

Insignia[®] System with Bone Screw Anchorage: Class I Crowded Malocclusion with Severe Maxillary Protrusion

Abstract

History: A 16-year-old female presented with a chief complaint (CC) of crowded and protruded anterior teeth.

Diagnosis: Excessive lower facial height (LFH) was 59% of the total facial height (FH). A convex facial pattern (16°) was associated with protrusion of the maxilla (SNA 89°). Both lips were protrusive to the E-Line (3mm/5mm). Facial anomalies included an ANB discrepancy (8.5°), lip incompetence ($\sim 5\text{mm}$), and an occlusal plane canted inferiorly $\sim 3^\circ$ on the patient's left side. Asymmetric Class III/I molar relationships were complicated by constricted arches, severe crowding in the anterior segments, and a 1.5mm midline discrepancy (mandible to the left). The Discrepancy index (DI) was 30.

Etiology: Constricted arches and excessive vertical dimension of occlusion (VDO) are usually associated with childhood developmental problems: 1. inadequate loading of the jaws due to a relatively soft, refined diet, and 2. nocturnal airway deficiency. The latter is secondary to hypertrophic lymphatic tissue in the pharynx, that atrophies in late adolescence.

Treatment: An Insignia[®] system appliance with passive self-ligating brackets was designed for a treatment plan that included extraction of all four first premolars to achieve specific objectives. 1. Retract anterior segments to relieve crowding, reduce maxillary protrusion, and correct (prevent) excessive gingival exposure (gummy smile). 2. Enhance skeletal anchorage with bilateral infrazygomatic crest (IZC) extra-alveolar (E-A) bone screws (BSs). 3. Use bilateral maxillary incisor BSs to intrude and retract the upper anterior segment.

Outcomes: 24 months of active treatment resulted in the desired outcome, as evidenced by a Cast-Radiograph Evaluation (CRE) of 24, and excellent dental esthetics (Pink & White) score of 0.

Conclusion: Complex malocclusions require a detailed mechanics plan involving supplemental anchorage, e.g. intermaxillary elastics and/or temporary anchorage devices (TADs). Prospective compensation for incisor retraction is an important prerequisite for producing an efficient fixed appliance to optimize outcomes and minimize treatment time. (*J Digital Orthod* 2018;51:22-39)

Key words:

Insignia[®] system, passive self-ligating bracket, archwire sequence, custom bracket, IZC bone screws, miniscrew, bimaxillary protrusion, digital set-up, iatrogenic gummy smile, deepbite, Class II elastics, bite turbos, temporary anchorage devices, infrazygomatic crest, extra-alveolar, bone screws

Introduction

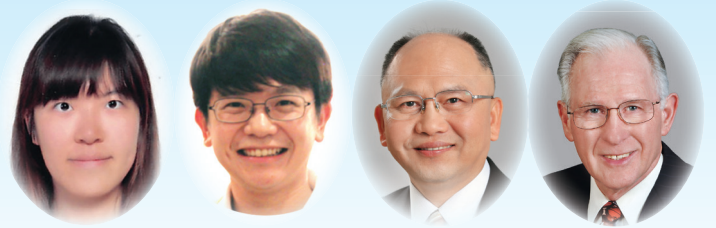
Excessive lip prominence due to dentoalveolar protrusion is a common Asian trait that compromises facial esthetics.¹ Extraction of premolars is well accepted by the affected patients.² In the absence of significant dental crowding, closing extraction space to reduce lip protrusion may distally tip and extrude the upper incisors, resulting in iatrogenic gummy smile with a deep bite. This case report presents a patient with lip protrusion who was managed with a self-ligating appliance that is aligned with the Insignia[®] system (Ormco, Glendora, CA). Anchorage for retraction of the anterior segments, as well as for prevention of gummy smile and deepbite, was provided with endosseous bone screws (BSs).

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Diagnosis and etiology

A 16-year-old female was concerned about protrusive lips and crowding in both dental arches (Figs. 1-4). The patient had a long lower face, convex profile, and increased vertical dimension of occlusion (VDO) (Fig. 5). Molar relationships were bilateral end-on Class III with asymmetric canine interdigitation that was Class I on the right and Class II on the left (Fig. 3). Overjet was ~3mm and overbite was ~1.5mm. Severe crowding >7mm was noted in the lower anterior region and both arches were narrow (Fig. 3).



■ Fig. 1: Pre-treatment facial and intraoral photographs



■ **Fig. 2:**
Frontal view of an asymmetric smile that was associated with malaligned anterior segments.



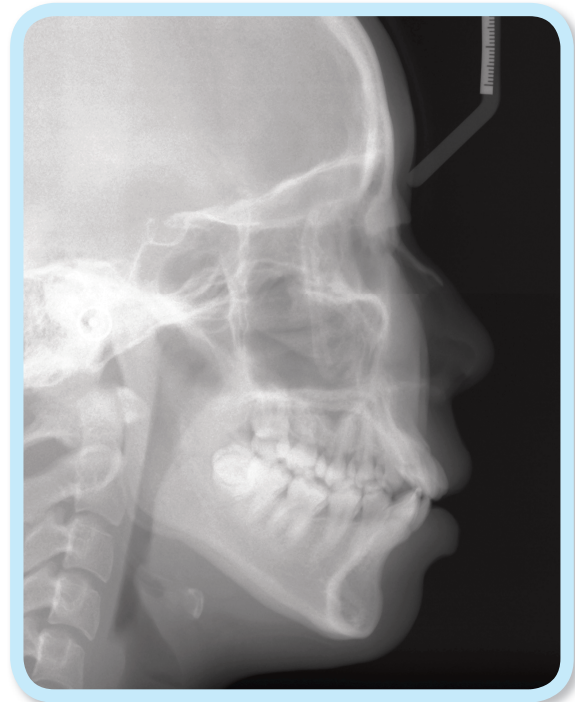
■ **Fig. 3:**
Pre-treatment dental models (casts)

The lateral cephalometric radiograph (Fig. 5) was consistent with a skeletal Class II pattern (SNA 89° , SNB 80.5° , and ANB 8.5°). There was a steep mandibular plane angle (SN-MP 39°), flared incisors (U1 to SN 112.5° ; L1 to MP 104°) and protrusive lips (E-line to UL 3mm; E-line to LL 5mm) (Table 1).

