

3M Science.
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Innova

*Orthodontic science and
practice excellence*

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James Ingebrand
Vice President and
General Manager
3M Oral Care

The challenge, and the charm, of orthodontics is that it is an aspect of health care that will never become strictly routine. Every patient comes with their own unique combination of treatment needs, biological limitations, and overall expectations. The techniques and appliances that you employ must be versatile enough to address the many case variables, while at the same time delivering predictable performance each and every time.

It has long been 3M's commitment to help limit the unwanted variability that can come with treatment, while at the same time, allowing your expertise to come through for each patient's individual needs. We strive to provide you with innovative products that truly help you deliver superior results. In pursuing that goal, we appreciate learning from you about the techniques and creativity you employ and the resulting successes you achieve. *Innova* is our chance to pass along some of these insights, drawn from real-life clinical experiences.

This edition presents some new examples of how variability is controlled to achieve clinical goals. Precise lingual appliance mechanics, reliable vertical and sagittal movement with ceramic brackets, and solving complex orthodontic challenges are addressed here. Even though no two cases are exactly alike, we share these examples of control and successful outcomes with the hope that they inspire an approach for one of your future patients.

Performance, efficiency and controlling unwanted variability are themes for our 3M exhibit at the 2017 AAO Annual Meeting in San Diego. We feature presentations by fellow orthodontists on topics such as indirect bonding using digital technology, practice opportunities using aesthetic treatment options, and effective Class II correction. If you attend, be sure to stop by our exhibit area and ask about 3M™ APC™ Flash-Free Adhesive. It's a worry-free, 3M-exclusive innovative bonding system designed to increase bonding efficiency, while also improving your bottom line.

We want hear about your successes, your best practices, and the versatility you apply to our appliances to provide consistent high-quality results. We look forward to these conversations, whether at the AAO Annual Meeting or through your 3M representative.

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3M™ Incognito™ Appliance System with new Tip Bar Anterior Brackets

Incognito™
Appliance System



Ralf Paehl, 3M Oral Care

Ralf Paehl leads the R&D department at TOP-Service for Lingualtechnik GmbH, a 3M company (Bad Essen, Germany). With his group he develops both mechanical and software solutions for custom lingual orthodontics. He received his diploma in aeronautical engineering in 1992 in Braunschweig, Germany, and joined TOP-Service in 2001.



Since its introduction, more than 140,000 patients have been treated successfully with the 3M™ Incognito™ Appliance System. Its technology of customized, digital enhancements has made it a unique offering in the lingual segment of the orthodontic market.

The Incognito Appliance is well-known for excellent rotation and torque control. In some clinical cases, angulation nevertheless has been reported to be challenging. Whereas for torque and rotation there is a positive interface between wire and slot, angulation moments can only result from ligation forces, because of the slot being open occlusally in the anterior section. What is known as being very helpful for easy and comfortable wire insertion bears limitations when it comes to building up moment for angulation movements.

Measures to improve tip control with Incognito Brackets

The 3M R&D team proposed a collection of three measures to improve angulation control with Incognito Appliances:

1. As the ligature is the link between bracket and wire and is providing the angulation moments, the team worked with orthodontists to design a ligature optimized for the Incognito Appliance. 3M™ AlastiK™ Lingual Ligatures are smaller than conventional labial O-rings and have an optimized relatively wide rectangular cross-section, therefore, providing good elasticity and forces for the considerably small lingual Incognito Brackets.
2. When improving the angulation moment, it is more important to have a precise slot dimension and slot orientation. After evaluating and testing different processing options, the formerly manual broaching process was replaced by a high precision



electrical discharge machining (EDM) process. EDM is most often used in high precision toolmaking. The process is capable to provide tolerances in the micron-mm range. In the past, the slot precision was dependent on the skills of the lab technicians, therefore this new process is much more robust than before."

3. The Tip Bar design for anterior teeth features two additional posts to optimize angulation control.



3M™ Incognito™ Brackets with Tip Bar

Mechanical background: In crafts and engineering, levers are well-known aids to increase moments. For instance, most people have experienced the difficulty of loosening tire screws, unless a wider level is used. The same principle is used with the Tip Bar. While not affecting the inter-bracket distance in a negative way, the additional posts left and right to the bracket body increase the lever, which is relevant for angulation control.

Design: The first idea to come to mind, when thinking about how to increase the lever, was to simply widen the bracket. It is very easy to scale up brackets in the mesio-distal direction. Unfortunately, when widening anterior brackets, inter-bracket distances are compromised. As simple and promising this idea was, further analysis revealed that for crowded cases, wire insertion became much more challenging. Interestingly, when showing different design options to the Incognito System Advisory Board, the orthodontists selected this design because of its simplicity.

After doing a hands-on session and trying to insert wires on a maloccluded typodont, the Advisory Board orthodontists realized the above-mentioned shortcomings. With less inter-bracket distance, the wire needs to deflect harder to run from slot to slot. The mandate to the R&D team was to widen the slot base without widening the bracket body. When doing so, the next problem popped up: for overties, the ligature needs to pass under the wire before running it over the wire and getting it behind the hook. This type of ligation would not work anymore with a widening of the slot base, and the team did not want to compromise proven and efficient ligation styles.

A solution was needed which widens the lever on the one hand, but leaves room for overties on the other hand. The idea was born to add two posts separate from the bracket body and distant enough to run ligatures between bracket body and posts. After proving the mechanical efficiency, the design optimization started.

Design evolution: Again, the Incognito System Advisory Board became involved and were provided maloccluded typodonts with the first Tip Bar version. The typodonts were sent out for in-vitro testing and the R&D team received helpful feedback. The feedback immediately was used to optimize the design and come up with a second version, which again was sent to the doctors and received positive feedback. One example of evolved design features, which were changed based on the doctors' feedback, is the fact that the bars were extended lingually to catch the wire in as many situations as possible, including in crowded situations. This way, the Tip Bar would not only become efficient in the finishing phase only, but in intermediate, or in milder cases, or even in the initial stages of the treatment. Last but not least, a design needs to meet manufacturing requirements. Such considerations led to a third version of the design. We also took the opportunity to make the design even smoother and lower profile.

3-D printing and high precision slot processing:

When starting the development of the Incognito Appliance back in 2001, one of the first strategic decisions was to use Rapid Prototyping – today better known as 3-D printing – to manufacture the custom lingual brackets. Taking into account the maturity of the technology at the time it was a risky decision, but it was the only one providing the flexibility needed for a completely individual appliance.



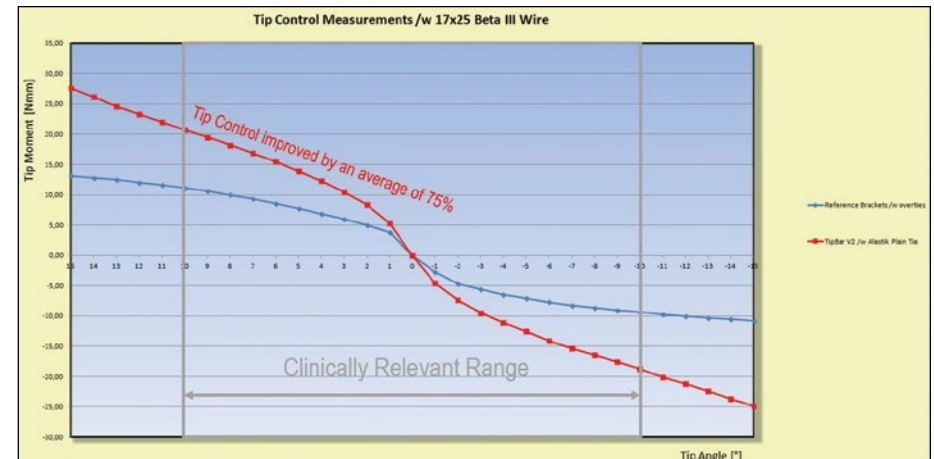
Although 3M is now manufacturing thousands of brackets every day, no two brackets are the same. In 2014, 3M invested in a new printing technology, providing a huge leap forward in terms of capacity and print quality. It was also an important enabler for the intricate Tip Bar design. To make it even more complex for the Incognito engineering team, at about the same time a new slot manufacturing process was introduced.

While 3-D printing is able to provide a precise bracket to tooth fit, it cannot yet meet the very strict requirements for slot precision, measured in the microns range. In the past, high precision custom-made tools have been used to manually broach the slots. To make sure not only to improve the angulation moment, but also the angulation precision, a new technology for slot manufacturing was installed. It is a complex process known as EDM, and utilized because of the achievable accuracy typically used in toolmaking.

Comparable to a jigsaw, a very thin wire and high frequency voltage is used to cut out the slot. All you see during the processing, which happens under water, are fine sparks. This is done multiple times at decreasing voltage to improve precision and surface finish of the slots. The Incognito Appliance team came up with a unique solution to position and fix the brackets for the EDM cut. The challenge was to provide a safe and precise fixation for parts, which are different every time and therefore cannot simply be clamped into a vice.

Lab testing: When developing or modifying an orthodontic product, lab testing is an important part of the project, in order to learn about product performance. One important test – the most exciting – was to compare the Tip Bar brackets to the conventional Incognito upper arch anterior brackets. As the goal was not only to improve the angulation control, but also to make it easier to use, an Alastik Lingual Ligature was used as a plain tie to ligate the archwire to the Tip Bar brackets, whereas for the conventional brackets an overtie was used. The Tip Bar brackets in combination with the less challenging ligation showed an angulation moment improved by about 75% compared to the conventional brackets with a power chain overtie.

Summary: Incognito Brackets with Tip Bar will address anterior angulation challenges in a way that makes a noticeable difference in clinical use. Whereas the Tip Bar design feature provides about 75% greater angulation moment, the EDM cut slots are responsible for precision and excellent torque and rotation control. The Incognito System R&D and Engineering team with the Tip Bar project managed to improve finishing without compromising the well-known positive aspects of the Incognito Appliance.



3M™ Victory Series™ Superior Fit Buccal Tubes now available in Roth* Rx.

Available 3M™ APC™ Flash-Free Adhesive provides complete 7×7 flash-free bonding capability.

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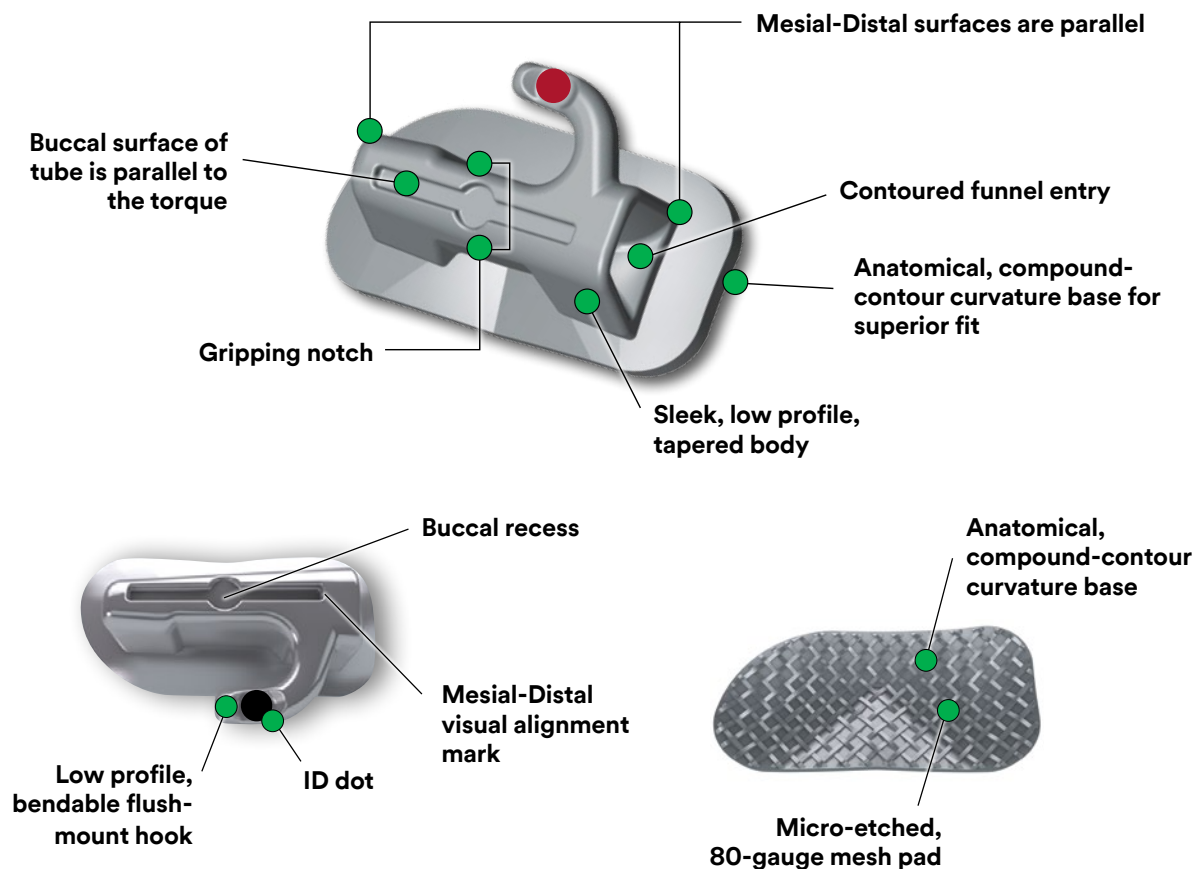
APC™ Flash-Free
Adhesive Coated Appliance System

Imagine not having to clean up flash in the hard-to-reach molar area.

