technique
Tongue star 2 (TS2) – System for rapid open bite closure

case report
Use of diode laser in the treatment of gingival enlargement during orthodontic treatment

industry report
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Expanding the Horizons of Aligner Therapy with TADs
Dear readers,

When I began working in the field of orthodontics (in the Middle Ages!), it was very different from what I encounter today in my daily practice. This is normal: with the progression of research on biology, biomechanics and biomaterials, as well as with the development of the technology, results have increasingly been improving, as have treatment times, aesthetics and patient comfort.

There is another important aspect too that has completely changed our way of working: orthodontics has finally come out of its isolation to perfectly interact with other fields of dentistry. In this sense, this issue of the ortho magazine fully interprets this new age by presenting, beyond papers, new and original orthodontic appliances and techniques that also make a contribution in different fields of dentistry applied to orthodontics, such as CAD/CAM technology, whitening and laser-assisted surgery.

I congratulate the editor for the choice of this new approach and wish you all a good read.

Yours faithfully,

Prof. Carlo Fornaini

Researcher, Université Nice Sophia Antipolis, France
Researcher, University of Parma, Italy
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Virtual reality and orthodontics: A new patient experience

Author: Dr Yassine Harichane, Canada

Imagine the following scenario: your patient arrives, both relaxed and calm, at your practice. Although the patient is visiting the practice for the first time, he is familiar with it and knows its interior well. Without further introduction, the patient takes a seat in the dental chair, and the orthodontic procedure is performed quickly and comfortably with patient compliance. There are no complications or tension, and the treatment is easily achieved. Imagine such a soothing and comfortable environment in which to treat patients. Now imagine this very same scenario through the eyes of the patient. One can see that it could actually be a comfortable experience. This is not some hypothetical futuristic utopia; this is actually happening now, and the aforementioned points are some of the many benefits of virtual reality (VR).

VR is a process that entails immersing the viewer in a 360° environment. By turning his head left, right, up or down, the patient can visualise a real or an artificial environment. The spectator could be immersed in the Caribbean Sea surrounded by corals or in a Canadian forest (Fig. 1). The operation is simple: the participant wears a lightweight and comfortable headset in which a smartphone is inserted (Fig. 2). Owing to the gyroscopic sensors, the smartphone will project a matching image corresponding to the movements. If the patient raises his head, he will see the sky or the ceiling, and if he lowers his head he will see his feet. This technique is made possible by a 360° shot using a dedicated camera (Fig. 3) and simple editing software (Fig. 4). The result is simply astonishing as we find ourselves projected into a place that may vary from actual tourist sites to virtual scenarios as in video games. The applications in orthodontics are numerous and at present we are exploiting only a tiny part of its potential functions. The possibilities might be endless. Hence, it might become possible for the patient to visit the dental office from his home, where he can visualise the front desk, admire the treatment rooms or view the cleanliness of the sterilisation room (Fig. 5). The aim is to offer a virtual visit of the practice to allow the patient to choose a quality clinic, as well as familiarise himself with the space before his first appointment. Once physically seated in the chair, the patient can wear the VR headset during the treatment and visualise a restful environment of his choosing. From here on, it is solely a matter of preference, as the patient might enjoy the beach, a VR video of Honolulu, or maybe even climbing a mountain. Any VR video is acceptable, as long as it achieves its purpose: calming the patient during a treatment session. Thus, everything becomes less tense, and the patient is relaxed. This might also be convenient for the dentist, as he can then execute whatever treatment is necessary as quickly and efficiently as possible.

Convincing the patient to undertake an orthodontic treatment is one thing, convincing him to follow the relevant recommendations is another. Obtaining patient compliance is not easy, especially in the case of younger patients. Furthermore, dentists have an unfortunate notorious association with pain and suffering, which might induce anxiety in a patient. Again, VR can be applied here to divert the attention of the most dynamic patients. Another aspect worthy of mention regarding the benefits is the intellectual retention of instructions on hygiene procedures, for example, which might be dependent on sup-
It is plausible to assume that verbal instructions on hygiene may be forgotten once the patient has left the clinic. Most orthodontic practices provide only leaflets, but few patients retain these or follow their recommendations. A VR video featuring the practitioner or team members might have a much greater impact on follow-up care at home. The message could be pre-recorded and viewed on demand by the patient. The aims of this format is that it can provide different intellectual integration between information, which is connected to a stream of visual and auditory stimuli. The clinician might wish to promote the patient retaining the provided information in an easier way to achieve greater clinical success. For example, youngsters might remember their favourite movie line by heart, as opposed to information provided by their dentist. This is because it demands less of youngsters to remember words that are connected with pictures.

For the health practitioner, VR may yield an unexpected, but welcome, advantage in terms of professional education (Fig. 6). Many of us have not been able to attend a conference on the other side of the world for logistical reasons. In the near future, it will be possible to attend an orthodontic congress and listen to international speakers while sitting comfortably at home. Similarly, the demonstration of a new therapeutic technique will be easier with a VR video rather than plunging into a detailed explanation in an article without any illustration. The trainer can record his or her procedures with a 360° camera to allow the student to learn through immersion the technical movements and ergonomics of the technique being taught.

It would be an understatement to claim that VR provides an alternative to conventional styles of learning. Although it is far from perfect, it allows a wider spread of knowledge and a totally immersive pedagogy. VR is changing the way we work, learn and treat our patients. We have seen over time an evolution of orthodontic care by improving patient comfort. We are not just dealing
with a set of teeth fixed into a bone mass appended to a skull, but with a person whose positive experience will inevitably lead to clinical success. Similarly, orthodontic education has evolved over time, since the transmission of knowledge is no longer done with a Kodak Carousel slide projector, but with sophisticated presentation software, incorporating photographs and clinical videos. VR is paving the way to a higher degree of evolution regarding how to understand our environment, whether it is an environment of care or work. As with tourism or cinema, VR offers many opportunities in the field of health. Orthodontics is entering into a 360° revolution focused on the patient experience.

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**about**

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Tongue star 2 (TS2) – System for rapid open bite closure

Author: Dr. John Constantine Voudouris, Canada

**Introduction**

The aim of this article is to discuss a new system to treat severe skeletal open bite malocclusion using a new, miniaturised tongue star 2 (TS2) device. In the first part, the author will focus on clinical evaluation of TS2, the second part is devoted to tongue thrusting, open bite aetiology and its treatment.

**Clinical evaluation of TS2**

**Methods**

Clinical applications of the first generation of the tongue star devices with nine rounded protrusions, initially manufactured as one-piece, were evaluated over a two year period in the private orthodontic clinic of the author. Improvements were noted and implemented to develop a second generation tongue star 2.

The new TS2 was made in Italy by SIA Orthodontic Manufacturer as a four-piece unit including a body with six tie-wing undercuts for cross-bite elastics, brazed to the bonding pad for greater flexibility, and 80-gauge mesh for higher bond strength against lingual shearing forces.

For each orthodontic patient, 12 TS2s were bonded, including six tongue stars positioned on the palatal aspects of the gingival middle-third of the upper six anterior teeth from canine to canine, and six tongue stars were placed on the lingual middle-third of the lower anteriors from canine to canine.

TS2s were the central device of a four component system to treat severe anterior, and lateral tongue positioning. The second component of the system included tongue stars bonded at the same time as a Siamese twin, active self-ligating appliance that employed the third component of new initial NiTi iArch wires for light force control. These specialised archwires with a higher vertical dimension than horizontal dimension (for example, .018” × .014”) acted closer to the canter of resistance of the root for earlier moments of incisor torque, and were incorporated with curve of Spee for the lower arches, and reverse compensating curve on the upper arches to further facilitate incisor re-eruption.

The fourth component of the system included a vertical box elastic from the upper lateral incisors to the lower canines (1/4”, 4.5 oz) that was additionally applied on the labial aspects for light incisor re-eruption in conjunction with the TS2s.