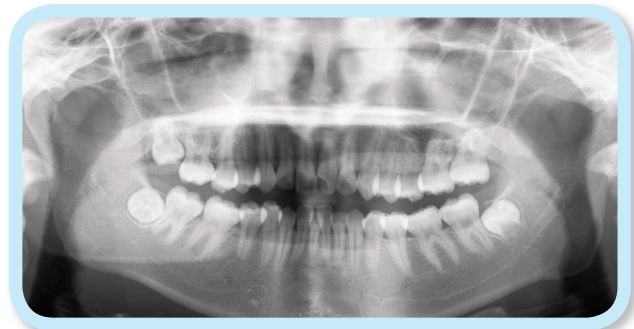
The panoramic radiograph was within normal limits (WNL) except for an unerupted upper right second molar (UR7) (Fig. 6). Temporomandibular joint (TMJ) transcranial radiographs revealed slight asymmetry WNL in the open and closed positions (Fig. 7).



■ **Fig. 4:**
Inferior (left) and lateral (right) intraoral views show anterior protrusion and dental crowding (7mm).



■ **Fig. 5:** Pre-treatment lateral cephalometric radiograph



■ **Fig. 6:** Pre-treatment panoramic radiograph

The ABO Discrepancy Index (DI) was 30 as shown in the subsequent worksheet.

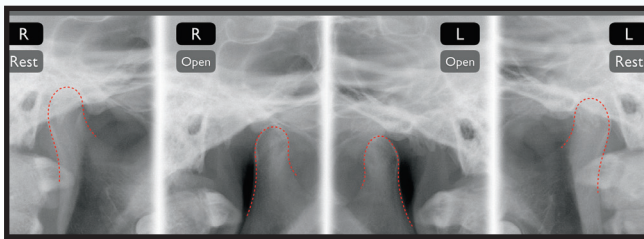


Fig. 7: Pre-treatment TMJ transcranial radiographs show the right (R) and left (L) sides in the rest and open positions. The mandibular condyles are outlined in red. The slight asymmetry between the right to left TMJs is WNL.

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA° (82°)	89°	88°	1°
SNB° (80°)	80.5°	80°	0.5°
ANB° (2°)	8.5°	8°	0.5°
SN-MP° (32°)	39°	39.5°	0.5°
FMA° (25°)	31.5°	32.5°	1°
DENTAL ANALYSIS			
U1 To NA mm (4 mm)	2.5 mm	2 mm	0.5 mm
U1 To SN° (104°)	112.5°	98.5°	14°
L1 To NB mm (4 mm)	12.5 mm	8 mm	4.5 mm
L1 To MP° (90°)	104°	94.5°	9.5°
FACIAL ANALYSIS			
E-LINE UL (-1 mm)	3 mm	-0.5 mm	3.5 mm
E-LINE LL (0 mm)	5 mm	0 mm	5 mm
%FH: Na-ANS-Gn (53%)	59%	58%	1%
Convexity: G-Sn-Pg' (13°)	16°	16.5°	0.5°

Table 1: Cephalometric summary

Treatment Objectives

After discussing multiple options with the patient, the following treatment was accepted:

- (1) Maintain facial convexity and the VDO.
- (2) Extract all four first premolars to relieve crowding and retract the anterior segments.
- (3) Correct lip protrusion by retracting the incisors and decreasing their axial inclination.
- (4) Establish ideal overjet and overbite.
- (5) Correct iatrogenic gummy smile with maxillary anterior TAD anchorage.
- (6) Align dental midlines.
- (7) Establish Class I molar and canine relationships bilaterally.

Treatment Plan

Extract all first premolars and install the digitally designed fixed appliance (*Insignia*®) with passive self-ligating (PSL) brackets as specified in Figures 8 and 9. Utilize the archwires, auxiliaries and elastics prescribed by the same manufacturer (*Ormco Corporation, Glendora CA*). Correct crowding and install bilateral infrazygomatic crest (IZC) bone screws to anchor retraction of the anterior segments to resolve dental protrusion and optimize the axial inclination of the incisors. Install bilateral bone screws in the apical area of the maxillary anterior region to control the tendency for developing a gummy smile and deep bite.

Maximally retract the anterior segments to resolve dental protrusion as well as the axial inclination of the incisors. Install bilateral IZC bone screws to serve as anchorage to further retract the upper arch. Prevent iatrogenic gummy smile and deep bite with upper incisal bone screws. Specify digital set-up as shown in Figs. 8 and 9.

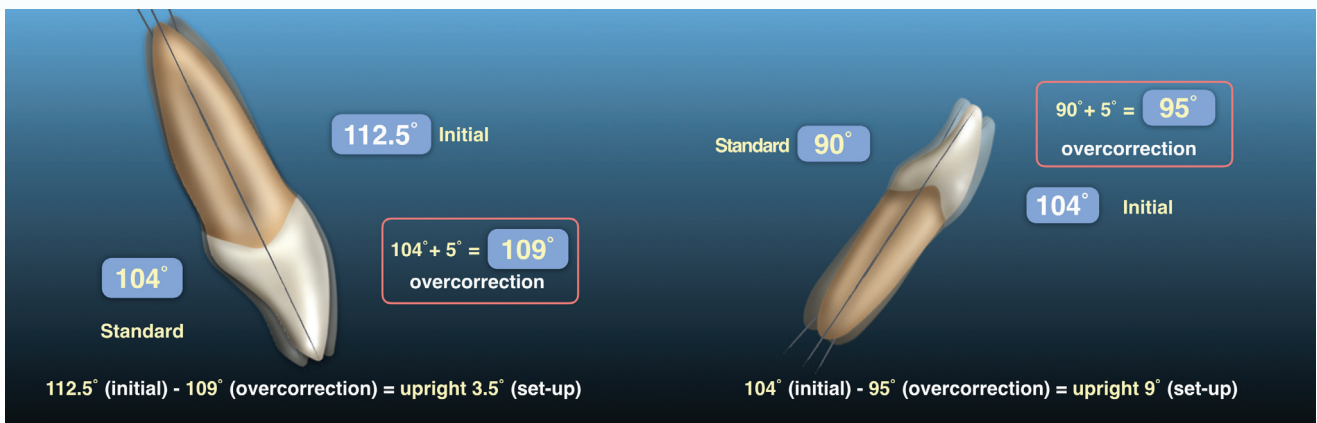


Fig. 8: As illustrated, torque compensations of 5° in the digital appliance are required for incisors that will be retracted to close space. If both IZC bone screws and Class II elastics are required, upper incisors should be increased 10°. See text for details.

