Skeletal Class III Crowded Malocclusion Treated with the Insignia® Custom Bracket System

Abstract

***Chief Complaint (CC)**: A 18-year-old female presented with a CC of poor personal confidence due to an unesthetic smile.*

***Diagnosis and Etiology**: Facial form was concave (G-SN-Pg' -3º) with decreased, but acceptable lip protrusion (E-Line -2/-1mm). An intermaxillary discrepancy of ANB -2º was the sum of slight maxillary deficiency (SNA 81º) and modest mandibular protrusion (SNB 83º). The maxillary arch was asymmetric: (1). Class I on the right, (2). 4mm Class III on the left, (3). 3mm anterior crossbite, and (4). 2mm upper midline deficiency to the right. Both arches were functionally underdeveloped which was manifest as severe dental crowding of -10mm/-6mm in the upper and lower arches, respectively. The intermaxillary arch length deficiency resulted in mesial-out rotation of the lower canines, and the upper canines were blocked out to the labial.*

***Treatment**: The Insignia® system was utilized to digitally plan an ideal intermaxillary alignment, following extraction of all four 1st premolars, that was based on the 3D image of each tooth. The digital set-up was then reverse engineered to construct a full fixed, self-ligating appliance with a custom bracket for each tooth, that produced ideal alignment once the full size archwires were placed. Each tooth was bonded with a custom jig designed for ideal positioning of the bracket on each tooth. This digital method is designed to eliminate repositioning of brackets and archwire adjustments. Comprehensive treatment with progressive stock and custom archwires was accomplished with 10 appointments in 15 months. One finishing bend was required during the detailing phase because of a preventable error during the pre-treatment digital set-up.*

***Outcomes**: The excellent alignment, comfortable occlusion, and pleasing smile substantially increased the patient's poise and personal confidence. This skeletal Class III malocclusion, with a Discrepancy Index (DI) of 28, was treated in 15 months to a Cast-Radiograph Evaluation (CRE) of 16 and a Pink & White Esthetic Score of 1.*

***Conclusions**: Insignia® is a precise method for a direct path to outstanding clinical outcomes with minimal chair time, adjustments and treatment duration. The rate of tooth movement is enhanced, and the incidence of root resorption is reduced, by controlling PDL stress and repetitive episodes of necrosis via progressive relatively flexible archwires, that require few if any detailing adjustments. (Int J Orthod Implantol 2017;47:52-69)*

Key words:
Insignia® system, digital bracket positioning, passive self-ligating bracket, archwire sequence, custom bracket, custom torque, low periodontal ligament (PDL) stress, necrosis, ectopic eruption, Class III malocclusion, crowding, occlusal bite turbo, dental esthetics

Introduction

The Insignia® System (*Ormco, Glendora, CA*) was introduced in 1987 by Dr. Craig Andreiko, an orthodontist and an on-the-job trained engineer. The clinical method involves two components: (*1*) Insignia Approver®: three-dimensional (*3D*) real-time, virtual treatment planning software, and (*2*) Customized Fixed Appliance: brackets, placement jigs, and archwires. Insignia Approver® provides a digital simulation of the desired result according to clinician's preference. Based on prescribed tooth alignment, the off-site system produces custom brackets and archwires by a reverse engineering process. Bracket-positioning jigs are fabricated

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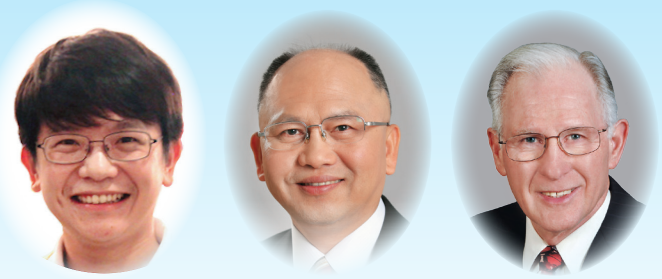

Fig. 1: Pre-treatment facial and intraoral photographs

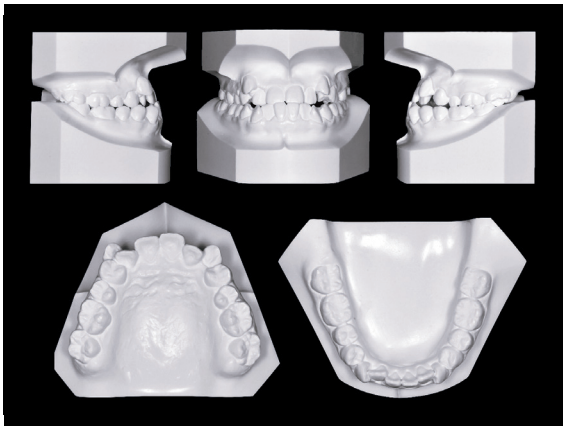

Fig. 2: Pre-treatment dental models (casts)

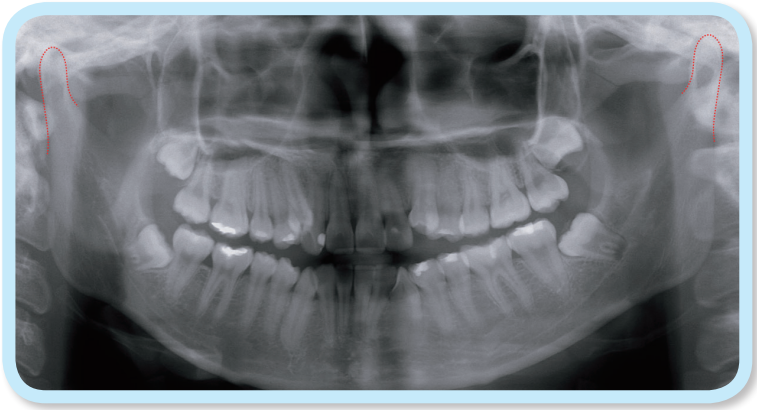

Fig. 3: Pre-treatment panoramic radiograph

to assist the clinician in accurately bonding a customized bracket on each tooth. Insignia® produces clinical efficiency by controlling and minimizing variables to achieve optimal results with minimal treatment duration.[1-4] The precisely defined brackets facilitate the initial alignment and leveling to receive a rectangular archwire in each arch. Once full-sized rectangular archwires are placed, each arch becomes a segment that is biomechanically akin to a large multi-rooted tooth.[5] When arches are moved as segments, major corrections are accomplished with determinate mechanics because each segment is a single abutment. The PDL stress of segmental mechanics is inherently low because the applied load is divided over the entire root surface of all teeth in the segment.[5]

