Skeletal Class III Malocclusion with Anterior and Posterior Crossbites: Camouflage Treatment with Mandibular Second Molar Extractions and TSADs

Abstract

History: *An 18-year-8-month-old male was referred for orthodontic consultation with chief complaints of a prognathic mandible, anterior spaces, and open bite.*

Diagnosis: *Cephalometric analysis showed a skeletal Class III relationship with bimaxillary protrusion (SNA, 90˚; SNB, 92.5˚; ANB, -2.5˚). Clinical examination revealed a severe anterior crossbite (overjet = -5mm), an anterior open bite, bilateral lingual posterior crossbite, and full-cusp Class III molar relationship. There were small spaces between the anterior teeth in both arches. The mandibular dental midline deviated 1mm to the right. The chin shifted 3mm to the right. The Discrepancy Index for this severe skeletal malocclusion was 71.*

Treatment: *Bone screws were placed in the mandibular buccal shelves to retract the mandibular arch. Bilateral lower second molars were extracted to create posterior spaces for retracting the mandibular arch to correct the anterior crossbite. A Damon® system full-fixed appliance with passive self-ligating brackets was applied to correct the dental malocclusion. Early light Class III elastics were also used to facilitate the anterior crossbite correction. The posterior crossbite was a big challenge, which was resolved with cross elastics and careful archwire adjustment. The active treatment was 26 months. A surgical crown-lengthening procedure was performed to increase the esthetic outcome of the maxillary anterior teeth.*

Results: *After 26 months of active treatment, this severe skeletal Class III malocclusion was conservatively corrected to an excellent result without orthognathic surgery. The Cast Radiograph Evaluation was 31 points, and the Pink and White dental esthetic score was 1.*

Conclusions: *This case report demonstrates that the use of passive self-ligating appliances, lower second molar extractions, and buccal shelf screws can resolve a severe anterior negative overjet combined with an anterior open bite and lingual posterior crossbite without orthognathic surgery. (J Digital Orthod 2022;67:4-22)*

Key words:
Skeletal Class III, anterior crossbite, anterior negative overjet, anterior open bite, posterior crossbite, temporary skeletal anchorage devices (TSADs)

Introduction

Skeletal Class III malocclusion is more common among Asians than Americans and Europeans. The Chinese and Malaysian populations have a high prevalence of Angle Class III malocclusion, at 15.69% and 16.59%, respectively.[1]

Orthognathic surgery is one treatment option; however, the majority of patients in Taiwan decline surgery because of morbidity, potential complications, and expense.[2] As a result, treating a Class III malocclusion without surgery is a common approach for orthodontists in Taiwan. Using temporary skeletal anchorage devices (TSADs) as anchorage for lower arch retraction is often preferred.[3]

This case report documents an 18-year-8-month-old male patient who was referred by his dentist for

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orthodontic consultation. His chief complaints were a prognathic mandible, spaces between the adjacent anterior teeth, and no contact between the upper and lower front teeth. The pre-treatment facial and intraoral photographs are documented in Fig. 1.

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

When examining the oral condition, a severe negative overjet (OJ = -5mm) and bilateral lingual posterior crossbite indicated this was a challenging malocclusion.

The patient was informed that surgery was a conventional treatment option, but he regarded this approach as being too aggressive. Therefore, he wanted a non-surgical treatment, which made the challenging task even more difficult. After a thorough clinical data analysis, some camouflage treatment options were carefully planned. After discussing the pros and cons with the patient, he chose the treatment protocol which involved mandibular 2nd molar extractions and the use of TSADs. After 26 months of active treatment, an excellent result was achieved.

Fig. 2: *Pre-treatment cephalometric radiograph*

Diagnosis

The cephalometric analysis (Fig. 2; Table 1) revealed a skeletal Class III malocclusion (ANB, -2.5˚) with bimaxillary protrusion and markedly protrusive mandible (SNA, 90˚; SNB, 92.5˚). The mandibular plane angle (SN-MP, 27˚; FMA, 20˚) was relatively flat but within normal limits (WNL). The angle of lower incisors (91˚) was also WNL, but the upper incisors had an increased axial inclination (116.5˚). The facial profile was concave (G-Sn-Pg', 0.5˚) with a relatively retrusive upper lip (-3mm to the E-line) and a protrusive lower lip (6mm to the E-line). An increased vertical dimension of occlusion (%FH: Na-ANS-Gn, 57%) was evident, but there was no functional shift.

CEPHALOMETRIC SUMMARY

SKELETAL ANALYSIS	PRE-TX	POST-TX	DIFF.
SNA˚ (82˚)	90˚	90˚	0˚
SNB˚ (80˚)	92.5˚	92˚	0.5˚
ANB˚ (2˚)	-2.5˚	-2˚	0.5˚
SN-MP˚ (32˚)	27˚	29˚	2˚
FMA˚ (25˚)	20˚	22˚	2˚
DENTAL ANALYSIS			
U1 TO NA mm (4 mm)	5.5	7	1.5
U1 TO SN˚ (104˚)	116.5˚	115˚	1.5˚
L1 TO NB mm (4 mm)	8	3	5
L1 TO MP˚ (90˚)	91˚	73˚	18˚
FACIAL ANALYSIS			
E-LINE UL (-1 mm)	-3	-1	2
E-LINE LL (0 mm)	6	2	4
Convexity: G-Sn-Pg' (13˚)	0.5˚	1.5˚	1˚
%FH: Na-ANS-Gn (53%)	57%	58%	1%

Table 1: *Pre-treatment and posttreatment cephalometric analysis*

The panoramic radiograph revealed that all four wisdom teeth had already erupted and were reasonably well-aligned (Fig. 3). Pre-treatment plaster cast models showed a severe negative OJ (-5mm), bilateral lingual posterior crossbite, anterior open bite, mild spaces in upper and lower arches (maxilla: 3mm, mandible: 1mm), and bilateral beyond-full-cusp Class III molar relationship (Fig. 4). Temporomandibular joint (TMJ) morphology was normal in the open and closed positions (Fig. 5). There were no signs nor symptoms of temporomandibular dysfunction (TMD).

Compared to the facial midline, the lower dental midline was 1mm to the right. Oral hygiene was good. No significant medical or dental histories were reported.

The American Board of Orthodontics (ABO) Discrepancy Index (DI) was 71 as shown in the subsequent Worksheet 1. The most significant problem was the anterior crossbite (40 points).

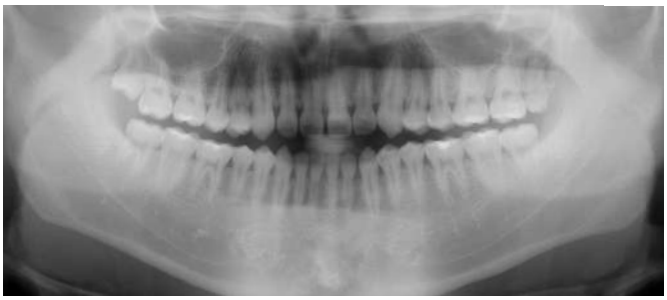

Fig. 3: *Pre-treatment panoramic radiograph*

Fig. 4: *Pre-treatment study models (casts)*

Treatment Objectives

The treatment objectives were to (1) correct the anterior crossbite, (2) close the spaces between the anterior teeth, (3) close the anterior open bite, (4) correct the posterior crossbite, (5) achieve Class I molar and canine relationships, and (6) improve facial esthetics.