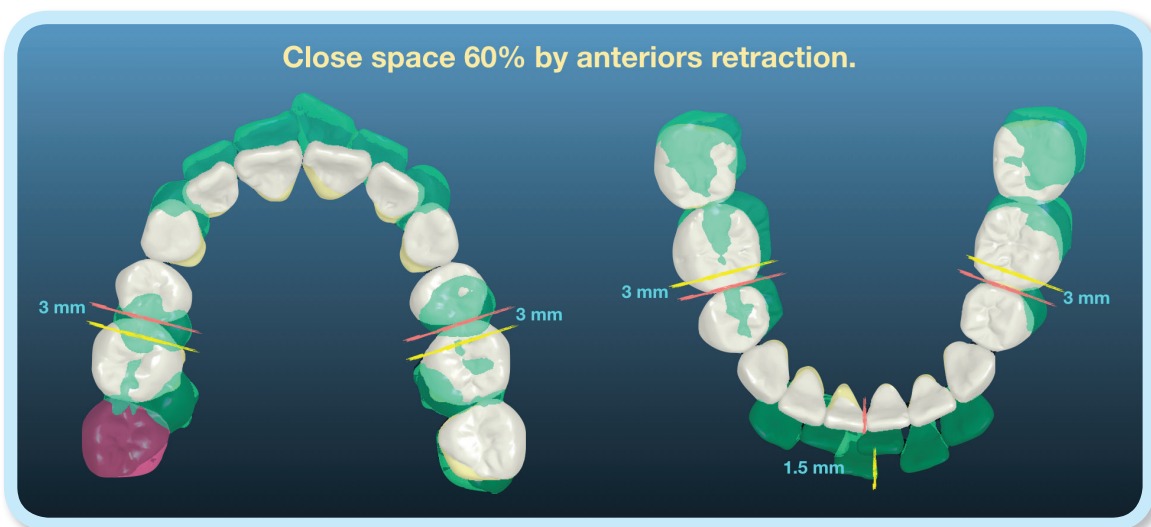


Fig. 9: The unerupted UR7 is purple, green teeth show the pre-treatment positions of the erupted dentition, and yellow lines mark the pre-treatment mesial surfaces of the first molars, as well as lower midline. The prescribed space closure in both arches is 60% anterior retraction and 40% mesial movement of buccal segments. Pink lines are the projected post-treatment mesial surfaces of the first molars and the lower midline, which is shifted 1.5 mm to the right. The digital set-up of the final result (white teeth) prescribes the fixed appliance and bracket position on each tooth that is reverse engineered to the original malocclusion. See text for details.

Digital Set-Up

(1) Vertical:

- Upper: *Maintain*
- Lower: *Maintain*
- Anterior overbite: *Set to 1.5mm*

(2) Extract upper and lower 1st premolars.

(3) A/P movement and space closure: Close space 60% by anterior retraction (*Fig. 9*).

(4) Incisor Crown Torque:

- Upper: *Upright 3.5 degrees*
- Lower: *Upright 9 degrees*

Note: Closing extraction spaces decreases the axial inclination of the anterior teeth, so both upper and lower incisors required ~5° more positive torque. Upper incisor crown torque was reduced from 112.5° (*pre-treatment*) to 109° (*standard 104° + over-correction 5°*). The lower incisor torque was decreased from 104° (*pre-treatment*) to 95° (*standard 90° + over-correction 5°*) (*Fig. 8*).

(5) Midline correction:

- Maintain the upper midline and move lower midline to the right 1.5mm to coincide with the upper midline.

(6) Archwire Plane:

- Set brackets at the center of the upper and lower central incisors.

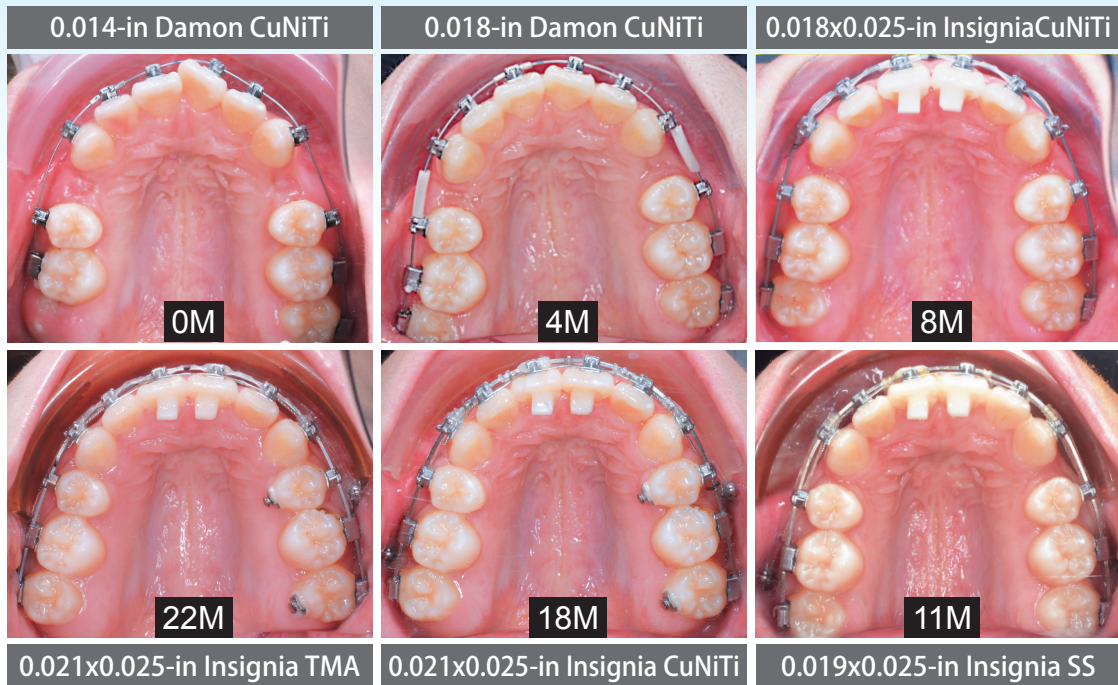
Treatment Progress

Two months following extraction of all four 1st premolars, all teeth were bonded with an Insignia® digitally-designed 0.022-in custom appliance as specified on all permanent teeth. All treatment and sequencing details are shown in Table 2 and illustrated in Figs. 10 and 11. The archwire sequence (*Table 2*) was documented at 0, 4, 8, 11, 18 and 22 months (0-22M) with upper (*Fig. 10*) and lower (*Fig. 11*) occlusal photographs, arranged in clockwise order. Fixed appliances were removed after 24 months of active treatment.