3M™ Victory Series™ Superior Fit Buccal Tubes are the only buccal tubes that offer unique 3M™ APC™ Flash-Free Adhesive, giving you the convenience and simplicity of a complete, streamlined 7×7 flash-free system.

Whether you use metal or ceramic brackets, ligated or self-ligated appliances, 3M science has combined the most-requested features for handling and performance into these next-generation Victory Series Buccal Tubes. Choose .022 or .018 slot, single or double in the 3M™ MBT™ Appliance System or Roth* prescription.

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3MSM Health Care Academy

3MTM IncognitoTM Appliance System International Users Meeting

This exciting and informative event is organized to appeal to all 3MTM IncognitoTM Appliance System users. In the morning, the entire group of attendees will gather for plenary lectures addressed to all. In the afternoon, the attendee will have a choice of which lecture to attend during the breakout sessions. The breakout lectures will either be focused on an advanced topic, beginner topic or practice differentiation/marketing topic. This will allow for our doctors to feel fully engaged, regardless of their experience level with the Incognito System.

►► [Click For More Info](#)

Saturday, October 7: Incognito Appliance System International Users Meeting

- 8:00 a.m. – 5:30 p.m., followed by a farewell reception until 7:00 p.m.
- Lectures delivered in either English or French, with simultaneous translations available
- Lectures, workshops, and Poster Symposium of research and best practices

There is also an opportunity to attend a refresher course on Friday, October 6.

Friday, October 6: Incognito System Refresher Course

- Taught in English by Dr. Paul Ward and Dr. Leandro Fernandez
- Register for the refresher course here: www.cmmevents.net/refresher

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Paris, France
October 7, 2017

Registration is now open!

For registration and more event details, visit
www.cmmevents.net/parisusersmeeting

Speakers include...

- Dr. Steffen Decker (U.K.)
- Dr. Skander Ellouze (Tunisia)
- Dr. Laila Hitmi (France)
- Dr. Jae Sik Hur (Korea)
- Dr. Toru Inami (Japan)
- Dr. Beyza Kircelli (Turkey)
- Dr. Robbie Lawson (U.K.)
- Dr. Esfandiar Modjahedpour (Germany)
- Dr. Patricia Obach (France)
- Dr. Adam Schulhof (U.S.)
- Dr. Roberto Stradi (Italy)
- Dr. Steve Stramotas (Australia)
- Dr. Neil Warshawsky (U.S.)

3MSM Health Care Academy

Upcoming 2017 Educational Opportunities

DATE	LOCATION	EVENT
April 11	Shanghai, China	The Importance of Smile Aesthetics in Daily Orthodontic Practice
April 12-13	Shanghai, China	SmartClip™ Appliance System
April 13	Hangzhou, China	The Importance of Smile Aesthetics in Daily Orthodontic Practice
April 15	Xian, China	The Importance of Smile Aesthetics in Daily Orthodontic Practice
April 16-17	Xian, China	SmartClip™ Appliance System
Apr 27-28	Zhengzhou, China	MBT™ System Mechanics
May 5-6	New York City, New York, USA	Leveraging Today's Technology to Deliver an Outstanding Patient Experience
May 12-13	Prague, Czech Republic	3M Regional Conference: Aesthetics & Treatment of Challenging Cases
May 17-18	Shenzhen, China	Class II Correction
May 17-18	Fukuoka, Japan	JETsystem Seminar
May 22-23	Jinan, China	MBT™ System Mechanics
May 24-25	Osaka, Japan	Incognito™ System Certification Course
May 25-26	Chongqing, China	Class II Correction
May 26-27	Istanbul, Turkey	Incognito™ System Certification Course
June 1-2	Sumare, Brazil	MBT™ System Professors Meeting
June 5-6	Foshan, China	MBT™ System Mechanics
June 9	Cordoba, Argentina	Forsus™ Correctors Seminar
June 9	Split, Croatia	The Patient Journey
June 12	Mexico City, Mexico	Forsus™ Correctors Seminar
June 13	Mexico City, Mexico	MBT™ System Mechanics
June 14	Guadalajara, Mexico	Forsus™ Correctors Seminar
June 14	Guadalajara, Mexico	MBT™ System Mechanics
June 15	Tijuana, Mexico	Forsus™ Correctors Seminar
June 15-16	Santiago, Chile	Incognito™ System Certification Course
June 15-16	Taizhou, China	MBT™ System Mechanics
June 16	Tijuana, Mexico	MBT™ System Mechanics
July 6	La Plata, Argentina	MBT™ System Mechanics
July 31-August 2	Santiago, Chile	MBT™ Certification Course
August 2-4	Concepción, Chile	MBT™ Certification Course
August 14-17	Presidente Prudente, Brazil	MBT™ System International Course
August 18-19	Breckenridge, Colorado, USA	Aesthetics: Meet Patient Demand with Desired Results



Interested in an upcoming educational event? Contact your local 3M Oral Care representative today!

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Upcoming 2017 Educational Opportunities (continued)

DATE	LOCATION	EVENT
September 1	Zurich, Switzerland	Orthodontic Bonding & Aesthetic Treatment
September 7	Tokyo, Japan	Incognito™ System Advanced Course
September 14	Tokyo, Japan	MBT™ System Mechanics
September 15	Huntington Beach, CA, USA	Leveraging Today's Technology to Deliver an Outstanding Patient Experience
September 11-12	Ningbo, China	Class II Correction
September 16-17	Huntington Beach, CA, USA	Orthodontic Resident Summit: Aesthetics and your Bottom Line
September 27-29	Dubai, UAE	Dubai Orthodontic Conference
October 6	Gdansk, Poland	MBT™ System Mechanics: Molar and Incisor Extraction Cases, Molar Mesialisation
October 7	Kiev, Ukraine	TAD Mechanics
October 23	Tel Aviv, Israel	Forsus™ Correctors and Self-Ligation
October 23-25	San José, Costa Rica	MBT™ Certification Course
October 25-27	San Salvador, El Salvador	MBT™ Certification Course
November 3	Brno, Czech Republic	Forsus™ Correctors and Self Ligation
November 9-10	Moscow, Russia	Treating TMD/TMJ Effectively & Efficiently
November 13-14	Wuhan, China	SmartClip™ Appliance System
November 15-16	Nanjing, China	SmartClip™ Appliance System
November 15-16	Tokyo, Japan	Incognito™ System Certification Course
November 16-17	Nashville, TN, USA	In-Office Course
November 17-18	Warsaw, Poland	Incognito™ System Certification Course



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Clinical Cases



3MSM Health Care Academy

Treatment of an open bite case with 3MTM ClarityTM ADVANCED Ceramic Brackets and miniscrews.

CLARITYTM | ADVANCED
advanced ceramic brackets



Dr. J.C. Pérez-Varela

MD, DDS, MS, Ph.D. Specialist in Orthodontics. Doctor of Medicine and Surgery. Spanish Board of Orthodontics. European Board of Orthodontics. Active Member of the Angle Society of Europe. Associate Professor, University of Santiago de Compostela.



Dr. B. Iglesias-Sánchez

DDS, MS. Specialist in Orthodontics. Specialist in Lingual Orthodontics (UV). Private Practice in Orthodontics in Santiago de Compostela.

Introduction

At present, there is an increasing demand from patients for orthodontic treatment by aesthetic means. That makes us search for more aesthetic alternatives to conventional metal brackets. 3MTM ClarityTM ADVANCED Ceramic Brackets are an alternative that has more weight in our consultations for both adult and adolescent patients.

Presentation of the clinical case

The patient came to our office for joint pathology with TMJ discomfort.

In the extraoral examination, the patient presented malar hypoplasia, open nasolabial angle, 1 mm gingival smile, concave profile and a long face (Figure 1A-F).

In intraoral exploration, the patient presented molar and canine Class I on both sides, slight tendency open bite, upper and lower midline do not match up and crowding (Figure 2A-C).

In the teleradiography, the lower incisor was proclined and the upper incisor was retroclined. The patient was Class II and she was biretrusive (Figure 3).



Figure 1A-F



Figure 2A-C



Figure 3

Evolution of the case

At the beginning of the treatment, we proposed that the patient use a lower splint to try to relax the muscles and to try to find the central relation (Figure 4A-C). To do this, we combined the use of lower splint and upper Clarity ADVANCED Brackets for six months (Figure 5A-C).



Figure 4A-C



Figure 5A-C

At the end of this stage, we re-evaluated the case because there was a mandibular retro positioning and it had increased the Class II and the open bite. The patient had markedly improved joint discomfort (Figure 6A-D, Figure 7A-B, Figure 8, and Figure 9A-B).

We told the patient that the ideal treatment for her was orthognathic surgery, and because she refused, we decided to look for an alternative by placing TADs in the lower arch between 36 and 37 as well as 46 and 47. We preferred to place implants in the lower arch because it was a denser bone, so we only needed two instead of four (Figure 10).

The placement of the TADs was performed later when we had placed lower brackets and had reached a steel arch (Figure 11A-E).



Figure 6A-D

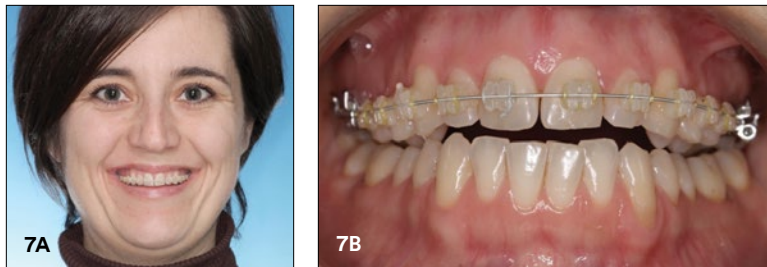


Figure 7A-B

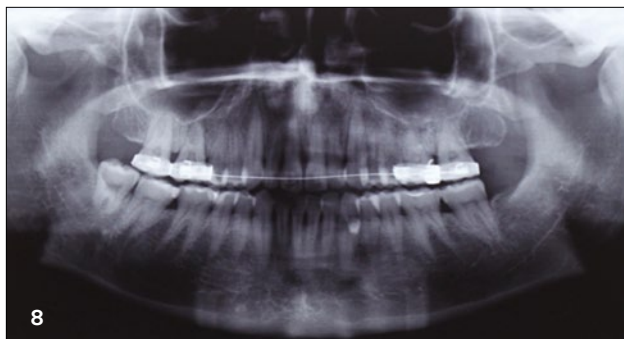


Figure 8

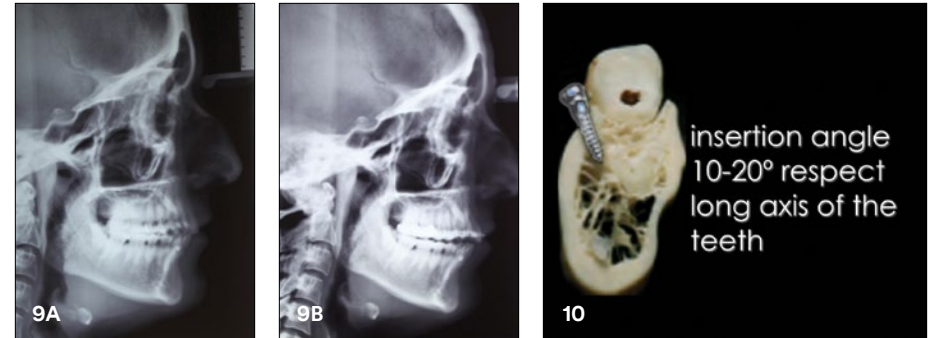


Figure 9A-B

Figure 10

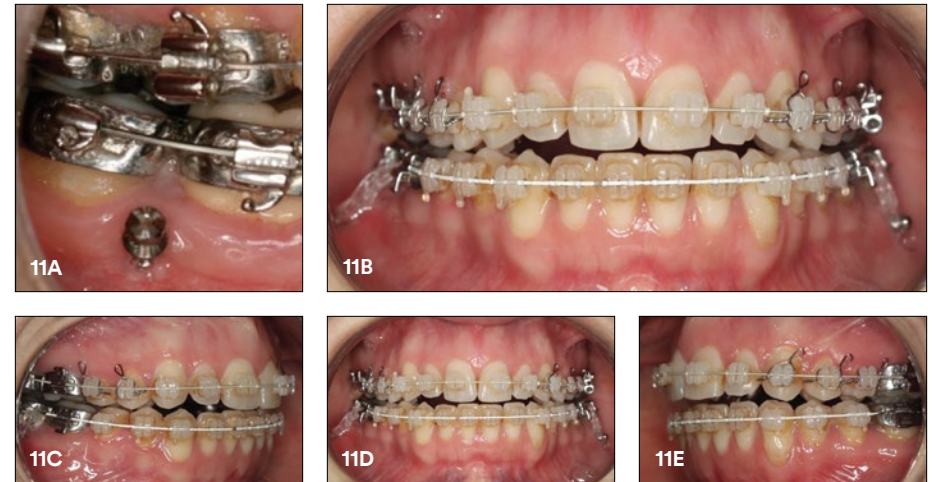


Figure 11A-E

The archwires we used during treatment combined with Clarity ADVANCED brackets are:

1. Alignment: 0.014 NiTi and 0.016 NiTi
2. Leveling: 0.017×0.025 NiTi
3. Space Closure: 0.019×0.025 Steel Wire
4. Finishing: 0.018 Steel Wire with bending

These archwires were used in both the upper arch and the lower arch.