**Clinical results and conclusion**

TS2s were found to be highly effective in restricting anterior tongue positioning for rapid open bite closure (ROC). No clinically significant root resorption was noted that appeared to be related to the light forces applied. Therefore tongue stars are recommended for rapid open bite closure since they cause the tongue to be retracted during treatment to permit anterior dental re-eruption.

**Multi-directional forces of anterior tongue positioning (tongue thrusting)**

The tongue affects the alignment of the dentition because it has one of the strongest sets of muscles in the human body capable of reflex. Malocclusions involving open bites are classified as two
types, anterior open bite located in the area of the anterior canine-to-canine area, and lateral open bites located at the premolars and molars. In open bite malocclusions, the tongue attempts to seal the oral cavity for effective swallowing (suction-effect) in an unnatural, anterior position. In addition, the tongue thrusts both superiority and inferiorly. This results in progressive opening of the bite preventing eruption of the upper and lower incisors. It is significant that both the upper and lower incisors are not only intruded, but also proclined often by the unnatural anterior tongue position between the incisors. Several factors have been associated with open bites.

Aetiology of open bite includes:
1) Primary anterior, superior and inferior tongue positioning in conjunction with lateral tongue thrusting.
2) Allergies, asthma, nasal obstruction from for example nasal septum deviation as a result of chronically inflamed turbinates, chronically enlarged tonsils and adenoids, etc.
3) Primary, habitual mouth breathing (or 2º), associated often with anterior, superior and inferior tongue positioning.
4) Skeletal downward and backward growth of the mandible (dolichocephalic).
5) Muscle hypoactivity (an extreme pathological example is observed in muscular dystrophy patients).
6) Dental delay of incisor eruption and overeruption of the molars.
7) Habits such as thumb-sucking, finger-sucking, blanket-sucking, over-retention of soothers after the age of 6.

Several appliances have been developed to control the anterior tongue positioning including the traditional cemented tongue-cribs soldered to molar bands, and bondable tongue habit-breakers type brackets on the palatal of the upper incisors. These were often bulky, uncomfortable and cumbersome for patients.

What is TS2?
The first tongue star was developed in 2014 with nine-reminder protrusions rounded at the tips to prevent anterior tongue positioning. It was manufactured as a one-piece bracket and tested clinically for two years by the author in his private orthodontic clinic in Toronto, Canada. This first
The second generation TS2 was made in Italy, by SIA Orthodontic Manufacturer, as a four-piece unit including:
1) Bracket body with nine rounded protrusions and six new, tie-wing undercuts.
2) Braze (for flexibility) to a bonding pad.
3) Separate 80-gauge mesh for greater shear resistance and bond strength.

The separate application of 80-gauge bonding mesh is used to improve bond strength during shearing forces on the lingual. TS2s are miniaturised in size similar to bondable buttons to be comfortable for patients and to facilitate oral hygiene. In addition, tie-wing like undercuts are designed into six of the nine protrusions are used to improve the placement of crossbite elastics. This is required commonly in lateral open bite treatment that is associated with severe skeletal maxillary constriction (Figs. 2a & b).

Where should TS2 be placed?
Clinically, TS2s are bonded on the middle-third regions of the upper and lower canine-to-canine regions (Figs. 3a & b). The TS2 position recommended for the upper anteriors is just gingival to the middle third to prepare for the corrected upper incisors to approach contact with the lower incisors during rapid open bite closure. This provides a total of 12 TS2s on the day of first bonding of a full Siamese twin, active self-ligating appliance recommended with new .018” × .014” NiTi, iArch wires (SIA Orthodontic Manufacturer). In addition, for each open bite treatment, TS2s are ap-
A 9-year-old patient demonstrating that the anterior tongue positioning is additionally directed inferiorly resulting in the proclination of the lower incisors, supporting the indication that TS2s need to be placed in both the upper and lower arches.

The radiographs reveal that anterior tongue positioning (c) is often associated with nasal obstruction related to enlarged and chronically inflamed turbinates (d), secondary mouth breathing, and molar overeruption.

Lip harmony and balance were shown after ROC using the four-component system of TS2s, anterior box elastics, active self-ligating brackets, and specialised archwires for torque control.
applied in conjunction with anterior box elastics (1/4", 4.5 oz, see Fig. 6b) from the labial aspects of the upper lateral incisors to the lower canines to facilitate a rapid open bite closure (Figs. 4a & b). This completes a system composed of four-components for rapid open bite closure.

**Why apply TS2?**

Normal swallowing takes place approximately 600 times/day or more (including during chewing and speaking) the tongue is generally positioned in the palate. However, in anterior open bites the tongue fills the open bite space through anterior tongue positioning (previously referred to as tongue thrusting). TS2s are applied for both Rapid Open Bite Closure and for Rapid Lateral Open Bite Closure (Figs. 4a & b). They are used in conjunction with active self-ligating appliances due to the low resistance shown in vitro to permit free and controlled movement of the upper and lower anteriors. Once the incisors begin to develop a positive overbite relationship the tongue generally begins to retract posteriorly into a more natural tongue position assuming the aetiology of the open bite has been additionally controlled (for example, nasal obstruction).

**When should TS2 be placed?**

TS2s are recommended at all ages including for both early interceptive treatment in children (Figs. 5a–f) and in adults. The ideal recommended time of placement is at the time of placement of active self-ligating brackets (that are regularly positioned on the labial aspects). TS2s and active self-ligating brackets work ideally and synergistically with specialised iArch wires that have a higher vertical dimension than horizontal dimension (for example .018" x .014") to be closer to the centre of resistance for earlier incisor moments of torque and control required for open bite correction. The archwires incorporate curve of Spee for the lower arches and reverse compensating curve on the upper arches to further facilitate incisor re-intrusion. TS2 incisor re-extrusion is further facilitated by the alignment of the anterior teeth, where a labial box elastic can be placed that also restrains the tongue (please see Fig. 6b). No clinically significant root resorption was found with the use of this light force system that reduces the unnatural and multi-directional anterior, superior, inferior and lateral tongue forces.

**How does TS2 work?**

The basic mechanism of action is that the TS2 produces a negative conditioning reflex response for anterior tongue positioning. This is similar to a hot-stove effect (Fig. 6a). However, due to the rounded ends of the nine protrusions the tongue is not lacerated, nor is the operator’s glove or skin. The feeling against the finger is one of coarse sandpaper as simply a reminder for the tongue to stay retracted away from the open bite. This permits the TS2s to work effectively in conjunction with the anterior box elastics (5/16", 4.5 oz) for rapid open bite closure (ROC) shown in Figure 6b. In lateral open bite patients where the TS2s are placed at the premolars and molars crossbite elastics are applied, that are generally heavy 1/4", 4.5 oz, to further prevent lateral tongue positioning while maxillary expansion is completed simultaneously. In addition, it is important that the patient is instructed to exercise swallowing with the tongue in the roof of the mouth from the day of TS2 placement.
Special procedures with TS2s and overcorrection of open bites
As anterior open bites are corrected it is important to observe the gingival protrusions of the TS2s for the possible need of reduction with a high-speed to prevent dental interferences. The objective is to overcorrect the open bite to be greater than 30% overbite for long-term retention. The reason is that open bites are often associated with patients growing with the mandible in a downward and backward direction. It is additionally recommended that upper and lower brackets from canine-to-canine be bonded 1 mm toward the gingival than the customary average height positions to facilitate open bite closure. This is particularly important at the upper lateral incisors that are the smallest of the incisor teeth and affected most by the unnatural, anterior tongue positioning forces.

Conclusions: Advantages of TS2 applications
A system of four components was developed and tested to produce rapid open bite closure. This included the use of new tongue stars, anterior box elastics with active self-ligating brackets with new iArches to provide freedom of movement of the system including the upper and lower archwires with its proven low resistance, in vitro.