Diagnosis and Etiology

A 18-year-8-month female complained about her "*embarrassing smile.*" A concave facial profile (*-3º*) was associated with decreased but acceptable lip protrusion (*E-Line -2mm/-1mm*). The lower facial height was relatively increased (*56.1%*) because of a deficiency in maxillary height. The maxillary midline was shifted 2mm to the right relative to the facial and mandibular midlines. The face was relatively symmetric in the frontal view but dental exposure when smiling was asymmetric (*Fig. 1*).

The intraoral examination and dental casts revealed asymmetric buccal segments: Class I on the right side and 4mm Class III on the left. Bimaxillary crowding (*-10mm/-6mm*) was associated with a 3mm anterior crossbite. Maxillary canines were blocked out to the labial, and mandibular canines were rotated in on the mesial. There were numerous cervical carious lesions (*Figs. 1 and 2*). The panoramic radiograph showed four unerupted (*impacted*) third molars, and symmetric mandibular condyles (*Fig. 3*). No temporomandibular disorder (*TMD*) signs or symptoms were reported or clinically evident. The pre-treatment cephalometric analysis documented a mandibular protrusion (*ANB -2º*) due to a slightly retrusive maxilla (*SNA 81º*), that was also vertically deficient (*~46% of Na-ANS-Me*), and a moderately protrusive mandible (*SNB 83º*). The upper incisors were labially inclined (*U1 to NA 6mm, U1 to SN 114º*), and the axial inclination of the mandibular incisors was decreased (*L1 to NB 2mm, L1 to MP 84º*) (*Table 1 and Fig. 4*). The American Board of Orthodontic (*ABO*) Discrepancy Index (*DI*) was 28 points, which is classified as a severe skeletal malocclusion as documented in the Worksheet 1 at the end of this report.[6]

Fig. 4: Pre-treatment lateral cephalometric radiograph

The etiology of the blocked out upper canines was inadequate development of the maxillary arch to accommodate the adult dentition. This is a common problem in developed countries because children eat prepared food, that does not require sufficient masticatory loading to fully develop jaw width.[7] Since the current skeletal Class III patient maintained lip competence and tongue pressure during the mixed dentition phase, incisor inclination was a typical expression of Class III compensation: labially inclined upper and lingually inclined lower incisors. Furthermore, the maxillary canines were buccally blocked out because they were the last permanent teeth to erupt in an arch, with inadequate space for the dentition. The asymmetric Class III molar relationship probably reflects ectopic eruption of the upper right lateral incisor and premature loss of the right deciduous canine. The upper right first molar then moved mesially into a Class I relationship, despite the prognathic relationship of the mandible as evidenced by the left Class III molar relationship. Overall, the etiology of this severe malocclusion (*DI 28*) was consistent with an extraction treatment plan to restore adequate esthetics and function.

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA° (82°)	81°	81°	1°
SNB° (80°)	83°	82°	1°
ANB° (2°)	-2°	-1°	1°
SN-MP° (32°)	33°	35°	2°
FMA° (25≥)	26°	28°	2°
DENTAL ANALYSIS			
U1 To NA mm (*4 mm*)	6 mm	5 mm	1 mm
U1 TO SN° (104°)	114°	110°	4°
L1 To NB mm (*4 mm*)	2 mm	1 mm	1 mm
L1 TO MP° (90°)	84°	80°	4°
FACIAL ANALYSIS			
E-LINE UL (*-1 mm*)	-2 mm	-2 mm	0 mm
E-LINE LL (*0 mm*)	-1 mm	-2 mm	1 mm
Convexity: G-Sn-Pg' (*13°*)	-3°	0°	3°
%FH: Na-ANS-Gn (*53%*)	56.1%	57.3%	1.2%

■ Table 1: Cephalometric summary

Treatment Objectives

(1) Achieve a harmonious facial profile

(2) Restore caries and improve oral hygiene

(3) Correct the anterior crossbite, crowding and midline discrepancy

(4) Achieve ideal Class I dental alignment and intermaxillary occlusion

Treatment Alternatives

The first consideration was orthodontics combined with orthognathic surgery. After relieving the crowding and decompensation of the dentition, the facial balance is restored via a mandibular setback. However, the skeletal discrepancy (*ANB -2*) was not sufficient to require orthognathic surgery, and the patient declined the option.

The second alternative was orthodontic treatment with premolar extractions. Although asymmetric premolar extractions was considered, extraction of both upper first premolars was preferred for rapid resolution of the ectopic canines and correction of the axial inclination of the maxillary incisors.