During the working phase, we used the combination of 0.019×0.025 steel archwires in both arches with TADs that were anchored with chains directly to the arch between the first and second lower molars (Figure 12A-C).

After we closed the open bite, we used short intermaxillary elastics in Class II position (Figure 13A-D).



Figure 12A-C

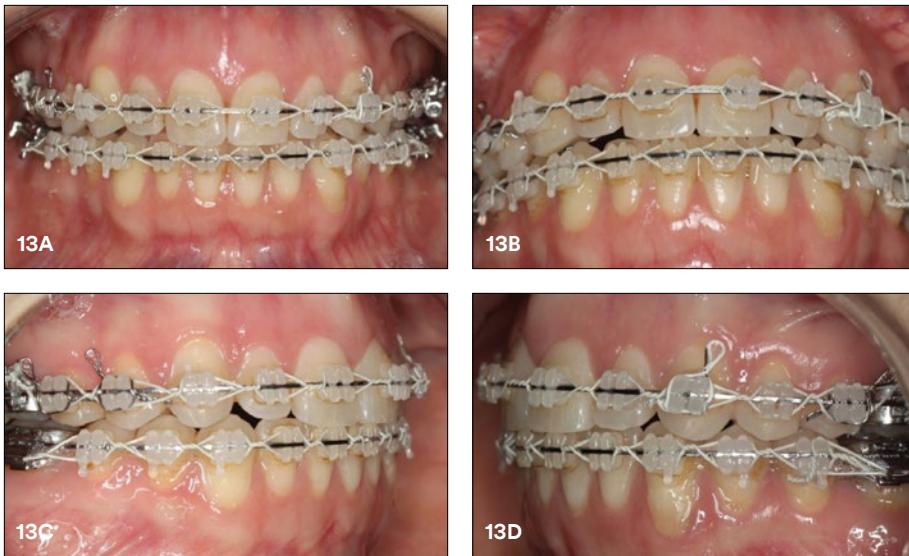


Figure 13A-D

Once a good final adjustment had been achieved, we applied bends in the finishing phase to a 0.018 steel archwire and achieved the final aesthetics (Figure 14A-D, Figure 15A-D, and Figure 16A-B).

The total treatment was 28 months.

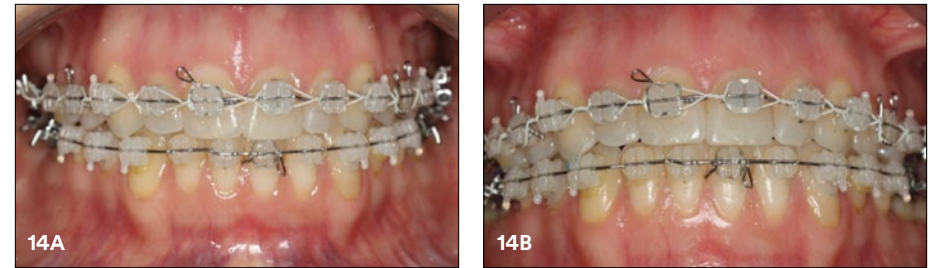


Figure 14A-D

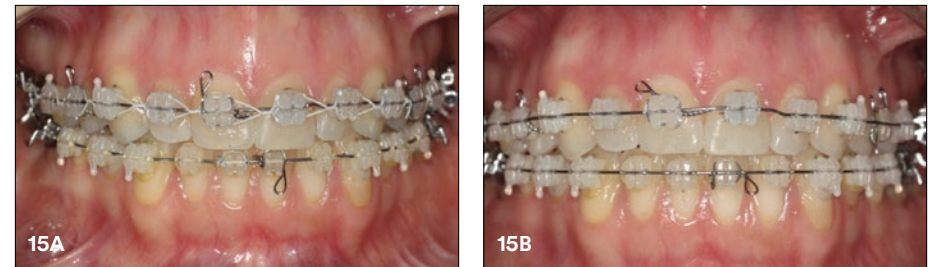


Figure 15A-D



Figure 16A-B

Treatment results

The patient presented a bilateral molar and canine Class I, alignment and leveling of both arches, absence of articular pathology, centered medial lines and an improvement of the smile amplitude. There are no significant changes in the patient's face (Figure 17A-F and Figure 18A-D).



Figure 17A-F



Figure 18A-D

At the end of the treatment, we did a little gingivectomy to find the symmetry in the gum and a composites in 21 and 11 to obtain a better aesthetic (Figure 19 and Figure 20A-D).



Figure 19

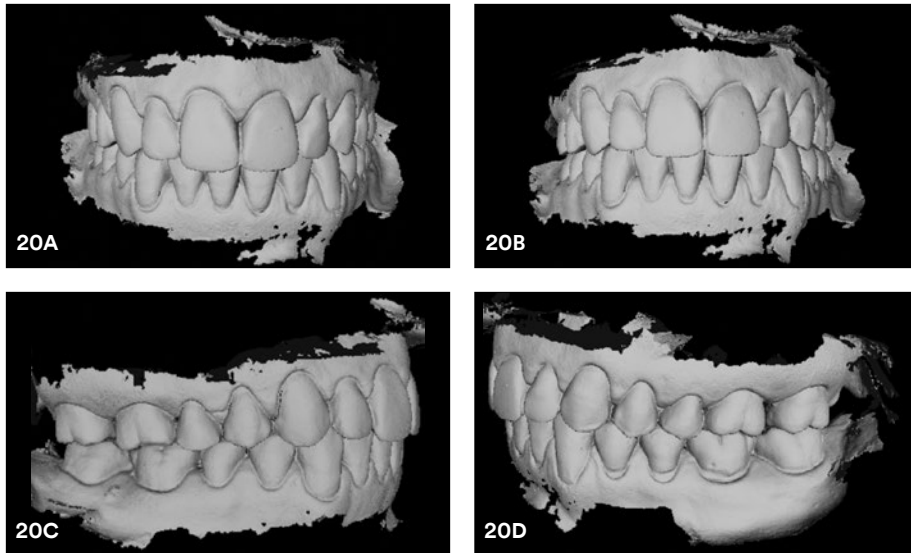


Figure 20A-D

Teleradiography showed that the upper and lower incisors have a correct position and inclination. In the CBCT, we can observe that the roots are in the middle of the alveolar bone and there is no root resorption (Figure 21A-B and Figure 22).

Two years later, the occlusion and function is stable. The aesthetic of the smile is acceptable. The patient does not have TMJ problems (Figure 23A-C).

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Case photos provided by the authors.

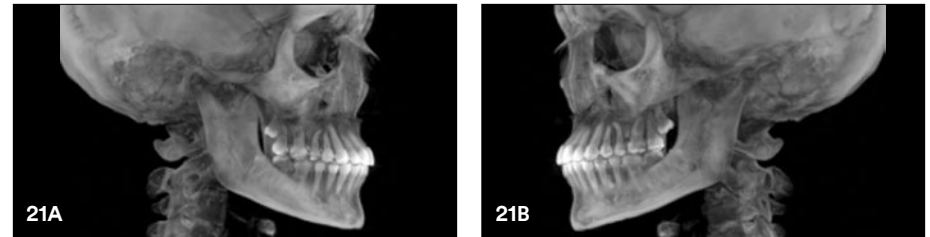


Figure 21A-B

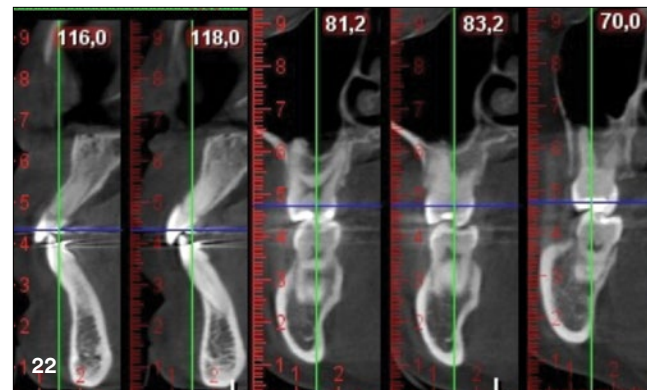


Figure 22



Figure 23A-C

3MSM Health Care Academy

Adolescent Class II Treatment with 3MTM IncognitoTM Appliance System and 3MTM ForsusTM Class II Correctors

IncognitoTM
Appliance System



Dr. Omur Polat-Ozsoy

Professor Omur Polat-Ozsoy received her Dental Degree from Hacettepe University and Specialty Degree in Orthodontics from Selcuk University. She has been teaching and practicing at Baskent University since 2004. She is an active member of a number of professional organizations including American Association of Orthodontists, World Federation of Orthodontics

and Societa Italiana di Ortodonzia. Dr. Ozsoy serves as a reviewer to many national and international journals like *American Journal of Orthodontics* and *Dentofacial Orthopedics*, *Angle Orthodontist*, *European Journal Orthodontics* and *Korean Journal of Orthodontics*. Her academic interests include pain in orthodontics, skeletal anchorage, lingual orthodontics and indirect bonding.

Introduction

Conventional orthodontic treatment during adolescence is challenging, especially when aesthetics is one of the main factors in development of self-confidence during this developmental stage. The adolescent is usually both non-compliant and esthetically demanding. Most patients are willing to have a short treatment period, and if they have a sagittal discrepancy the treatment may be exhausting for both the patient and the doctor.

In this report, the treatment of an adolescent Class II patient with lingual braces and the 3MTM ForsusTM Class II Correctors appliance will be presented.

Case

A female patient, 14 years and nine months of age, presented to our clinic for the correction of her mandibular retrusion (Figure 1A-H). Radiographic evaluation revealed complete permanent dentition with developing wisdom teeth (Figure 1I-J). The patient was a low angle, dental Class II patient with retrusion of upper and lower incisors. She only had a minimal amount of crowding in upper arch and sagittal mandibular correction was the main goal of the treatment. The patient had a high rate of aesthetic expectancy from the appliances. Therefore, lingual treatment using the 3MTM IncognitoTM Appliance System was offered (Figure 2A-E).