Treatment Alternatives

Option 1. Orthognathic surgery is often indicated for severe Class III malocclusions. In this case, it was the option that could achieve the best treatment outcome; however, the cost and morbidity of orthognathic surgery caused the patient great concern.

Option 2. Extract mandibular 3rd molars for retraction, and use TSADs for anchorage. This option

Fig. 5 :
Pre-treatment TMJ transcranial radiographs are shown from left to right: right TMJ closed, right TMJ open, left TMJ open, and left TMJ closed.

has the advantage of preserving the stronger teeth, as the 2nd molars are generally more robust than 3rd molars. However, the disadvantage of this option is that it increases the difficulty of retracting the mandibular arch.

Option 3. Extract mandibular 2nd molars for retraction, and incorporate TSADs for anchorage. This option facilitates mandibular retraction, but the surviving 3rd molars are generally less preferred for longterm oral function. Fortunately, the present patient had well formed lower 3rd molars.

After a thorough discussion of the pros and cons for each approach, the patient chose option 3 as the most desirable camouflage treatment to avoid surgery. The patient provided informed consent for the treatment, knowing that this approach was challenging and that the outcome would be compromised. It was also suggested to extract the upper 3rd molars because they would not be in the occlusion after treatment.

Treatment Plan

Retract mandibular arch by extracting mandibular 2nd molars and installing TSADs. Extra-alveolar OrthoBoneScrews® (OBSs, 2x12-mm, iNewton Dental, Inc., Hsinchu City, Taiwan) are planned bilaterally in the buccal shelves to serve as anchorage for mandibular retraction. Correct the posterior crossbite by expanding the upper arch with a 0.016x0.025-in stainless steel (SS) archwire, as well as constrict the lower arch utilizing bilateral crossbite elastics. Finally, the posterior occlusion is to be detailed and seated with vertical elastics as necessary.

Treatment Progress

The archwire sequence is summarized in Table 2. Treatment progress is documented in the following views: right buccal, frontal, left buccal, upper occlusal, and lower occlusal, respectively (Figs. 6-10), and the detailed treatment mechanics are outlined in Table 3. From the following section onward, the nomenclature used is a modified Palmer notation with four oral quadrants: upper right (UR), upper left (UL), lower right (LR), and lower left (LL). Teeth are number 1-8 from the midline.

A 0.022-in Damon® Clear™ and Damon® Q™ fixed appliance (Ormco, Brea, CA) with passive self-ligating (PSL) brackets was selected along with all specified archwires and orthodontic auxiliaries. In the beginning, brackets were bonded on all lower teeth except L7s and L8s. High torque brackets were placed on the lower canines, and low torque brackets were bonded upside down on the lower incisors. The purpose of this bracket selection was to provide more lingual root movement of the lower anterior teeth to offset the unwanted side effects of Class III elastics. For the same reason, low torque brackets were placed on the upper anterior teeth one month later. The initial archwire was a 0.014-in copper-nickle-titanium (CuNiTi).

In the following months, the sequence for upper archwires was 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, and 0.016x0.025-in SS. Early light Class III elastics (Parrot, 5/16-in, 2-oz; Ormco) were used from U6s to L4s to correct the sagittal discrepancy from the 4th to the 6th months of treatment. In the 6th month, buccal shelf bone screws were installed bilaterally to anchor the retraction of the

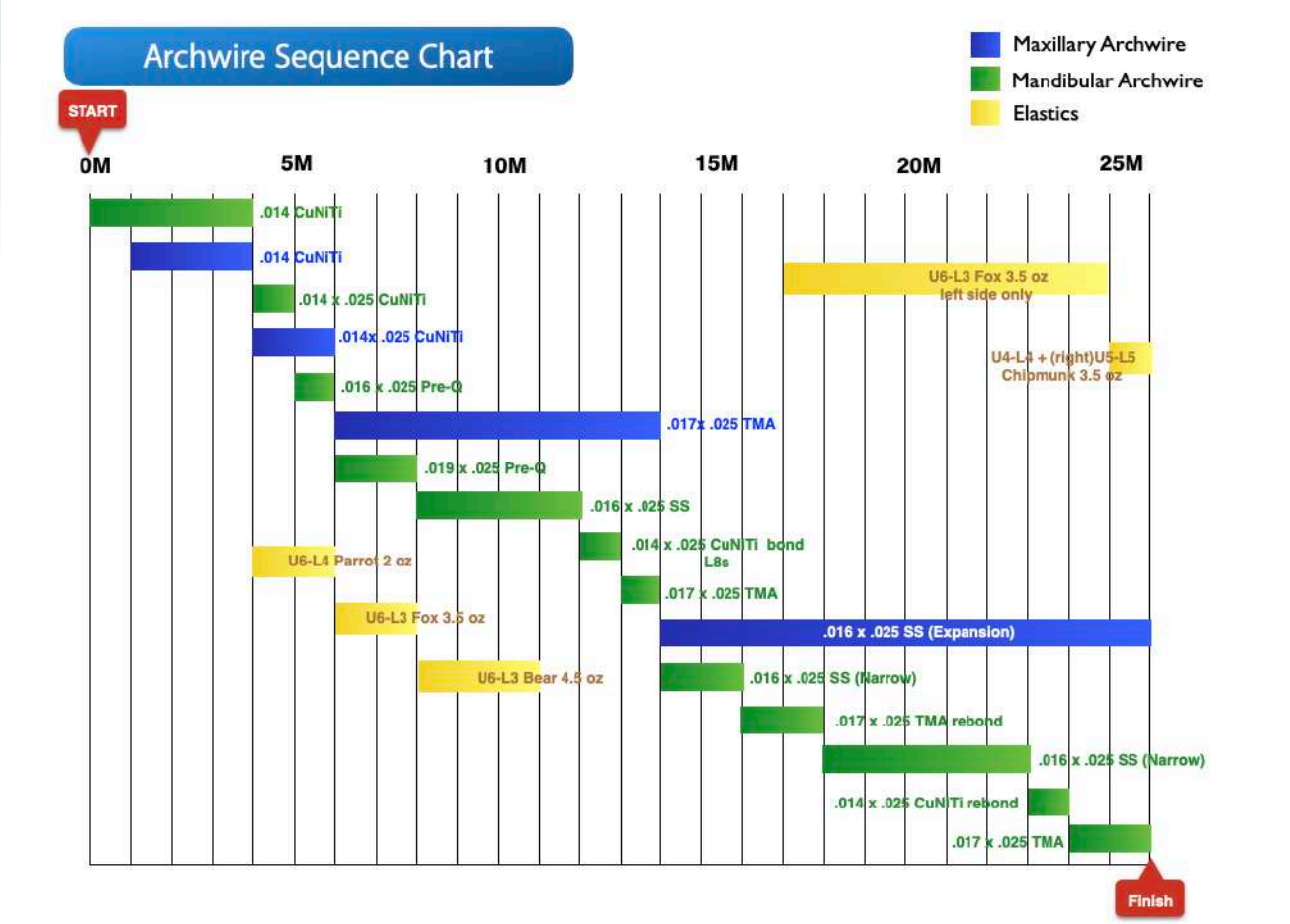

Table 2:
The archwire sequence chart is a treatment timeline for the procedures involved in managing the malocclusion: archwire changes, adjustments, and elastics. Posterior intermaxillary relationships were corrected with expansion and contraction adjustments. (Pre-Q: pre-toruqued, see text and Table 3 for details.)

