Have fun, will brush: Improving orthodontic outcomes with effective home care

By Dr Dana Van Elslande, Canada

Getting braces is a time of both excitement and dread. For kids and teens, braces can be arite of passage. For adults, it is an opportunity to invest in an improved appearance and more attractive smile. With this excitement comes a bit of worry for patients (and parents) though — how will I (or how will my child) manage oral hygiene with all this apparatus in the way?

The orthodontic provider feels the same concern. Once the braces go on, brushing becomes much more challenging, and poor brushing leaves patients at risk for gingivitis, white scars and tooth decay. Ensuring adequate home care is one of the biggest challenges in most orthodontic offices unless patients adopt some of the oral hygiene practices we recommend, they are not going to attain the incredible results that are possible.

Like many practices, we are seeing more adults every year — currently about 25% of our patients are adults. Often, they are parents of our younger patients, through their child’s experience, parents can see how the technology has changed since they were kids. Braces are generally easier to manage and often have shorter treatment time. Contemporary oral hygiene products also make it easier to get from braces on to the end goal of ‘beautiful smile’.

A comprehensive programme

Our practice adopted Crest Oral-B Ortho Essentials because we wanted a comprehensive programme to help encourage and motivate patients with their oral hygiene. Programme elements include an Office Oral Hygiene Visual Analogue Chart (Fig. 1), commitment letter, communication letters for patients and parents, a ‘how to care for your braces at home’ video, and a regimen of advanced home care products: an oscillating-rotating power toothbrush, stannous fluoride toothpaste; fluoride mouth rinse, and an orthodontic specific dental floss. These four products work together to help reduce plaque build-up and protect teeth from gingivitis, white scars and cavities.

One unique aspect of this programme is that the Office Oral Hygiene Visual Analogue scale interacts with our management software, allowing us to graph patients’ progress over time so we can show our patients (and mom and dad) how well they are doing with self-care. Together with patients, at each appointment we score their oral hygiene on a scale from 1–5. A score of ‘1’ indicates very poor oral care, whereas ‘5’ indicates excellent care. These scores are entered into our software programme, which has the ability to generate a graph where we can monitor how the oral care is progressing throughout the patient’s treatment. It is a wonderful tool to use with children and adults alike, as it provides us with a visual representation of how performance has either improved (measured we need to celebrate) or declined (meaning we need to make changes before irreversible damage). In addition, we incentivise patients by giving tokens at each visit if they receive scores over a ‘3’. These tokens can be cashed in for merchandise or gift cards to their favorite stores or online sites. The technology helps us engage our orthodontic patients in a fun way and not surprisingly, adults enjoy seeing their results just as much as kids.

Noticeable outcomes

The Ortho Essentials kit contains four key products that work together to help achieve the outcomes we want.

The Oral-B P&G 9000 Smart Series Power Toothbrush with bluetooth technology with ortho brush head is a cornerstone of the kit. The ortho brush head is specifically designed to clean around brackets and wires, which can be very challenging to manage without additional tools.

The toothbrush’s built-in technology enhances compliance with good brushing habits. Patients begin by downloading a free app onto their mobile device (usually a phone), then sync their power brush with the app. Every time the patient brushes, the app receives brushing data, and the patient gets immediate feedback on the mobile device screen. Using the built-in 2-minute timer, patients can see how long they have been brushing, and a red light ‘alerts’ them know if they are using excessive force. On the mobile screen, the app provides information about the brushing mode, battery status, and a reminder to change the toothbrush head.

To keep the user experience fresh — and to keep kids checking in — the app also incorporates news, weather, and oral care tips. Additionally, the Focused Care feature can be customised to show areas of the mouth that need special attention, so the patient can brush those areas again after the regular 2-minute brushing is complete.

Crest Pro-Health toothpaste contains stannous fluoride — an active ingredient well-known to protect against plaque, gingivitis, cavities, dietary acid erosion, and sensitivity. Regular use of this paste has been clinically shown to inhibit plaque build-up between brushings.5

The Crest Pro-Health Advanced with Extra Deep Clean Rinse offers additional anti-cavity fluoride protection. Oral-B Superfloss is a floss threader that helps patients (particularly kids) easily thread floss under the braces wires.

The four components of the Ortho Essentials kit work together to keep the teeth and gums protected and healthy. ‘Healthy’ means for our practice, directly leading to improved looks. The Ortho Essentials programme has been a game-changer for our practice that fits into the busy schedules. The Ortho Essentials programme has been a game-changer for our practice that fits into the busy schedules. The Ortho Essentials programme has been a game-changer for our practice that fits into the busy schedules. The Ortho Essentials programme has been a game-changer for our practice that fits into the busy schedules.