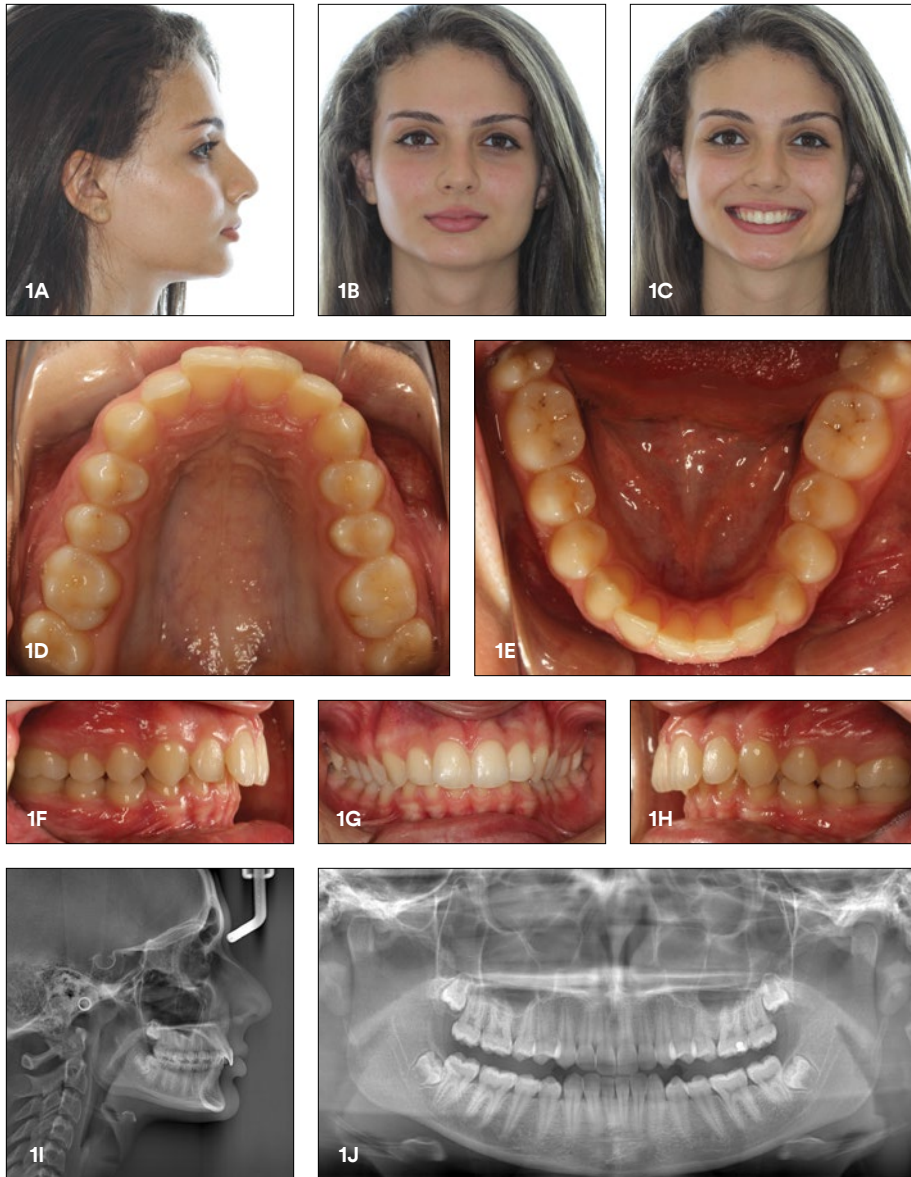


Figure 1A-J: Pretreatment photos and radiographs.

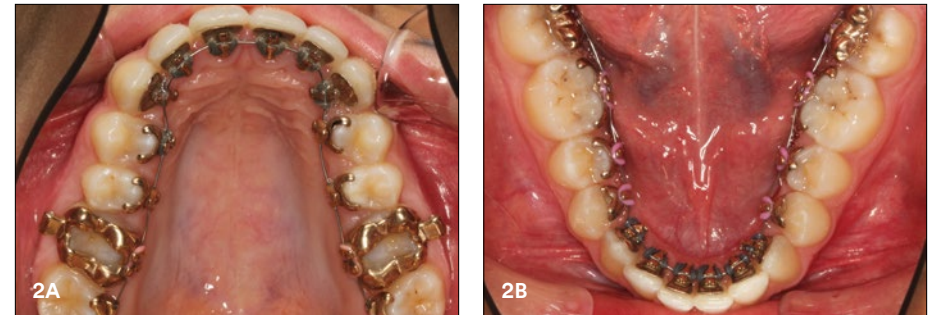


Figure 2A-E: Initial bonding.



Figure 3A-C: 3M™ Forsus™ Class II Correctors application at 0.016×0.024 SS archwires.

When the treatment initiated, a special buccal attachment for the Forsus Appliance was not available. Therefore, after leveling, a 17×25-inch steel wire was bonded to the buccal surfaces of the lower canines and first premolars for the attachment of the Forsus Appliance (Figure 3A-C). During Forsus Appliance application, no breakage was seen on the lower buccal attachments. The main advantage observed with combined application of lingual appliances and the Forsus Appliance was the minimal anterior movement of lower incisors. Since the center of resistance of lower teeth was buccal to the brackets, lingual appliances do not cause proclination of teeth unlike buccal appliances.

During treatment progress, five unplanned visits were made due to bracket debonding. The treatment lasted 17 months. Upper and lower fixed retainers were placed at the time of debonding (Figure 4A-H). During a 12-month follow-up, no relapse was observed (Figure 6A-H). In conclusion, Class II treatment of an adolescent was successfully completed using Incognito brackets and the Forsus Appliance.

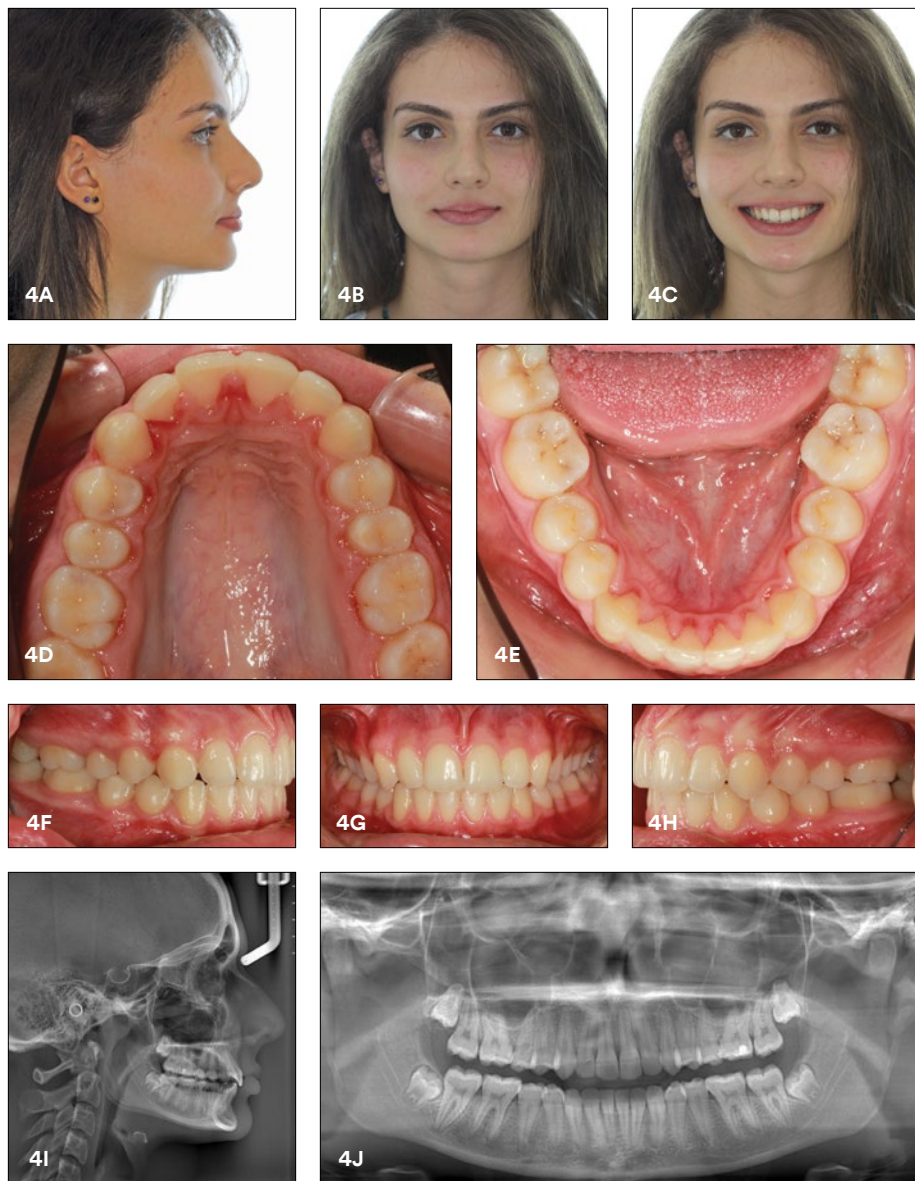


Figure 4A-J: Post-treatment photos and radiographs.

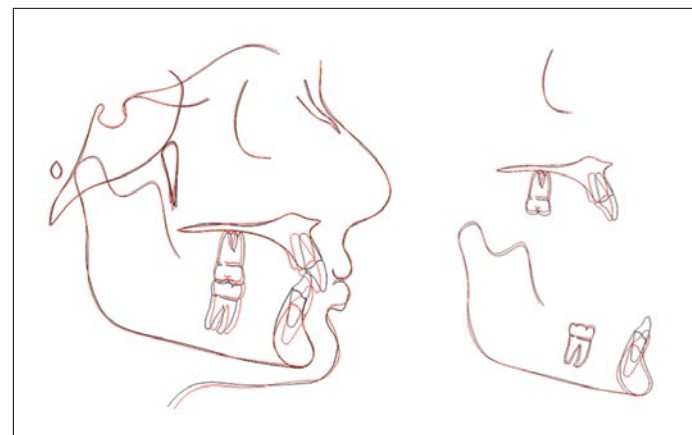


Figure 5: Pre- and post-treatment cephalometric superimposition and pre- and post-cephalometric measurements.

Cephalometric Analysis			
	Pretreatment	Post-Treatment	12-Month Retention
SNA	80.9	81.3	82
SNB	78.4	78.9	79.5
ANB	2.5	2.4	2.5
SN-GoGn	24.9	24.9	22.5
U1-NA (°)	18.6	20.6	20.8
U1-NA (mm)	4.4	2.1	2.2
L1-NB (°)	18.3	24.7	22
L1-NB (mm)	2.3	2.8	2.1
UL-Eplane (mm)	-4.8	-5.4	-5.4
LL-Eplane (mm)	-2.6	-2.6	-2.5

Table 1: Cephalometric analysis.

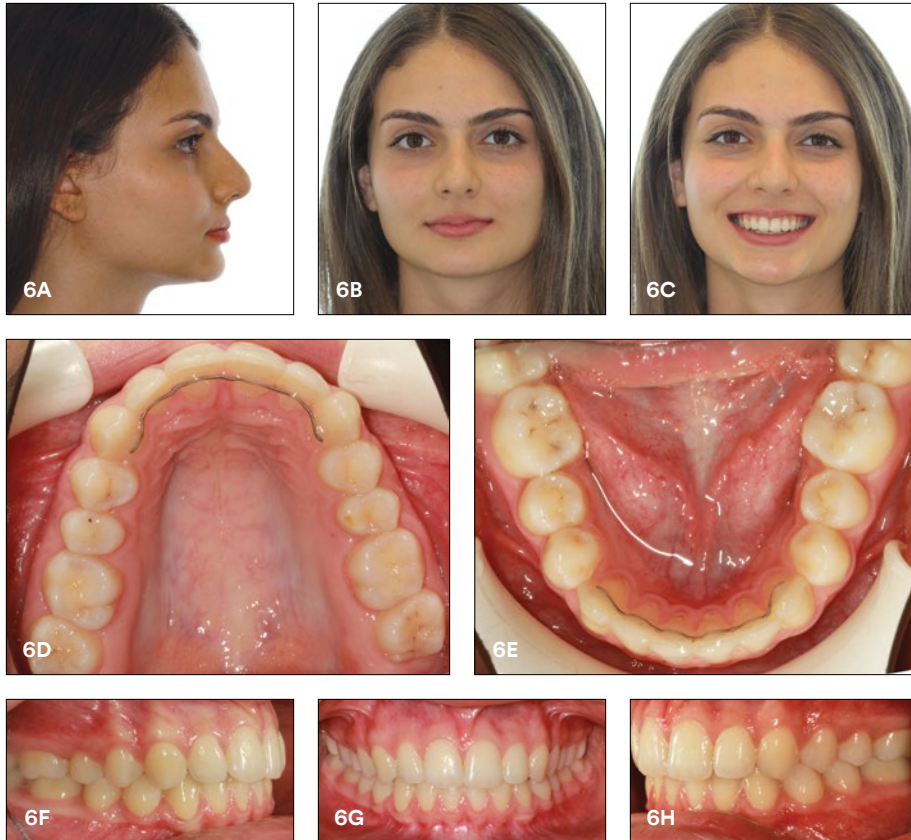


Figure 6A-H: 12-month follow-up photos.

Dental Analysis

- Bilateral Class II malocclusion
- Deep Bite
- Light crowding in upper arch
- Narrow lower jaw

Treatment Plan

Upper/lower Incognito Appliance with Forsus Class II Corrector

Wire Sequence

0.014 Superelastic NiTi; 0.016×0.022 Superelastic NiTi; 0.018×0.025 Superelastic NiTi, 0.016×0.024 SS; 0.0182×0.0182 TMA

Treatment Duration

17 months

Retention

Upper/lower fixed retainers (3-3) 0.215 multistranded wire

Case photos provided by Dr. Omur Polat-Ozsoy.

3MSM Health Care Academy

Sliding mechanics in an extraction case treated with 3MTM ClarityTM ADVANCED Ceramic Brackets and the 3MTM MBTTM Appliance System.

