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After the TAO 2022 Annual Meeting in early December, 2022, Dr. Chris Chang invited Dr. Kenji Ojima to visit their residence and the newly completed front yard aviary. The aviary features a hot tub-equipped water pond, a water fountain, and the most extraordinarily, a 20-year-old Bishop Wood tree, which extends beyond the closure of the mesh ceiling. Not only do the birds love their indulgent new home, but the Chang family and their guests also find themselves soothed and relaxed after some time immersed in it.

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2023
熱愛學矯正

全新的貝多芬高效 Damon 矯正大師系列課程是由國際知名講師張慧男醫師親自規劃及授課，課程特色強調由臨床病例帶動診斷、分析、治療計畫擬定與執行技巧。此外，透過數位影片反覆觀看，課堂助教協助操作，以及診間臨床見習，讓學員在短時間能快速上手，感染「熱愛矯正學，熱愛學矯正」的熱情。

張慧男 博士

新竹貝多芬齒顎矯正中心負責人
中華民國齒顎矯正專科醫師
美國齒顎矯正專科醫師學院院士（ABO）
美國印地安那普渡大學齒顎矯正研究所博士
美國 Angle 學會會員

Damon Master

(Thu) 9:00-5:00 中文授課

The Beethoven Damon Master Program, created by Dr. Chris Chang, is a two-year clinical program. Its hands-on orientation features case study-based diagnosis, analysis, treatment planning and result evaluation. Combining in-class teaching assistants, after-class video review and chair-side observation, participants will learn to master the essential tips of the Damon System.

2023

Module 1 - 4/13
Module 2 - 5/11
Module 3 - 6/8
Module 4 - 6/29
Module 5 - 7/13
Module 6 - 7/27
Module 7 - 8/10
Module 8 - 8/24
Module 9 - 9/7
Module 10 - 9/21
Module 11 - 9/28

Excellent Finishing

(Tue) 9:00-12:00 中文授課

Critically reviewing classical literature and contemporary papers and applying lessons learned to clinical work; utilising ABO's DI and CRE standards to turn excellent finishing into attainable goals.

Finishing XV

Module 1 - 4/18
Module 2 - 5/16
Module 3 - 6/13
Module 4 - 7/11
Module 5 - 8/15
Module 6 - 9/12
Module 7 - 10/3
Module 8 - 11/7
Module 9 - 12/19
Module 10 - 1/9/24'
Module 11 - 3/12

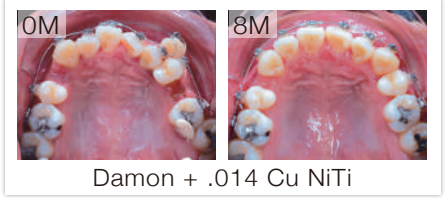
International Workshop

(Digital Orthodontics, OBS & VISTA)

English Class

The workshop provides a 3 day, advanced hands-on program to experienced Damon users. The program includes world-class lectures, model and surgical hands-on workshops, and clinical observation on patient care and clinic management.

course@newtonsa.com.tw
+886-3-573-5676 #218 Annie



Damon + .014 Cu NiTi

Damon Clear

Damon + Bite Turbo + Early Light Short Elastic

每次上課請依最新一期 JDO 公告為主

報名專線
湧傑 Yong Chieh

北區 楊文君
02-27788315 #122

中區 張馨云
04-23058915

南區 蔡淑玲
07-2260030

上課地點：新竹市建中一路25號2樓（金牛頓藝術科技）
2F, No. 25, Jianzhong 1st Rd., Hsinchu City, Taiwan (Newton's A)

Learn from a True Master

In 2017, I was blessed to meet a true **aligner** master, Dr. Kenji Ojima. After listening to his one-day lecture, I was completely hooked. Two days later, we met again in Rome, Italy. We held lectures together at the Italian Society of Orthodontics International Congress and consequently became close friends. I have had the privilege to learn from his **aligner** experience firsthand, and I decided that our office, Beethoven Orthodontic Center, would from that point on follow his methods.

Five years later, the Taiwan Association of Orthodontists (TAO) 2022 Annual Meeting arranged Dr. Kenji and yours truly in the same section to discuss how to treat difficult cases with **aligners**. After my lecture, a female professor came to me and made an interesting comment, "After listening to your lecture, I felt that I was like a frog living in a shallow well." I was so surprised by her comment, as we had sat together when I first heard Dr. Kenji's methodology. After his initial lecture, she commented that if orthodontic cases could be treated with Dr. Kenji's **aligner** approach, we would all go out of business. She obviously meant that ironically. However, this time, I could feel the comment came from the bottom of her heart; it was certainly not intended to be ironic.

What I have learned from her comments is that I was most fortunate to have instinctively followed the methods and executed the techniques which I had learned from the Japanese **aligner** master. I believe the female professor still has her doubts. However, the proof is in the pudding, and the differences between her results and mine treated with **aligners** have been huge, which further cements my belief in Dr. Kenji's approach. I think time has shown that we made the right decision and also had the right attitude of not only learning from and following the right person, but also wholeheartedly executing his techniques. Without executing the techniques you have learned, learning is nothing. So, my dear friends, we are all students for life. Although that sounds very cliché, the key point is we have to learn ambitiously. It means we need to have the courage to execute, not only to listen. If we can **align** ourselves with new approaches and techniques, then we can carry on along our road to glory.

In this issue's Taiwanese Lifestyle, we introduce our new house with surrounding aviary. We invited my true master, Dr. Kenji, to stay in my guest room to become **aligned** with the atmosphere. The same space is not only used by ourselves, but also shared with our beloved birds. I am so happy that Dr. Kenji enjoyed it so much as well. I am convinced that after reading this article, you, too, will love it.