Appointment	Archwire	Notes
1 (0 months)	U: 0.014-in Damon CuNiTi L: 0.014-in Damon CuNiTi	Unlock the anterior crossbite with posterior bite-turbos constructed with Fuji II Type II Glass Ionomer cement (GC America, Alsip IL) on the occlusal surfaces of the L7s. The UR2 was palatally blocked-in with inadequate space to bond the bracket; an open coil spring was used to create space. A light power chain (2-oz) was applied from the UR3 to the UR6 to retract the canine. Early light short Class III elastics (Quail, 3/16-in, 2-oz) were used from the U5s to L3s, to retract the lower canines and to relieve lower anterior crowding and gingival recession.
2 (4 months)	U: 0.016-in Damon CuNiTi L: 0.018-in Damon CuNiTi	The UR2 bracket was bonded.
3 (6 months)	0.014x0.025-in Insignia CuNiTi	The Class III elastics were moved from U5 to U6 to add more horizontal vector to retract the lower anterior teeth, and correct the anterior crossbite.
4 (8 months)	0.018x0.025-in Insignia CuNiTi	
5 (10 months)	0.021x0.025-in Insignia CuNiTi	The Class III elastics were changed to Fox (1/4-in, 3.5-oz) as the overjet improved (edge to edge).
6 (11 months)	0.019x0.025-in Damon SS	Once the crossbite was solved, power chains were applied to close the extraction spaces on the SS working wire. The Class III elastics were changed to Class II elastics from the U3s to L6s to control lower anterior teeth uprighting during space closure.
7 (12 months)	0.021x0.025-in Insignia CuNiTi	
8 (13 months)	0.021x0.025-in Insignia TMA	
9 (14 months)		The incisal edges of the right central and lateral incisors were not well aligned. A first order bend (in-and-out bend) was applied to correct this discrepancy (Fig. 6).
10 (15 months)		All appliances were removed. Anterior fixed retainers were bonded on all maxillary incisors (2-2), and on all mandibular canines and incisors (3-3). Removable clear overlay retainers were delivered for both arches, and the patient was instructed to wear them full time for the first 6 months and nights only thereafter. Instructions were provided for home hygiene and maintenance of the retainers.

■ Table 2: Treatment Sequence.

However, this approach would require more Class III elastics and may result in less maxillary protrusion. After a discussion of the pros and cons of the alternatives, the patient chose the second option with extraction of all four 4s because it was less invasive than orthognathic surgery, and furthermore she preferred less lip protrusion.

The Insignia System® was selected for custom construction of the fixed appliance with passive self-ligating (*PSL*) brackets (*Damon Q®, Ormco, Glendora CA*). All archwires and orthodontic auxiliaries were produced by the same company, unless otherwise stated.

Digital Set-Up

(1) Vertical Movement:

Upper: *Extrude incisors 1mm,*

Lower: *Intrude incisors 2mm, intrude lower molars 1mm*

(2) Anterior overbite: *1.5mm*

(3) Crown Torque:

Upper: *Decrease 10 degrees*

Lower: *Increase 10 degrees*

*Note: The upper incisor crown torque was uprighted from 114º (*pre-treatment*) to 104º (*standard*). The lower incisor torque was increased from 84º (*pre-treatment*) to 94º (*standard 90º + over-correction 4º*). Early Class III elastics to resolve anterior crossbite and lower anterior crowding, but the elastics were expected to upright the lower anterior segment, so the lower incisors required more positive torque.

(4) Extract upper and lower 4's.

(5) A/P movement and space closure *(Fig. 5)***:**

UR6, LR7, LL7: *Move 2mm mesially*

LL6: *Move 3mm mesially*

Close upper spaces by canine retraction and protrude incisors. Close lower spaces by anterior retraction.

(6) Midline correction *(Fig. 6)***:**

Move upper midline 3mm left to coincide with the lower midline.

(7) Archwire Plane:

Center of upper and lower central incisors.

Treatment Progress

Before bonding the brackets, four first premolars were extracted, and all decay was restored. Figs. 7-11 shows the 13 month sequence of applied mechanics. Fixed appliances were removed two months later (*15 months*).

Treatment Results

After 15 months of active treatment, a harmonious facial profile and a pleasing smile was achieved. The

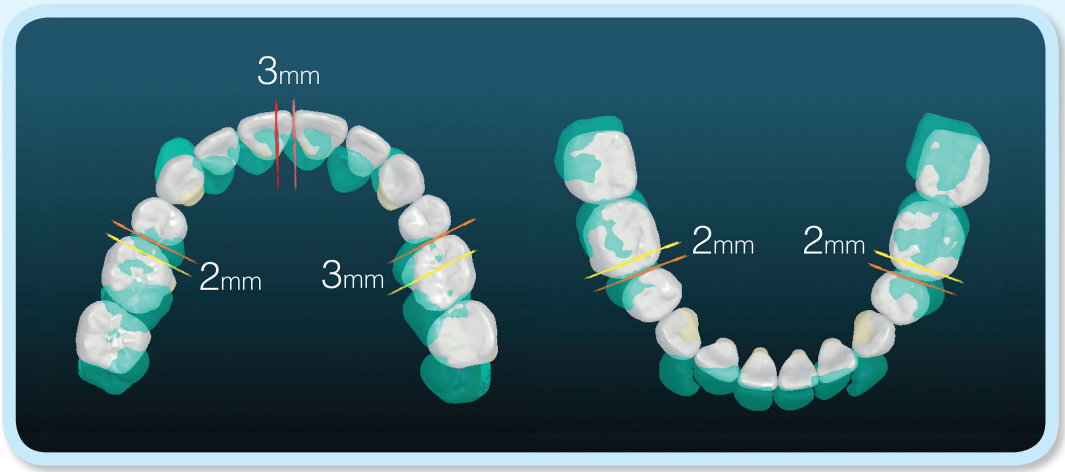

Fig. 5:

Digital set-up prescribes movement in the sagittal plane and space closure. White teeth are the post-treatment dentition. Green teeth are the pre-treatment dentition. Yellow lines mark the pre-treatment mesial surfaces of the first molars. Orange lines are the post-treatment mesial surfaces of the first molars. Red line is the pre-treatment upper midline. Pink line is the post-treatment upper midline.