CLARITY | **ADVANCED**
advanced ceramic brackets

MBTTM
Versatile+ Appliance System



Dr. Gianluigi Fiorillo

Dr. Gianluigi Fiorillo received his degree in Dentistry from La Sapienza University of Rome in 1992 and post graduate Certificate in Orthodontics in 2000 from the University of Ferrara. Since 2007 he has been a visiting professor of D'Annunzio University of Chieti, also in 2015 at the Second University of Naples and in 2016 at the University of Catania. He coordinates (in Italy) the 3MTM MBTTM Versatile+ Appliance System study group and is the author of the orthodontic blog mbteam.co. Dr. Fiorillo lives and works in Rome, dealing exclusively in orthodontics.

The choice of an extraction treatment can be made because of crowding, protrusion, dental asymmetries and class relationship. In all of these factors, using straight wire technique, the space closure is achieved by sliding mechanics generating friction in the posterior region, whatever the anchorage system. In other words, the alignment of the teeth in the anterior region first allows a sliding only on premolars and molars, as if cuspids and incisors move like a single big tooth with two ends, sliding to the posterior binary represented by the slots or, conversely, moving the posterior teeth forward, sliding on the same segments of the arch.

This shows that friction exerts its negative effects on the premolar brackets with a ligature, since the molar tubes can be considered a slot with four sides, like self-ligating brackets. This consideration alone should help to mitigate the concern that supporters of the self-ligating technique express to the “problem” of friction in extraction cases in straight wire technique. But to be honest, friction occurs also when cuspids are moving towards extraction spaces when resolving crowding and with incisors, while correcting the horizontal and vertical misalignment, rotations, overlays and protrusions. And to be frank, sliding is prevented the most, especially in this stage, because of the presence of ligatures or by using ceramic brackets.

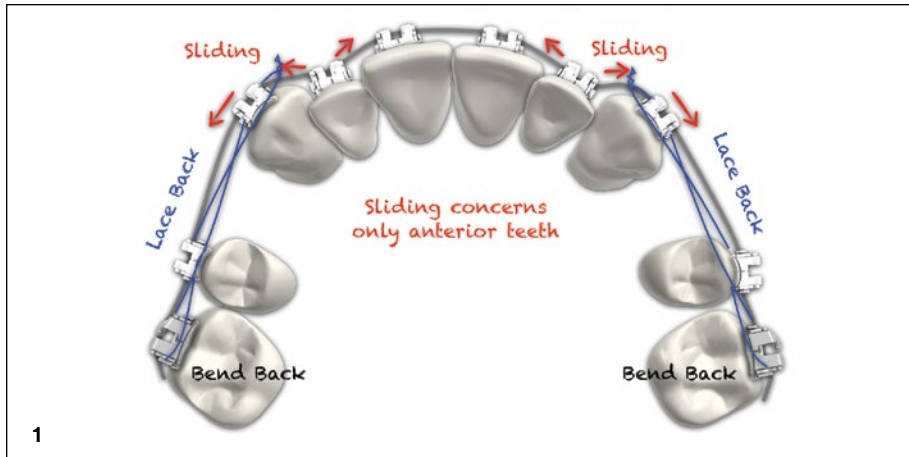


Figure 1: 3M™ MBT™ Appliance System Philosophy – Leveling and alignment phase.

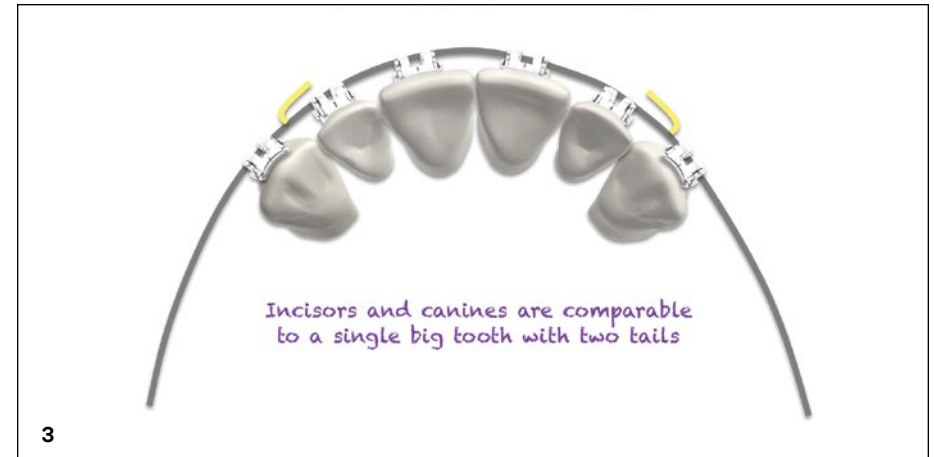


Figure 3: 3M™ MBT™ Appliance System Philosophy – Space closure phase.

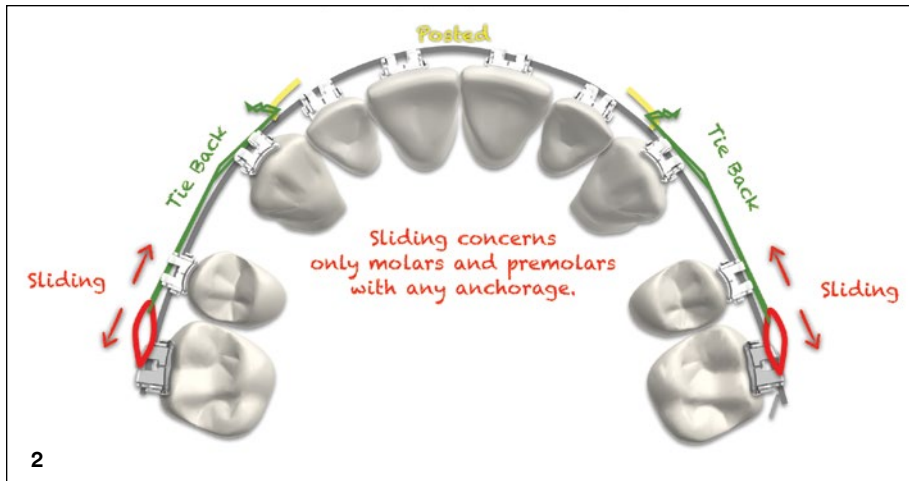


Figure 2: 3M™ MBT™ Appliance System Philosophy – Space closure phase.

In my daily clinical experience, I make an extensive use of aesthetic 3M™ Clarity™ ADVANCED Ceramic Brackets, and this doesn't represent a problem. In fact, I don't find any differences compared to the traditional stainless steel ligated brackets. Moreover, these brackets show the same efficiency of self-ligating ones; however, they are more expensive (considering the price, strength of adhesion, breaking resistance, and the general frequency of replacement). On the following page, a clinical case of a 25-year-old female showing a molar Class I, crowding and protrusion in a skeletal relationship of Class II (Figure 4A-H).

In this case, we used Clarity ADVANCED Brackets with 3M™ APC™ Flash-Free Adhesive and stainless steel molar tubes in the MBT prescription. According to the clinical protocol recommended in the MBT technique, the applied arch sequence is: 0.014" NiTi SE, 0.016" NiTi SE, 0.017×0.025" NiTi HA, 0.019×0.025" NiTi HA and Posted SS 0.019×0.025" with lacebacks, bendbacks and tiebacks, as usual.



Figure 4A-H

This case is characterized by a skeletal Class II and high angle, occlusal relationship of Class I with crowding and protrusion of the incisors. The chosen treatment included extraction of the four first premolars, establishing medium anchorage to avoid depressing the lip support and, at the same time, resolving crowding, dental protrusion and overjet. The first premolars have undergone interproximal reduction to assist stability, while the lower premolars are immediately extracted to allow the “driftodontics” phenomenon. The appliance is placed in the upper arch and characterized by the presence of 0.014" NiTi SE arch and laceback to guide distally the canines during crowding resolution. In this phase the friction occurs especially in the area of the anterior teeth.

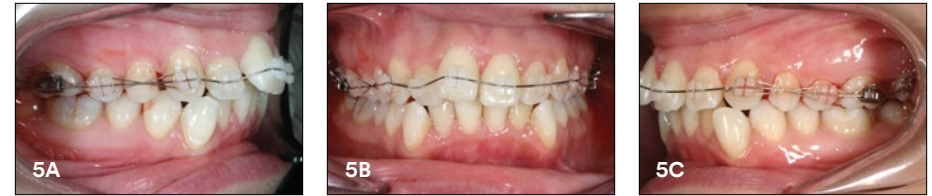


Figure 5A-C



Figure 6A-C



Figure 7A-E



Figure 8A-B

The lacebacks are activated by twisting the mesial ends to keep them in tension, if possible, until the appearance of spacing in the anterior teeth. After the first wire, a 0.016" NiTi SE and 0.017"/0.025" NiTi Heat Activated are applied in upper, while the lower arch can change the alignment of teeth and close spaces spontaneously. In the fifth month of treatment, the brackets are applied below, using the same sequence of wires and applying lacebacks. At this time, the spaces corresponding to the first lower premolars are already partially closed.



Figure 9A-E

The complete closure of the spaces can be achieved if control of the overbite is complete, and for that it is necessary to apply 0.019"/0.025" NiTi SE and, most importantly, the posted SS 0.019"/0.025". At this point, the combination with the tieback technique begins the real space closure phase, in which the sliding and friction take place only in correspondence of the second premolars and the molars. As can be seen in the figures, the active tiebacks are sections of elastic chain that are clinically effective along with the classic combination of 0.010" wire and elastomeric ligatures.



Figure 10A-E

Subsequent checks only require ligature and tieback replacement, having given a light anti-Spee curve on the lower posted wire. After a short period of occlusal settling with short vertical elastics, the appliances were deboned. The duration of treatment was 19 months and two vacuum formed retainers were provided.



Figure 11A-E



Figure 12A-E

The resolution of crowding and protrusion and the closure of premolar spaces based on the biomechanics of the MBT System and the Clarity ADVANCED ceramic bracket has been very efficient. The treatment time was short, there was only breakage of molar tubes, and the amount of friction was not high enough to influence the success of the therapy. On the contrary, the biomechanical progression was fast and characterized by easy case management.



Figure 13A-C

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Case photos provided by Dr. Gianluigi Fiorillo

3MSM Health Care Academy

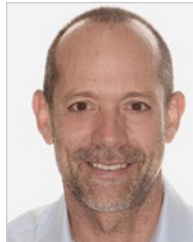
A lingual orthodontic case with 3MTM IncognitoTM Appliance System combined with orthognathic surgery.

IncognitoTM
Appliance System



Dr. B. Iglesias-Sánchez

DDS, MS. Specialist in Orthodontics. Specialist in Lingual Orthodontics (UV). Private Practice in Orthodontics in Santiago de Compostela.



Dr. F. Hernandez-Alfaro

MD, DDS, Ph.D., FEBOMS. Professor & Chairman Department of Oral & Maxillofacial Surgery. Universitat Internacional de Catalunya. Director Instituto Maxilofacial. Centro Médico Teknon.



Dr. J.C. Pérez-Varela

MD, DDS, MS, Ph.D. Specialist in Orthodontics. Doctor of Medicine and Surgery. Spanish Board of Orthodontics. European Board of Orthodontics. Active Member of the Angle Society of Europe. Associate Professor, University of Santiago de Compostela.

Introduction

At present, there is an increasing demand for aesthetic orthodontic treatment on the part of patients. That makes lingual orthodontics with 3MTM IncognitoTM Appliance System an alternative that has more weight in our dental practice every day, and especially when the patient knows that it will be lengthened in time. For this reason, many of our surgical patients require lingual brackets.

Presentation of the clinical case

The patient came to our office for joint pathology with discomfort in the right TMJ. In the intraoral exploration, there is Class II on the right side, which increases in centric relation, mild mandibular asymmetry, lower midline to the right, upper

midline centered with Filtrum, absence of 36, upper and lower gingival recessions, crowding and articular clicking (Figure 1A-C).



Figure 1A-C

In the extraoral examination, she presented malar hypoplasia, open nasolabial angle, 1 mm gingival smile and mandibular retrusion (Figure 2A-F).

In the teleradiography, the patient presents a Class II, with a birretrusion, the upper incisor was proclined and the lower incisor was retroclined. In the orthopantomography, the patient had no 36, the level of the bone was good and she didn't have any dental problems (Figure 3A-B).



Figure 2A-F



Figure 3A-B

Diagnosis and treatment plan

After analyzing the patient and seeing that she presents a Class II that increases in centric relation, we proposed that for best results, we should perform Bimaxillary Orthognathic Surgery combined with lingual braces. We will close the lower space, leaving the 37 in the place of 36 and 38 in the place of 37.

We did the case analysis with the 3M™ Unitek™ Treatment Management Portal | TMP program, and the final result obtained was a good occlusion, with a canine and molar in Class I, and midlines centered (Figure 4A-C).