Treatment Results

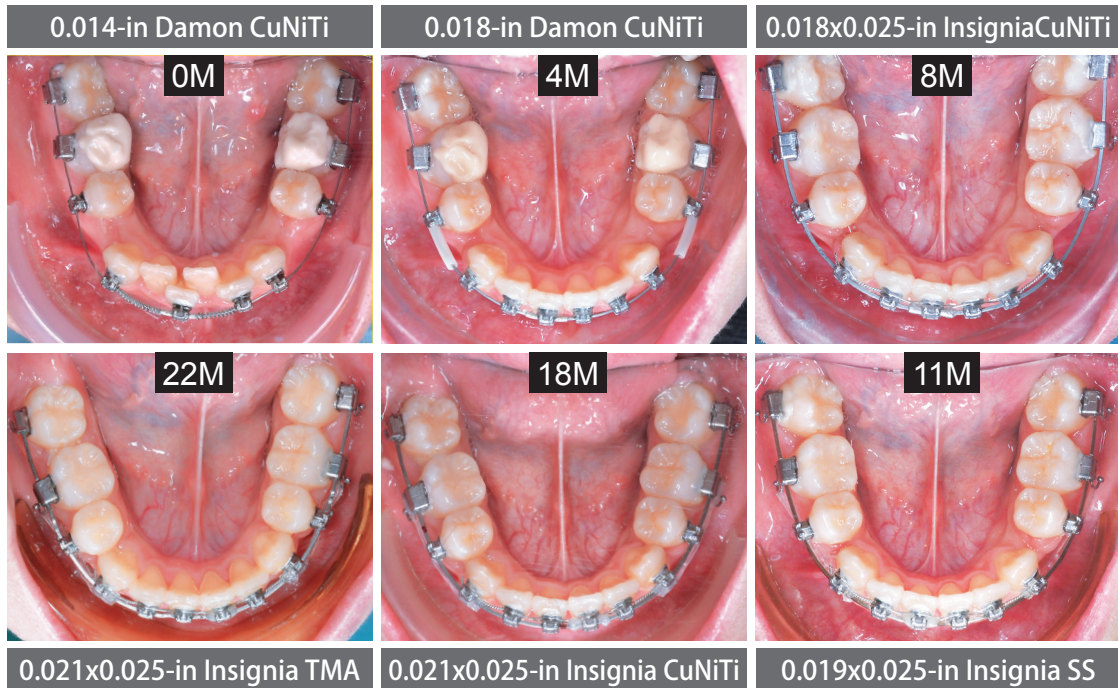
The patient was satisfied with the balanced facial profile and harmonious relationship of the lips (*Fig. 12*). Overjet was corrected to 0mm and the overbite was reduced to 1mm. The canine and molar relationships were corrected to Class I bilaterally (*Fig. 13*). A functional occlusion with stable posterior support and optimal anterior guidance was established (*Fig. 14*).

Cephalometric superimposition before and after treatment (*Fig. 15*) showed that the maxillary first molars were translated mesially about 3mm. The maxillary central incisors were extruded 1.5mm and translated distally about 5mm. The mandibular first molars were translated mesially about 3mm. Lower incisors were uprighted about 10 degrees and intruded about 1mm. The post-treatment panoramic radiograph documented adequate root parallelism (*Fig. 16*), and TMJ imaging was WNL (*Fig. 17*). The ABO Cast-Radiograph Evaluation (CRE) score was 24



■ Fig. 10:

Treatment progress in months (M) and the archwire progression from the start of treatment (0M) to twenty-two months (22M) is shown in a clockwise array of maxillary occlusal photographs. See text for details.



■ Fig. 11:

Treatment progress in months (M) and the archwire progression from the start of treatment (0M) to twenty-two months (22M) is shown in a clockwise array of mandibular occlusal photographs. See text for details.

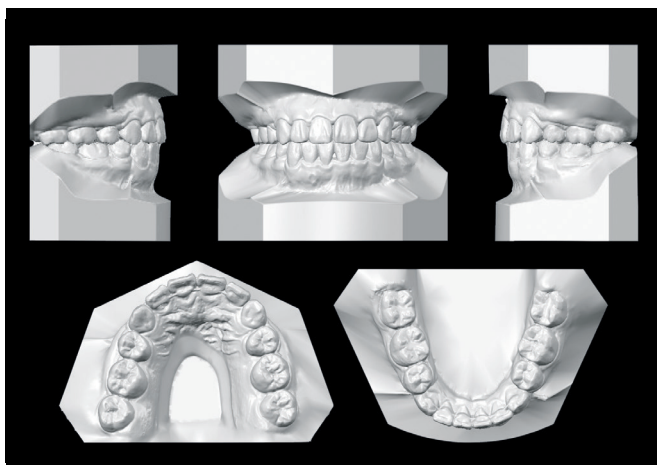
points (*Worksheet 2*). The major CRE discrepancy was the buccolingual inclination. The Pink and White dental esthetic score was 0 points, as shown in the supplementary worksheet 3. The patient was well satisfied with the esthetic and functional correction (*Fig. 18*).