***Left**: Move tooth UR6 2mm mesially. UL6 is to be moved 3mm mesially. Close upper spaces with canine retraction in conjunction with incisor protrusion. Move the upper midline 3mm to left as shown by the red and pink lines.*

***Right**: Move teeth LL7, and LR7 2mm mesially. Close lower spaces by retracting the mandibular anterior segment.*

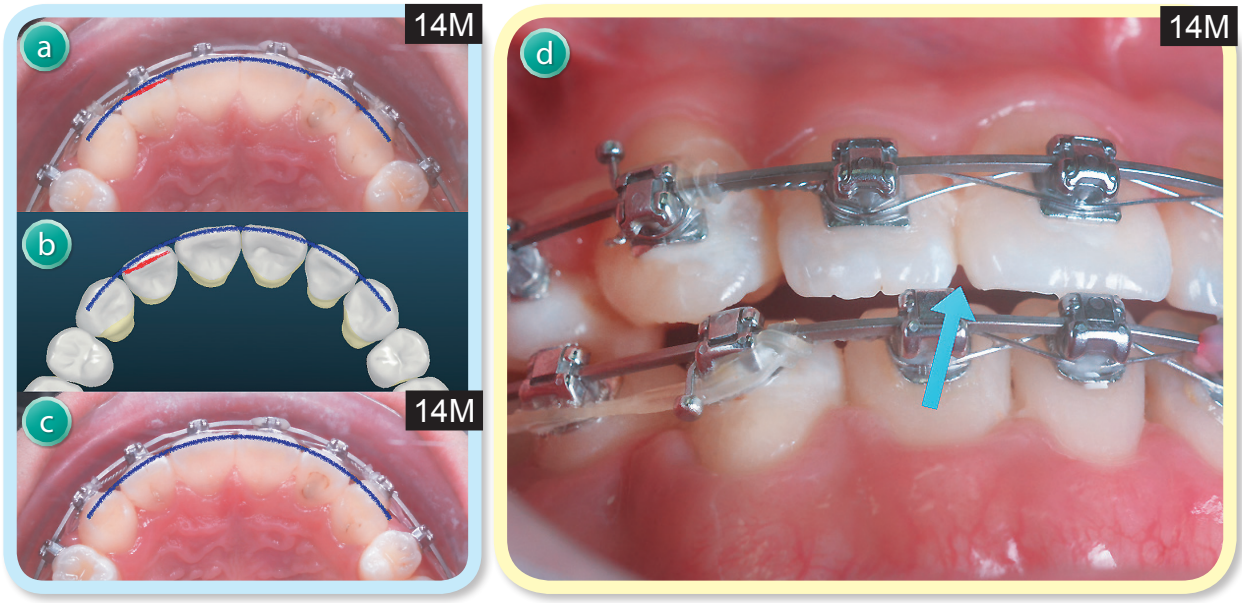

Fig. 6:

A discrepancy between the upper right central and lateral incisors was noted from the occlusal view (a) and frontal view (d) at fourteen months (14M). When comparing the intraoral photograph (a) to the digital set-up (b), the incorrect UR2 alignment (red lines) is almost the same. A first order bend (in-and-out bend) was applied to resolve the discrepancy which was actually an error in the digital alignment. See text for details.

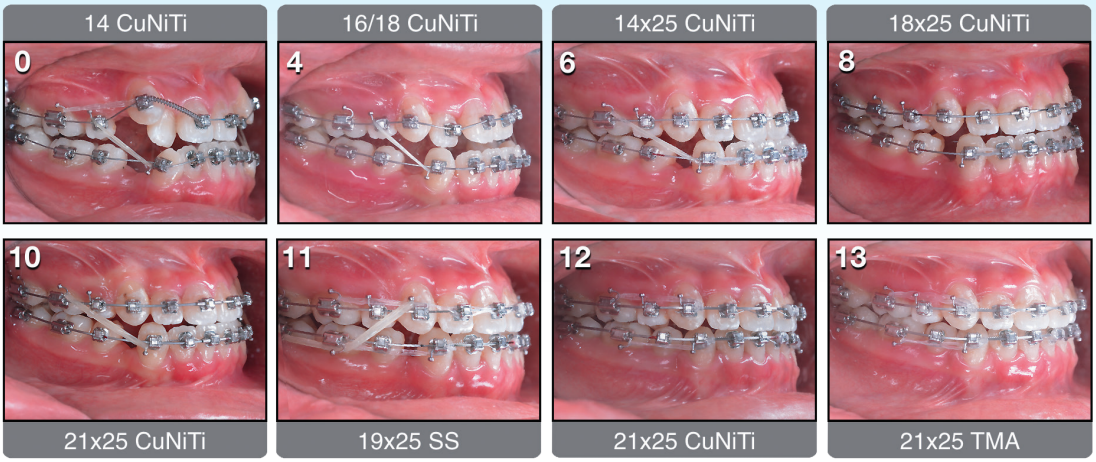

Fig. 7:
The right lateral views for the first 13 months of applied mechanics. The archwire type is shown at the top of each photo, and treatment time in months is an inset number in the upper left corner.

Fig. 8: A series of frontal views is similar to Fig. 7.

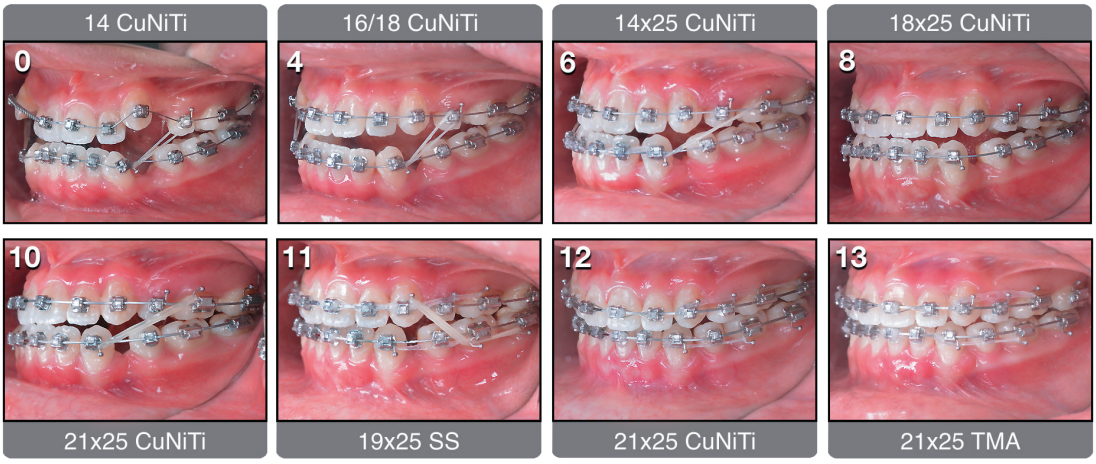

Fig. 9: A series of left lateral views is similar to Fig. 7.