Enabling compliance

A proven做不到 oral care regimen is essential to successful orthodontic outcomes. If a patient is not able or willing to comply, the braces may have to be removed and treatment delayed until he or she is able (usually only if dietary starchy, or food is not being reduced). The combination of mechanical brushing and flossing plus chemical paste and rinse action helps to reduce plaque build-up and protect against cavities. This regimen of oral hygiene provides excellent care for patients without braces as well.

Conclusion

In the end, orthodontic treatment is not just about positioning the teeth and improving looks, it’s also about better functioning and oral health. Patients are experiencing a certain look, when their braces are removed — beautiful, white, shiny teeth and tight pink gums, and their routine oral hygiene directly affects that outcome. We know that kids and adults are busy — so we have implemented a programme that fits into the busy schedules. The Ortho Essentials programme has been a game-changer for our practice, directly leading to better outcomes for our patients.

Dr Van Elslande

As an orthodontist, Dr Van Elslande has specialised training in orthodontics. She received her Bachelor of Medical Science, Doctor of Dental Surgery degree and her Masters in Clinical Orthodontics from the University of Alberta.

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Archwire Sequence for Insignia®, a Custom Bracket System with a Bright Future

By Ormco

Abstract

Insignia® system is a reverse-engineered production of custom brackets, based on the desired final alignment. Each arch is designed to enhance outcomes and decrease patient comfort, maximizing the potential of each step in treatment, and achieving alignment to place the final archwire as soon as possible. There are four phases in Insignia® progressive archwire therapy: (I) stock light round wires, (II) customized rectangular copper-nickel-titanium (CuNiTi) wires, (III) major mechanics as needed, and (IV) finishing. This article recommends archwire sequencing, based on clinical experience with the Insignia® bracket system. In addition to traditional progressive archwire therapy, the Insignia® system is well-designed for segmental mechanize mechanisms, to decrease PDL compressive stress. Segmental mechanics, with extra-alveolar screw anchor placement and anterior bite turbos, is designed to enhance outcomes and decrease treatment time by increasing the rate of tooth movement and controlling root resorption. (Int J Orthod Implant 2017;46:60-69)

Key words: Insignia®, system, passive self-ligating bracket, archwire sequence, custom bracket, custom torque, low PDL stress, enhanced rate of tooth movement, decreased root resorption

Introduction

Insignia® (Ormco, Glendora, CA), introduced by Dr. Craig Andreiko in 1987 (Fig. 1) is designed for four phases in the Insignia® system is well-designed for segmental determinate mechanics to enhance outcomes and decrease patient comfort, maximizing the potential of each step in treatment, and achieving alignment to place the final archwire as soon as possible. There are four phases in Insignia® progressive archwire therapy: (I) stock light round wires, (II) customized rectangular copper-nickel-titanium (CuNiTi) wires, (III) major mechanics as needed, and (IV) finishing. This article recommends archwire sequencing, based on clinical experience with the Insignia® bracket system. In addition to traditional progressive archwire therapy, the Insignia® system is well-designed for segmental mechanize mechanisms, to decrease PDL compressive stress. Segmental mechanics, with extra-alveolar screw anchor placement and anterior bite turbos, is designed to enhance outcomes and decrease treatment time by increasing the rate of tooth movement and controlling root resorption. (Int J Orthod Implant 2017;46:60-69)

Fig. 1: Dr. Craig Andreiko (1950-2013) was the inventor of the Insignia® bracket system. (Ormco, Glendora, CA)

Fig. 2: Archwires are arch wire components used in Insignia® progressive archwire therapy. There are four phases in Insignia® progressive archwire therapy: (I) stock light round wires, (II) customized rectangular CuNiTi wires, (III) major mechanics as needed, and (IV) finishing. This article recommends archwire sequencing, based on clinical experience with the Insignia® bracket system. In addition to traditional progressive archwire therapy, the Insignia® system is well-designed for segmental mechanize mechanisms, to decrease PDL compressive stress. Segmental mechanics, with extra-alveolar screw anchor placement and anterior bite turbos, is designed to enhance outcomes and decrease treatment time by increasing the rate of tooth movement and controlling root resorption. (Int J Orthod Implant 2017;46:60-69)

Fig. 3: Small dimension round wires minimize frictional binding between the tube of the PSL bracket and the wire, allowing the PSL bracket to slide freely along the wire during debonding and alignment.

Fig. 4 and 5 are sequences of introral photographs documenting the treatment with Insignia® progressive archwire therapy.

Discussion

The Insignia® approach to debonding (Fig. 4) is a highly efficient method for debonding, with the wires in the final stage being “uncapped” and easy to remove. The Insignia® archwire results in the application of a very light clinical force (25cN) at the endpoint of the archwire, which is usually ~0.45mm down the length of the root. (The movement of the apex in the opposite direction of the applied force crushes the PDL in a relatively small area next to the apex, because of the anatomical irregularity of root and bone surfaces."