Appointment	Archwire	Notes
1 (0 months)	U/L: 0.014-in Damon CuNiTi	Disarticulation with posterior bite-turbos constructed with Fuji II Type II Glass Ionomer cement (GC America, Alsip IL) on the occlusal surfaces of the L6s. Open coil springs for space opening in the lower anterior segment.
2 (2 months)		Re-activation open coil springs.
3 (4 months)	U/L: 0.018-in Damon CuNiTi	
4 (6 months)	U/L: 0.014x0.025-in Insignia CuNiTi	Started using early light Class II elastics (Quail, 3/16-in, 2-oz) from U3s to L6s to retract maxillary anteriors.
5 (8 months)	U/L: 0.018x0.025-in Insignia CuNiTi	Maxillary anterior teeth were tied together with stainless steel ligature wire. Remove lower posterior bite turbos. Bond anterior bite turbos near the cingulum of the upper central incisors and use Class II elastics (Fox, 1/4-in, 3.5-oz) from U3s to L6s.
6 (10 months)	U/L: 0.021x0.025-in Insignia CuNiTi	
7 (11 months)	U/L: 0.019x0.025-in Insignia SS	Close all extraction spaces with power chains. Iatrogenic gummy smile was noted due to space closure and Class II elastics. Pause elastics and install IZC and incisor bone screws to control incisors dumping and iatrogenic gummy smile.
8-13 (12-17 months)		New power chains were used to re-activate space closure mechanics.
14 (18 months)	U/L: 0.021x0.025-in Insignia CuNiTi	
15 (19 months)	U/L: 0.021x0.025-in Insignia TMA	
16-20 (20-24 months)		Detail and adjust incisal edges of the LL2 and LL3.

■ Table 2: Treatment sequence



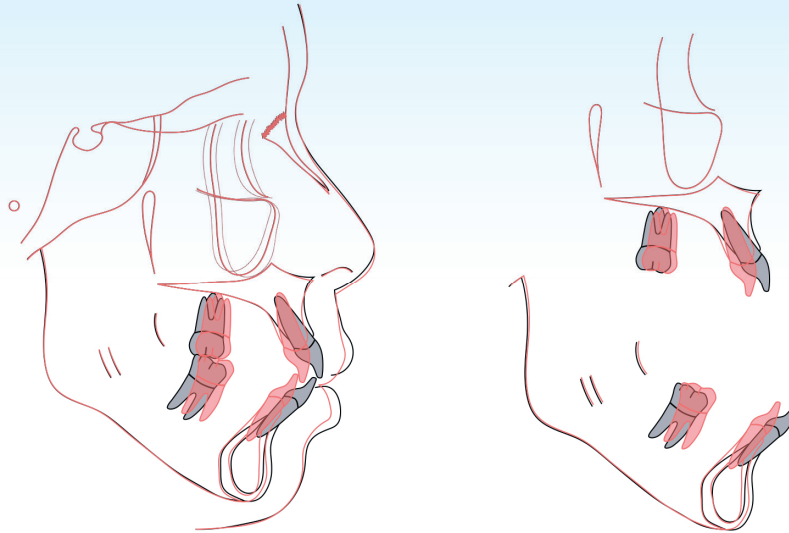
■ Fig. 12: Post-treatment facial and intraoral photographs.



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



■ Fig. 14: Post-treatment lateral cephalometric radiograph



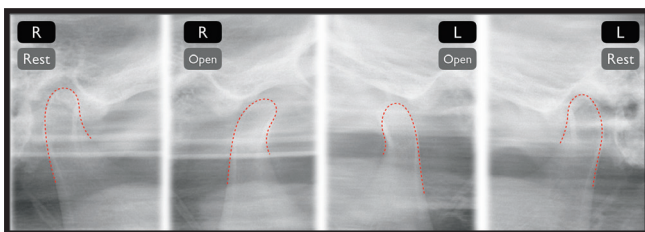
■ **Fig. 15:** Superimposed cephalometric tracings show dentofacial changes resulting from 24 months of active treatment (red) are compared to the pre-treatment (black). See text for details.



■ **Fig. 16:** Post-treatment panoramic radiograph



■ **Fig. 18:** After orthodontic treatment, the patient displayed a pleasing smile.



■ **Fig. 17:** Post-treatment TMJ transcranial radiographs are shown of the right (R) and left (L) sides in the rest and open positions. The contours and articular relationships are WNL for both sides.

Discussion

The Insignia[®] system supplies a virtual set-up to plan treatment mechanics with “the end in sight.”³ Customized brackets, reverse engineered from a digital set-up, are a powerful technology that is very accurate and efficient.^{1,4,5} The first order and second order prescription are usually expressed as specified in the digital set-up. The third order perspective, also

called the root torque prescription, is dynamically expressed and has a multi-factorial effect.¹ The clinician must monitor the treatment process to anticipate specific compensations for optimizing efficiency of the correction. Multiple factors affecting torque expression are:

(1) Crowding: The lower was more crowded (7mm) than the upper arch (4mm) (Fig. 1). The lower extraction spaces relieve more crowding so there is less incisor retraction, which results in less loss of torque in the lower arch. More torque compensation is required for the upper arch.

(2) Tooth Shape and Size: Root length and surface area are greater for upper compared to lower incisors (Fig. 19). The same bracket torque and archwire expresses better torque control in the lower incisors, so distal translation is more easily achieved.

(3) Anchorage Compensation: Compared to the maxilla, the posterior mandible is more dense cortical bone, which provides better anchorage for retraction of lower compared to upper anteriors.⁶ In addition, the periodontal ligament (PDL) of lower molars forms more dense cortical bone⁷ that further enhances lower posterior anchorage.⁸ Posterior maxillary anchorage is further compromised by the larger PDL surface area of upper incisors (Fig. 19). Extracting all four 4s and closing spaces without supplemental anchorage may result in excessive overjet and a Class II relationship.^{1,6,9,10} IZC bone screws and Class II elastics both tend to increase distal

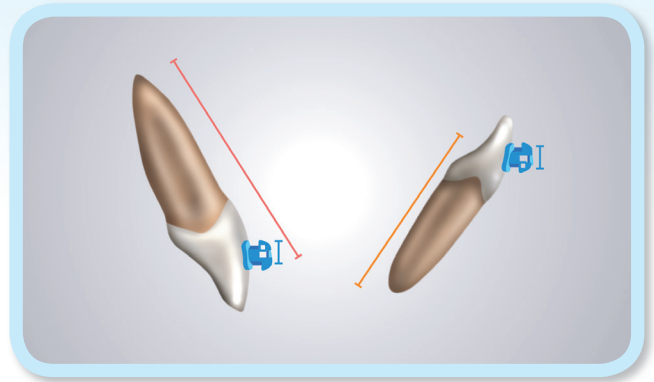


Fig. 19: Root length from bracket to apex and PDL surface area are greater for the upper compared to the lower incisors. Thus more torque compensation is required for upper incisor retraction.