Fig. 10: A series of upper occlusal views is similar to Fig. 7.

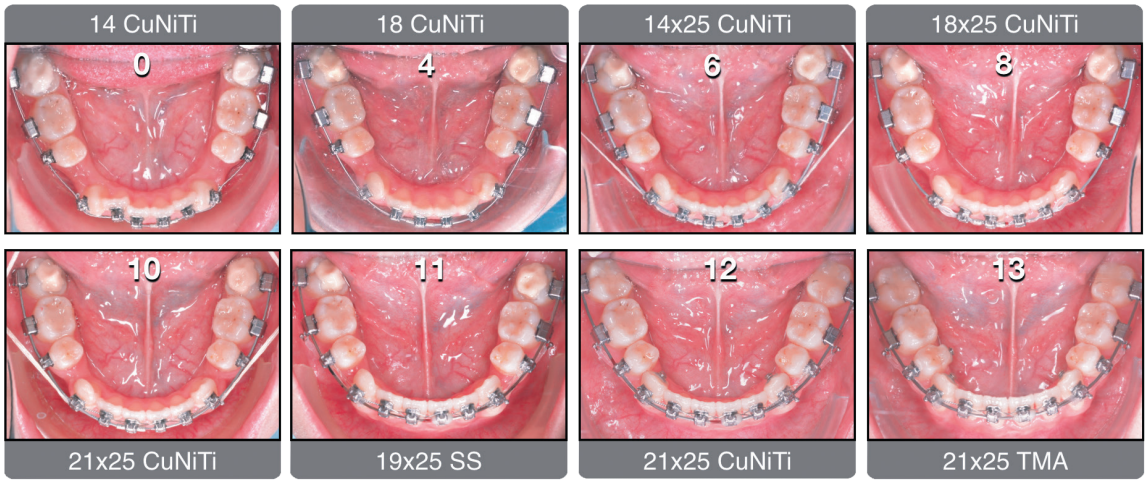

Fig. 11: A series of lower occlusal views is similar to Fig. 7.

anterior crowding and crossbite were resolved, resulting in a near ideal Class I occlusal relationship (*Figs. 12 and 13*). The treatment outcome was an excellent 16 points with the ABO Cast-Radiograph Evaluation (*CRE*), as shown in the supplementary worksheet 2 at the end of this report. The major residual problems were discrepancies in marginal ridges and buccolingual inclinations.[8] The post-treatment cephalometric and panoramic film are shown in Figs. 14 and 15. The condylar head positions were symmetrical; no TMD signs or symptoms were reported before, during or after treatment.

The superimposed tracings and cephalometric analysis (*Fig. 16 & Table 1*) show that the ANB angle increased 1°, due to the retraction of the lower anteriors and clockwise rotation of the mandible. Torque control of the upper incisor was ideal (*U1-SN=110º*), but mandibular incisor torque was decreased after lower extraction spaces were closed (*L1-MP=80º*).

Fig. 12: Post-treatment facial and intraoral photographs

Fig. 13: Post-treatment dental models (casts)

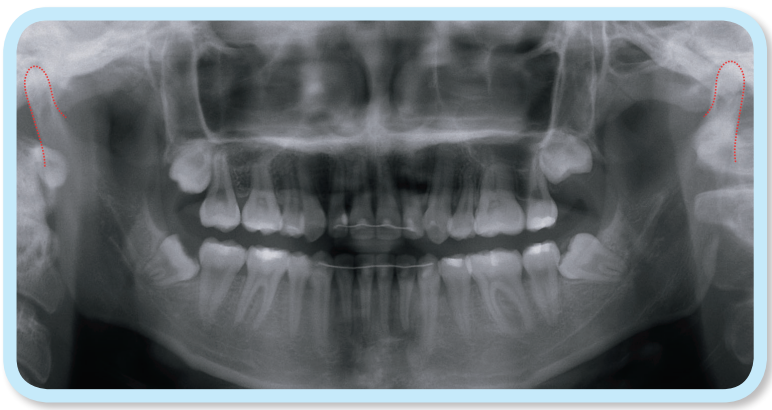

Fig. 14: Post-treatment panoramic radiograph

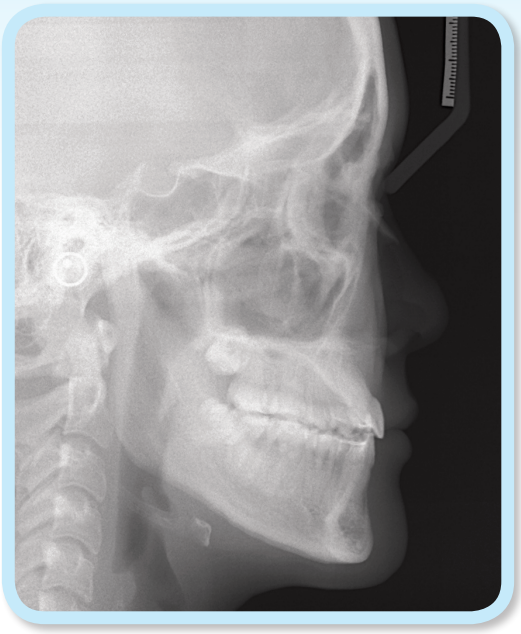

Fig. 15: Post-treatment lateral cephalometric radiograph

In retrospect, increased torque of the lower incisors was indicated during the treatment planning phase, but that change may have resulted in an end-to-end incisal relationship. Another option was to extract U5s and L4s, but that may have required a bone screw to resolve the asymmetric maxillary segments. Another potential option was an asymmetric extraction pattern: UR4, UL5 and L4s. This approach had esthetics appeal because the UR4 had longer crown length than the UR5, but this problem was subsequently corrected with a diode laser (*Fig. 17*). In any event, a more positive torque value for the lower incisors was indicated during the digital set-up phase to compensate for lingual tipping during space closure.