In conclusion:
1) Metal TS2s are highly effective and efficient chairside for ROC.
2) Efficiency is gained by ready-made, bondable TS2s, that do not wear, are miniaturised for patient comfort and facilitate oral hygiene.
3) TS2s are placed on all 12 anterior dental units from the upper canine-to-canine, and lower canine-to-canine since the tongue was observed and found to be positioned anteriorly, superiorly and inferiorly.

TS2s are applied in conjunction with anterior box elastics (5/16", 4.5oz) and ideally with new, low profile active self-ligating brackets with NiTi clips for light, continuous forces for the periodontal membrane, completely frost-coated for aesthetics, and with progressively lower forces from molars to incisors. Active self-ligating brackets make use of reduced resistance found in vitro and active seating of iArch wires for earlier moments of torque that are closer to the centre of resistance of the incisors to improve control (future publication).

references

about
Dr John Constantine Voudouris maintains teaching positions at the University of Toronto, as an associate in the discipline of Orthodontics, for 31 years, teaching mandibular advancement appliances, and at New York University, as a visiting scholar, in the Division of Biological Sciences for 18 years, teaching active self-ligation. He is a full member of the Eastern Chapter of the Edward H. Angle Society of Orthodontists and the recipient of the prestigious American Association of Orthodontist’s Milo Hellman Research Award for condylar growth modifications and glenoid fossa remodelling with Herbst appliances, applying electromyographic, cephalometric and histological investigations. Dr Voudouris maintains a private orthodontic specialty practice in Toronto, Canada.
Introduction

In recent decades, we have witnessed the substantial development and expansion of the use of fixed orthodontic appliances. While their application has many advantages, several problems related to the health of the soft tissue may sometimes appear during treatment. In fact, the use of fixed orthodontic appliances may provoke labial desquamation, erythema multiforme, gingivitis and gingival enlargement.

Gingival enlargement is a very common complication during orthodontic treatment, but fortunately, it seems to be transitory and generally resolves after orthodontic therapy, even if sometimes incompletely. Gingival overgrowth induced by orthodontic treatment shows a specific fibrous and thickened gingival appearance, different from fragile gingiva with marginal gingival redness common in allergic or inflammatory gingival lesions.

Several clinical studies suggest that orthodontic treatment may be associated with a decrease in periodontal health, causing a hypertrophic form of gingivitis. However, the actual pathogenesis of gingival enlargement is not yet completely understood, although probably involves increased production by fibroblasts of amorphous ground substance with a high level of glycosaminoglycans. Increases in mRNA expression of Type I collagen and up-regulation of keratinocyte growth factor receptor could play an important role in excessive proliferation of epithelial cells and increased development of gingival enlargement, on the basis of some studies, in cases of poor oral hygiene status. However, there is no clear definition on its aetiology, although it is probably associated with the inflammatory response induced by the corrosion of orthodontic appliances, particularly those of nickel, linked to an inflammatory response considered a Type IV hypersensitivity and manifested as nickel-induced allergic contact stomatitis, even if its aetiology has not yet clearly been defined.

The treatment of these conditions is surgical. Histological and histochemical studies have demonstrated that the removal of the gingival papilla can promote the formation of normal connective tissue. Because the classic intervention performed by scalpel has some disadvantages, mainly linked to the discomfort for the patient (e.g. anaesthesia by injection and sutures), there has been great interest in the utilisation of laser technology.
Case Report: Diode Laser During Orthodontic Treatment

Fig. 1: Clinical view, showing gingival enlargement, just before the debonding procedure.

Fig. 2: Application of a topical anaesthetic.

Fig. 3: Surgical laser-assisted treatment via laser gingivectomy.

Fig. 4: Clinical view just after surgery.

Fig. 5: Healing five days after surgery.

Fig. 6: One month follow-up.
Case report

A 14-year-old female patient was referred to our department by the orthodontics unit because, at the end of fixed orthodontic treatment, she had developed gingival enlargement in the upper arch (Fig. 1), probably related to the fast closure of the spaces associated with very poor oral hygiene due to bleeding during toothbrushing. Just after the removal of the appliance, a topical anaesthetic (EMLA, AstraZeneca) was applied to the gingivae (Fig. 2) and a gingivectomy was performed using a diode laser (XD-2, Fotona) according to the technique of removal of the interdental papillae (Fig. 3). The parameters used were as follows: a wavelength of 808 nm, 3 W in continuous wave, a 320 μm fibre in contact mode. The intervention had a duration of 375 seconds, and the patient did not feel any pain (Fig. 4). After the intervention, the patient did not take any kind of pain medication, and the healing process was completed in five days (Fig. 5).

Discussion

The first laser appliance was built by Maiman in 1960, and some years later, it was successfully employed in medicine and in oral surgery with several advantages. It may provide excellent incision performance with sealing of small blood and lymphatic vessels, resulting in haemostasis and reduced postoperative oedema. Furthermore, target tissues are disinfected as a result of local heating and production of an eschar layer, which results in a decreased amount of scarring owing to decreased post-operative tissue shrinkage, allowing one to avoid the use of sutures.

Diodes, the last generation of laser used in dentistry, have several advantages, such as reduced cost and size, and offer the operator the possibility to work both in continuous and chopped mode. Based on our experience, we can confirm that this technology may represent a new approach to the resolution of gingival enlargement during orthodontic treatment, with better comfort for the patient during and after surgery.
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Orthodontic management of maxillary lateral incisors agenesis

Author: Dr Dan Andrei Iacob, Romania

The purpose of this article is to show the different modalities of treatment for upper lateral incisors agenesis. In daily practice, orthodontists often meet cases of upper lateral incisors agenesis. The two common treatment options are: space closure, using canines to substitute the missing lateral incisors, or space opening for future restorations.

Introduction

- Theoretical considerations.
- The second most common agenesis, representing 20% of the congenital missing teeth.
- The second most common agenesis (Europe), after the mandibular second premolar.
- The most frequently missing tooth in the American population.
- Unilateral agenesis is often associated with dysmorphia or microdontia of the corresponding contralateral tooth.

Treatment alternatives

- Space opening for future restorations.
- Space closure—canine substitution of the lateral incisor.

Treatment objectives

- Optimal dentogingival aesthetics.
- Functional occlusion.

Optimal dentogingival aesthetics objectives

- Gingival height of contour of the upper anterior teeth (Fig. 1): central incisors and canines are more superior than that of the lateral incisors.
- The long axis of the central incisor and the canines should be slightly mesial to the gingival height of contour (Fig. 2).
- The long axis of the upper lateral incisor should be coincidental to the gingival height of contour (Fig. 2).
- Dental proportions: the width of well-proportioned teeth should be approximately 60% to 75% of their height (Fig. 3).

Functional occlusion objectives

- 3–4 mm of overbite.
- 0–2 mm of overjet.
- Anterior and canine guidance, which allows for the immediate disclusion of molars and premolars when making lateral or protrusive movements.
- Centric occlusion coinciding with centric relation.

Treatment strategies for canine substitution

- Angulate and extrude the canine to mimic an upper lateral incisor relative to the gingival height of contour.
- Intrude the upper first premolar to mimic an upper canine relative to the gingival height of contour.
- Apply lingual root torque to mimic the emergence profile of the lateral incisor and improve the emergence profile of the bulky gingival tissue of the substituted canine: use a lower second premolar bracket on the upper canine.
- Adjust dental proportions as necessary: mesiodistal reductions on the upper central incisors to balance adjustments on the substituted canine.
lateral incisors agenesis treatment

Fig. 1
Fig. 2
Fig. 3
Fig. 4
Fig. 5
Fig. 6
Fig. 7
Fig. 8
Fig. 9
Fig. 10
Fig. 11
Fig. 12
Fig. 13
Fig. 14
Fig. 15
Fig. 16
Fig. 17
Fig. 18
Fig. 19
Fig. 20
Fig. 21

case report
When is canine substitution appropriate?