Chris Chang PhD, ABO Certified, Publisher of JDO

Asymmetric Skeletal Class III Malocclusion with Missing Molars and Deep Anterior Crossbite

Abstract

History: *A 25-year-old male presented with chief complaints (CC) of anterior crossbite and protruded lower lip.*

Diagnosis: *The patient was diagnosed with a Class III malocclusion, associated with anterior crossbite (overjet = -3mm), deep bite (overbite = 8mm), asymmetric missing teeth (UR6, UL5, LL7), and a concave profile. The ABO Discrepancy Index (DI) was 43.*

Treatment: *This severe malocclusion was corrected with extraction of mandibular first premolars and a passive self-ligating (PSL) fixed appliance. Class III early light short elastics (ELSE) and bite turbos were used to resolve the anterior crossbite.*

Results*: Following 30 months of active treatment, the skeletal Class III malocclusion was successfully aligned, and the anterior corssbite was corrected by retracting the lower anterior segment. Both the concave profile and the protrusive lower lip were improved. This malocclusion, with a Discrepancy Index of 43 points, was treated to a Cast-Radiograph Evaluation (CRE) of 8 and a Pink and White (P&W) dental esthetic score of 5 points. The patient was pleased with the treatment outcome.*

Conclusions*: A severe skeletal malocclusion was corrected in 30 months with a full-fixed PSL appliance, bite turbos, early light short Class III elastics, and space closure mechanics. (J Digital Orthod 2023;69:4-22)*

Key words: *Class III anterior crossbite malocclusion, passive self-ligating brackets, asymmetrical dentition*

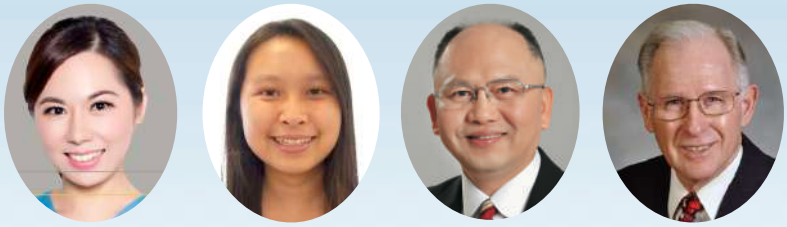
The dental nomenclature for this case report is a modified Palmer notation with four quadrants: upper right (UR), upper left (UL), lower right (LR), and lower left (LL). Teeth are numbered 1-8 from the midline in each quadrant.

History and Etiology

A 25-year-old male sought orthodontic evaluation with chief complaints of an unattractive smile and protruded lower lip (Fig. 1). Clinical evaluation revealed a Class III molar relationship, anterior crossbite, and missing teeth (UR6, UL5, and LL7) (Figs. 1-5). Dental examination revealed an anterior crossbite malocclusion. Because of early loss of permanent molars due to caries, the etiology of the anterior crossbite was probably posterior occlusal collapse in late mixed dentition combined with atopic eruption of maxillary incisors.[1]

Facial analysis revealed a decreased vertical dimension of occlusion (VDO), concave profile, and a protrusive lower lip. No contributing medical history was reported. There were no signs nor symptoms of temporomandibular dysfunction. This severe malocclusion was corrected in 30 months with a passive self-ligating (PSL) appliance, anterior bite turbos, and Class III early light short elastics (ELSE). Orthognathic surgery was not required for this severe discrepancy (ANB, -6˚).

Sophia P.-W. Shu
Lecturer, Beethoven Orthodontic Course (Left)
Kristine Chang,
Training Resident, Beethoven Orthodontic Center (Center left)
Chris H. Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Center right)
W. Eugene Roberts,
Editor-in-Chief, Journal of Digital Orthodontics (Right)



Diagnosis

Skeletal:

- Class III malocclusion (SNA, 78˚; SNB, 84˚; ANB, -6˚) in centric occlusion (C_O)
- Normal mandibular plane angle (SN-MP, 36˚; FMA, 29˚)

Dental:

- Molar relationship in C_O: *Class III on the right and Class I on the left*

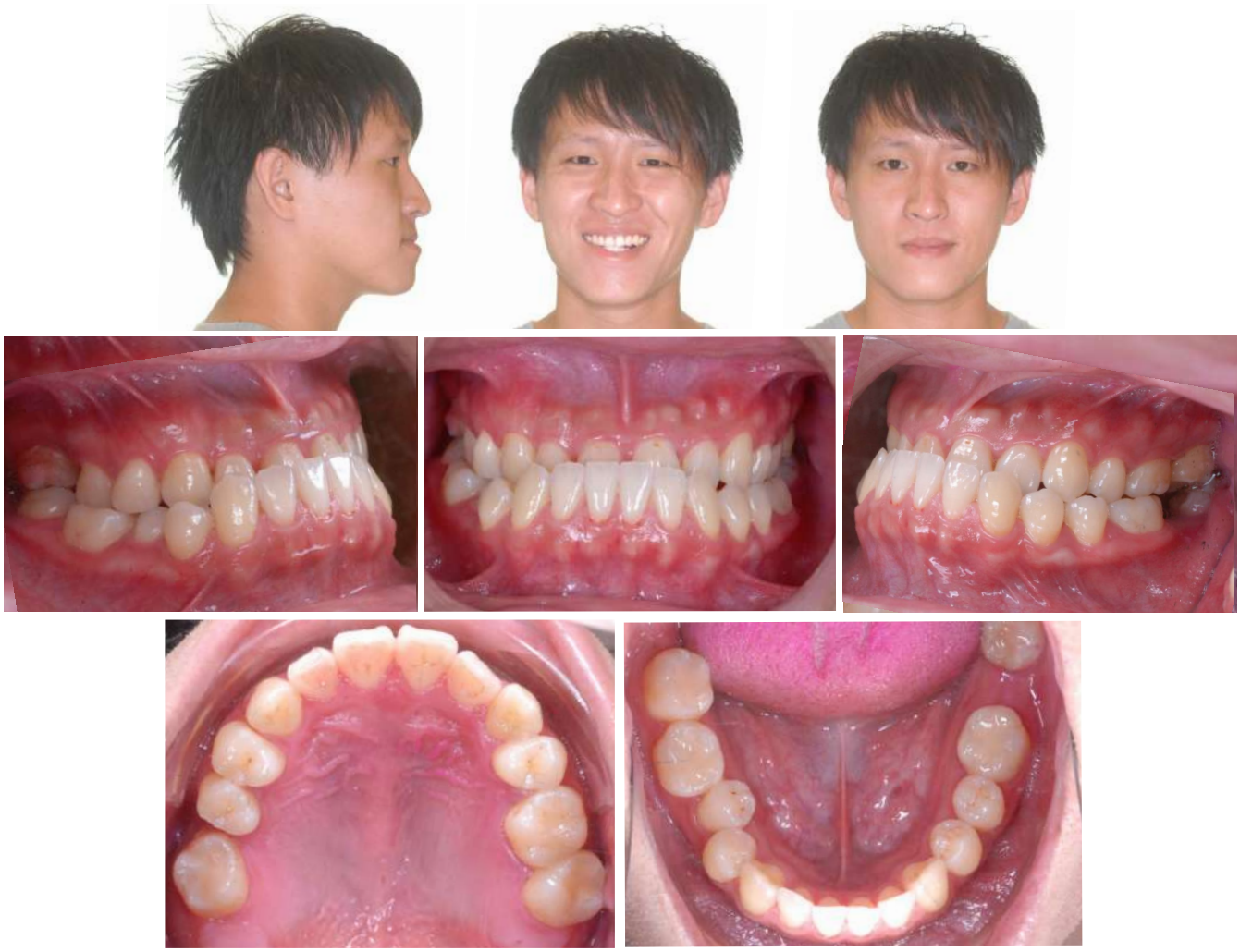


Fig. 1: *Pre-treatment facial and intraoral photographs*

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

Fig. 3: *Pre-treatment panoramic radiograph*

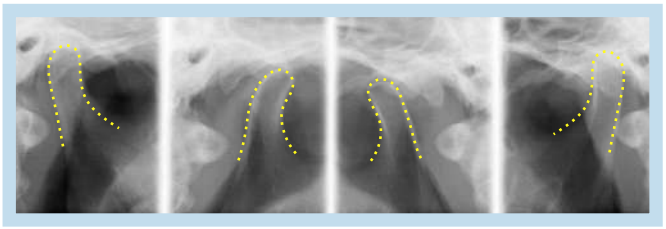


Fig. 4:
Pre-treatment transcranial radiographs of the temporomandibular joints (TMJs). From the left to right are right TMJ closed, right TMJ open, left TMJ open, and left TMJ closed.

- Canine relationship: *Bilateral Class III*
- Negative overjet: *-3mm*
- Deep overbite: *7mm with a deep curve of Spee*
- Crowding: *1mm in the lower arch*
- Third molars: *All missing, except LL8*
- Midlines: *The upper dental midline was shifted 2mm to the left, but the lower dental midline was coincident with the facial midline.*
- Arch forms: *Oval-shape form in both maxillary and mandible arches*

Facial:

- Profile: *Concave*
- Lips: *Protrusive lower lip*
- Vertical dimension of occlusion (VDO): *Decreased*

Treatment Objectives

The principle objectives were to: (1) correct the anterior crossbite by opening the bite and retracting the lower anterior segment, (2) extract LR4 and LL4 to retract the anterior teeth and protract the posterior teeth, (3) improve the facial profile by retracting the lower lip, (4) use a full-fixed appliance to level and align both dental arches, (5) protract UR7 and LL8 to close posterior spaces, and (6) achieve an ideal finish.

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

Maxilla (all three planes):

- A-P: *Increase.*
- Vertical: *Increase.*
- Transverse: *Maintain.*

Mandible (all three planes):

- A-P: *Retract the anterior teeth.*
- Vertical: *Intrude the incisors by correcting the curve of Spee.*
- Transverse: *Maintain.*

Maxillary Dentition:

- A-P: *Maintain.*
- Vertical: *Maintain.*
- Inter-molar/Inter-canine Width: *Expand to properly occlude with the lower dentition.*

Mandibular Dentition:

- A-P: *Decrease by retracting the anterior teeth.*
- Vertical: *Decrease by intruding the incisors .*
- Inter-molar/Inter-canine Width: *Maintain.*

Facial Esthetics:

- Retract the protrusive lower lip and increase the maxillary incisor exposure.

Treatment Alternatives

Implant-supported prostheses to restore missing UR6 and UL5 was an option to increase the A-P plane and to protrude the upper lip. However, the disadvantages for this treatment were the cost and that it was a more invasive approach. The patient preferred using a full-fixed orthodontic appliance to correct the anterior crossbite, as well as extracting L4s to retract and level the lower anterior segment. Because of the asymmetric extraction spaces, closing all spaces and retracting the incisors risked deviation of the midline and asymmetric molar relationship. The patient was warned about the potential side effects, but was also informed that a 4mm midline deviation is clinically acceptable.[2]

Results Achieved

Maxilla (all three planes):

- A-P: *Maintained*
- Vertical: *Maintained*
- Transverse: *Maintained*

Mandible (all three planes):

- A-P: *Retracted*
- Vertical: *Anterior segment was intruded.*
- Transverse: *Maintained*

Maxillary Dentition:

- A-P: *Incisors were slightly tipped labially.*
- Vertical: *Maintained*
- Inter-molar/Inter-canine Width: *Slightly expanded*

Mandibular Dentition:

- A-P: *Anterior teeth were retracted.*
- Vertical: *Anterior segment intruded*

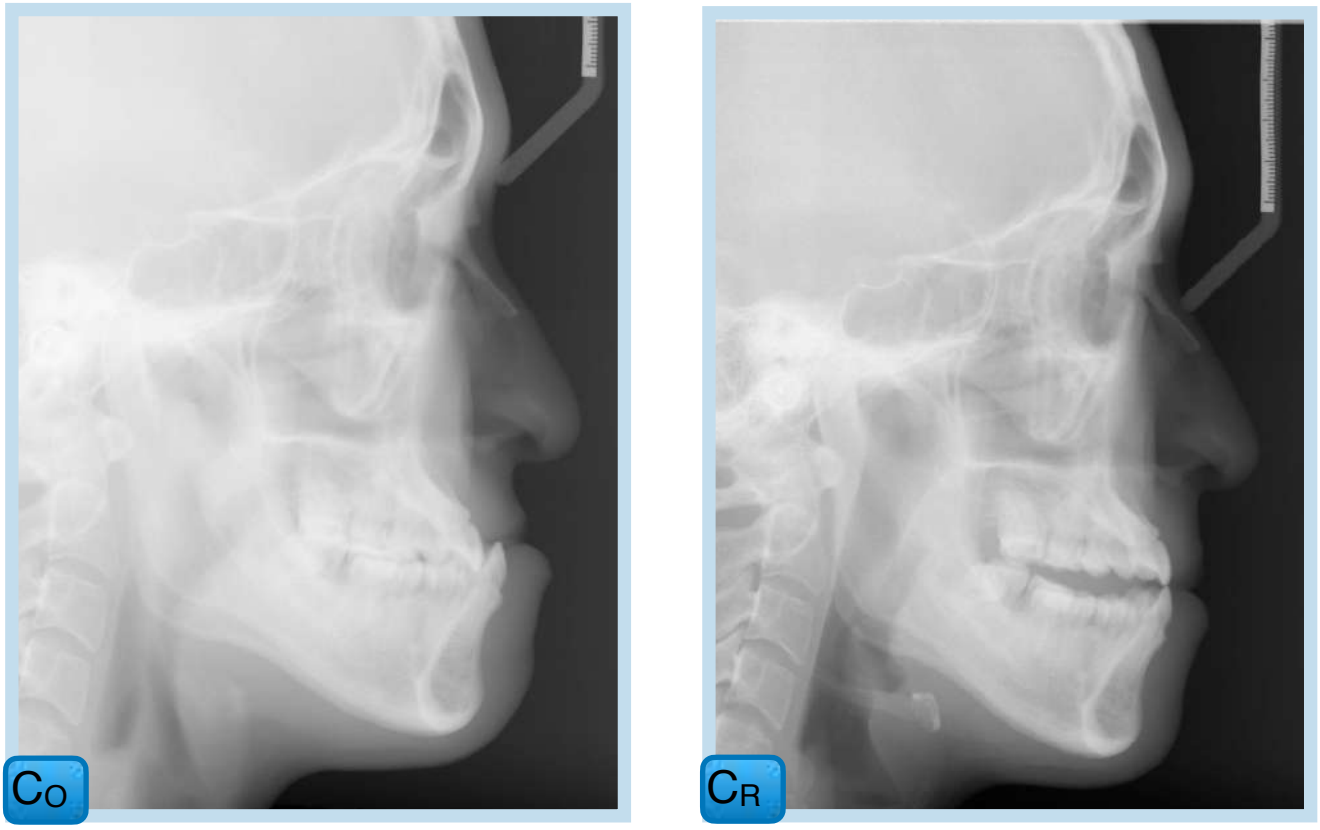


Fig. 6: *With the mandible positioned in centric relation (C_R), the incisors were in an end-to-end occlusion, and the facial profile was straight.*

- Inter-molar/Inter-canine Width: *Slightly decreased*

Facial Esthetics:

- Protrusive lower lip was retracted.

Treatment Progress

All treatment and sequencing details are outlined in Table 2, and the treatment progress is documented in the following views: right buccal, frontal, left buccal, upper occlusal, and lower occlusal, respectively (Figs. 8-12).

A 0.022-in Damon Q (Ormco, Glendora, CA) passive self-ligating (PSL) fixed appliance was selected along with all specified archwires and orthodontic auxiliaries. Prior to active treatment, the mandibular first premolars (LR4 and LL4) were extracted.

In the beginning, brackets were bonded on the lower teeth. High-torque brackets were placed on the lower canines (LR3 and LL3), and low-torque brackets were bonded upside down on the lower incisors. The purpose of this bracket selection was to achieve increased torque control and to provide more lingual root movement of the lower anterior teeth. One month later, standard torque brackets were placed on the upper anterior teeth except for upper canines (UR3 and UL3), which were bonded with high-torque brackets.

The initial archwires for both upper and lower arches were 0.014-in copper-nickle-titanium (CuNiTi) followed by 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, and 0.016x0.025-in SS. Early light Class III elastics (Quail 3/16-in, 2oz; Ormco)

CEPHALOMETRIC SUMMARY			
	PRE-TX	POST-TX	DIFF.
SKELETAL ANALYSIS			
SNA° (82°)	78°	77°	1°
SNB° (80°)	84°	83°	1°
ANB° (2°)	-6°	-6°	0°
SN-MP° (32°)	36°	35°	1°
FMA° (25°)	29°	28°	1°
DENTAL ANALYSIS			
U1 TO NA mm (4 mm)	10	11	1
U1 TO SN° (104°)	114°	116°	2°
L1 TO NB mm (4 mm)	5	-1	6
L1 TO MP° (90°)	82°	71°	11°
FACIAL ANALYSIS			
E-LINE UL (-1 mm)	-8	-6	2
E-LINE LL (0 mm)	0	-4	4
%FH: Na-ANS-Gn (53%)	48%	48%	0%
Convexity:G-Sn-Pg' (13°)	-6°	-4.5°	1.5°

Table 1: *Cephalometric summary*

Fig. 7:
Anterior bite turbos are constructed on the lingual surfaces of the lower central incisors for the correction of the anterior crossbite.