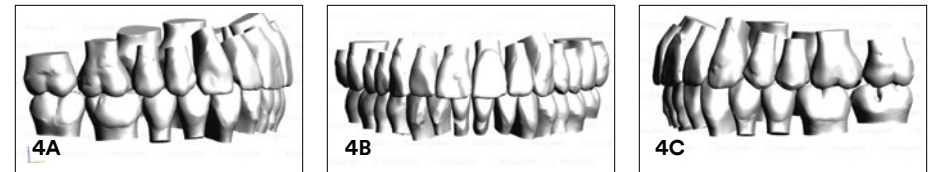


Figure 4A-C

Evolution of the case

Once we decided that we were going to perform the case with Incognito Lingual Appliances, we took impressions of the patient and while we waited for the brackets to be finished, we put a splint for muscle relaxation on the patient to deprogram the mandible.

The sequence of archwires used was:

- Upper: 0.016 NiTi, 0.016×0.022 NiTi, 0.018×0.025 NiTi, 0.016×0.024 Steel, 0.0182×0.0182 TMA (all with bends).
- Lower: 0.016 NiTi, 0.016×0.022 NiTi, 0.018×0.025 NiTi, 0.016×0.024 Steel, 0.0182×0.0182 TMA (all without bends, except TMA).

Once the brackets arrived, we placed the upper and lower arches with 0.014 NiTi archwires in both arches. We kept both for two months and they reached arcs of 0.016 NiTi that we maintained for another two months (Figure 5A-C).



Figure 5A-C

Since we were going to perform the closing of spaces in the lower arch, we did not begin to place the lower chain until we placed the steel arch. During this process, due to the mandible being in a centric relation, the lower dental midline was more deviated and the Class II was increased (Figure 6A-C, Figure 7A-D, and Figure 8A-B).



Figure 6A-C

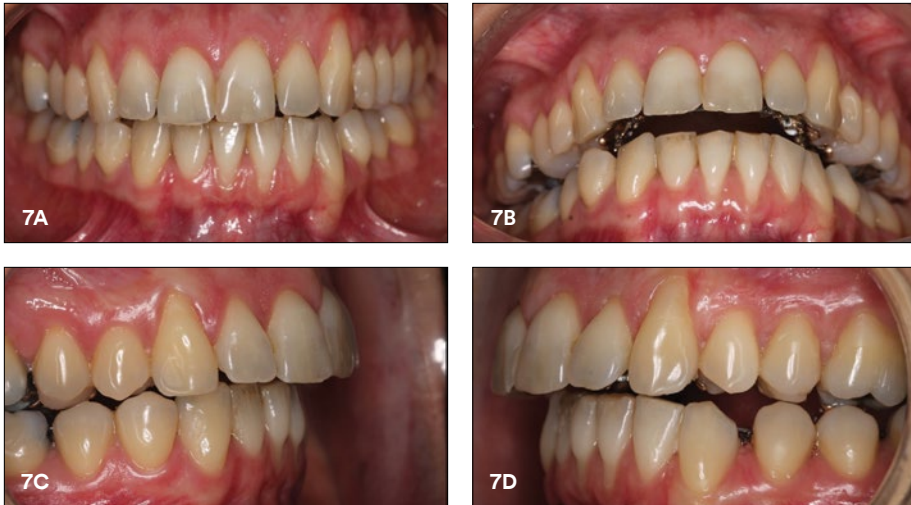


Figure 7A-D

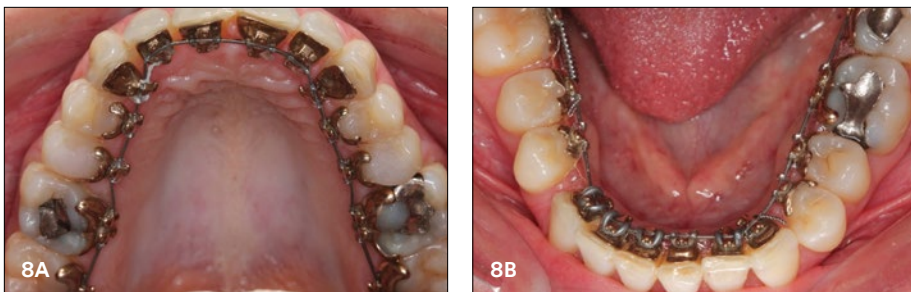


Figure 8A-B

The patient wanted to be operated on as soon as possible for cosmetic reasons, due to the mandibular retrusion that occurs after the mandible stays in a centric relation, and early surgery was planned. We did photos before surgery to the planification (Figure 9A-J and Figure 10A-G).



Figure 9A-J



Figure 10A-G

After orthodontic preparation/decompensation, 3-D planning of the procedure is simulated by the surgeons, and CAD/CAM splints printed (Figure 11A-D):

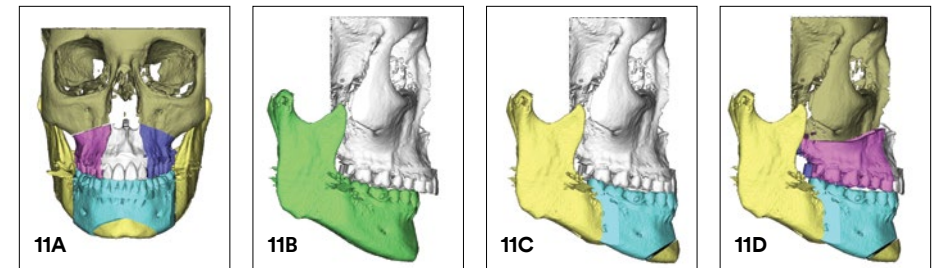


Figure 11A-D

Under general anesthesia and nasotracheal intubation, four miniscrews were placed for intraoperative maxillomandibular fixation and postoperative elastic management. After that, a posterior approach in the mandible allowed for bilateral sagittal osteotomy with advancement and centering according to the CAD/CAM intermediate splint. On each side bone fixation was achieved with a miniplate, four mono-cortical screws and one bicortical screw.

Then, a minimally invasive 2 cm approach to the maxilla allowed for a LeFort I osteotomy, with the twist technique published by the surgeon. Two preformed plates were used for maxillary fixation according to the final splint. Incisions were closed in planes. Surgical time was 80 minutes (Figure 12A-D, Figure 13A-D, and Figure 14A-D).

Immediate postoperative recovery was uneventful, and the patient was discharged from the hospital the day after the procedure.

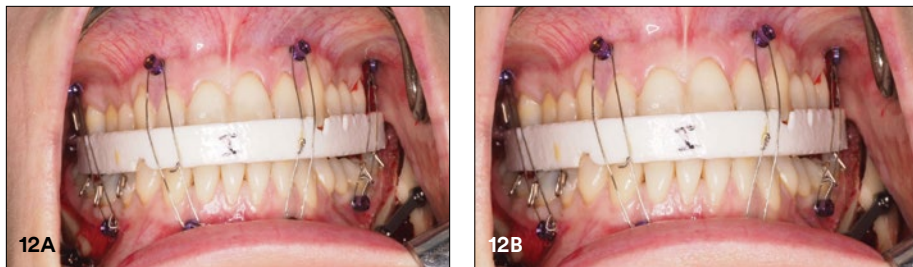


Figure 12A-D

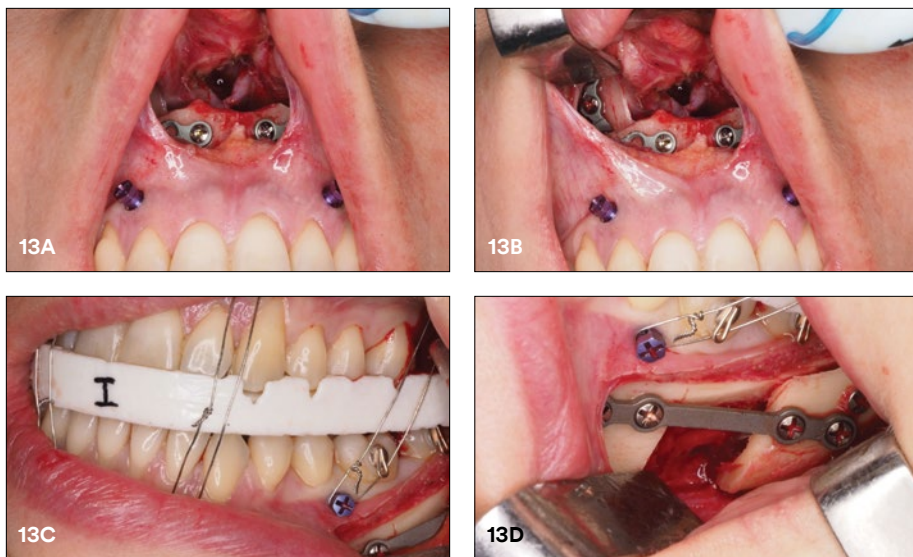


Figure 13A-D

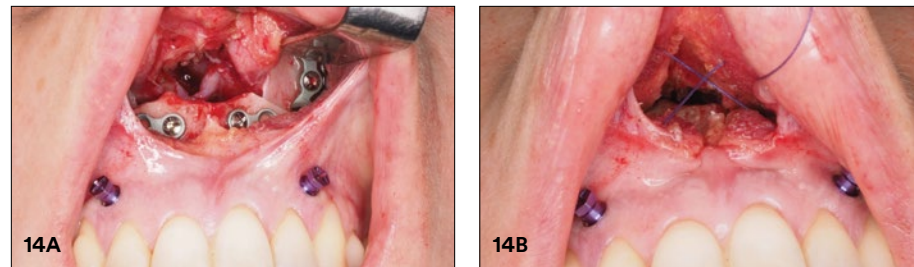


Figure 14A-D

We continued to close the space after the surgery in the lower arch with the help of intermaxillary elastics on the vestibular area just after the surgery, since the patient did not present much oral opening (Figure 15A-E and Figure 16A-J).



Figure 15A-E



Figure 16A-J

We worked with steel arches for eight months, closing the occlusion.

The last three months, we used TMA archwires of 0.0182×0.0182 in both arches to carry out the finalization of the case (Figure 17A-D and Figure 18A-D).

We performed the placement of fixed retainers in both arches at the end of treatment. The incisal edges of the upper incisors that were abraded have been reconstructed with composite.



Figure 17A-D

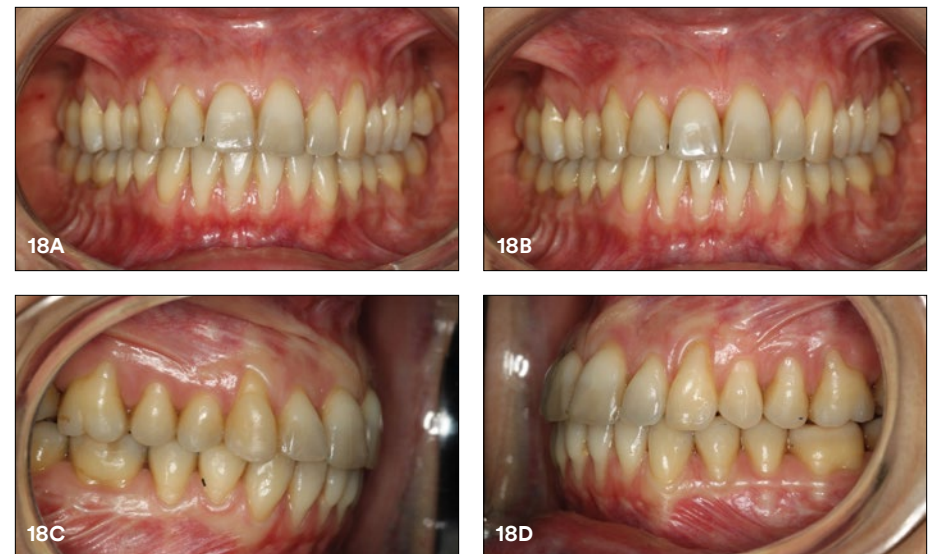


Figure 18A-D

Treatment results

The patient achieved a canine and molar bilateral Class I. The spaces were closed and the occlusion is acceptable. The facial and smile aesthetics improved greatly and the joint discomfort improved. In the telerradiography, the inclination of the incisors is correct, and the patient has a Class I. In the orthopantomography, the patient has good parallelism of the roots, she doesn't have resorption and the level of the bone is good. (Figure 19A-C, Figure 20A-H, and Figure 21A-B).