mandibular dentition. In the 11th month, the anterior crossbite was already corrected. The sequence for the lower archwire in the first 11 months was 0.014 CuNiTi, 0.014x0.025-in CuNiTi, 0.016x0.025-in pre-torqued CuNiTi, 0.019x0.025-in pre-torqued CuNiTi, and 0.016x0.025-in SS. Then the L8s were bonded in the 12th month right after the anterior crossbite was corrected, and the lower archwire was changed back to 0.014x0.025-in CuNiTi. In the 13th month, buttons were bonded on the L4s and L8s to attach power chains for facilitating space closure, and the lower archwire was changed to 0.017x0.025-in TMA. In the 14th month, upper and lower archwires were changed to 0.016x0.025-in SS. At the same time, the upper archwire was expanded, and the lower archwire was constricted, in order to correct the posterior crossbite. Thereafter, the sequence for the lower archwire was changed back and forth due to repositioning of brackets several times. The sequence was 0.017x0.025-in TMA, 0.016x0.025-in SS, 0.017x0.025-in TMA, 0.016x0.025-in SS, 0.014x0.025-in CuNiTi, and 0.017x0.025-in TMA.

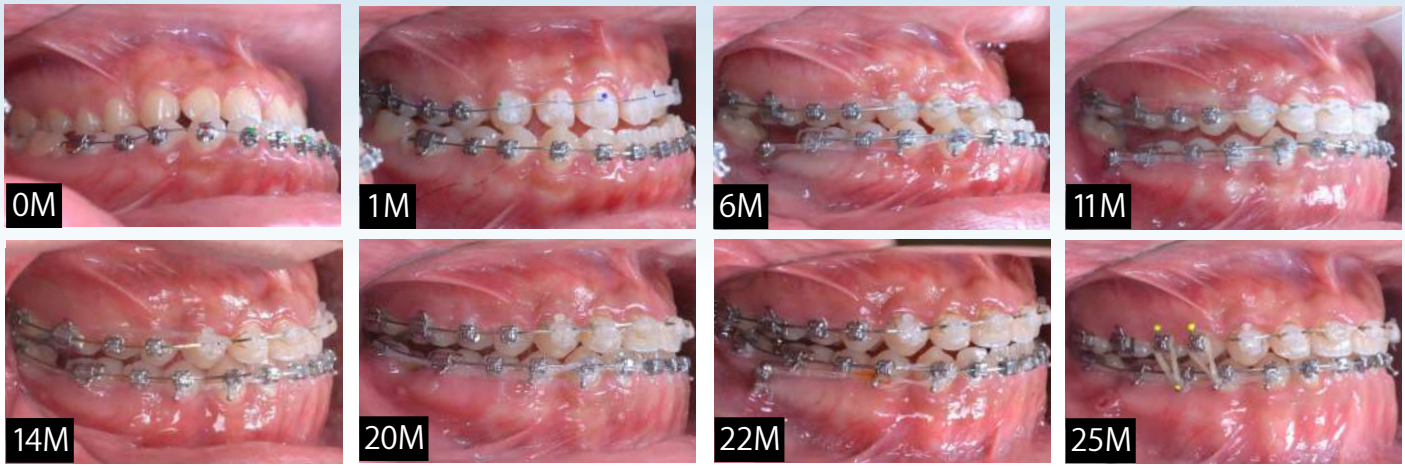

Fig. 6: Treatment progression from the right buccal view is shown from the start (0M) to twenty-five months (25M) of treatment.

Fig. 7: Treatment progression from the frontal view is shown from the start (0M) to twenty-five months (25M) of treatment.

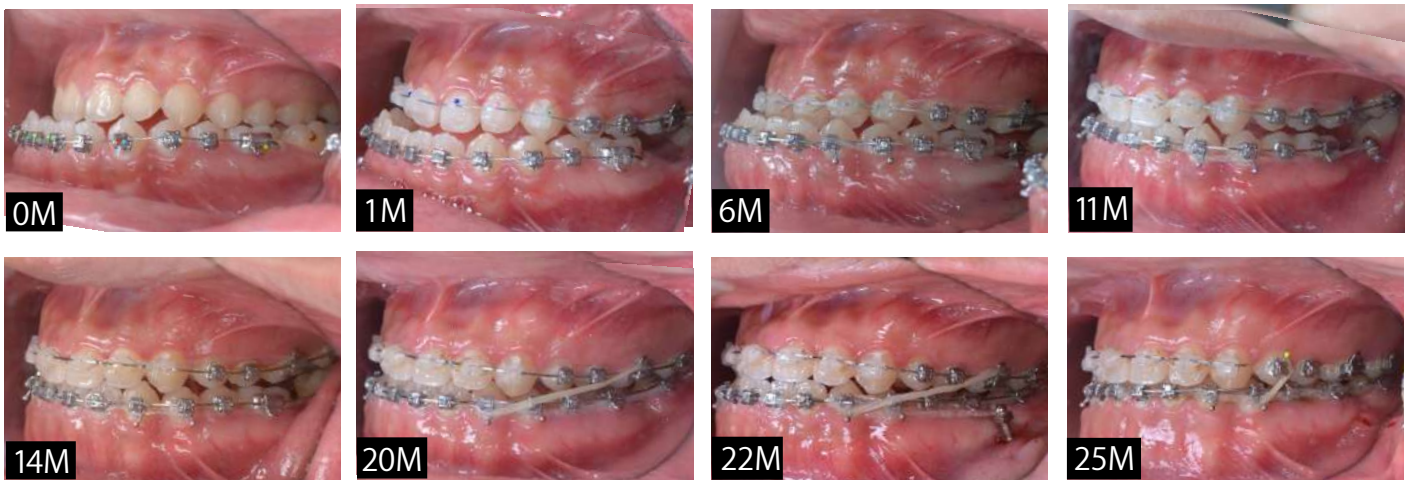

Fig. 8: Treatment progression from the left buccal view is shown from the start (0M) to twenty-five months (25M) of treatment.