Appointment	Archwire	Notes
1 (0 month)	L : 0.014-in Damon CuNiTi	Bond all lower teeth from LL8 to LR7. LL4, LR4, and LL6 were already extracted. Bond low torque brackets upside down to achieve high torque on the lower incisors. Place high torque brackets on the lower canines.
2 (1 month)	U: 0.014-in Damon CuNiTi	Bond all upper teeth from UR6 to UL7 with standard torque brackets except for UR7 and UL5, which were missing prior to treatment. Bond composite resin bite turbos on the lingual surfaces of the mandibular incisors to open the bite. Start using early light short Class III elastics (Quail 3/16-in, 2oz) from UR5 to LR3 and UL6 to LL3 to retract the mandibular anterior teeth.
3 (2 months)		Rebond the bite turbos on lower incisors.
4 (3 months)	U: 0.018-in Damon CuNiTi	Rebond the bite turbos on lower incisors.
5 (4 months)	U: 0.014x0.025-in Damon CuNiTi	
6 (5 months)	L: 0.014x0.025-in Damon CuNiTi	
7 (6 months)	U: 0.017x0.025-in Damon TMA	Use power chains to re-activate space closure. Replaced early light short Class III elastics (Fox 1/4 in, 3.5 oz) from UR5 to LR3 and UL6 to LL3 to retract the mandibular anteriors.
8 (7 months)	L : 0.016x0.025-in Damon Pre-Torqued CuNiTi	Add 15° on the lower archwire from LL2 to LR2. Apply anterior root torque to increase incisor torque. Ligate anterior teeth with a stainless steel ligature, and tie in a figure-eight pattern to maintain firm contact. Close extraction spaces with power chains.
9 (8 months)		Use power chains to re-activate space closure.
10 (9 months)	U: 0.018-in Damon CuNiTi L: 0.019x0.025-in Damon Pre-Torque	Rebond UR1 and UR4 to conform with the axis. Stop using elastics.
11 (10 months)	U: 0.014x0.025-in Damon CuNiTi	
12 (11 months)	L : 0.016x0.025-in Damon SS	Add 15° on the archwire from LL2 to LR2.
13 (12 months)		Continue to close all the space with power chains. Place lingual buttons on LL5 and LL8 to enhance posterior teeth space closure.
14-15 (13-14 months)	U: 0.017x0.025-in Damon TMA	Expand the upper archwire and constrict the lower archwire. Ligate anterior teeth with a stainless steel ligature.
16-18 (15-17 months)		Use Class III elastics (Fox, 1/4-in, 3.5-oz) from L3s to U6s and U7s, to add more horizontal vector to retract the lower anteriors and to protract the upper posteriors. Close spaces with power chains.
19 (18 months)	U: 0.016x0.025-in Damon SS	Expand the upper archwire.
20 (19 months)		Continue to close space with power chains.
21 (20 months)	L : 0.014x0.025-in Damon CuNiTi	Rebond LL6. Continue to close spaces with power chains and Class III elastics.
22 (21 months)	L : 0.017x0.025-in Damon TMA	Perform inter-proximal reduction (IPR) on maxillary incisors to correct black triangles. Close spaces with power tube and power chains.

Table 2: *Treatment sequence (continued on the next page)*

Appointment	Archwire	Notes
23 (22 months)	L : 0.016x0.025-in Damon SS	Expand the lower arch wire. Perform IPR on LR2, LR3 and LL1, LL2 to eliminate the V shape. Close spaces with power chains.
24 (23 months)		Continue to close space with power chains.
25 (24 months)	L : 0.017x0.025-in Damon TMA	Expand the lower arch wire. Rebond LL5 to conform with the axis. Close the anterior segment with power tube. Stop using elastics.
26-27 (25-26months)		Continue to close all the spaces with power chains and power tube. Bond lingual buttons on UR4 and UR6 to attach a power chain for space closure between the posterior teeth.
28 (27 months)	L : 0.014x0.025-in Damon CuNiTi	Rebond LR2 and LR6.
29 (28 months)		Continue to close all the spaces with power chains and power tube. Cut the upper arch wire distal to the U3s, and prescribe intermaxillary elastics (Chipmunk 1/8-in, 3.5-oz) to settle the canines and second molars.
30 (29 months)		Apply Chipmunk (1/8-in, 3.5-oz) to settle R7s and applied Fox (1/4-in, 3.5 oz) from UL3 to LL6-7.
31 (30 months)		Remove all appliances. Bond anterior fixed retainers from canine to canine (3-3) on the mandibular arch. Deliver removable clear overlay retainers for both arches, and instruct the patient to wear them full time for the first 6 months and nights only thereafter. Provide instructions for home hygiene and maintenance of the retainers.

Table 2: *Treatment sequence (continued from the previous page)*

were used from UR5 to LR3 and UL6 to LL3 to retract the mandibular anterior teeth. In the 6th month, the anterior crossbite was already corrected. Power chains were used to facilitate space closure.

In the 7th month, the upper archwire was changed to 0.017x0.025-in TMA, and the lower archwire was changed 0.016x0.025-in pre-torqued CuNiTi with 15 degrees added to the incisors (LR2 to LL2) to increase root torque control and to prevent the crown from tipping lingually. In the 12th month, lingual buttons were bonded on LL5 and LL8 to enhance space closure. Thereafter, both upper and lower archwires were changed to 0.016x0.025-in SS in order to correct the posterior crossbite by expanding the upper archwire and constricting the lower archwire.

The sequence for the lower archwire was changed back and forth several times due to correction of the crossbite, space closure, and repositioning of brackets. The sequence was 0.016x0.025" pre-torqued CuNiTi, 0.019x0.025" pre-torqued CuNiTi, 0.016x0.025" SS, 0.014x0.025" CuNiTi, 0.016x0.025" SS, 0.017x0.025" TMA, and 0.014x0.025" CuNiTi.