Occlusal considerations
- Class II free of mandibular crowding: molars in full Class II and premolar brought forward to act as the canine, while remaining in a Class I relationship with the lower canine.
- Class I with sufficient mandibular anterior crowding that would necessitate premolar extractions on the lower arch.

Profile
- Flat.
- Slightly convex profile.

Canine size, shape and colour
- The width at the cementoenamel junction: the wider the tooth, the more difficult it will be to mimic a lateral incisor.
- Colour: canines are the teeth that are the most saturated with chroma. A canine that is smaller in shape and does not have an oversaturation of chroma would make an excellent candidate for canine substitution.

Smiling lip level
- Depending on how high the smile line is, it may show the canine eminence.
- Large canines often have an obvious root prominence, and high lip levels may reveal that there is an unnatural eminence in the lateral sight.

Clinical case

A 13-year-old patient complaining about the aesthetic aspect of her smile was sent to my office by a general dentist with a diagnosis of the bilateral lateral incisors agenesis.

The treatment started with an aesthetic analysis of the patient’s face (Figs. 4–10), which was as follows:
- Square face.
- Slight facial asymmetry, with menton deviated to the right.
- Maxillomandibular biretrusion (Fig. 10).
- Correct curl of the upper lip.
- Left side of the face is more flat compared with the right side.
- Right eye slightly higher.
- Insufficient display of the upper anterior teeth with lips in repose.

Then occlusal analysis (Figs. 11–21) was performed:
- Skeletal Class III (Fig. 17).
Dental Class I.
Maxillary hypoplasia with lower arch dental compensations.
Insufficient overbite and overjet.
Upper spacing due to the laterals agenesis (Fig. 18).
Upper midline deviated to the right.
Initial CR mounting (Figs. 19–21).

Finally space analysis was carried out (Tables 1a & b).

Treatment plan
It was concluded that maxillary hypoplasia was an indication for space opening. Considering the young age of the patient, the skeletal pattern and the high demands regarding aesthetics, it was decided to:
- Open spaces for two implants, but in the posterior area: 14 and 24.
- Substitute the laterals with canines.
- Temporary implants and crowns on teeth #14 and 24, until 18 years.
- Reshaping the canines and first premolars to match the shape of the lateral incisors and canines: direct composites restorations on teeth #13, 11, 21, and 23.

Treatment step by step:
- Upper bracket placement (Fig. 22): level and align the gingival margins, and correct the torque on the upper canines who will substitute the lateral incisors.
- Implants space opening: substitute laterals with canines (Figs. 23–25) and substitute canines with first premolars (Figs. 26–28).
- Finishing and occlusal settling (Figs. 29–31).
- Verifying the implant site width (Fig. 32) and provisional implants and crowns placement (Fig. 33).

Restorative phase
At the end of orthodontic treatment, gingival margins were well aligned, midlines were centred and canines and first premolars were positioned to facilitate the restorative phase of treatment (Figs. 34–36). At this phase, a final CR mounting and wax-up was performed (Figs. 37–39), as well as the anterior teeth restorations (Fig. 40).

Orthodontic treatment has improved both dental and facial aesthetics (Figs. 41–47) and the functionality of the occlusion (Figs. 48–52).

<table>
<thead>
<tr>
<th>Table 1a: Space analysis (Maxilla)</th>
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<tr>
<td>Maxilla</td>
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<tr>
<td>AP incisors position</td>
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<td>Total</td>
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<table>
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<th>Table 1b: Space analysis (Mandible)</th>
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<tr>
<td>Mandible</td>
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<td>AP incisors position</td>
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<tr>
<td>Curve of SPEE</td>
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<td>Total</td>
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</table>
Conclusions

Canine substitution can be an excellent treatment alternative for congenitally missing maxillary lateral incisors. Patient selection is critical and depends on the type of malocclusion, profile, canine shape and colour, and smile lip level. Pre-treatment evaluation of these selection criteria is necessary to ensure treatment success and predictable aesthetics.

When planning to replace congenitally missing lateral incisors, you should remember that an interdisciplinary approach is necessary to provide the most predictable treatment outcome.

The orthodontist should always consider the patient’s age, skeletal and facial pattern, dentoalveolar crowding, as well as performing dental and facial aesthetic analyses.

Dr Dan Andrei Iacob

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Maxillary molar distalisation with aligners and cyclic forces

Author: Dr Tommaso Castroflorio, Italy

Introduction

In the last decade, clear aligner therapy (CAT) has become a well-known treatment option in orthodontics, mainly owing to patients’ preferences for aesthetic appliances. With respect to conventional fixed appliances, aesthetics is not the only advantage of CAT. Several papers have concluded that aligners provide better comfort and, being metal-free, avoid irritation of the cheek and gingival tissue; facilitate better oral hygiene, allowing the patient to remove the aligner while eating and to brush and floss the teeth after eating; and results in less pain compared with conventional brackets. In clear aligner-based orthodontics, an intentional mismatch between the aligner and the teeth is programmed based on the desired tooth position. Through this process, a force system is transmitted to the teeth. However, CAT has shown some limitations regarding the generation of complex force systems for achieving extrusion, rotation, bodily tooth movements and root movement control. In order to overcome these limitations, auxiliaries such as power ridges and composite attachments were designed and engineered to improve CAT biomechanics, enabling the expression of more complex force systems. Even so, orthodontics is not only a matter of applied mechanics, since the biological response of the patient plays a determining role. Aligners are capable of producing the same biological response as fixed appliances do.1

Stimulation of the bone cells is mediated by several factors, such as a member of the tumour necrosis factor ligand and receptor superfamilies, including the receptor activator of nuclear factor kappa B ligand, the receptor activator of nuclear factor kappa B, and osteoprotegerin.2 Osteopontin is another protein that has been linked to bone resorption via promotion of osteoclast adhesion to the osseous matrix.3 Research has demonstrated that the use of cyclic forces increases the rate of bone remodeling compared with static forces.4 A force propagating through biological tissue, such as alveolar bone and the periodontal ligament, is transduced as a tissue-borne and cell-borne mechanical stress that in turn induces interstitial flow.5 Although liquid flow is a current focus of the mechanotransduction pathways, its anabolic and catabolic effects rely upon deformation of extracellular matrix molecules, transmembrane channels, the cytoskeleton and intranuclear structures.6 Cells are known to respond more readily to rapid oscillation in force magnitude (i.e. to cyclic forces) than to constant forces.7 However, randomised clinical trials testing the effect of a commercial device generating cyclic forces during orthodontic treatment produced contrasting results.8 Biases in both the cited studies prevented the drawing of a definite conclusion. In a real clinical setting, the same device has been reported to be reliable.9 The tested device is AcceleDent (OrthoAccel Technologies). The device has a mouthpiece similar to a sport mouthpiece, which the patient bites on to during use. The mouthpiece portion is connected to an activator that stays outside the mouth. The activator includes a battery, motor, rotating weights and microprocessor for storing usage data. The patient connects the mouthpiece to the activator and uses the device once daily for 20 min. The applied force from the device is 0.25 N (25 g). This low force is
intended to be barely noticeable and not uncomfortable. The device can be used with fixed appliances and aligners. A human skull study has shown that the vibration generated by the AcceleDent device can be well transmitted through the dentition and skull. Therefore, the device is able to reduce treatment time by inducing a more rapid response of bone cells to orthodontic forces.