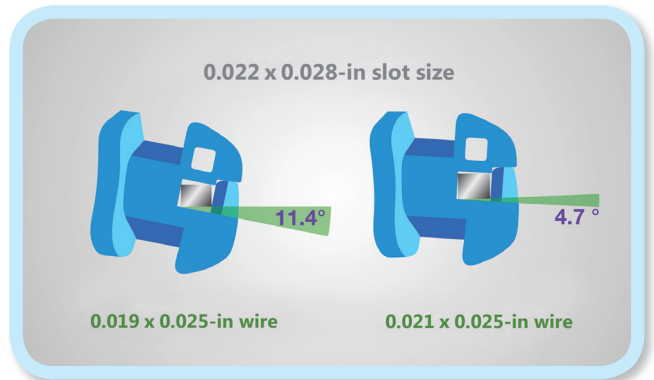


Fig. 20: For 0.022-in brackets (0.019x0.025-in slot size), the play with a 0.019x0.025-in wire is 11.4° compared to 4.7° for an 0.021x0.025-in wire. The play must be considered in the torque compensation for incisal retraction with a specific archwire. See text for details.

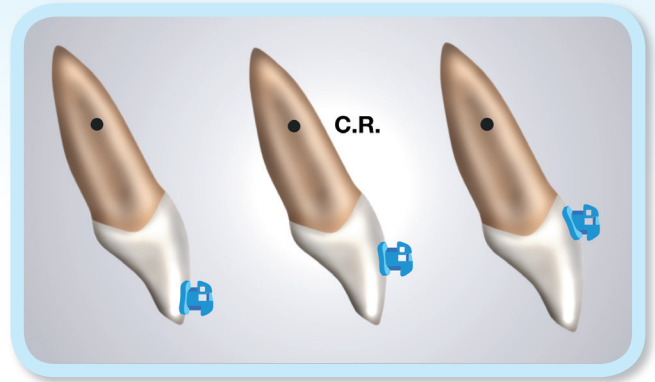
tipping of the maxillary incisors. To achieve a more ideal final alignment, incisal torque compensation is required for maxillary incisors in the digital treatment plan (Fig. 8).

(4) Axial Inclination of Incisors: The initial axial inclinations of the incisors is an important factor in planning torque compensation(s).

If torque compensation results in excessive axial inclination of the incisors, differential interproximal reduction (IPR) is a good solution. Considering all the variables for the present patient, that tend to decrease upper incisor axial inclination, the digital set-up (Fig. 8) was revised to over-correct the upper incisors 10°.

(5) Archwire Size and Bracket Play: The resilience of a rectangular wire produces a moment to resist lingual tipping of anterior teeth. Using a full-size archwire reduces the wire-to-lumen “play” effect (Fig. 20) that reduces the axial inclination of the incisors as posterior space is closed.^{1,3} Following the recommended wire sequence, either an 0.019x0.025-in stainless steel or TMA wire can be used for optimal space closure. Compared to 0.019x0.025-in, a larger dimension 0.021x0.025-in archwire has less “play” effect in an 0.022-in slot bracket. A large rectangular archwire is effective for controlling axial inclinations, but more friction is produced when closing posterior spaces. A stepwise approach may be indicated: close space on a smaller dimension archwire and then correct of the incisal inclination with an 0.021x0.025-in TMA archwire.

(6) Bracket Position: The distance of the bracket slot to the center of resistance (C.R.) of the root supported by alveolar bone plays an important role in the magnitude of the moment generated by a horizontal force. Maxillary incisor brackets can be bonded in the three positions relative to the labial surface: near the incisal edge, middle



■ Fig. 21:

Relative to the center of resistance of the root (C.R.) the bracket can be bonded on the labial surface in a gingival, middle or apical position, as shown from left to right.

third, and close to gingiva (Fig. 21). The same linear force applied near the incisal edge creates the largest moment tipping the incisor palatally. Despite the mechanical advantage of locating a bracket nearer the C.R., gingival positioning may result in soft tissue irritation, a compromise in hygiene, and interfere with the application of torquing auxiliaries, if needed. All considered the most ideal position of the bracket is in the center of the labial surface of the incisors after they are ideally positioned in the pretreatment digital set-up.

(7) Deepening of the Overbite and Distal Tipping of the Incisors: Eight months into treatment, space closure in the upper arch resulted in distal tipping and extrusion of the maxillary incisors (Fig. 10). Anterior bite turbos were bonded on the lingual surfaces of upper central incisors to open the bite and apply intrusive force to the incisors (Fig. 22). Anterior bite turbos (*planes*) utilize the functional force of occlusion to control anterior overbite and overjet.^{11,12}

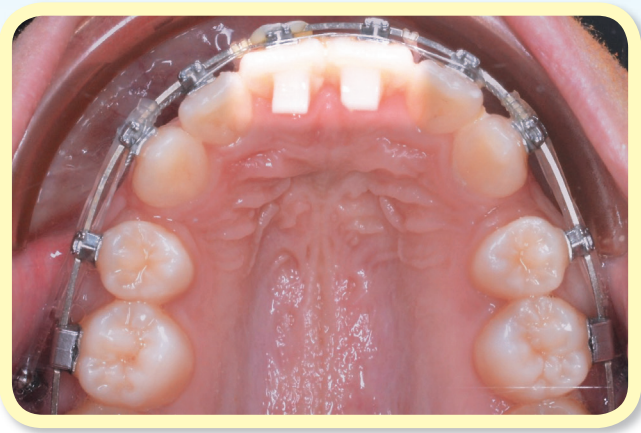


Fig. 22:
Two bite turbos were bonded on the palatal surface of the maxillary central incisors at the 8th month and Class II elastics (Fox, 3.5-oz) were applied.