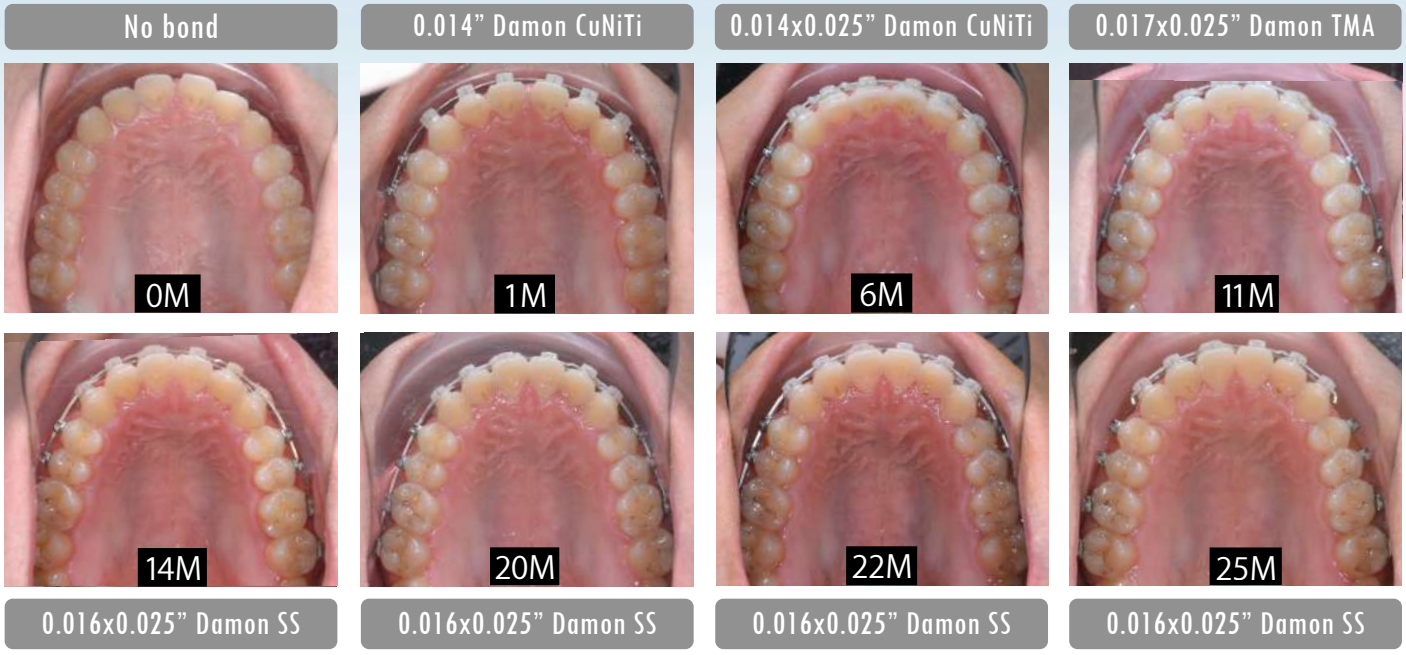

Fig. 9: Treatment progression from the maxillary occlusal view is shown from the start (0M) to twenty-five months (25M) of treatment.

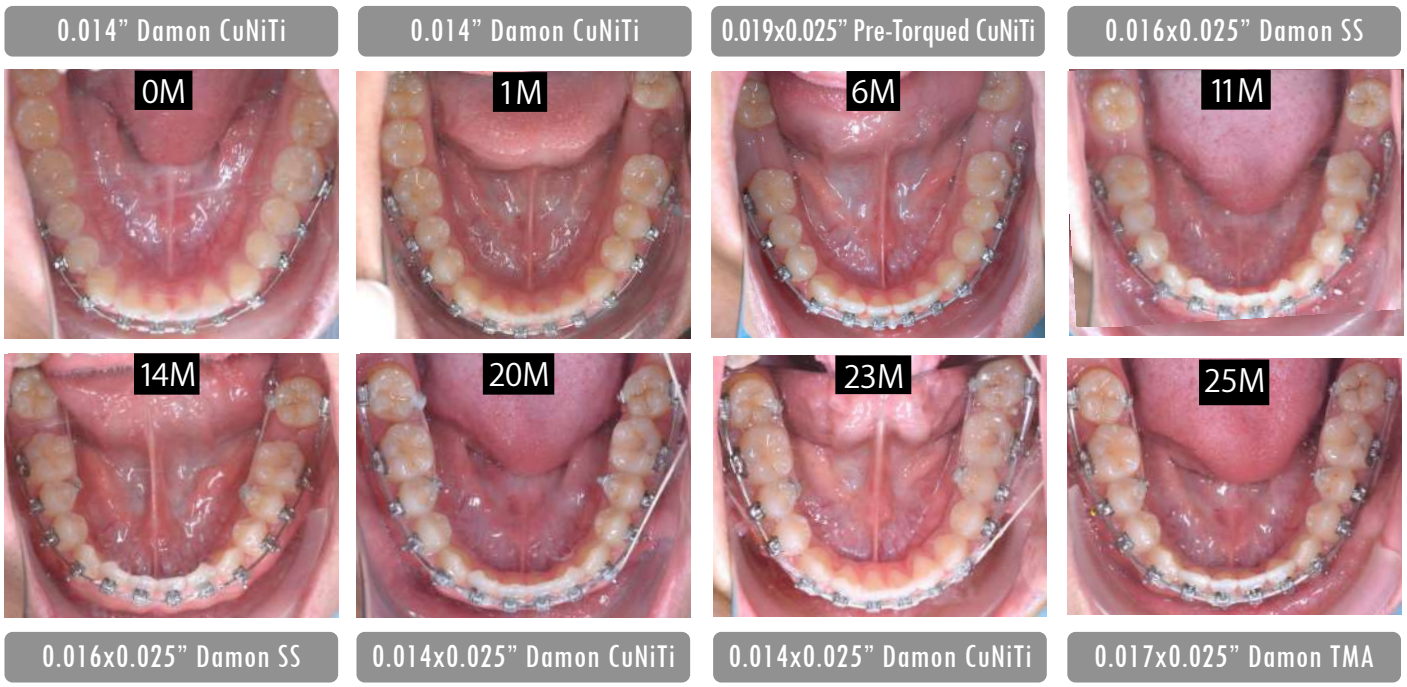

Fig. 10: Treatment progression from the mandibular occlusal view is shown from the start (0M) to twenty-five months (25M) of treatment.

Appointment	Archwire	Notes
1 (0 month)	L : 0.014-in Damon CuNiTi	Bond lower teeth except L7s and L8s. L7s will be extracted. High torque brackets were selected.
2 (1 month)	U: 0.014-in Damon CuNiTi	Bond all upper teeth. Low torque brackets were selected.
3 (2 months)		Observation
4 (3 months)		Rebond UL5 to adjust tooth position.
5 (4 months)	U: 0.014x0.025-in Damon CuNiTi L : 0.014x0.025-in Damon CuNiTi	L7s were extracted. L8s remained unbonded. Start using early light short Class III elastics (Parrot, 5/16-in, 2-oz) from U6s to L4s to retract mandibular anteriors.
6 (5 months)	L : 0.016x0.025-in Damon Pre-Torqued CuNiTi	Use pre-torqued archwire in the lower arch to compensate for side effects of Class III elastics.
7 (6 months)	U: 0.017x0.025-in Damon TMA	Class III elastics (Fox, 1/4-in, 3.5-oz) were used from L3s to U6s to retract the lower anteriors.
8 (6 months & 2 weeks)	L : 0.019x0.025-in Damon Pre-Torqued CuNiTi	Change to stronger pre-torqued archwire in the lower arch to further control the side effects of Class III elastics. Install two buccal shelf (BS) screws as the anchorage for retracting the lower arch. Place power chains from screws to lower canines to provide retraction force.
9 (7 months)		Change power chains for new ones to provide retraction force. The negative overjet was alleviated from -5mm to -3mm.
10 (8 months)	L: 0.016x0.025-in Damon SS	Class III elastics (Bear, 1/4-in, 4.5-oz) were used from L3 to U6 bilaterally to retract the lower anteriors.
11 (9 months)		Change new power chains to provide retraction force.
12 (10 months)		Build bite turbo on the lingual side of the lower incisors to facilitate overjet correction. The negative overjet was corrected to only -0.5mm.
13 (11 months)		The negative overjet (anterior crossbite) was corrected. Remove Class III elastics.
14 (12 months)	L : 0.016x0.025-in Damon Pre-Torqued CuNiTi	Rebond LR1, LR2, and LL1 to adjust tooth position.
15 (12 months)	L : 0.014x0.025-in Damon CuNiTi	Bond LR8 and LL8. Start to adjust L8s. Place a new archwire in the lower arch to engage all lower teeth. Remove BS screws because they interfered with the placement of new archwire.
16 (13 months)	L: 0.017x0.025-in Damon TMA	Place buttons on L5s and L8s. Place power chains between L5 and L8 buttons for space closure. Rebond LR1 to adjust tooth position.

