProMax 3D is a CBCT product family consisting of exceptional all-in-one imaging units. The intelligent units support several different imaging modalities and provide all needed specialist tools. As a reflection of their suitability for orthodontics, three of the Planmeca ProMax 3D units—Classic, Mid and Max—have now been certified for use with the suresmile treatment management system.

Planmeca ProMax 3D units have been designed to meet the strictest of requirements in maxillofacial imaging. They support three different types of 3-D imaging (CBCT, 3-D face photo and 3-D model scan), and also extraoral bitewing, cephalometric and digital panoramic imaging. This flexibility between 2-D and 3-D allows clinics to optimise their imaging procedures, and select the techniques that work best with each case—at an optimal patient dose.

The Braces imaging protocol of Planmeca ProMax 3D units is tailor-made for orthodontics, as it allows users to acquire a low dose CBCT image, which accurately shows the metal brackets on braces. With powerful artefact removal algorithms used in image reconstruction, the units produce images that reveal the exact position of roots in relation to bone.

The CBCT units’ stable support system helps patients remain completely still during imaging. This is especially important when acquiring high contrast images as part of orthodontic treatments.

**Certified for use with suresmile**
The Planmeca ProMax 3D Classic, Mid, and Max CBCT units are now certified for use with the suresmile treatment management system by OraMetrix.

The suresmile system has been designed to enable orthodontists to visualise and simulate multiple diagnostic set-ups and design customised archwires for every patient.

The accuracy of patient scans plays a critical role in maximising the effectiveness of the suresmile system. Combining the system with a CBCT unit allows the efficient visualisation and virtual manipulation of teeth and their roots. The orthodontic braces protocol of Planmeca ProMax 3D units has been optimised for use with the suresmile treatment management system.

**See more at a lower dose**
The effective patient dose of CBCT imaging is closely related to the protocol used for scanning. Planmeca has established itself as the industry leader in pioneering ultra low dose imaging. The innovative Planmeca Ultra Low Dose protocol available in all Planmeca ProMax 3D X-ray units reduces the effective patient dose in CBCT imaging significantly—without a statistical reduction in diagnostic image quality.

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AcceleDent Aura—Vibration device for orthodontic treatment

The most common concerns that prevent some patients from commencing orthodontic treatment are the length of treatment time and pain. Orthodontists and patients alike have found a solution to these treatment barriers with AcceleDent Aura, a prescription-only, Class II medical device employing SoftPulse Technology, which has been proven to accelerate orthodontic treatment by as much as 50 per cent and reduce pain associated with treatment. AcceleDent has clearance in more than 40 countries and the body of research supporting its safety and efficacy continues to grow as more orthodontists and patients report positive results with this non-invasive, accelerated-treatment technology.

Medical literature has shown that the application of low-level pulsatile forces to bone can restore balance to the bone deposition and resorption cycle. While their exact mechanisms of action are not understood, medical devices that transmit micro-pulses have been shown to prevent bone breakdown and to increase bone density in animal and human studies. Micro-pulse therapy continues to be researched as a viable treatment option for patients with osteoporosis and bone fractures. Orthodontic tooth movement is the result of controlled manipulation of the bone deposition and resorption cycle using arch wires, springs, aligners and other appliances to apply force to teeth, which in turn alters the environment of the alveolar bone. Applying micro-pulse technology, such as that used in AcceleDent, in conjunction with orthodontic appliances has been clinically shown to accelerate this process. Published in the peer-reviewed Seminars in Orthodontics, this prospective, double-blind, randomised, sham-controlled trial has demonstrated that gentle, non-invasive vibration, applied as an adjunct to treatment for 20 minutes per day, significantly increases the rate of tooth movement.

The AcceleDent Aura device incorporates an activator, which generates the micro-pulses, and a mouthpiece, which comes in large- and small-arch sizes. The patient turns on the activator and bites down on the mouthpiece for 20 minutes daily during the course of orthodontic treatment. Small and lightweight, AcceleDent is designed for hands-free use and is held in place simply with bite pressure. This enables patients to engage in other activities, such as reading, driving, watching television or using a computer, which provides some convenience for patients in scheduling the daily treatment.