Case report

A 25-year-old female patient requested an aesthetic orthodontic treatment that was not easy to manage because of her job as a make-up artist travelling across Europe. She presented with a Class II, Division 1 relationship: mild crowding in the lower arch and moderate crowding in the upper arch. The overjet was increased up to 10 mm. The profile analysis also revealed a protruded lip position (Figs. 1a–c). Considering the patient’s aesthetic request and her refusal of surgical intervention or extraction, the treatment plan was designed to obtain a final molar and canine Class I relationship through sequential distalisation of the maxillary teeth using Invisalign aligners (Align Technology), composite attachments on all of the distalising teeth and Class II elastics.
The patient was instructed to wear the aligners and the Class II elastics for at least 21 h per day. Furthermore, she used the AcceleDent device for 20 min per day for the duration of the orthodontic treatment. Aligners were changed every two weeks until the maxillary second molars were fully distalised, then every ten days until the first molars were in their final position and then every seven days until the end of treatment.

The ClinCheck (Align Technology) software demonstrated the need for 63 aligners to obtain the desired results with the prescribed sequence of stages, attachments and Class II elastics. Thus, the estimated treatment time was approximately 30 months. However, because the patient had chosen to use AcceleDent, the case was finalised in 18 months of treatment without any additional aligners with respect to the initial prescribed 63 (Figs. 4a–c, 5a–c).

The clinical results were excellent and revealed a final molar and canine Class I relationship with functional overbite and overjet, and the profile of the lower third of the face was highly improved. The superimposition of the cephalometric tracings revealed a maxillary molar distalisation of about 6 mm without significant tipping and excellent control of the buccolingual...
maxillary molar distalisation with aligners

Fig. 4a
Fig. 4b
Fig. 4c

Fig. 5a
Fig. 5b
Fig. 5c

Fig. 6
case report
maxillary molar distalisation with aligners

Fig. 7a
Fig. 7b
Fig. 7c

Fig. 8a
Fig. 8b
Fig. 8c

Fig. 9
inclusion of the incisors. The Class II elastics were responsible for mandibular protraction of about 1.5 mm. Retention was provided by Vivera retainers (Align Technology) (Figs. 6, 7a–c, 8a–c).

Discussion and conclusion

In several studies conducted on Class II intraoral non-compliance appliances, dentoskeletal effects revealed anchorage loss at the reactive part, distal tipping and extrusion of molars.12 Usually, the anchorage loss occurred particularly in the incisal area owing to the reciprocal force reacting to the distalising force. Previous studies have confirmed that the use of Class II elastics during maxillary molar distalisation with aligners prevents the uncontrolled proclination of the anterior teeth.13 Furthermore, the sequential distalisation protocol limits space opening between the distalising teeth, which is more aesthetic, maintains maximum aligner contact with the teeth and reduces the flexibility of the plastic material. That, in turn, minimises uncontrolled incisal tipping, which is expressed clinically as increased overbite with a loss of palatal root torque.

Treatment duration is influenced by the malocclusion complexity, the amount of tooth movement required and the applied system of forces. The distalisation of maxillary molars is frequently required in Class II non-extraction patients. Resolving Class II molar relationships by distalising maxillary molars may be indicated for patients with minor skeletal discrepancies.14 Simon et al. reported a high accuracy (88%) of the bodily movement of maxillary molars with CAT when a mean distalisation movement of 2.7 mm was prescribed.15 The authors reported the best accuracy when the movement was supported by the presence of an attachment on the tooth surface. Furthermore, they underlined the importance of staging in the treatment predictability. Ravera et al. investigated the dentoskeletal effect of maxillary molar distalisation with Invisalign aligners in adult patients and found that clinicians can consider the use of Invisalign aligners in treatment planning for adult patients requiring 2–3 mm of maxillary molar distalisation.16 In order to obtain this amount of movement, maxillary third molars, if present, should be extracted to have sufficient room to move the second and first molars in Class II malocclusions. It has been suggested that teeth moved with aligners do not undergo the typical stages of orthodontic tooth movement described by Krishnan and Davidovitch,17 because of the intermittent forces applied by the aligners. However, light continuous forces are able to produce orthodontic tooth movement with less cell damage with respect to light continuous forces.19 Cyclic forces applied by the AcceleDent device are oscillatory in nature and change in magnitude rapidly and repeatedly, affecting the cells with each oscillation of force magnitude.20 The frequency of cyclic forces is never zero. Force frequency is a concept of critical importance, but has rarely been considered in the field of orthodontics and dentofacial orthopaedics until recent years. Cells are known to respond more readily to rapid oscillation in force magnitude (i.e. to cyclic forces) than to constant forces.7 Therefore, AcceleDent acts as a physical mediator of the bone modelling and remodelling processes behind orthodontic tooth movement, thus facilitating the action of the aligners. The result is excellent tracking of the aligners, because of the expression of the biomechanics produced by the interaction between aligner, attachments and tooth surface (Fig. 9). The successful incorporation of AcceleDent into an orthodontic treatment can significantly reduce treatment time, making it an attractive adjunct for patients. In the presented case, treatment duration was shortened by 45% with an effective, user-friendly and safe technique.

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Oral hygiene in orthodontics

During orthodontic treatment, many patients seek advice on how to clean their braces effectively and gently. Since ordinary toothbrushes and interdental brushes are not suitable for orthodontic appliances, Swiss oral care provider Curaden, under its CURAPROX brand, is now offering the new Ortho Kit. This specialised kit contains the CS ortho ultra soft toothbrush, the CS 1009 single brush, the CPS 07, CPS 14 and CPS 18 interdental brushes, and ortho wax. The Ortho Kit is a perfectly combined set of products and gives dental professionals the best option for improving orthodontic patients’ oral hygiene.

When used correctly, the right toothbrush should dislodge and remove plaque through small circular movements along the gingival margin. Demonstrating the right balance between comfort and effectiveness, the CS ortho ultra soft toothbrush is specifically designed to clean both teeth and orthodontic appliances. With 5,460 filaments, the compact brush head allows for easy cleaning of the brackets’ outer surfaces and its shape helps patients brush at the right angle. Each filament has a diameter of 0.1 mm, allowing the production of a head with many fine, though durable, bristles. The groove in the middle of the brush head accommodates the brackets and wires to allow the brush to clean the teeth better. In addition, the octagonal handle facilitates brushing at an angle of 45°. The CS ortho ultra soft toothbrush cleans efficiently and thoroughly and has gained an outstanding reputation among orthodontic practices and patients.

Patients wearing orthodontic appliances have to exercise particular care in their oral hygiene, since bacteria can accumulate more easily around the brackets and wire surfaces. A single-tufted toothbrush, the CS 1009 is particularly suited for use on wires and brackets. The brush adapts to the contours of the brackets, can easily be moved from the top to the bottom, and is gentle on the gingivae. The CS 1009 also adapts to the anatomy of the gingival margin, making it an indispensible expert tool that every orthodontist should use.

How to use interdental brushes in orthodontic care

Interdental brushes allow for effective prevention of dental caries and periodontal disease and should ideally be used before, during and after orthodontic treatment. To maximise the potential for atraumatic, effective and acceptable cleaning without harm to the papillae, CURAPROX offers ultra-fine bristles, extra thin wire cores and a durable system for all of its interdental brushing systems. Developed to suit the orthodontist’s needs, the CPS 07, CPS 14 and CPS 18 interdental brushes are especially capable of cleaning wires and brackets. With an accessibility of 2 mm and an effectiveness of 8 mm, the CPS 18 allows for excellent cleaning of the outer wires, whereas the CPS 14 is especially suitable for the inner wires. The CPS 07 allows for complete cleaning of the gaps between the teeth.

CURAPROX has placed special focus on the comfortable use of international brush holders for the specific needs of orthodontic patients. For example, the UHS 451 holder has a smart click system...
on which the CPS 07, CPS 14 and CPS 18 interdental brushes can easily be mounted. Patients can also use various other holders.