Table 3: *Treatment sequence for all procedures is outlined in detail.*

Appointment	Archwire	Notes
17 (14 months)	U: 0.016x0.025-in Damon SS L: 0.016x0.025-in Damon SS	Rebond button on LR8 and rebond LL2 for adjusting tooth position. Expand the upper arch and constrict the lower arch by adjusting the archwires. Add 15˚ lingual root torque on LL2-LR2 area of the lower archwire.
18 (15 months)		Close space with power chains.
19 (16 months)	L : 0.017x0.025-in Damon TMA	Rebond LR1. Rebond botton on LR5. Consolidation with continuous ligatures from LL3 to LR3 to prevent space opening. Add 15˚ lingual root torque on LL2-LR2 area of lower archwire. Start using Class III elastics (Fox, 1/4-in, 3.5-oz) from U6 to L4 (left side) to correct Class III malocclusion.
20 (17 months)		Rebond LR1.
21 (18 months)	U: 0.016x0.025-in Damon SS	Continue to expand the upper arch and constrict the lower arch. Continue to use Class III elastics (Fox,1/4-in,3.5oz) from UL6 to LL4 to correct Class III malocclusion.
22 (19 months)		Rebond button on LR8. Close space with power chains.
23 (20 months)	U: 0.014x0.025-in Damon CuNiTi L : 0.014x0.025-in Damon CuNiTi	Close space with power chains. Continue to use Class III elastics (Fox,1/4-in, 3.5oz) from UL6 to LL4 to correct Class III malocclusion.
24 (21 months)	L : 0.017x0.025-in Damon TMA	Close space with power chains.
25 (22months)		Close space with power chains. Add 10˚ buccal crown torque for LL5 and LR5 with a 3rd order bend. Re-install TSADs to correct overjet.
26 (23months)	L : 0.014x0.025-in Damon CuNiTi	Rebond LL8 and LR8.
27 (24months)	L : 0.017x0.025-in Damon TMA	Add 15˚ buccal crown torque for LL1, LL2, LR1, and LR2 with a 3rd order bend.
28 (25months)		Cut the upper archwire from U3s. Instruct patient to use intermaxillary elastics from the premolars to premolars to decrease posterior open bite.
29 (26months)		All appliances were removed. Anterior fixed retainers were bonded. Removable clear overlay retainers were delivered for both arches. Instructions were provided for home hygiene and maintenance of the retainers.

Table 3 (cont.): *Treatment sequence for all procedures is outlined in detail.*

Treatment Results

Both arches were well aligned in a Class I occlusion with coincided dental midlines (Figs. 11 and 12). The overjet was corrected from -5mm to 1mm, and the posterior crossbite was corrected. The posttreatment panoramic radiograph shows complete space closure with good root parallelism and no significant periodontal bone loss (Fig. 13). The L5s and L6s experienced mild root resorption. The posttreatment cephalometric radiograph documents the dentofacial correction of the profile and the occlusion .

The superimposed cephalometric tracings show three important changes: (1) the retraction of the lower molars as well as slight clockwise rotation (opening) of the mandible, (2) the retraction and

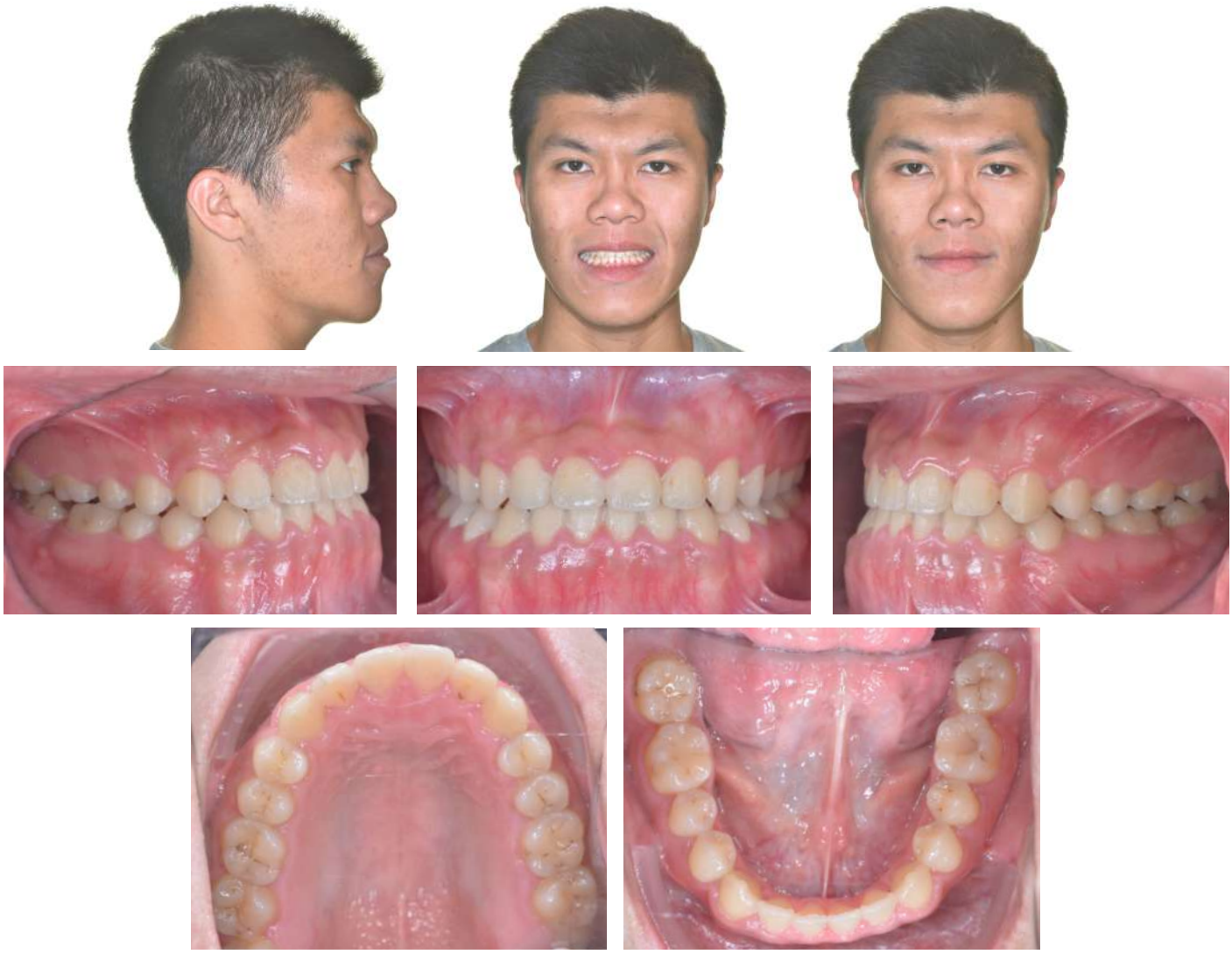

Fig. 11: *Posttreatment facial and intraoral photographs after 26 months of active treatment*

Fig. 12: Posttreatment study models (casts)

Fig. 13: Posttreatment panoramic radiograph

lingual tipping of the lower incisors, and (3) extrusion of the upper dentition (Figs. 14 and 15).