The relative large reactive force applied to a small area of the PDL near the apex results in compressive stress in the bone and PDL, which increases treatment time. Thus comprehensive orthodontic tooth movement therapy requires an extended period of time (2-3 years) because of the rate of bone growth."

Phase I: Stock Light Round Wires

The objectives for the first phase of treatment are: (a) level and align, (b) initiate arch development as needed, and (c) resolve 50% of the rotations. A stock 0.016" Insignia® CuNiTi wire is used as an initial archwire to minimize interdental discrepancies and level the arches. The small dimension of the initial round archwire minimizes friction and binding between the wire and the tube-like lumen of the PSL brackets. With this mechanism, the teeth can slide freely along the wire as they are leveled and aligned. To manage severe crowding, narrow arch form and/or compromised periodontal support, a stock 0.016-in or 0.018-in Damon® CuNiTi archwire can be used as an alternative second archwire to further align the teeth. The purpose of these round CuNiTi wires in the Phase I (initial stage) is not to completely resolve rotations, but to provide adequate alignment of brackets to atraumatically transition to the second phase in the sequence (rectangular archwires). If a patient feels pain, or the brackets dislodge when closing the slide, progression to the rectangular wire(s) is premature.

Phase II: Insignia® Rectangular CuNiTi Wires

The objectives of the second phase are (a) start resolving torque and root angulation problems, (b) complete leveling and alignment, (c) finish rotation corrections, and (d) complete arch form development, as needed. The recommended Insignia® CuNiTi rectangular archwire sequence is 0.016x0.022-in, 0.018x0.025-in, and 0.020x0.025-in. Each archwire must be inserted with minimal archwire force, or the arch is not ready to progress. Minor spacing in the anterior segments is consolidated with elastomeric chains. The entire lower cuspid CuNiTi archwire is used to prepare for the insertion of the cuspid co%! (co%! is a stock 0.022x0.028 SS) wire in the next phase.

Phase III: Major Mechanics

The objectives of the third phase are to close any remaining space as well as to correct anteroposterior and intermaxillary relationships. All teeth in the anterior segments of each arch are retracted en masse (together). Consistent with a straight wire approach, a stock 0.019x0.025-in SS archwire is used for sliding mechanics. A relatively rigid SS archwire (0.019-in or 0.019x0.025-in) is recommended for maintaining the integrity of the arch during space closure, either by chains of elastics or closing loops, rigidity across edentulous segment is particularly important for large extraction spaces. The stock SS archwire is adjusted to fit the patient’s specific arch form before insertion. Moreover, reduction of the SS archwire in the posterior segments is recommended to control bracket friction and binding when closing spaces with elastomeric chains.

In addition, if intermaxillary correction is required, OrthoClinicalScrews® (OrthoClinical Screws, Hsinchu City, Taiwan) are an ideal source of anchorage for the Insignia® system. OrthoClinical Screws® are placed buccally into the molar in each arch to provide skeletal anchorage that does not interfere with dental alignment or the path of tooth movement. Each archwire can be retracted, intruded or rotated to eliminate severe malocclusions conservatively.

Phase IV: Finishing

The objectives of the fourth phase of treatment are to complete torque expression and final detailing to achieve ideal intra-arch and intermaxillary alignment. An Insignia® 0.020x0.025-in CuNiTi archwire is used to achieve the full expression of the dental set up. If needed, finishing is achieved with an Insignia® 0.022x0.025-in TMA archwire. It is important to order the final TMA archwire as a backup, because uncontrolled anatomical variables can result in minor alignment discrepancies, that are easily managed with routine finishing adjustments.

By Ormco
tooth movement is relatively slow. Controlling PDL compressive stress is a high priority for advanced mechanics to enhance the rate of tooth movement and decrease the incidence of root resorption. The Insignia® system is an ideal, fixed appliance platform for developing a new generation of mechanics to increase the rate of tooth movement and decrease the incidence of root resorption (Fig. 6).

**Enhancing the Rate of Tooth Movement:** Adult second mandibular molars, engaged as single teeth on an archwire, were applied to a stress of about 0 g/mm/mo. However, second molars as part of a mandibular arch, that is engaged as a segment connected by a rigid archwire, are intruded about 2mm in 6mo. Thus, the rate of molar movement for the entire arch as a segment, which is about three times the rate of sustained mol lar movement with routine mechanics, is. This rapid rate of tooth movement appears to reflect decreased PDL necrosis, because the PDL compressive stress for all teeth in the segment was spread uniformly over the surfaces of all the roots in the segment, resulting in stress <5kPa, which is well below the threshold for PDL necrosis. These data suggest that treatment time and risk of FAIR can be decreased if the archwire and mechanics are designed to separate individual teeth, on a series of progressive archwires.