(8) Iatrogenic Gummy Smile: Class II elastics and upper space closure result in deepening of the anterior overbite and distal tipping of the maxillary incisors. Cephalometric analysis at 11 months into treatment documented this problem, which is commonly referred to as incisal “dumping” (Fig. 23). Two labial bone screws were placed between the roots of the central and lateral incisors to provide apical traction to correct the iatrogenic gummy smile by intruding the maxillary incisors. Superimposition of cephalometric radiographic between 11mo progress and the end of active treatment revealed 3mm of upper incisor intrusion and decreased over-bite.

Iatrogenic Gummy Smile

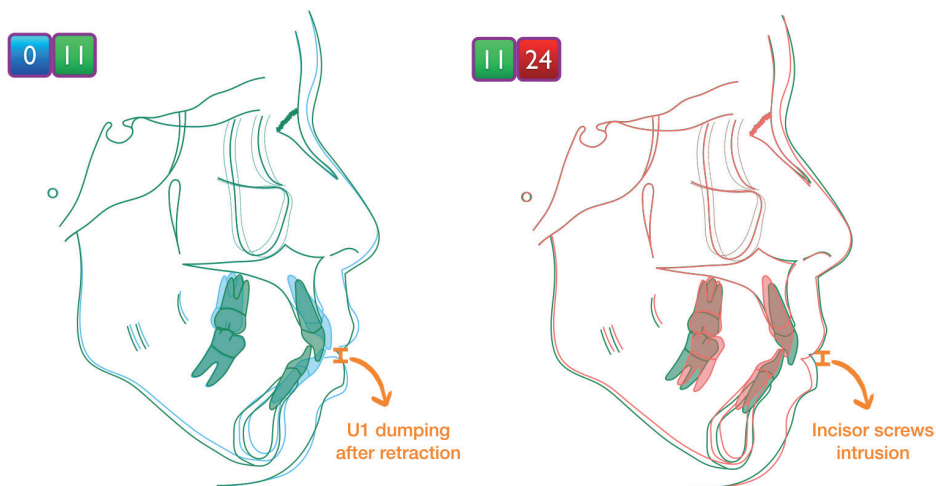
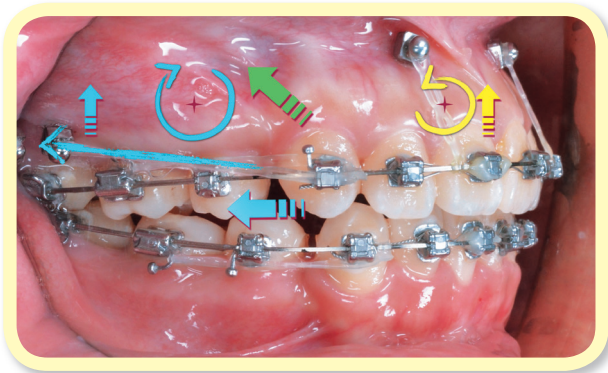


Fig. 23:
Left- Superimposed cephalometric tracings show dentofacial changes resulting after 11 months of active treatment (green) compared to the pre-treatment position (blue). An iatrogenic gummy smile was associated with upper incisors that were tipped lingually and extruded. This loss of upper incisor axial inclination (“torque”) is commonly referred to as “dumping.”
Right- A cephalometric tracing at 11 months into treatment (green) is superimposed on the post-treatment tracing (red), revealing 3mm of upper incisor intrusion. The caption “Incisor screw intrusion” refers to the intrusion of the maxillary anterior segment. See text for details.

(9) Biomechanics: Combining maxillary posterior space closure with the use of IZC and incisal bone screws results in complex mechanics that are difficult to visualize clinically (Fig. 24). Multiple lines of force bilaterally decrease the length of the arch and produce two moments around axes in the frontal plane, one in the anterior segment (*yellow*) and the other in the posterior aspect of the maxilla (*blue*). These mechanics avoid the adverse effects of distal tipping (*loss of torque*) and extrusion of the upper incisors which are normally produced by prolonged use of Class II elastics.¹³⁻¹⁶



■ Fig. 24:

A unilateral view of the maxillary arch illustrates the bilateral IZC anchored mechanics that retract and distally rotate the maxillary arch. The sketched blue arrow, along the chain of elastics from the maxillary canine to IZC bone screw, shows the line of force that is divided into distal (horizontal blue arrow) and vertical components (smaller blue arrow). Since the lines of force are occlusal to the center of resistance of the maxilla bilaterally, the center of rotation is a frontal axis through the maxilla (red star) that produces a moment (blue curved arrow) that rotates the maxilla distally. The maxillary anterior miniscrews anchor intrusive force (yellow arrow) that create a counterclockwise moment (yellow curved arrow) tending to flare the maxillary incisors. When properly executed, these composite mechanics produce a resultant load on the upper archwire (green arrow) that retracts and intrudes the maxillary dentition.

A customized digital appliance focuses on loads applied to the teeth, but additional anchorage from intermaxillary elastics and bone screws must be carefully considered. The Insignia® system produces an ideal fixed appliance for optimal alignment based on a pretreatment digital set-up of the final result. This approach substantially enhances outcomes with minimal treatment time if supplemental anchorage is integrated into the overall treatment plan.^{3,4}

Conclusions

1. Closing four first premolar extraction sites in a Class I non-growing patient often results in an iatrogenic Class II malocclusion.
2. Mandibular posterior segments have more anchorage value compared to the maxilla.
3. Intermaxillary elastics correct an iatrogenic Class II malocclusion by steepening the plane of occlusion, which is associated with retraction and extrusion of the maxillary incisors.
4. IZC and maxillary incisor bone screws can be used to correct the iatrogenic problem, but this stepwise approach lengthens treatment time and exposes the teeth to excessive root movement.
5. It is best to utilize a digital set-up of the desired final alignment to produce a precise fixed appliance that includes maxillary incisal torque compensations up to 10° for the specific mechanics planned.

- The Insignia® system combined with maxillary bone screw anchorage is ideal for prospectively planning the efficient correction of complex malocclusions with minimum treatment time and root movement.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE = 30

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 =

Total = 3

OVERBITE

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

Total = 2

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 = 0

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 _____ pts.
 Beyond Class II or III = 1 pt. per mm. _____ pts.
 additional

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 $\geq 6^\circ$ or $\leq -2^\circ$ = 4 pts.