A second common barrier to orthodontic treatment is pain. As evidenced by a randomised controlled trial published in the peer-reviewed journal Angle Orthodontist, micro-pulse vibration devices, such as AcceleDent, significantly lower orthodontic treatment pain scores for overall pain and biting pain. A reduction in discomfort is highly attractive to orthodontic patients and likely aids in compliance with the daily AcceleDent regimen and contributes to patient satisfaction.

Dr Kenji Ojima has treated more than 400 aligner cases with AcceleDent, including complex orthodontic cases. The Journal of Clinical Orthodontics published the results of Ojima’s treatment of a 26-year-old female patient who was diagnosed as a skeletal Class II with infra-labioversion of the maxillary canines and a steep mandibular plane angle. All four of the patient’s third molars were removed prior to aligner treatment. Ojima’s assessment of this patient called for the patient to change aligners every 14 days over 30 months; however, the patient was unwilling to undergo treatment for that length of time. To accelerate her treatment, Ojima prescribed AcceleDent with instructions to change aligners every five days, enabling the patient to complete treatment in 18 months while experiencing no discomfort.

Faster orthodontic treatment results have also been demonstrated with fixed appliances, as illustrated by Dr Sharon Orton-Gibbs. Reporting on the first extensive single-centre treatment experience with delivery of pulsatile forces, Orton-Gibbs published the results of predicted and actual treatment times for 14 control patients treated with fixed appliances and 14 AcceleDent patients treated with fixed appliances. As published in the Journal of Clinical Orthodontics, Orton-Gibbs found that the AcceleDent group completed treatment 33.5 per cent faster than their predicted treatment times, saving an average of 6.23 months of treatment time.

Conclusion

AcceleDent Aura enables orthodontists to remove barriers to treatment and give patients what they want—faster orthodontic treatment with reduced discomfort—while achieving sophisticated clinical results. The peer-reviewed evidence and clinical reports prove that AcceleDent Aura accelerates orthodontic treatment by as much as 50 per cent and reduces pain. There are tens of thousands of AcceleDent patients across the world who, along with their orthodontists, have reported high satisfaction with their accelerated treatment.

Editorial note: A complete list of references is available from the publisher.

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Tribune CME
Abrasive techniques have traditionally been discussed as a treatment in all areas of dentistry. With AquaCare, UK-based Velopex International has introduced an innovative and contactless method to abrade and polish teeth and orthodontic appliances. The unit combines four powder cartridge systems with an easy-to-use multi-function handpiece that can be used as a 3-in-1. AquaCare is capable of delivering abrasion and prophylaxis media all via the same handpiece. Among the many applications areas, orthodontists can use AquaCare for bonding orthodontic brackets. The enamel of the tooth to be treated can be ‘etched’ to the exact size of the orthodontic bracket at the place of attachment. This is achieved by holding the cutting nozzle 2 mm above the surface of the tooth and gently moving it in a circular motion over the required area. This will result in a dry ‘etched’ surface ready to accept the bonding agent. The risk of saliva contamination is greatly reduced because the aluminium oxide dries the surrounding mucosa. The same technique can be used to clean the orthodontic brackets. Therefore, AquaCare is a superior tool for incognito lingual brackets as it is able to reach difficult internal surfaces in order to clean and attach the brackets.

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Ortho Tribune Study Club

Join the largest educational network in orthodontics!
World-class speakers, hands-on instruction, master classes, forums and social networking opportunities, all in the heart of one of the greatest cities in the world. Between June 23 and 26, the fabled Waldorf Astoria in Manhattan will be hosting the Nobel Biocare Global Symposium under the banner “Where innovation comes to life.”

Four days of learning

The symposium’s four-day program will be based on three main themes: refining and enhancing treatment, digital dentistry and achieving clinical excellence in challenging situations. Each theme has a complete schedule of its own, including lectures, master classes and practical sessions. Should attendees choose to follow only one theme, the symposium schedule allows them to be a part of every related session.

If, on the other hand, delegates would like to pick and choose between the different themes and attend individual sessions of special interest in several (or all) of the themes, Nobel Biocare gives them the opportunity to design their own learning program.