Figure 19A-C

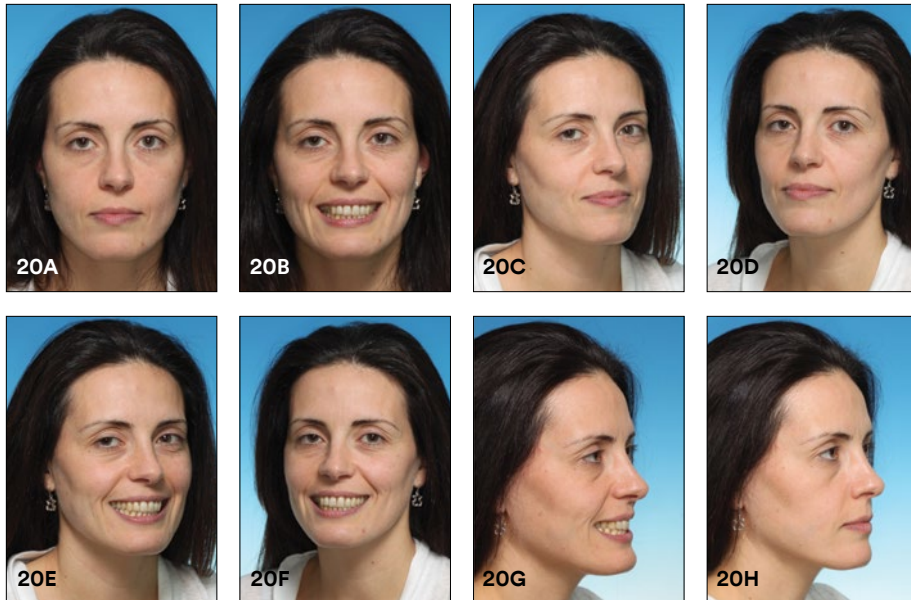


Figure 20A-H

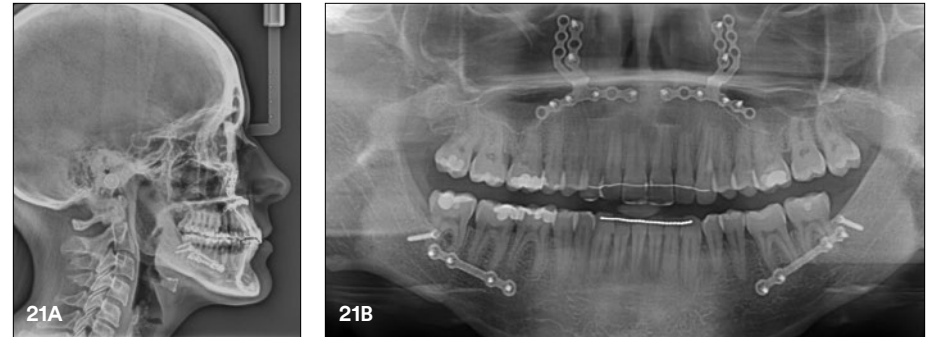


Figure 21A-B

Conclusions

In cases where there is a severe skeletal discrepancy, it is necessary to perform a combined orthodontic treatment and orthognathic surgery in order to obtain all goals.

Case photos provided by the authors.

3MSM Health Care Academy

Incorporating eyelets into 3MTM SmartClipTM SL3 Self-Ligating Appliance System.

SMARTCLIPTM SL3
SELF-LIGATING APPLIANCE SYSTEM



Dr. Gilad Har-Zion

Dr. Gilad Har-Zion received a D.M.D. in 1992, and the MSc. (Magna cum laude) and Specialist in Orthodontics in 2001 from Hebrew University, Jerusalem.

Since then, he has been teaching in the Department of Orthodontics at the Hebrew University and now holds the position of Senior lecturer of the practice (since 2014).

1999 – Private and public practices – Orthodontics.

2000 – Instructor in graduate course in Orthodontics, Hebrew University, Jerusalem, Israel

2006 – Examiner in Phase II board examinations in Orthodontics, the Israel Dental Association.

2008 – Member of the committee for board examinations in Orthodontics, the Israel Dental Association.

Dr. Har-Zion has been practicing with the 3MTM MBTTM Appliance System since 2000, and the 3MTM SmartClipTM and 3MTM ClarityTM SL Self-Ligating Systems since 2004. Current research includes friction in self-ligating brackets as well as clinical phenomena associated with various self-ligating systems.

Dr. Har-Zion has lectured and presented posters in Israel, Europe and in the U.S., and has published several scientific articles in peer-reviewed Orthodontic journals. He serves as a reviewer for several international orthodontic journals. Memberships include: Israel Dental Association, Israel Orthodontic Society, Israel Forum of Lingual Orthodontics, European Orthodontic Society, World Federation of Orthodontists and the American Association of Orthodontists.

Under certain conditions, self-ligating appliances can level and align faster than conventional brackets. In order to perform ideally, the frictional resistance of the self-ligating appliance must be kept as low as possible during the initial stages of treatment¹.

A problem arises when a malaligned tooth is placed in a location which prevents the placement of a self-ligating bracket in an ideal position. This typically occurs when a tooth is partially blocked out from the dental arch. Sometimes the bracket can be bonded in the correct position, but no space is left for the archwire, which therefore cannot be engaged in the bracket.

Generally these situations can be treated in two ways:

1. Bonding the self-ligating bracket in a non-ideal position. As the treatment progresses, the bracket will have to be replaced with another bracket (an additional expense) that will be positioned correctly.

2. Opening spaces with coil springs prior to the placement of the bracket.

This procedure can be very laborious and time consuming. In addition, treatment time is prolonged.

Recently, I started using vertical eyelets in these circumstances. The eyelet is a small, simple and relatively inexpensive attachment which requires only a small area of accessible tooth surface for bonding. When bonded parallel with the long axis of a tooth, the eyelet will function as a mini-tube or as a very narrow passive self-ligating bracket. Therefore, eyelets can be incorporated into the initial stages of treatment without significantly affecting the frictional resistance. As a result, teeth to which vertical eyelets have been bonded, will move towards the dental arch rapidly while simultaneously opening the missing space. This phenomenon is very common with the SmartClip appliance. When the tooth is sufficiently aligned, the vertical eyelet is replaced with a bracket that is bonded in the correct position (Figure 1A-B).

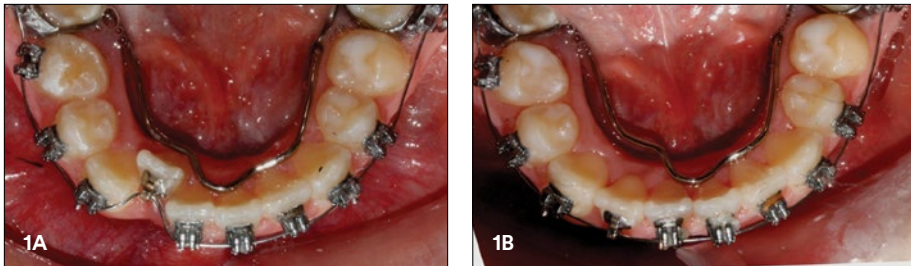


Figure 1A-B: (A) A vertical eyelet is bonded to a blocked out lateral incisor. NiTi 14" archwire is threaded through the eyelet. (B) After only 5 weeks, the lateral incisor is in the arch. The space opened spontaneously. The vertical eyelet can now be replaced by a bracket.

Vertical eyelets can easily be bonded in situations which prevent placement of brackets in the correct position. Moreover, because of their minute mesio-distal dimension, they can be selectively placed to correct rotations while simultaneously pulling the malaligned tooth into the arch (Figure 2A-D).

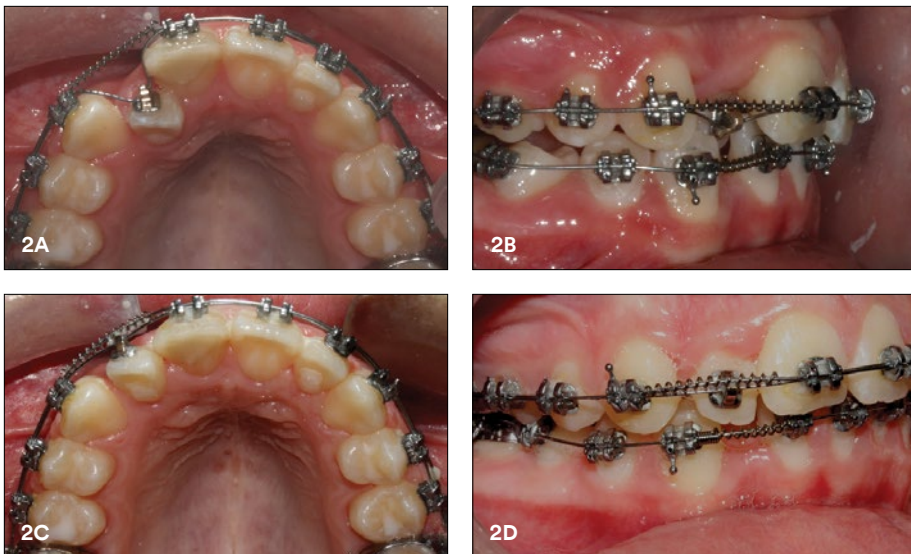


Figure 2A-D: (A-B) Concomitant with space opening on a main stainless steel 18" archwire a vertical eyelet is bonded to a blocked out upper lateral incisor. A piggyback NiTi 14" archwire is threaded through the eyelet. (C-D) After 11 weeks, the anterior crossbite is corrected and the lateral incisor is in the arch. A bracket can now be bonded in an ideal position.

When engaging the archwire to the SmartClip Appliance, it is important to remember that the archwire must be threaded through the eyelet before clipping it into the other brackets.

Another clinical situation in which vertical eyelets can be very useful is to promote the eruption of partially erupted teeth. When a tooth emerges into the oral cavity, a vertical eyelet can be bonded to the exposed part of the crown, even if it is very small. Thus, the tooth can be pulled towards the arch, eliminating the need to wait for spontaneous eruption and unnecessarily extending the treatment time (Figure 3A-B).

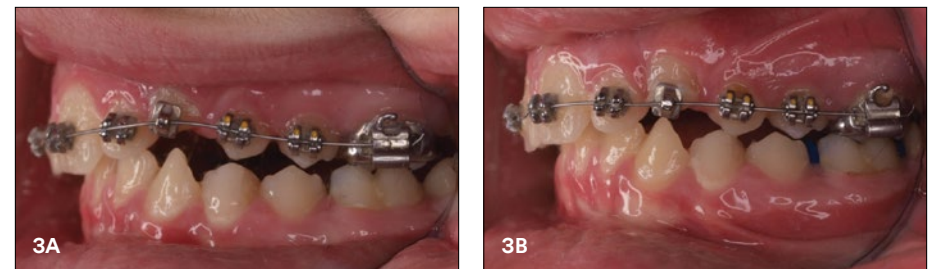


Figure 3A-B: (A) A vertical eyelet is bonded to a newly erupted canine. NiTi 14" archwire is threaded through the eyelet. (B) After 4.5 weeks, the canine has erupted considerably. A bracket can now be bonded in an ideal position.

For the last few years I have been using vertical eyelets as a routine in these circumstances. The eyelet is a small, simple and relatively inexpensive attachment which requires only a small area of accessible tooth surface for bonding. Usually after several weeks it is possible to bond a SmartClip Bracket in an ideal position. When compared with a lingual button, which can also be bonded to a partially erupted tooth and connected to the archwire with a stainless steel ligature, the advantage of the eyelet is that it has no sharp edges that can poke the patient. In addition, the archwire is secured in the lumen of the eyelet and cannot be spontaneously disengaged from the attachment, as sometimes happens with lingual buttons.

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Case photos provided by Dr. Gilad Har-Zion.

3MSM Health Care Academy

Effectiveness of the 3MTM IncognitoTM Appliance System and the ribbon archwire in the treatment of deep bite cases.

IncognitoTM
Appliance System



Dr. Jair Lazarín

Dr. Jair Lazarín received his post graduate Certificate in Orthodontics in 2005 from “Dr. Manuel Gea González” Hospital in Mexico City. In 2009, he received his Master's Degree in Biomaterials Science from the Mexican National University, UNAM, and is continuing with Ph.D. studies in clinical research at the same university.

Since 2005, Dr. Lazarín has been working at his private practice in Mexico City. He has lectured across Latin America about orthodontics, Class II treatment, self-ligation, distraction osteogenesis, orthognathic surgery and the 3MTM MBTTM Versatile+ Appliance System philosophy. He joined 3M in 2010 as professional services manager for Latin America.

Introduction

Today, patients look for orthodontic treatment with appliances that are invisible to the people around them. In order to satisfy this patient's request, we could count on clear tray aligners, which are highly aesthetic but sometimes mechanically inefficient to achieve certain tooth movements. We could also count on lingual braces, which are more predictable and have wider mechanical reach.

The following case shows the 3MTM IncognitoTM Appliance System and the effectiveness of the ribbon archwire feature of the appliance in the correction of a severe deep bite. Ribbon archwires are vertically much stronger than edgewise archwires, and for that reason, the correction of a deep bite through intrusion of the anterior segments is feasible.

Diagnosis

A 26-year-old male, dental and skeletal Class I with lower anterior crowding, upper incisors palatoversion and severe deep bite due to extrusion of the upper and lower anterior segments.



Figure 1: Initial lateral X-rays.



Figure 2: Initial panoramic X-rays.