Another key element of the Ortho Kit, the ortho wax helps patients become used to their appliance and protects the oral mucosa from abrasion and injury by bracket edges. The transparent and tasteless wax can easily be placed on to the brackets once warmed and is available in a convenient carrying case. Finally, the Ortho Kit contains a brochure with tips and advice on how to clean teeth and appliances effectively. It provides specific oral hygiene instructions for each product, as well as information about proper nutrition.

More than just communication

In addition to offering innovative products, Curaden emphasises the need to motivate dental professionals and patients. Motivation is crucial for effective orthodontic treatment because it encourages patients to engage in positive behavioural change and helps to achieve an overall positive outcome. Through the iTOP (individually trained oral prophylaxis) educational system, dental professionals will learn to communicate more effectively with their patients, to listen to their questions and concerns, and to establish long-lasting good oral hygiene for their patients. Owing to the combination of high-quality products and effective communication, dental professionals can ensure that their patients act in accordance with their advice and practise good oral health habits.

Optimum orthodontics right from the start

Besides the new Ortho Kit, the new CURAPROX Baby soother is a revolution in paediatric dentistry. This soother promotes the proper development of the palate and jaws by preventing misaligned teeth, problems caused by mouth breathing and skin irritation. Its flat tip ensures sufficient space for the tongue, while the side wings guide the suction pressure in the optimal direction.
FDC Dental Group is a network of 21 clinics in Singapore with a history spanning more than 15 years. With a team of over 30 experienced clinicians, FDC covers a wide range of treatments, including orthodontics and restorative dentistry and paediatric dentistry. With the recent rise in popularity of clear aligners as an alternative treatment to conventional fixed orthodontic appliances, FDC has seen a significant increase in demand for these products and recognised the need to internalise its manufacturing process to optimize quality, turnaround time and costs. “Lately, a lot of patients have been requesting clear aligners instead of traditional braces because of the aesthetic appeal and ease of use,” said Dr Nurul Aizat, CEO and group clinical director of FDC Dental Group. “Having previously relied on an external aligner manufacturer for our cases, we saw the opportunity to start managing the process ourselves in-house, to better control the quality of the aligners and reduce manufacturing cost. We commissioned Structo to assist us with their dental 3-D printers and to set up the entire production line in our facility,” Aizat added.

“The project with FDC was an exciting one from our perspective because it allowed us to take a holistic look at the entire digital process from scanning to manufacturing,” said Huub van Esbroeck, one of Structo’s founders. “The Structo OrthoForm’s high printing speed and throughput enables businesses like FDC to take control of their own manufacturing process, giving them an edge in the highly competitive orthodontics market.” By insourcing the manufacturing process, FDC has managed to achieve cost savings of up to 50 per cent per patient, which will be shared with the end user to make clear aligners more accessible to a broader demographic. Beside the cost, FDC managed to halve the manufacturing turnaround time from one month to only two weeks upon receiving a case. Faster delivery of aligners to the patient also contributes to AAA Aligners’ edge over its competitors.

“Structo’s mission is to empower businesses like FDC to deliver superior products with the help of digital dentistry and our application-specific solutions. We believe the speed of our printers will allow us to spearhead the widespread adoption of digital dentistry and we are glad we are able to help Dr Aizat and the entire team at FDC to realise the benefits of a full digital workflow,” added Huub.

Structo’s dental 3-D printers making waves across the industry

With its unique application-based product development, Structo has brought two leading dental 3-D printers to the market. Developed using its proprietary technology, called Mask Stereolithography (MSLA), Structo’s printers are...
designed to be high throughput manufacturing machines.

The company’s biggest user, Glidewell Dental, runs three Structo OrthoForm printers round the clock in its production line enabling it to achieve a throughput of 180 arches per printer per day –

“With the growing volume in (clear aligner) cases, we saw the opportunity to start managing the process ourselves in-house, to better control the quality of the aligners and reduce manufacturing costs.” Dr Nurul Aizat, CEO & Group Clinical Director, FDC Dental Group.

“Structo’s unique MSLA technology is just the type of innovation the industry needs.” David Leeson, Director of Engineering of Glidewell Dental.

more than any other 3-D printer in the same price category. The 3-D printer purchased by FDC Dental Group is the OrthoForm, an orthodontic 3-D printer capable of printing up to 30 arches in 1.5 hours. To date, the OrthoForm has helped Structo expand its global reach with an installation base in across four continents. "At Glidewell Dental, we run a high-volume facility with round-the-clock production of various models and appliances. When looking for a 3-D printer, I need something that not only prints accurately with reproducible results throughout the print platform but is also able to deliver the speed and throughput we require," commented David Leeson, Director of Engineering at Glidewell Dental.

After running three Structo OrthoForm printers over the last year, Glidewell has decided to further integrate Structo's MSLA technology printers to expand the company’s production capabilities. By being the launch customer and adding two of the newly released DentaForm 3-D printers, Glidewell Dental is now running five Structo 3-D printers at its production facilities. "Operating two of Structo's new printers is not only sufficient to replace a number of our existing printers, but also allows us to increase capacity overall," added Leeson, who mentioned that the company foresee
Structo is a Singapore-based dental 3-D printing solutions provider. It designs, develops and builds 3-D printers tailored for dental applications using its unique proprietary MSLA technology. With MSLA, Structo’s 3-D printers are able to achieve speeds much higher than that of conventional SLA printers, revolutionising the field of digital dentistry with higher throughput and lower costs, without compromising on print quality.

**ORTHOFORM**

With a large build platform and crisp printing resolution, the Structo OrthoForm 3-D printer is designed for the rapid manufacturing of dental moulds for use in secondary processes, such as vacuum forming. The adoption of digital dentistry is no longer a cause for concern with our unique proprietary MSLA technology which enables the OrthoForm to achieve record-breaking speeds (Up to 30 dental models in 90 minutes). The end result is higher throughput and lower costs, all without compromising on print quality.

“Having one of the leading dental labs in the world place its trust in our technology shows that our solution is addressing a very critical need in digital dentistry. David and his team have been providing us with a lot of feedback that has contributed to new features and design elements of the DentaForm printer. We are really excited to continue this partnership with Glidewell to help them expand their capacity,” added Huub.

Structo believes its high throughput printers which give laboratory managers greater flexibility in how they manage their manufacturing process, will help accelerate the adoption of digital dentistry. Technicians will no longer have to wait 4–5 hours for a single print job to complete, an inherent challenge that used to be a roadblock that prevented most dental professionals from deploying 3-D printing on a large scale. To further encourage the adoption of CAD/CAM in dentistry, Structo recently launched a blog on all things digital dentistry (blog.structo3d.com).
World’s Fastest Orthodontic Model 3D Printer

Built For Orthodontics

Largest Build Volume In Its Category

30 models in 1.5 hours

Powered by MSLA Technology
Sensorimotor training with RehaBite during orthodontic treatment

In daily practice, temporomandibular disorders (TMD) are usually treated with splints, such as Michigan splints, or similar devices. However, orthodontists have the problem that occlusal splints cannot be used in patients who are growing, or in patients undergoing therapy. In this context, sensorimotor training is an effective therapy for pain relief. Relieving postures caused by TMD pain can be eliminated without any influence on the occlusion of the patient. Additionally, neuromuscular adaptation will be supported actively using the RehaBite sensorimotor training appliance during orthodontic treatment.