The ABO Cast Radiograph Evaluation score was 31 points, as shown in the supplementary Worksheet 2. The major discrepancies were a right side Class II occlusal relationship (11 points) and mild posterior open bite (8 points). This result is acceptable for such a challenging Class III skeletal malocclusion. Dental esthetics were good as indicated by the Pink and White dental esthetic score of 1, detailed in the supplementary Worksheet 3. This camouflage treatment was completed with 26

Fig. 14: Posttreatment cephalometric radiograph

months of active treatment, and the patient was well pleased with the outcome.

Retention

Fixed retainers were bonded on the lingual surfaces of all maxillary incisors and mandibular anterior teeth. 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 also provided for oral hygiene and maintenance of the retainers.

Discussion

Skeletal Class III malocclusion with a severe anterior negative overjet is usually a clear indication for orthognathic surgery. On the other hand, the 3-Ring Diagnosis[5] developed by John Lin is an

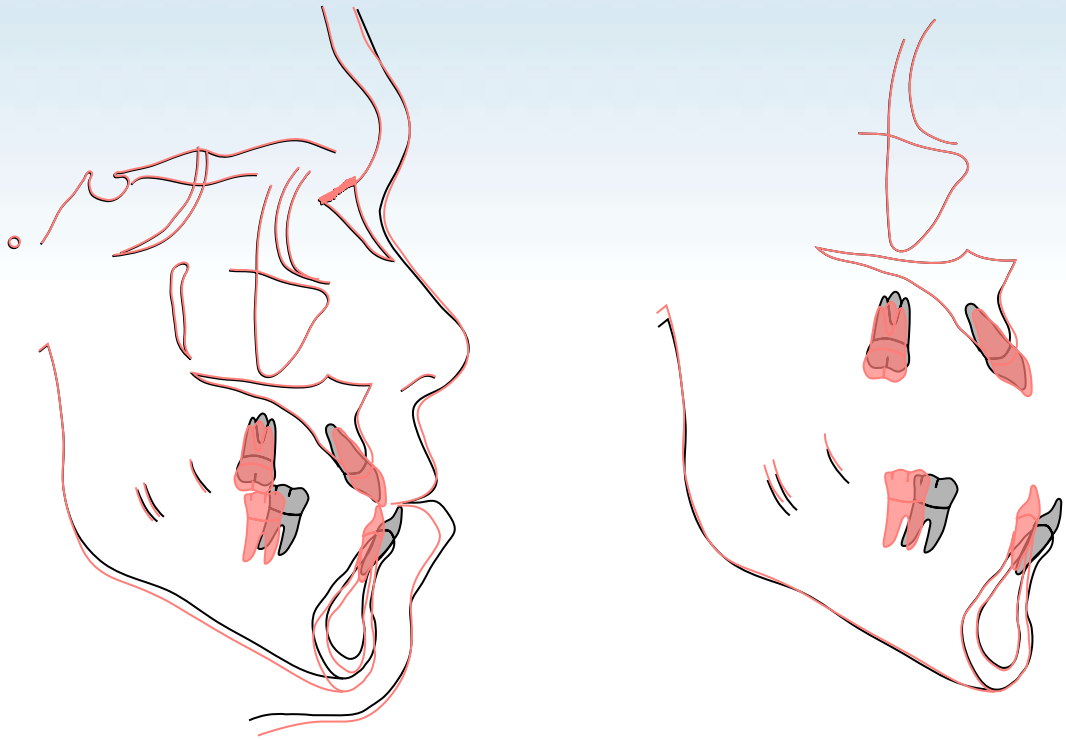

Fig. 15:
Cephalometric tracings are superimposed to show dentofacial changes from the start (black) to the end (red) of treatment. Superimpositions are made on the anterior cranial base (left), maxilla (upper right), and mandible (lower right). See text for details.

effective way for determining whether a Class III malocclusion can be corrected or at least substantially improved with a conservative treatment (Fig. 16). There are three good indicators for a non-surgical treatment: (1) orthognathic profile in C_R, (2) buccal segments that are approximately Class I, and (3) functional shift to C_O. As this patient only fitted one of these criteria (i.e., orthognathic profile), any conservative treatment would still be very challenging. In addition, the fact that his bilateral buccal segments were Class III greater than 10mm made the treatment even harder. Therefore, mandibular set-back surgery was first considered the most effective option to achieve the best treatment outcome. However, as previously mentioned, the patient refused surgery. In order to achieve Class I molar relationship and correction of the anterior crossbite, an 11mm space was required bilaterally. The patient had three molars in each quadrant, and this was good news as molar extraction could provide enough space needed for retracting the lower arch. Moreover, there were two other favorable factors: (1) a decreased mandibular plane angle, which provided more room for clockwise rotation of the mandible to make lower arch more retracted; and (2) a moderate open bite. Drawing from the discussion above, it was possible to treat the patient conservatively as long as he understood that it was a camouflage treatment which is subject to a compromised outcome.

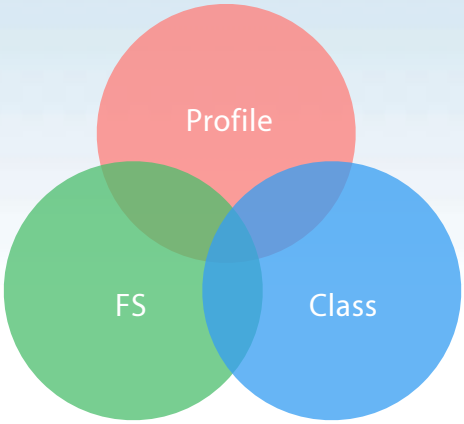

Fig. 16:
Lin's Three-Ring Diagnosis System assesses the potential for conservative correction of a Class III malocclusion with an anterior crossbite. Favorable factors are:

1. *Profile of the face is acceptable when the mandible is positioned in the centric relation (C_R);*
2. *Class I buccal segments in C_R; and*
3. *Functional shift (FS) is present from the C_R to centric occlusion C_O.*

1. Class III Mechanics

Class III camouflage treatment usually involves intermaxillary Class III elastics, which can result in increased axial inclination of the maxillary incisors and decreased axial inclination of the mandibular incisors,[6] particularly when there is an underlying Class III skeletal discrepancy.[7,8] Therefore, in order to counteract the unwanted side effects of Class III elastics, low-torque brackets were used on the upper anterior teeth to provide more buccal root movement. On the lower arch, low-torque brackets were bonded upside down on the incisors to deliver a high lingual root torque. Pre-torqued archwires were also used on the lower arch to increase the lingual root torque on the anterior teeth.