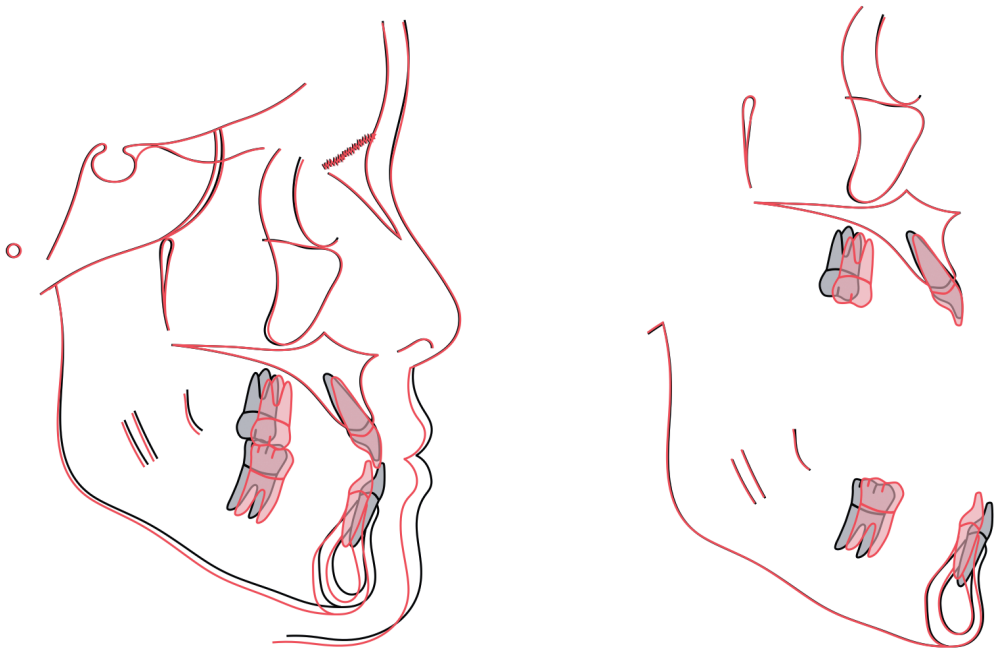

Fig. 16:
Pre-treatment (black) and post-treatment (red) cephalometric tracings are superimposed on the anterior cranial base (left), the maxilla (upper right), and the mandible (lower right). See text for details.

The Pink and White dental esthetic score was 1 point, as shown in the supplementary Worksheet 3 at the end of this report. There was an altered passive eruption around the gingival margin of upper premolars, and the gingiva was re-shaped with a diode laser. After one week, the gingiva has been recovered well (*Fig. 17*).[9] The patient is well satisfied with her functional occlusion, and she feels more confident with her attractive smile (*Fig. 18*).

Fig. 17:

***Upper**: A series of three intraoral photographs shows the gingival margins after fifteen months (15M) of active treatment.*

***Lower**: A similar series of photographs at one-week follow-up (1w-F/u) show the labial gingival margins after the labial surfaces of the U5s were adjusted with a diode laser.*

Fig. 18:

The oblique facial view on the left shows the esthetic and function compromise at the start of treatment (0M). A similar facial photograph on the right shows the pleasing result after fifteen months (15M) of active treatment. The patient is well pleased with her improved facial esthetics and attractive smile.

Discussion

Effectivity and efficiency

A reverse engineered bracket system allows clinicians to provide not only effective but also efficient treatment with decreased treatment time and fewer appointments.[2,3] In 1976, The original straight-wire appliance featured first, second, and third order prescriptions for each tooth; this improved the efficiency and consistency of the treatment results because less wire bending was required.[10] A critical element in the success of any straight wire appliance is accurate positioning of brackets on every tooth to precisely express the prescribed rotation, tipping, and torque values. However, it is clinically difficult to accurately position brackets visually, so considerable bracket rebonding and/or detailing bends are usually required, due to variations in tooth-surface morphology,[11-19] and inaccuracies in the direct bonding process.[11,14,18,19]

Insignia® is a custom fixed appliance system that fits the bracket bases to the existing contours of the teeth based on a scan of 3D image. The aligned bracket slots accommodate straight wires to move each tooth to the ideal final position as designed by the virtual set-up. Straight archwires are constructed as specified by the digital set-up, and the virtual bracket positions are transferred to the patient by bracket-positioning jigs. The custom design of the appliance eliminates wire bending and bracket rebonding, which provides for more effective mechanics to produce efficient treatment. For example, the current treatment of a severe Class III skeletal malocclusion (*DI 28*) was accomplished in only 10 appointments over 15 months. Only a single wire-bending adjustment was performed in the detailing phase, and that problem was due to an error in the initial digital set-up. The patient and the clinicians were well satisfied with the benefits of digital orthodontics.

Progressive archwire sequence

The Insignia® system permits clinicians "*to begin with the end in SIGHT.*" Therefore, the keys to efficient progression of treatment are: 1. provide an accurate prescription for the custom appliance, 2. follow the recommended archwire sequence, and 3. apply auxiliaries such as intermaxillary elastics as indicated. The clinical objectives are to: 1. ensure patient comfort, 2. maximize the potential of each step in treatment, and 3. achieve adequate alignment to place the final archwire as soon as possible (*Table 3*).[20]

Compared to traditional progressive archwire therapy, the Insignia® system reverse engineers the bracket slot for each tooth to achieve ideal alignment relative on a full-sized archwire. To achieve the full potential of the system, it is crucial to bond each bracket precisely utilizing the jig provided. If a bracket comes loose, it must be rebonded with the custom jig. The archwire sequence (*Table 2*) is designed to provide a minimal effective load to move all teeth as atraumatically as possible for a given stage of treatment, but it is not a "*cookbook.*" As with any orthodontic appliance clinicians must use clinical judgement in applying force to teeth. The most malposed tooth receives the highest direct load from the archwire, and then indirectly loads all the teeth on a continuous archwire. It may be necessary to use clinical judgement in selecting teeth to not fully engage