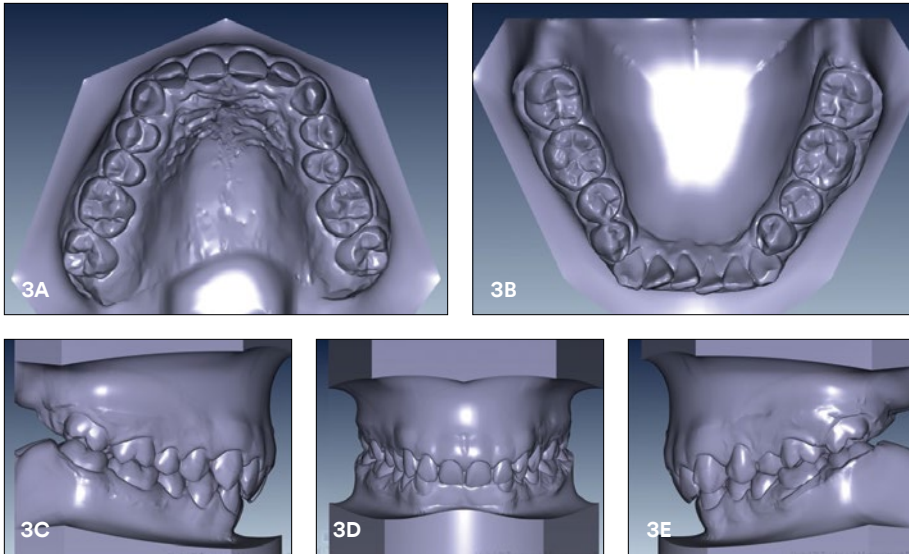


Figure 3A-E: Initial digital models.

Treatment plan

A non-extraction approach was selected for this patient. In order to correct lower arch crowding, IPR and dental proclination was planned, also upper incisors were supposed to procline and in order to correct the deep bite, intrusion of the upper and lower incisors was planned.

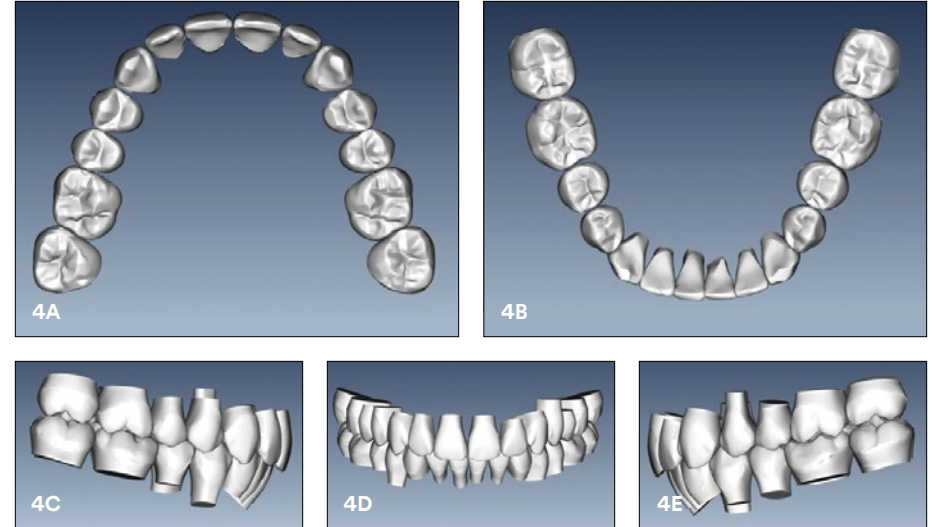


Figure 4A-E: Set-up.

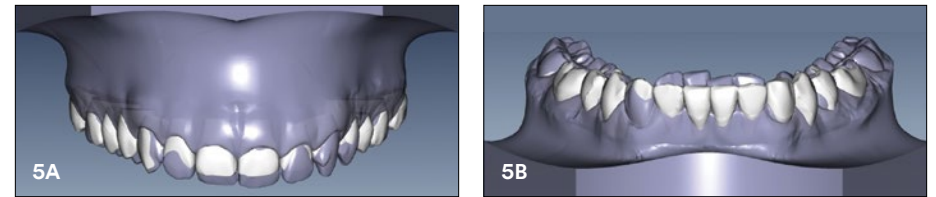


Figure 5A-B: Superimposition (frontal view).

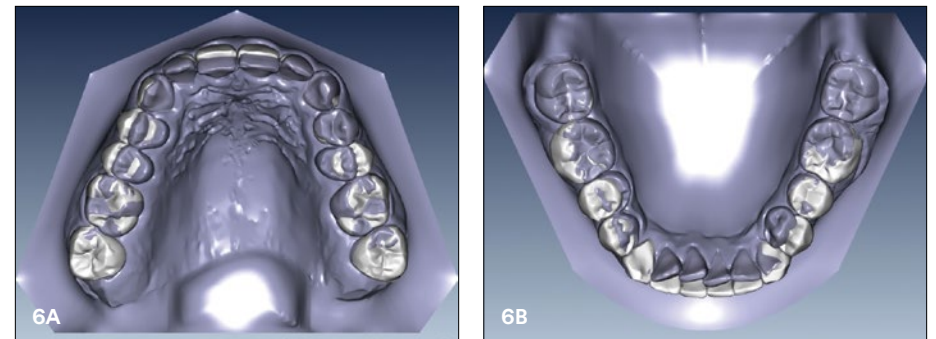


Figure 6A-B: Superimposition (occlusal view).

Treatment phases

IPR was performed and initial aligning was done using .012 Nitinol wires using the self-retaining tie-wings in the lower 3-3 brackets and overties on the upper 3-3 (Figure 7A and Figure 8A).

Once initial aligning was completed, rectangular Nitinol wires were used in order to start anterior segments intrusion, after that .016×.024 SS wires were placed to complete the intrusion, the upper one had extra torque to achieve proper inclination of the upper incisors (Figure 7B and Figure 8B).

Finishing stage was done with .0182×.0182 Beta III wires and after proper overbite and overjet were achieved braces were removed (Figure 7C and Figure 8C).



Figure 7A-C: Treatment phases.

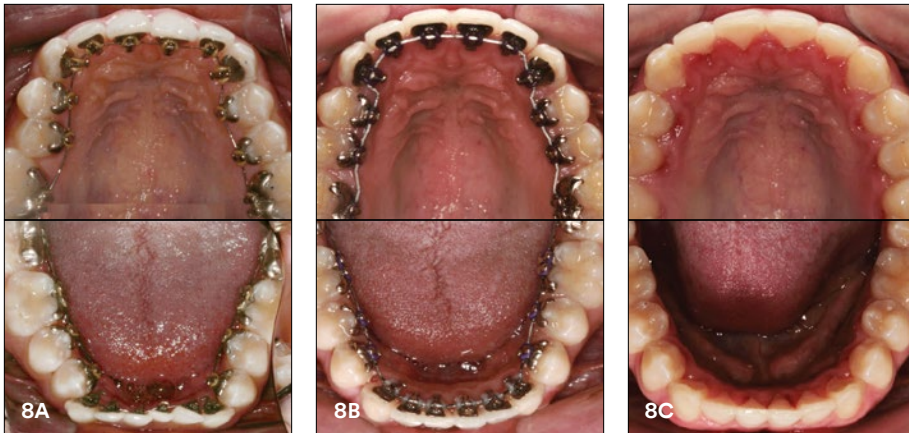


Figure 8A-C: Treatment phases.

Comments

The Incognito Appliance is very predictable regarding the treatment outcome. The ribbon archwires are much stronger in the vertical aspect than edgewise archwires. It is logical then that the Incognito Appliance is an optimal resource for the orthodontic treatment of deep bite cases.

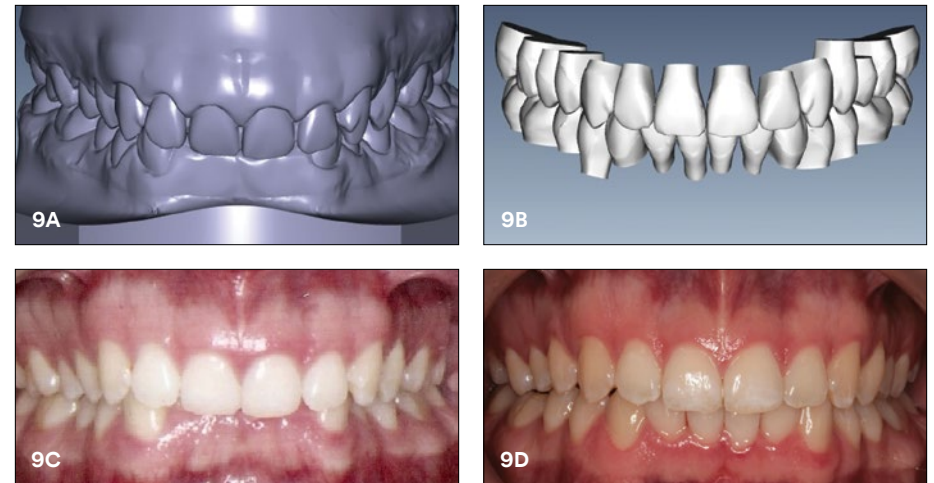
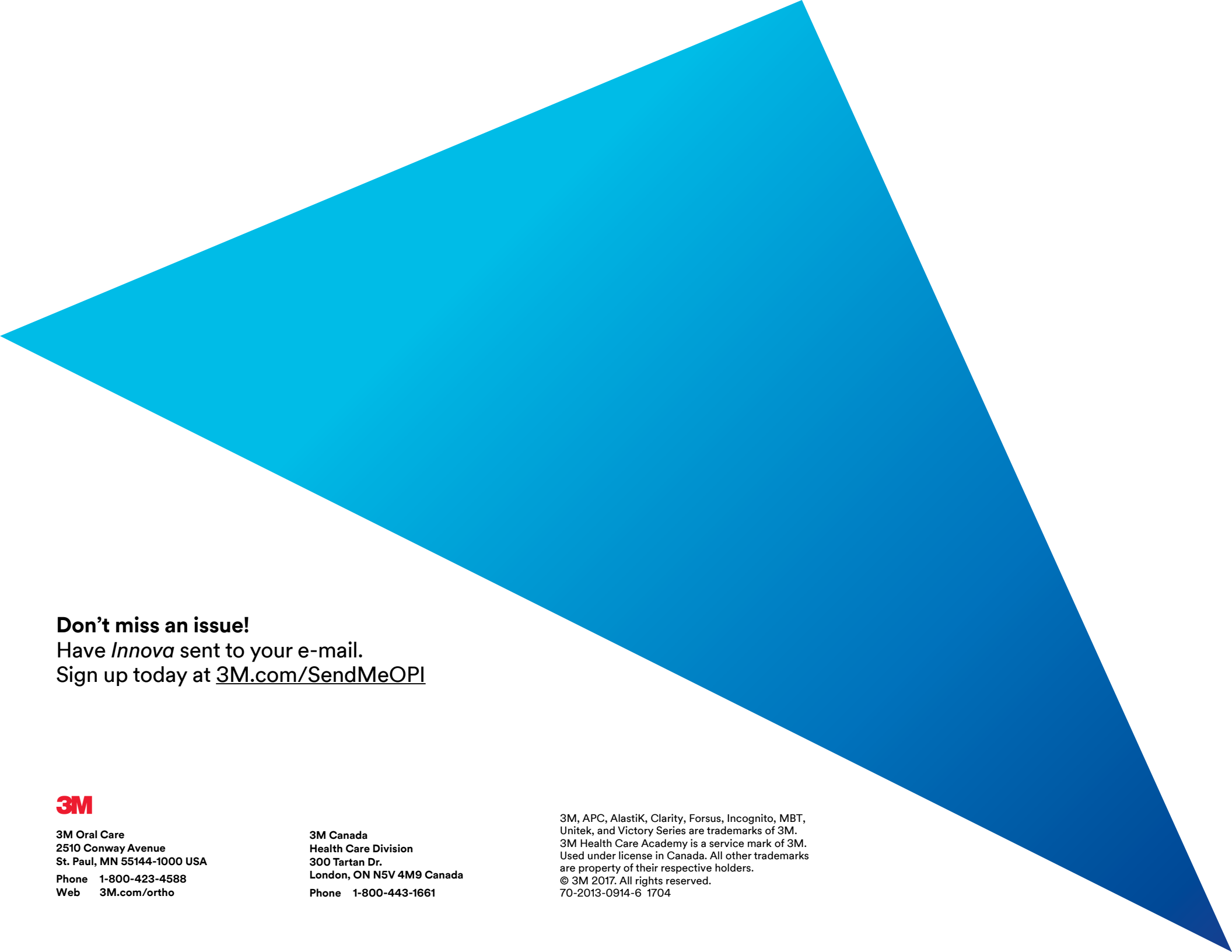


Figure 9A-D: Predictable outcomes.

I would like to thank Mariana Lazarín for her collaboration on this article.

Case photos provided by Dr. Jair Lazarín.



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