In addition to a theme-related agenda intertwined with independent study opportunities, the company is arranging a compelling array of forums, including an innovation assembly and a full-day compromised patient forum. Other forums will cover the company’s Partnering for Life program, through which Nobel Biocare helps dental professionals achieve their goals, the All-on-4® treatment concept and the dental laboratory workflow. A new generation of dental professionals will also have their own platform at the event’s NEXT GEN forum.

Getting to know each other

After a busy first day of lectures, master classes and hands-on sessions, a welcome cocktail on June 23 will provide the perfect opportunity to unwind and network with colleagues from around the world. Attendees will be able to raise a glass, enjoy some food and see a display of innovative Nobel Biocare products in the beautiful, historical setting of the Waldorf Astoria.

On the evening of June 24, Nobel Biocare will be hosting the symposium’s reception off-site at an exciting venue, yet to be revealed. It is set to be an evening to remember with an inspiring blend of diversion and education.

By popular demand

The Scientific Chairmen for the Nobel Biocare Global Symposium are Drs Peter Wöhrle (USA) and Bertil Friberg (Sweden). They recently announced that—for the first time at a Nobel Biocare dental event—registered attendees will be able to have a direct impact on the program by voting for various topics and speakers on the event’s website. The results will be revealed a few weeks before the symposium.

With world-class lecturers and thousands of dental professionals from around the world exploring the future of dental implants together, the 2016 Nobel Biocare Global Symposium promises to be an incomparable experience for everyone involved.

Registration for the symposium is open at: www.nobelbiocare.com/global-symposium-2016
The 4th Scientific Congress for Aligner Orthodontics will take place on 18th and 19th November 2016 at the Cologne Gürzenich. With more than 500 participants and over 30 exhibitors, the DGAO Congress is the worlds largest, independent aligner congress.
International Events

2016

American Association of Orthodontists
29 April–3 May 2016
Orlando, USA
www.aaoinfo.org

Dental Digital Marketing Conference
29–30 April 2016
Dallas, USA
www.dentalmarketingconference.com

11th CAD/CAM & Digital Dentistry International Conference
6–7 May 2015
Dubai, UAE
www.cappmea.com

3rd MIS Global Conference: 360° IMPLANTOLOGY
26–29 May 2016
Barcelona, Spain
www.mis-implants.com

Nobel Biocare Global Symposium
23–26 June 2016
New York, USA
www.nobelbiocare.com/global-symposium-2016/

European Orthodontic Society 2016 Congress
11–16 June 2016
Stockholm, Sweden
www.eos2016.org

Asia Pacific Orthodontic Society
10th Asia Pacific Orthodontic Conference
1–3 September 2016
Nusa Dua, Bali, Indonesia
www.10apoc.com

FDI Annual World Dental Congress
7–10 September 2016
Poznan, Poland
www.fdi2016poznan.org

Canadian Association of Orthodontists Annual Session
15–17 September 2016
Charlottetown, Prince Edward Island, Canada
www.cao-aco.org

ROYAL ESTHETICS
13th ESCD Annual Meeting
22–24 September 2016
Krakow, Poland
www.royalesthetics.eu

Greek Association for Orthodontic Study and Research
14th Panhellenic Orthodontic Congress
23–25 September 2016
Athens, Greece
www.eogme.gr
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In addition, images must not be embedded into the MS Word document. All images must be submitted separately, and details about such submission follow below under image requirements.

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Article lengths can vary greatly—from 1,500 to 5,500 words—depending on the subject matter. Our approach is that if you need more or less words to do the topic justice, then please make the article as long or as short as necessary.

We can run an unusually long article in multiple parts, but this usually entails a topic for which each part can stand alone because it contains so much information.

In short, we do not want to limit you in terms of article length, so please use the word count above as a general guideline and if you have specific questions, please do not hesitate to contact us.

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Please use single spacing and make sure that the text is left justified. Please do not centre text on the page. Do not indent paragraphs, rather place a blank line between paragraphs. Please do not add tab stops.

Should you require a special layout, please let the word processing programme you are using help you do this formatting automatically. Similarly, should you need to make a list, or add footnotes or endnotes, please let the word processing programme do it for you automatically. There are menus in every programme that will enable you to do so. The fact is that no matter how carefully done, errors can creep in when you try to number footnotes yourself.

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**Questions?**

Magda Wojtkiewicz (Managing Editor)
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