Insignia Archwire Sequencing			
I	Stock light round wires	0.014 0.016 / 0.018 (alternative)	Stock Damon CuNiTi
II	Insignia edgewise CuNiTi wires	0.014 x 0.025 0.018 x 0.025 0.021 x 0.025	Insignia CuNiTi
III	Major mechanics	0.019 x 0.025	Stock SS
IV	Finishing	0.021 x 0.025 0.021 x 0.025 0.019 x 0.025 (backup)	Insignia CuNiTi Insignia TMA Insignia TMA

■ Table 3:
The recommended archwire sequence is summarized for progressive archwire therapy utilizing the Insignia® bracket system.

initially, and then adjust the time that an archwire is used to achieve the intended objective for that wire. Under routine circumstances, overloading individual teeth is not a problem with the Insignia® system, because very flexible initial wires (*e.g. 0.014-in CuNiTi*) can be fully engaged to prepare for the subsequent progressive sequence of wires. However, if a bracket must be rebonded or reengaged on the archwire, the clinician must be alert to overloading the affected tooth with the archwire currently in use. It may be necessary to drop back to a more flexible archwire to align all teeth to atraumatically receive the next, more rigid archwire.

Controlling PDL compressive stress

Controlling PDL compressive stress is a high priority for optimal performance of advanced mechanics. The Insignia® system is an ideal, fixed appliance platform for developing a new generation of biomechanics to enhance the rate of tooth movement and decrease the incidence of root resorption.[20] Under routine clinical circumstances, the well designed custom appliance eliminates bracket rebonding and wire bending to finish the correction. Going directly from start to finish with "*the end in sight*" controls the episodes of PDL necrosis associated with engaging active archwires.[5] The next horizon is development of multiform archwires that deliver optimal force to each tooth with a long range of superelastic activation. This advance would substantially reduce the number of progressive archwires required for treatment, and thereby decrease the episodes of PDL necrosis during active treatment.[5]

Conclusions

1. The Insignia® system reverse engineers the

bracket slot for each tooth to achieve ideal alignment when engaged on a full-sized archwire.

2. Assuming compliance with application of the brackets, archwire sequence, and application of auxiliaries, the Insignia® system provides very efficient treatment, decreased treatment time, and optimal outcomes.

3. Eliminating bracket repositioning and archwire adjustments saves chair time, decreases the number of appointments, minimizes PDL compressive stress, as well as controls episodes of PDL necrosis and root resorption.

4. A customized digital appliance focuses mechanics directly on the desired outcome.

Acknowledgment

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 28

OVERJET

0 mm. (edge-to-edge)	=	
1 – 3 mm.	=	0 pts.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	3 pts.
7.1 – 9 mm.	=	4 pts.
> 9 mm.	=	5 pts.

Negative OJ (x-bite) 1 pt. per mm. per tooth = 7

Total = 7

OVERBITE

0 – 3 mm.	=	0 pts.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	3 pts.
Impinging (100%)	=	5 pts.

Total = 0

ANTERIOR OPEN BITE

0 mm. (edge-to-edge), 1 pt. per tooth
then 1 pt. per additional full mm. per tooth

Total = 0

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 2

CROWDING (only one arch)

1 – 3 mm.	=	1 pt.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	4 pts.
> 7 mm.	=	7 pts.

Total = 7

OCCLUSION

Class I to end on	=	0 pts.	
End on Class II or III	=	2 pts. per side	____ pts.
Full Class II or III	=	4 pts. per side	4 pts.
Beyond Class II or III	=	1 pt. per mm. additional	____ pts.

Total = 4

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts

Each degree < -2° _____ x 1 pt. = _____

Each degree > 6° _____ x 1 pt. = _____

SN-MP

≥ 38° = 2 pts.

Each degree > 38° _____ x 2 pts. = _____

≤ 26° = 1 pt.

Each degree < 26° _____ x 1 pt. = _____

1 to MP ≥ 99° = 1 pt.

Each degree > 99° _____ x 1 pt. = _____

Total = 4

OTHER (See Instructions)

Supernumerary teeth	_____	x 1 pt. =	_____
Ankylosis of perm. teeth	_____	x 2 pts. =	_____
Anomalous morphology	_____	x 2 pts. =	_____
Impaction (except 3rd molars)	_____	x 2 pts. =	_____
Midline discrepancy (≥3mm)		@ 2 pts. =	_____
Missing teeth (except 3rd molars)	_____	x 1 pts. =	_____
Missing teeth, congenital	_____	x 2 pts. =	_____
Spacing (4 or more, per arch)	_____	x 2 pts. =	_____
Spacing (Mx cent. diastema ≥ 2mm)		@ 2 pts. =	_____
Tooth transposition	_____	x 2 pts. =	_____
Skeletal asymmetry (nonsurgical tx)		@ 3 pts. =	_____
Addl. treatment complexities	2	x 2 pts. =	4

Identify: Ectopically erupted maxillary canines

Total = 4

IMPLANT SITE

Lip line : Low (0 pt), Medium (1 pt), High (2 pts) =_

Gingival biotype : Low-scalloped, thick (0 pt), Medium-scalloped, medium-thick (1 pt), High-scalloped, thin (2 pts) =_

Shape of tooth crowns : Rectangular (0 pt), Triangular (2 pts) =_

Bone level at adjacent teeth : ≤ 5 mm to contact point (0 pt), 5.5 to 6.5 mm to contact point (1 pt), ≥ 7mm to contact point (2 pts) =_

Bone anatomy of alveolar crest : H&V sufficient (0 pt), Deficient H, allow simultaneous augment (1 pt), Deficient H, require prior grafting (2 pts), Deficient V or Both H&V (3 pts) =_

Soft tissue anatomy : Intact (0 pt), Defective (2 pts) =_

Infection at implant site : None (0 pt), Chronic (1 pt), Acute(2 pts) =_

Total =

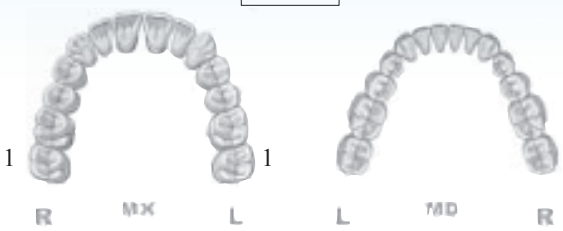
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 16