**Controlling PDL Stress:** Within the limits of current technology, avoiding root resorption is probable, during routine alignment and leveling with even the lightest, most resilient continuous archwires. When an archwire is activated, the load delivered to a tooth is directly related to the discrepancy between the bracket slot on the tooth and configuration of the unloaded archwire. The most malposed teeth receive the highest direct loads, but all teeth on a continuous archwire are indirectly loaded to some degree, because they anchor the load delivered to the malaligned teeth as the archwire is engaged. The only evidence of long-term tooth movement from stress is root resorption, and the movement of the entire mandibular arch to correct Class III openbite malocclusion. For that clinical application, continuous and relatively unresistant archwires are applied with bilateral 0.020 x 0.025 NiTi coil springs, anchored by mandibular buccal shelf orbital roots.

The concordance of these data from experimental or clinical conditions. Observations provide a strong rationale for using segmented, determinate mechanics to move entire arches en masse. These methods promise to expand the scope of treatment, enhance outcomes, decrease treatment time, and control root resorption.

**Acknowledgment**

Thanks to Mr. Paul Head for proof-reading this article.

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### Table 1: The recommended archwire sequence is summarized for progressive archwire therapy utilizing the Insignia® bracket system

<table>
<thead>
<tr>
<th>Archwire Sequence</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.040</td>
<td>Stock round wire</td>
</tr>
<tr>
<td>0.016 x 0.025 (alternative)</td>
<td>Stock Damon CuNiTi</td>
</tr>
<tr>
<td>Insignia® CuNiTi</td>
<td>0.018 x 0.025</td>
</tr>
<tr>
<td>Insignia® TMA</td>
<td>0.021 x 0.025</td>
</tr>
<tr>
<td>Ortho TRIBUNE</td>
<td>0.021 x 0.025</td>
</tr>
</tbody>
</table>

**INTELLIGENT DESIGN**

- Self-tapping and self-drilling to minimize the need for tissue punctures or pilot drills
- Asymmetric barrel thread stress compatible with innovative materials and methods for relatively atraumatic initial alignment
- Patented double-drive head for greater comfort and treatment flexibility
- Complete starter kit for one-step stopping
- Needleless anesthesia for greater comfort and improved patient acceptance
- Titrating fluoride for maximum stress and biocompatibility

**SIMPLe SYSTEM**

- Simple color-coded gullets guide proper miniscrew insertion
- Complete starter kit for one-step stopping
- Needleless anesthesia for greater comfort and improved patient acceptance

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**Insignia® System Advantages:**

- Determining precise bracket position and torque by reverse engineering the desired final alignment, has obvious advantages for progressive archwire therapy, the current main stream of orthodontic therapy. How- ever, this high-technology precision appliance is also a critical step in the evolution of advanced biomechanics to enhance outcomes and decrease treatment time. The precisely defined brackets facilitate the initial alignment and leveling to receive a rigid straight archwire in each arch, so that the major correction can be accomplished with determinate, low PDL stress mechanics. Extra-alveolar (E-A) bone screws are ideal anchor for moving arches as segments. Precision customized brackets, E-A bone screws and anterior bite tapering, are well established (Fig. 6).

The current challenge is to develop materials and methods for relatively atraumatic initial alignment in preparation for major mechanics, with innovative methods, to resolve the skeletal malocclusion with segmental treatment.

**Conclusion**

1. Progressive archwire therapy with the Insignia® system begins with the end in sight and all mechanics are a direct progression toward the desired final alignment along a straight wire. The recommended archwire sequence is summarized in Table 1. Clinicians select archwire sizes and materials according to the treatment plan. It is important to allow each archwire adequate time to provide the prescribed degree of alignment in preparation for the next archwire.

2. Insignia® is a futuristic fixed appliance, compatible with innovative 3D concepts in biomechanics. A low PDL stress approach focuses on a relatively atraumatic alignment and leveling with multi-force archwires, 2. anterior bite turbots to correct the VDO; 3. E-A OBS anchorage, and 4. segmented determinate mechanisms to move entire arches en masse. These methods promise to expand the scope of treatment, enhance outcomes, decrease treatment time, and control root resorption.

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**Insignia Archwire Sequencing**

- Stock round wire 0.040
- 0.016 x 0.025 (alternative) Stock Damon CuNiTi
- Insignia® CuNiTi 0.018 x 0.025
- Insignia® TMA 0.021 x 0.025

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**Fig. 4:** The mandibular occlusal view of the treatment sequence shown over 33 months using Insignia® progressive archwire therapy. The archwire and months of treatment are shown at the top and bottom of each photo.
References