Motor adaptation and rehabilitation

Healthy motion sequences can transform to relieving posture patterns1 due to musculoskeletal pain, changing the intra- and intermuscular recruitment patterns. This can cause stiffening of muscles, in conjunction with a reduced range of movement patterns. The stiffening process is a natural response that provides temporary relief by splinting the painful areas. Longer periods of pain can lead to lasting restriction of the physiological range of movement. In the long term, such relieving postures can trigger unphysiological stress of the tissue involved. Modern therapeutic concepts use active rehabilitation measures to improve motion patterns. Such actions can help to relieve painful adaptations triggered by coactivation patterns of the muscle structures involved.2–4

Coordinative sensorimotor training with RehaBite

Numerous studies have stated that home exercises can have an equally therapeutic effect like regular occlusal splints (Michigan splints or similar).5–7 Sensorimotor training with the RehaBite device improves the neuromuscular adaptation by controlling the movement and positioning of the mandible. Increased strain of sensory feedback systems and the stimulation of central nervous integration processes are triggered by sensorimotor training. The coordinative training leads to long-lasting changes of the intra- and intermuscular recruitment pattern. In conjunction with the training effect, it is assumed that coordinative training also causes structural modifications in specific cortical regions.8,9 In patients with muscle pain, the coordinative training can cause a hypalgesic effect, that is a significant reduction of sensitivity to pain (exercise-induced hypalgesia).10

Practice of coordinative training with RehaBite

RehaBite is a training device for home treatment and rehabilitation of muscle pain of the masticatory system. The elastic, fluid-filled bite pads work in accordance with the hydrostatic principle. In other words, the mandible can auto-balance itself11 on the fluid-filled bite pads like a see-saw (Fig. 1). The automatic, built-in feedback of the device provides the patient the ability to control the intensity of her training, and makes it possible
for the patient to accurately and faithfully reproduce training conditions (Figs. 2 & 3). Biofeedback in combination with active training can intensify motor learning processes.12 Spontaneous modifications of the intra- and intermuscular patterns of contractions of the muscles involved and physiological activation are frequent effects.

In the case of painful muscular jaw opening restrictions, the training is supplemented by intensive stretching exercises (Fig. 4). By using the post-isometric relaxation that is the result of the coordinative bite, the stretching effect is increased further still. The training exercises can either be performed under the instruction of the treating doctor or physician, or the patient may also use the RehaBite device for individual training, regardless of time or place, and can be further supplemented by exercises like gentle muscle massages.

Coordinative training for relieving TMD symptoms is very effective, and in some cases, necessary for patients undergoing orthodontic treatment. Home exercises like gentle massage and training tools such as RehaBite have shown significant results by improving muscle coordination and resolving relieving postures.

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

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Coordinative training as a therapy for temporomandibular joint dysfunction syndrome

Numerous studies in recent decades have proven that home exercises for treating temporomandibular joint dysfunction syndrome have the same therapeutic effect as that of occlusal splints. Recent scientific studies have shown that the masticatory muscles can be trained very effectively, particularly with coordinative exercises at a submaximal force level. The coordinative training causes long-lasting changes in the functional patterns of the muscles. Owing to this training effect, specific cortical regions of the brain are modified. The muscular adaptations induced by the training are an essential effect of successful muscle pain treatment.

RehaBite is the first training device that allows force-controlled intra-oral coordinative training under reproducible training conditions. This is achieved with the aid of a hydrostatic system, comparable to balancing on a see-saw. Other therapeutic effects of RehaBite include post-isometric relaxation (i.e. therapeutically effective relaxation of the muscles after previous tension) and haptic control that works like biofeedback (perception of the muscle function through the finger feedback provided by the RehaBite device). Comparable forms of all these elements can also be found in contemporary physiotherapeutic concepts.

According to clinical research by the Oral Physiology and Experimental Biomechanics group at Heidelberg University and the Karlsruhe Institute of Technology in Germany, inter- and intramuscular adaptions are considered to have a successful effect on muscle pain. Exercises with kinematic feedback and electromyographic force-controlled bite exercises and coordinative home exercises with and without technical support have a significant effect in reducing muscle pain.

RehaBite is an innovative training device for home treatment and rehabilitation of muscle pain in the masticatory system. The elastic glycerine-filled bite fork is made of non-toxic flexible plastic material. A major breakthrough is the haptic force control based on the hydrostatic principle.

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Introducing AcceleDent Optima

AcceleDent Optima is the most advanced accelerated orthodontic device with a comprehensive suite of technology-driven features. The only vibratory orthodontic device cleared by the US Food and Drug Administration, AcceleDent Optima is powered by patented and clinically proven Soft-Pulse Technology, a cyclic force that has been shown clinically and in research to increase the rate of bone remodelling in orthodontic treatment compared with static forces.

With AcceleDent, orthodontists report that they are expanding the range of patients they are clinically confident in treating. Difficult or complex movements can become easier to achieve in the planned amount of time. In addition to helping orthodontists achieve predictable clinical outcomes, AcceleDent has been clinically proven to safely and effectively speed up tooth movement by as much as 50 per cent while reducing orthodontic discomfort.

New features

Designed with enhanced patient convenience in mind, Optima is a smaller, lighter device that is waterproof and able to connect with smartphones and tablets through Bluetooth connectivity. The device’s small charging case enables patients to wirelessly charge the activator, which has a battery life of five to seven days. To achieve accelerated treatment, it is important for patients to use the device daily for 20 minutes.

Introducing the AcceleDent App

AcceleDent Optima is the only orthodontic device that directly connects patients and practices with monitoring and direct messaging, via the state-of-the-art AcceleDent App. The HIPAA-compliant app allows patients to track their usage and set reminder notifications.

Orthodontic practice staff can view this real-time compliance data on each of their AcceleDent Optima patients via a web portal that is customised for each AcceleDent provider. This access to compliance data allows for more proactive case management, including informed scheduling, and an overall increase in practice efficiency. The compliance data also enables clinical teams to compliment patients who are excelling with compliance and to encourage low-compliance patients.

Offering AcceleDent Optima at your practice

AcceleDent Optima and the AcceleDent App are designed to help your patients achieve the healthy, beautiful smile they want faster while increasing predictability in clinical outcomes.

Orthodontists interested in learning more about AcceleDent Optima can visit www.AcceleDent.eu to view the clinical evidence and case studies or contact OrthoAccel directly.
Ortho Rebels online shop: Great quality at low prices

For a long time, Ortho Rebels has proven that orthodontic products do not have to be expensive, but rather of good quality. Plus, that it is possible to order orthodontic products easily and round the clock on its site has made the Ortho Rebels online shop one of the leading suppliers of orthodontic products today.

One of the most distinctive elements of its business is that Ortho Rebels has cut prices, but not quality. For this reason, more and more cost- and quality-conscious orthodontists trust its products and conveniently make purchases online.

Why the company calls itself a rebel
Ortho Rebels protests against the trend towards expensive orthodontic products. It does not literally take to the streets to do this, but metaphorically mans the barricades by offering all the products in its online shop at extremely cost-effective prices.

Shop a comprehensive range
In the Ortho Rebels online shop, the dental professional can find a complete range of orthodontic products, including the following:

- Metal brackets
- Aesthetic brackets
- Buccal tubes
- Wires
- Adhesives
- Elastics
- Springs & ligatures
- Pliers & instruments

Order conveniently online
In addition to the reasonably priced, high-quality orthodontic products on sale, excellent service is what sets Ortho Rebels apart. A high level of service is provided by excellent contact persons who eagerly help customers with questions about products and orders. Customers can contact the shop telephonically during office hours and, of course, the online shop is open 24 hours a day, every day. Visit www.ortho-rebels.de to start exploring the new era of online shopping.
Two years ago, the European Aligner Society (EAS) started on its path as a scientific society whose aims are to provide information and education on aligner therapy, a treatment modality in which there has been an incremental growth in interest over the last decade among both clinicians and patients.

The first congress in Vienna in Austria, under former President Dr Graham Gardner, was a great success in terms of the scientific programme, visitor attendance and exhibitor presence. It represented our time point zero from where we started working on a common project with passion and enthusiasm.

One of the goals set by the EAS board for the second EAS congress is to continue to build on our success in Vienna by maintaining the quality of the lectures, compiling a scientific programme with the highest standards in orthodontic treatment and beginning to work on research awards.