2. Extraction for Mandibular Arch Retraction

In this case, extraction spaces were dental compensation to permit lower arch retraction. The patient had fully erupted first, second, and third molars in all four quadrants. Usually, extractions in a Class III malocclusion are performed on either the premolars or the molars. For this patient, premolar extractions could not provide enough space to correct the severe anterior crossbite. Therefore, molar extractions were necessary. When determining which molars are most suitable for extraction, the rule of thumb is to choose the weaker teeth for extraction (e.g., caries, short roots, post-endodontic restoration, etc). However, all molars in this case were adequate for oral function, so the pros and cons are:

(1) First Molars: extracting first molars may permit anterior crossbite correction without the use of TSADs. But the disadvantages for this approach are that it is time-consuming, and that mandibular second molars have a tendency to tip mesially and lingually, requiring additional orthodontic mechanics.[9]

(2) Second Molars: second molar extractions are effective for correcting the anterior crossbite. However, severe malocclusions may require the anchorage of mandibular buccal shelf bone screws. This approach may be less time-consuming compared to first molar extractions.

(3) Third Molars: third molar extractions usually preserve more robust molars. However, this extraction pattern is not effective for correcting severe anterior crossbite, and mandibular

buccal shelf bone screws are often needed to help retract the lower arch.

3. Lingual Posterior Crossbite

When correcting a Class III malocclusion, lingual posterior crossbite is a common complication associated with lower arch retraction. This problem is even intensified when a lingual posterior crossbite is present. There are two strategies used for the present patient to manage this problem: (1) bond buttons on the lingual side of L5s and L8s so space closure mechanics can be implemented simultaneously on the buccal and lingual surfaces to prevent the lingual crossbite from deteriorating; and (2) design archwire compensation by expanding the upper archwire and narrowing the lower archwire.

4. Temporary Skeletal Anchorage Devices (TSADs)

TSADs were an important part of this treatment because it is very difficult to retract the whole lower arch using only the upper arch as anchorage. Compared to Class III elastics, the osseous anchorage of TSADs helps to avoid excessive upper incisor proclination.[10] The buccal shelf screws were placed buccal to the roots, not between the roots. Therefore, the entire mandibular dentition could be retracted since the buccal shelf screws do not interfere with root movements of the teeth.[11]

5. Anterior Open Bite

The center of rotation of the whole mandibular arch was well apical to the line of force from the TSAD to the anterior segment. The force retracting the arch created a moment around the center of rotation, which posteriorly rotated the entire arch. In effect, there was an extrusion of the anterior segment and a relative intrusion of the molars.[11] These mechanics are very useful for correcting severe Class III malocclusions with an anterior open bite.

Conclusions

Skeletal Class III malocclusion is a complex problem that requires a careful evaluation. Lin's 3-Ring Diagnosis System is very useful for determining whether the problem can be managed conservatively or not. For the present patient, retracting the lower arch was the key to managing the severe skeletal Class III malocclusion without surgery. In order to retract the whole lower dentition, tooth extractions were necessary. After a thorough discussion, both the practitioner and the patient agreed on extraction of the L7s. Therefore, management of space closure was an important issue. Absolute anchorage from TSADs provided crucial assistance for maximal retraction. Specific torque selection of the lower incisor brackets and a pre-torqued archwire offset the anticipated severe distal tipping of the lower incisors with space closure and Class III elastics.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 71

OVREJET

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 = 40

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 = 8

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 = 0

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 8 pts.
Beyond Class II or III	=	1 pt. per mm. additional 4 pts.

Total = 12

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 7

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 pt.	= _____
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	_____ x 2 pts.	= _____

Identify:

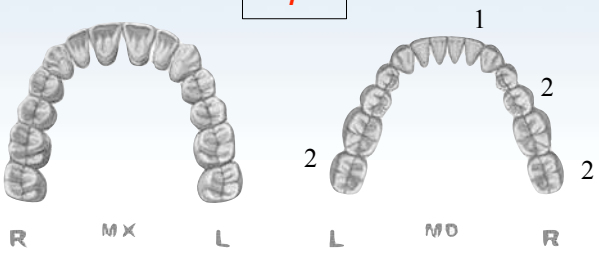
Total = 0

Cast-Radiograph Evaluation

Total Score: 31

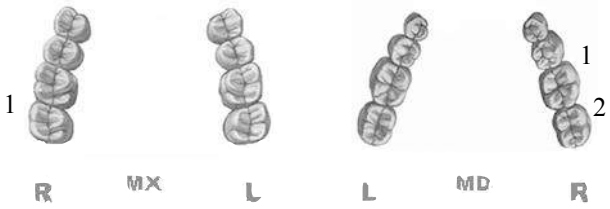
Alignment/Rotations

7



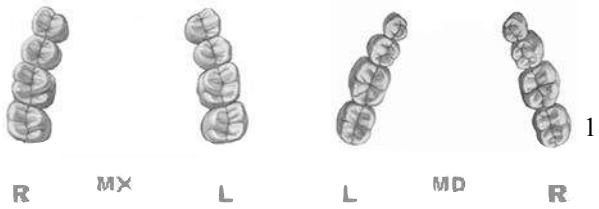
Marginal Ridges

4



Buccolingual Inclination

1

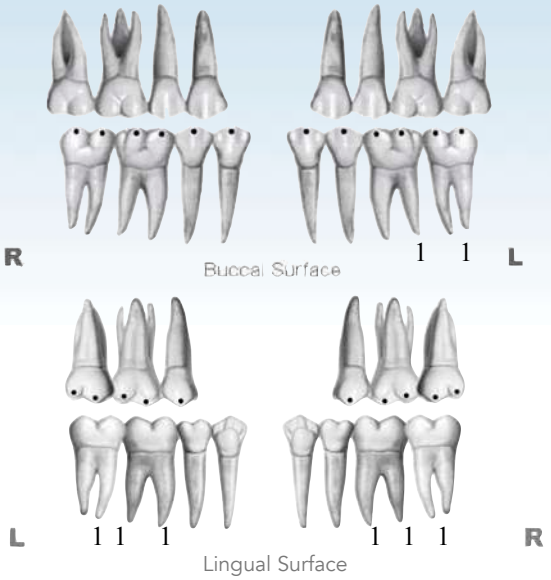


Overjet

0

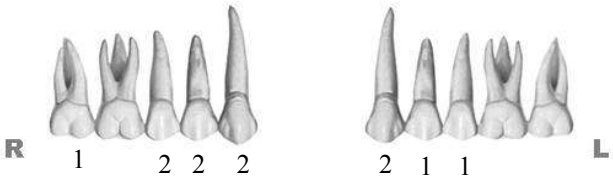
Occlusal Contacts

8



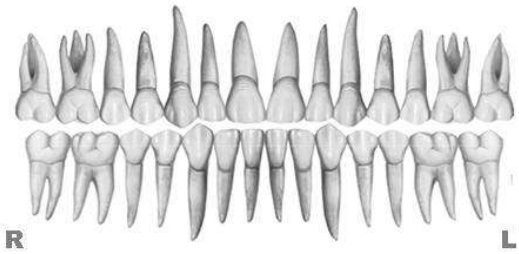
Occlusal Relationships

11



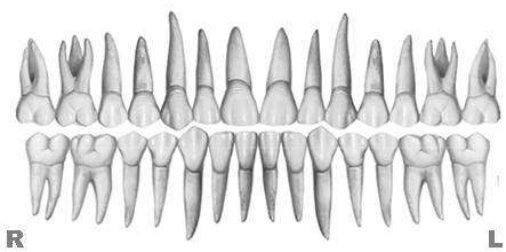
Interproximal Contacts

0



Root Angulation

0



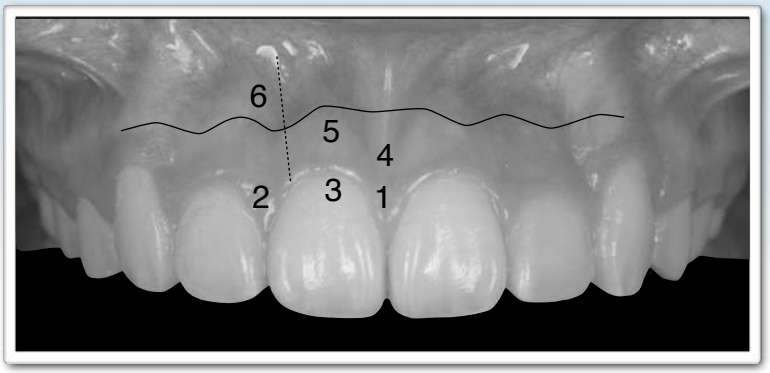
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score = 1