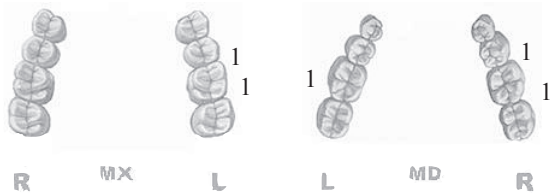
Alignment/Rotations

2



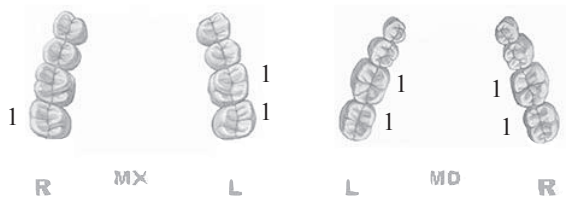
Marginal Ridges

5



Buccolingual Inclination

7

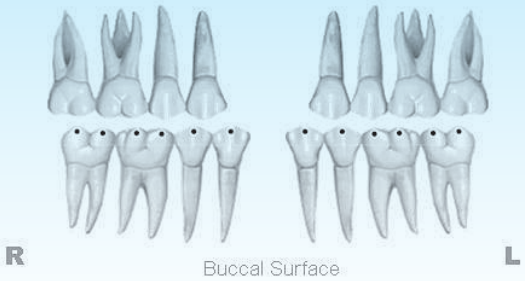


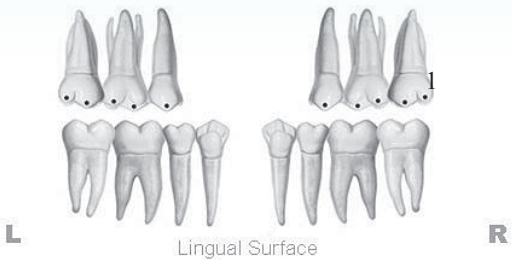
Overjet

1

Occlusal Contacts

0



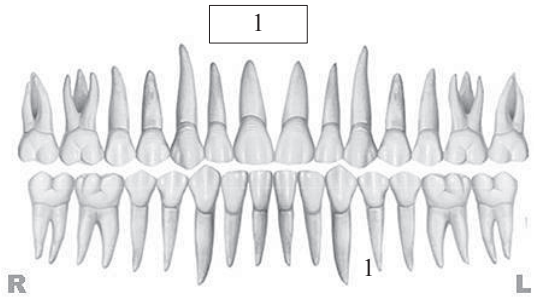


Occlusal Relationships

0

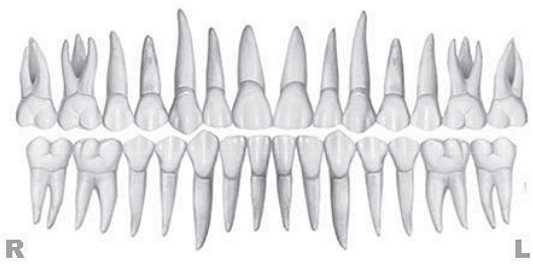
Interproximal Contacts

1



Root Angulation

0



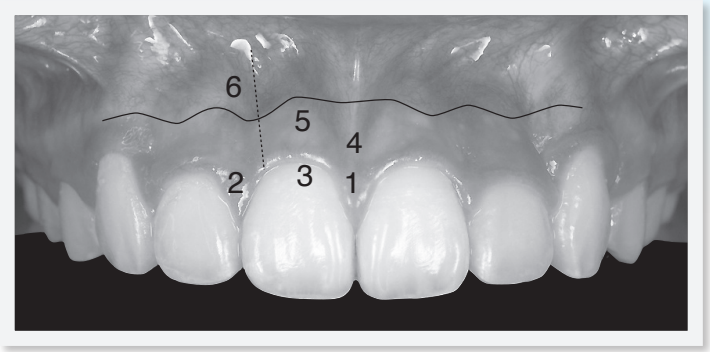
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score (Before Surgical Crown Lengthening)

Total Score: = 1

1. Pink Esthetic Score

Total = 0

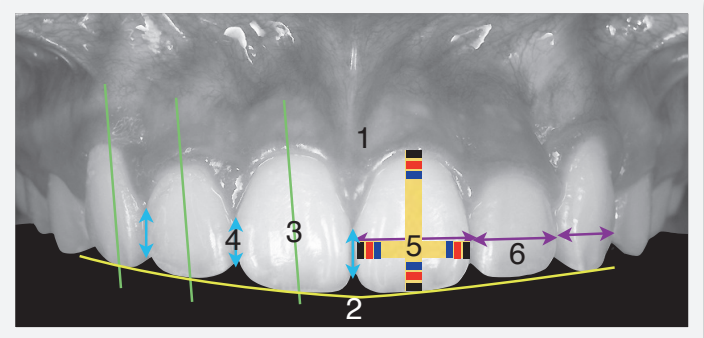


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

1. M & D Papilla	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	(0)	1	2
4. Level of Gingival Margin	(0)	1	2
5. Root Convexity (Torque)	(0)	1	2
6. Scar Formation	(0)	1	2

2. White Esthetic Score (for Micro-esthetics)

Total = 1



1. Midline	0	1	2
2. Incisor Curve	0	1	2
3. Axial Inclination (5°, 8°, 10°)	0	1	2
4. Contact Area (50%, 40%, 30%)	0	1	2
5. Tooth Proportion (1:0.8)	0	1	2
6. Tooth to Tooth Proportion	0	1	2

1. Midline	(0)	1	2
2. Incisor Curve	(0)	1	2
3. Axial Inclination (5°, 8°, 10°)	(0)	1	2
4. Contact Area (50%, 40%, 30%)	0	(1)	2
5. Tooth Proportion (1:0.8)	(0)	1	2
6. Tooth to Tooth Proportion	(0)	1	2