Each degree $< -2^\circ$ _____ x 1 pt. = _____

Each degree $> 6^\circ$ _____ x 1 pt. = _____

SN-MP

$\geq 38^\circ$ = 2 pts.

Each degree $> 38^\circ$ 1 x 2 pts. = 2

$\leq 26^\circ$ = 1 pt.

Each degree $< 26^\circ$ _____ x 1 pt. = _____

1 to MP $\geq 99^\circ$ = 1 pt.

Each degree $> 99^\circ$ 5 x 1 pt. = 5

Total = 14

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

Identify:

Total = 0

Cast-Radiograph Evaluation

Case #

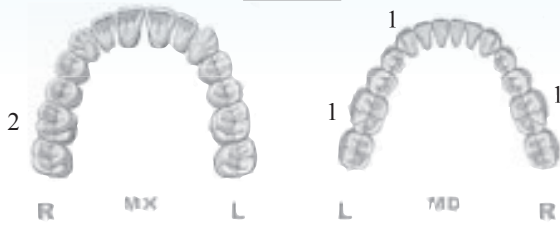
Patient

Total Score:

24

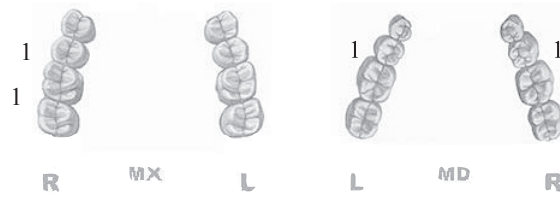
Alignment/Rotations

5



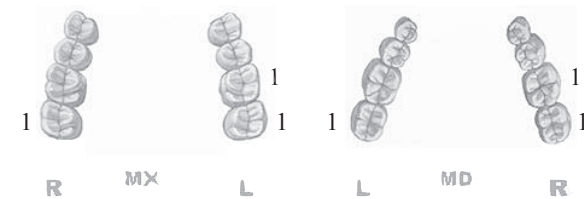
Marginal Ridges

4



Buccolingual Inclination

6



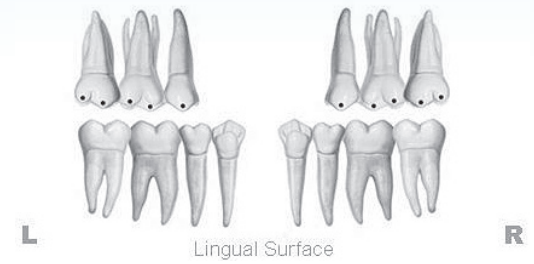
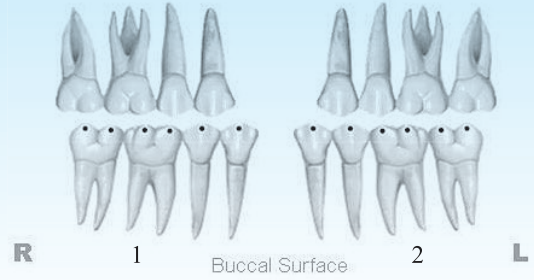
Overjet

0



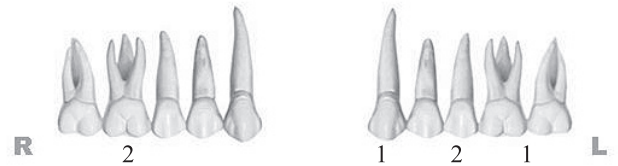
Occlusal Contacts

3



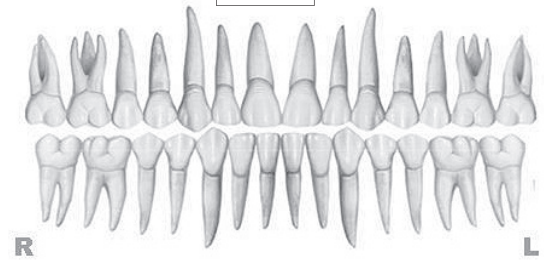
Occlusal Relationships

6



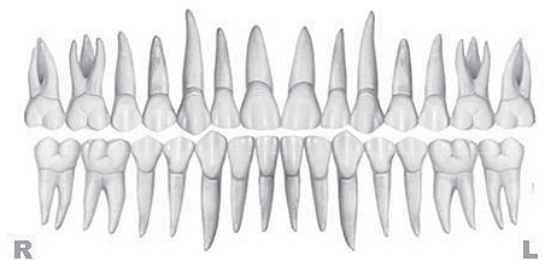
Interproximal Contacts

0



Root Angulation

0

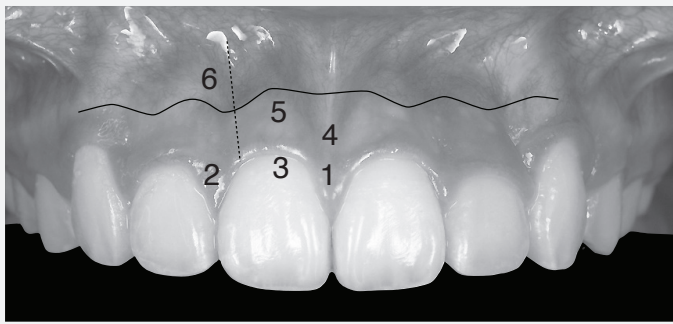


INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = 0

1. Pink Esthetic Score

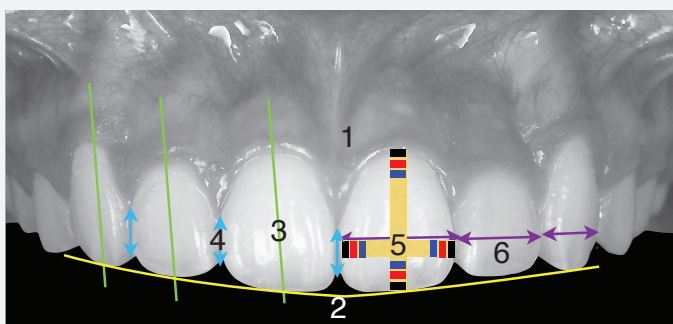


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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

Total = 0

2. White Esthetic Score (for Micro-esthetics)



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

Total = 0