1. Pink Esthetic Score

Total = 0

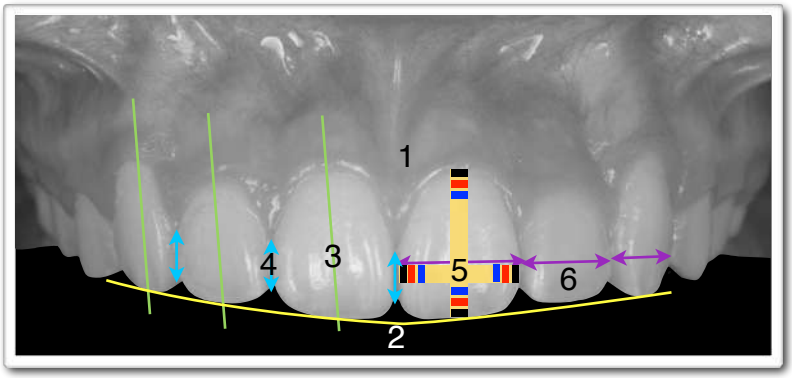


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

1. M & D 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

2. White Esthetic Score (for Micro-esthetic)

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	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	0	(1)	2
6. Tooth to Tooth Proportion	(0)	1	2

2022-2023 第十四年度

貝多芬 矯正精修班

時間：週二上午 09:00-12:00

地點：金牛頓教育中心（新竹市建中一路 25 號 2 樓）

上課日期：

2022　5/10、6/7、7/12、8/16、9/6、10/4、11/15、12/6

2023　1/10、2/7、3/7

- **09:00 ~ 10:00　精選文獻分析**
- **10:00 ~ 10:30　精緻完工案例**
- **10:50 ~ 12:00　臨床技巧及常犯錯誤分享**

全新的第十四年度 2022-23 貝多芬精修班，是由國際知名講師張慧男醫師主持，並偕同貝多芬牙醫團隊住院醫師群共同主講。

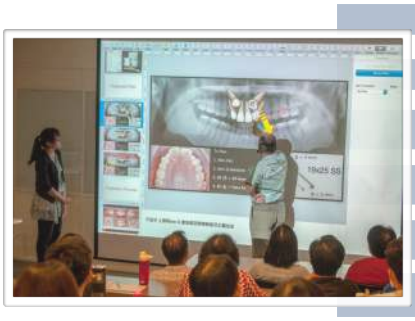
每月一次的課程之中，包含了：

1. 精選矯正權威期刊 AJODO 的文章做文獻分析與評讀。
2. 精緻完工 ABO 案例報告，其中因應數位矯正的世界趨勢，Insignia 與 Invisalign 病例為課程探討的主要內容之一。
3. 分享臨床上常犯的錯誤以及解決方法。

2022-23 貝多芬精修班內容豐富精彩，讓您經由每個月一次的課程，在面對各式的臨床案例時，更能游刃有餘、得心應手。

學習目的：

研讀最新趨勢文章可以窺知世界文獻公認的治療方式，而藉由評論文章的優缺點不僅能夠訓練判斷與思考能力，更可以清楚比較作法上的不同，達到完整理解治療方向、內容與穩定性的目標。



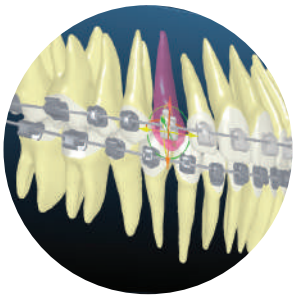
報名專線：03-5735676 #218 陳小姐

Dental Clinic Established 1996
Beethoven

International Workshop

Digital Orthodontics, OBS, VISTA

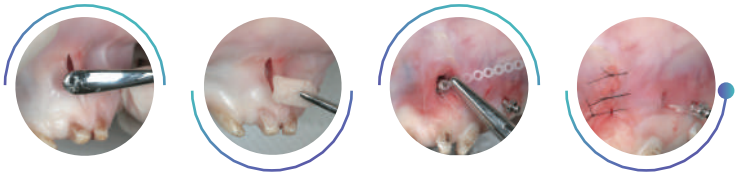
@Taiwan



INSIGNIA™

OBS

Beethoven's International Workshop is designed for doctors who provide orthodontic treatment using the Damon and Insignia System. This workshop is consisted of lectures, hands-on workshops as well as chair-side observation sessions. Participants will have the opportunity to observe clinical treatment, didactic lectures, live demonstration and gain hands-on practice experiences involving TAD placement, indirect bonding, CBCT-enhanced digital treatment planning for Insignia.



VISTA Vertical Incision Subperiosteal Tunnel Access

Registration:

Day 123	USD	3,600	Early bird rate: $100 off (advanced registration two months prior to the course date)
Day 4	USD	600	Early bird rate: $100 off (advanced registration two months prior to the course date)

For more information and registration, visit

http://iworkshop.beethoven.tw

course@newtonsa.com.tw
+886-3-5735676 #218 Annie

Course Schedule

Day 1 **Chair–side observation**

Day 2 **Insignia Lecture, Chair–side observation**

Chris' Lecture:
Digital Orthodontics with TAD

Day 3 **VISTA Lecture & workshop**

Chris' Lecture:
VISTA for Impacted Cuspids

* The topics for VISTA workshop:

1. VISTA with screw placement
2. VISTA with connective tissue graft
3. Suture technique

Prof. Dr. Paulo Fernandes Retto, Portugal

"Dr. Angle would be glad to know that contemporary orthodontics has a professional as Chris Chang!"

Digital Orthodontics, OBS & VISTA

Day 4 **Keynote workshop** (Optional)

by Newton's A team

1. Patient clinical records management
2. Patient communication presentation
3. Basic animations and visual aids

Dr. Rungsi Thavarungkul, Thailand

"If you think this is a computer course that will show you step–by–step how to use the application, please reconsider. If you want to improve communication in your practice, and with patients, this 8–hour course is definitely worth it."

KEYNOTE

THE LECTURER

Dr. Chris Chang

CEO, Beethoven Orthodontic and Implant Group. He received his PhD in bone physiology and Certificate in Orthodontics from Indiana University in 1996. As publisher of Journal of Digital Orthodontics-*A journal for Interdisciplinary dental treatment*, he has been actively involved in the design and application of orthodontic bone screws.