Treatment Result

After 30 months of active treatment, the patient was satisfied with the outcome. The posttreatment evaluation revealed that the mandibular anterior

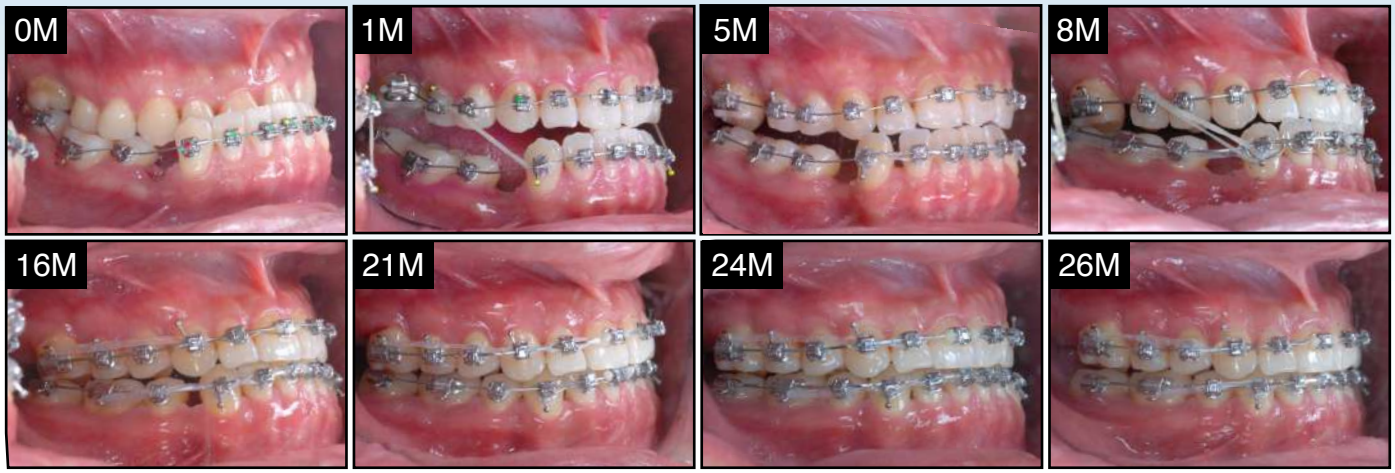


***Fig. 8**: Right buccal view progression from the start of treatment (0M) to 26 months (26M)*

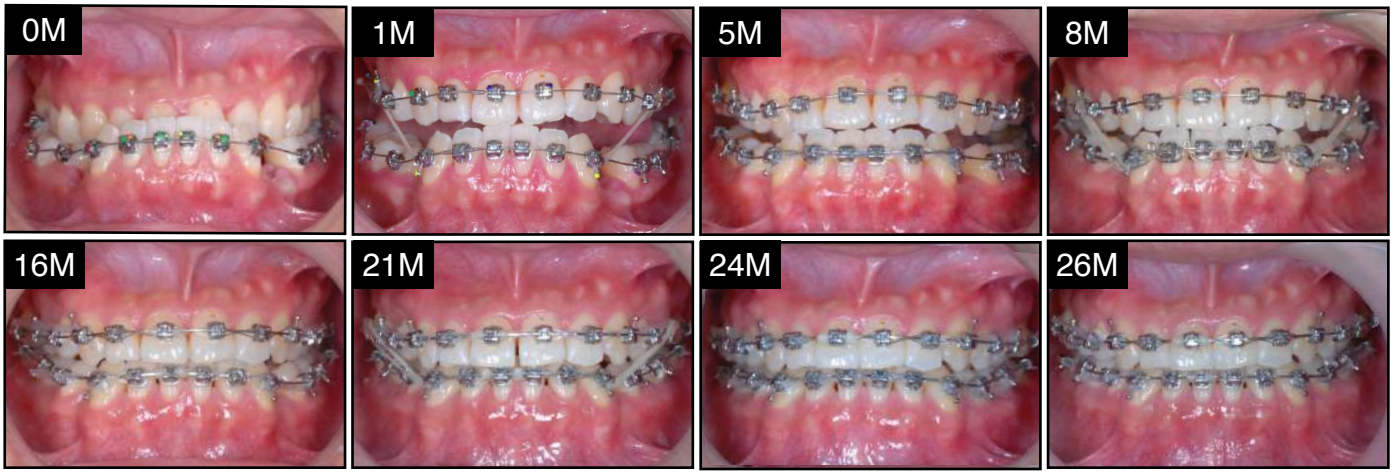


***Fig. 9:** Treatment progression from the frontal view*

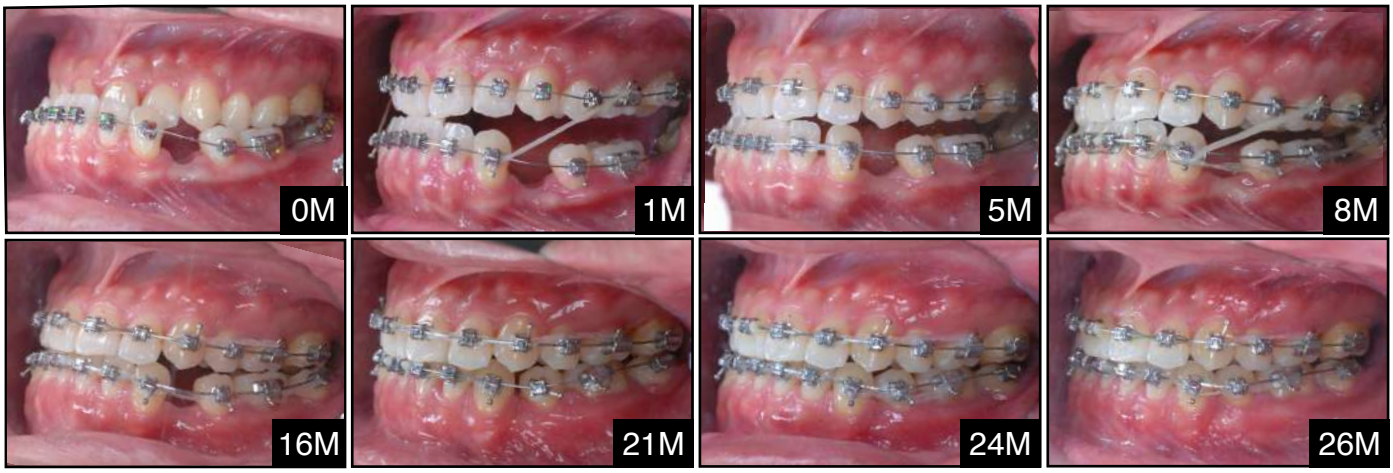


***Fig. 10**: Treatment progression from the left buccal view*

Fig. 11: *Treatment progression from the maxillary occlusal view over the 29 months of treatment with archwires specified in grey labels*