The congress, to be hosted by our new president, Dr Francesco Garino, will take place in the breath-taking surroundings of Venice in Italy from 16 to 19 February 2018. The event is planned to provide the most complete scientific and clinical education to orthodontists providing aligner therapy not only in Europe but throughout the world. Our commitment is to provide comprehensive information on aligner therapy and to provide clinicians with the tools to offer the best treatment choices available.

With this aim, the scientific programme features many of the specialty’s most distinguished lecturers. The two-day programme consists of pre-congress courses and workshops in a variety of fields related to aligner orthodontics. In the plenary session, keynote speakers from both the academic and the clinical fields will be giving presentations on several aligner systems. Topics will cover biomechanics, auxiliaries, hybrid treatments, teen treatments, temporary anchorage devices and digital smile design. Drs Luis Carrière, Benedict Wilmes, Junji Sugawara, John Morton and Christian Coachman, among others, have already confirmed their participation as lecturers.

The special Breakfast with the Expert will be held on Sunday morning to give every participant the opportunity to have a peer-to-peer discussion with the best-known experts in the field of aligner orthodontics. A post-congress course on digital smile design to be held by Coachman will be the real novelty of this congress. The entire day on 19 February will be dedicated to this revolutionary approach to aligner orthodontics.

EAS recognises that the orthodontic aligner industry and allied companies are crucial in helping to identify EAS as a reference and the provider of gold standard meetings for aligner orthodontics so that excellence, best practice and research can be enjoyed and shared not only by EAS members but also by all event attendees. The society works closely with companies that operate in the field of aligner therapy, from manufacture to digital integration and efficiency in aligner treatment. EAS is therefore in a strong position to bridge the gap between clinicians and the latest products being developed by these companies. This symbiotic relationship results in up-to-date knowledge creating a better patient experience and improved treatment outcomes.

With the enchanting city of Venezia, this congress will provide an outstanding combination of educational, social and recreational opportunities. EAS looks forward to welcoming you to Venice!

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Idyllically situated between the blue waters of Lake Geneva, the majestic snow-covered Alps and the Lavaux Vineyard Terraces UNESCO World Heritage Site, Montreux is considered by many to be one of Switzerland’s hidden gems. Every year, this medieval city, which over the course of its history has attracted artists and poets, draws visitors from around the world, most prominently for the annual Montreux Jazz Festival in July. From 5 to 10 of June this year, more than 2,100 dental professionals from 75 countries, enjoyed everything that Montreux has to offer, during the 93rd Congress of the European Orthodontic Society (EOS), which took place at the Montreux Music and Convention Centre (2m2c).

This year’s edition marked the return of the prestigious event to Switzerland since the last congress in the country was hosted in Geneva in 1983. Over the course of the next five days, it brought together professionals from all over the globe to discuss the latest scientific and clinical developments in the field. This year’s extensive programme was organised by 2017 EOS President, Professor Christos Katsaros and his team at the University of Bern. It focused on the alveolar envelope as the limit to orthodontic tooth movement and the different treatment strategies to expand the anatomical limits.

In a special session presented by the European Journal of Orthodontics, Prof. Martyn Cobourne and orthodontic consultant Dr Padhraig Fleming, both from the UK, as well as Forsyth Institute researcher Dr Alpdoğan Kantarci, from the US, debated accelerating tooth movement and its rationale and effect with moderator and journal editor Prof. David Rice. Furthermore, presentations in the greater programme covered the latest research on a variety of other important topics. Keynote speakers, all experts in their respective fields, critically analysed these subjects, followed by short presentations of new research data.

The main programme was complemented by a number of special meetings being held by orthodontic societies for students and teachers, among others. In addition to the programme, attendees were able to see and experience the latest innovations from some of the largest manufacturers of orthodontic products, including Align Technology and DW Lingual Systems. All in all, over 60 sponsors had their latest offerings on display. In the evenings, participants were able to enjoy the best Montreux has to offer, with a lake cruise and gala dinner at the world-famous Chillon Castle as the highlight of this year’s social programme.

Photo: EOS
EAS 2nd Congress in Venice, Italy, will showcase the latest developments in aligner technology and treatment by renowned experts in the field.

Congress will present a two-day plenary session, Pre-Congress Courses and “Breakfast with the Experts” event, followed by a post-Congress Digital Smile Design Course on the Monday after the Congress. The program will be defined by both experience and innovation.

EAS once again aims to be the main Continuing Professional Development provider for aligner orthodontists and allied professionals involved in aligner treatment delivery through the 2nd EAS Congress and future meetings.

The Congress will allow also orthodontists and companies to meet on a face-to-face basis.

REGISTRATION OPENS ON 13th September 2017

REGISTER AT: www.eas-aligners.com
International Events

2017

The European Damon Forum
7–9 September 2017
Monaco
→ www.ormo.de

Swiss Society for Aligner Orthodontics SSAO
9 September 2017
Zurich, Germany
→ www.aligner-ortho.ch

British Orthodontic Conference
14–16 September 2017
Manchester, UK
→ www.bos.org.uk

Canadian Association of Orthodontists Annual Scientific Session
14–16 September 2017
Toronto, Canada
→ www.cao-aco.org

2017 European Carriere Symposium
14–16 September 2017
Barcelona, Spain
→ www.carrieresymposium.com

2017 Asian Carriere Symposium
27–28 September 2017
Tokyo, Japan
→ www.carrieresymposium.com

SEDA Congress
6–7 October 2017
Madrid, Spain
→ www.seda.es

DGKFO Bonn
11–14 October 2017
Bonn, Germany
→ www.dgkfo2016.de/jahrestagung-2017

PCSOrtho 81st Annual Session
12–15 October 2017
Reno, US
→ www.pcsortho.org

34th Annual Meeting of the German Association of Oral Surgeons (BDO)
17–18 November 2017
Berlin, Germany
→ www.oralchirurgie.org

ADF Paris
28 November–2 December 2017
Paris, France
→ www.adf.asso.fr/en

2018

2nd Congress European Aligner Society
16–18 February 2018
Venice, Italy
→ www.eas-aligners.com

26th Australian Orthodontic Congress
9–12 March 2018
Sydney, Australia
→ www.aso2018sydney.com.au

American Association of Orthodontists – AAO
4–8 May 2018
Washington D.C., US
→ www.aaoinfo.org

94th Congress of the European Orthodontic Society – EOS
17–21 June 2018
Edinburgh, Scotland
→ www.eos2018.com

48th SIDO International Congress
19–21 October 2017
Rome, Italy
→ www.sido.it/en

NESCO Annual Meeting
9–12 November 2017
Boston, US
→ www.neso.org

Journées de l’Orthodontie
10–13 November 2017
Paris, France
→ www.journees-orthodontie.org

GNYDM
24–29 November 2017
New York, US
→ www.gnydm.com

2nd Congress European Aligner Society
16–18 February 2018
Venice, Italy
→ www.eas-aligners.com

26th Australian Orthodontic Congress
9–12 March 2018
Sydney, Australia
→ www.aso2018sydney.com.au

American Association of Orthodontists – AAO
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submission guidelines

Please note that all the textual components of your submission must be combined into one MS Word document. Please do not submit multiple files for each of these items:

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- all the image (tables, charts, photographs, etc.) captions;
- the complete list of sources consulted; and
- the author or contact information (biographical sketch, mailing address, e-mail address, etc.).

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.

Text length
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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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. Any formatting contrary to stated above will require us to remove such formatting before layout, which is very time-consuming. Please consider this when formatting your document.

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Please place image references in your article wherever they are appropriate, whether in the middle or at the end of a sentence. If you do not directly refer to the image, place the reference at the end of the sentence to which it relates enclosed within brackets and before the period.

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