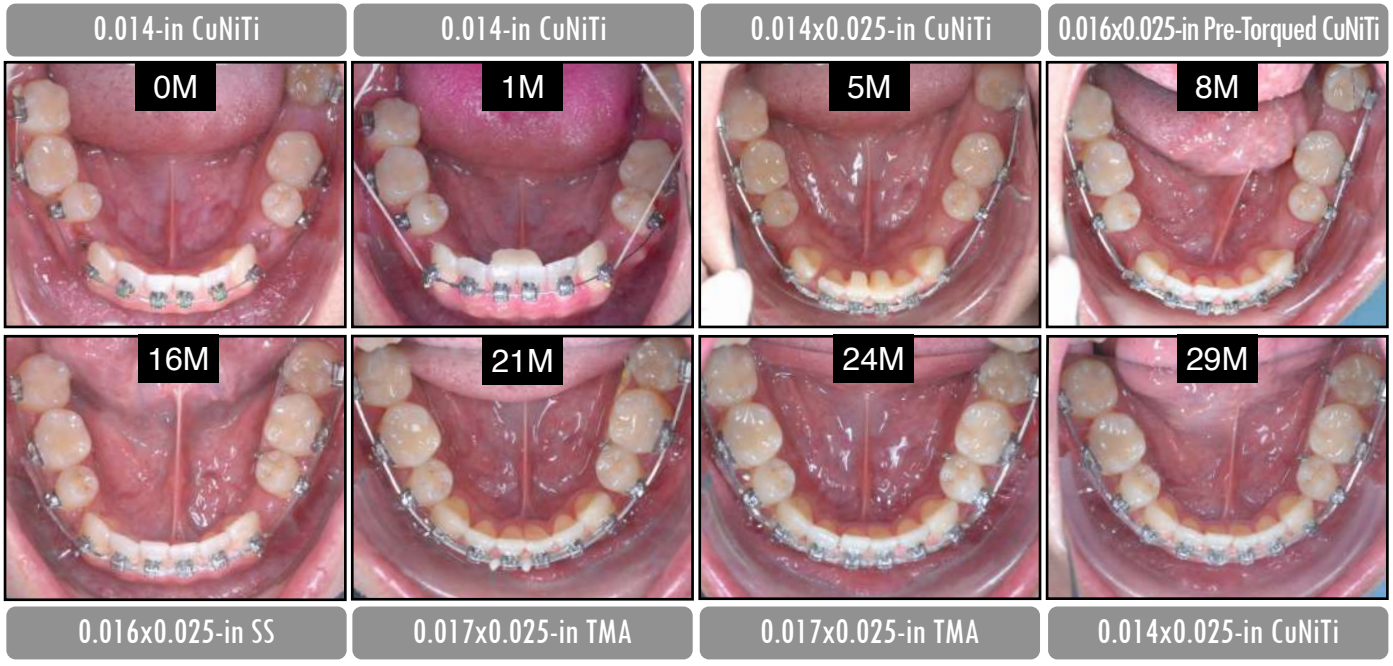


Fig.12*: Treatment progression from the mandibular occlusal view with archwires specified in grey labels*

segment was retracted, and the anterior crossbite was corrected. The ABO Cast-Radiograph Evaluation (CRE) score was 8. The major discrepancies were occlusal contact (5 points), occlusal relationship (2 points), and marginal ridge (1 point). A comparison of the pre- and posttreatment records revealed a significant improvement in facial profile and dental alignment. The patient was well satisfied with the result.

Retention

An anterior fixed retainer was bonded on the lingual surfaces of the lower dentition from canine to canine. Removable clear overlay retainers were delivered for both arches. The patient was instructed to wear them full time for the first 6 months and nights only

***Fig. 13**: Posttreatment facial and intraoral photographs*

Fig. 14: *Posttreatment cephalometric radiograph*

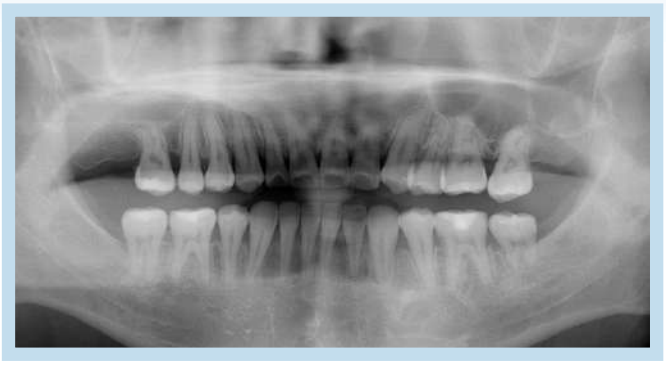


Fig. 15: *Posttreatment panoramic radiograph*

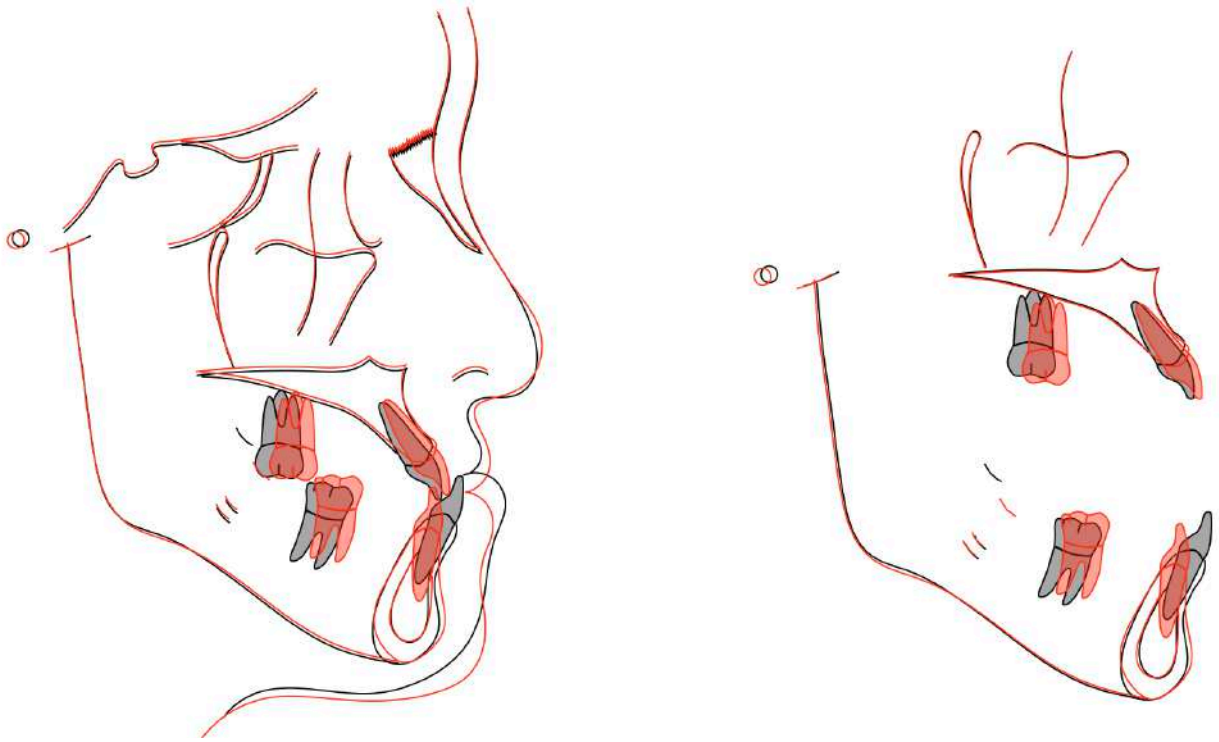


Fig. 16:
Superimposed cephalometric tracings show dentofacial changes after 30 months of treatment (red) compared to pre-treatment (black). The protrusive lower lip was corrected, resulting in a more balanced facial profile.

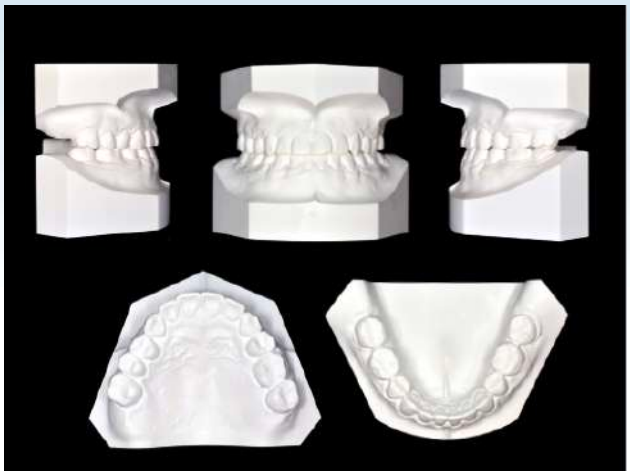


***Fig. 17**: Posttreatment panoramic radiograph*

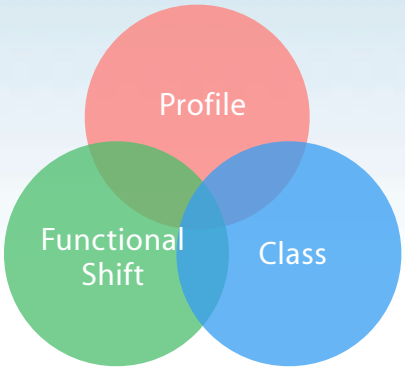


***Fig. 18**: The 3-ring diagnosis introduced by John Lin*
Profile: Orthognathic profile in C_R position
Class: Canine and molar Class I relationships
FS: Functional shift ($C_O \neq C_R$)

thereafter. Instructions were provided for home hygiene, as well as for maintenance of the retainers.

Discussion

Treatment for Class III malocclusion is often quite challenging primarily due to an inadequate diagnosis. Based on Lin's Three-Ring Diagnosis system (Fig. 18), it is possible to predict a good conservative treatment prognosis for 90% of anterior crossbite patients[3,4] with these three characteristics: orthognathic profile in centric relation (C_R), Class I molar relationship, and an anterior functional shift from C_R to centric occlusion (C_O) (Fig. 18).[5-7]

The present Class III patient had a straight facial profile in C_R and an anterior functional shift from C_R to C_O (Fig. 6). Although the patient's mandible could be manipulated backward to an edge-to-edge position,[8] his occlusion was still diagnosed as dental Class III on the right side and dental Class I on the left. The mandibular manipulation was important to determine if there was a functional shift, as it suggests good response to dentoalveolar treatment.

To facilitate anterior crossbite correction, brackets with appropriate torque, bite turbos, and light force Class III elastics were used in malocclusion treatments.[9] The Class III mechanics extruded maxillary molars, rotated the occlusal plane in a counter-clockwise direction, and changed the axial inclinations of the incisors in both arches (Fig. 19).[10] Protraction of the molars with intra-arch mechanics resulted in retraction of the lower anterior segment.[11,12] Therefore, for this patient, bite turbos were bonded on the anterior teeth to create intermaxillary space and to increase the vertical dimension of occlusion (VDO). The anterior bite turbo helped open the bite for correction of the excessive curve of Spee. Early light short Class III elastics were used to increase the axial inclination of the maxillary anterior teeth and retract the mandibular anterior teeth.

For better control of axial inclination of the upper and lower anterior segments, differential bracket torque was selected.[13] Standard torque brackets (+15˚) were used on the upper incisors to help control labial tipping. In the lower arch, upside-down low torque brackets (+13˚) were used on the lower incisors to express high torque, and high torque brackets (+7˚) were bonded on the lower canines to provide more labial crown torque to offset the retraction force applied by Class III elastics (Fig. 20). However, upside-down low torque brackets bonded on the lower anterior teeth were insufficient for controlling axial inclinations. Therefore, progressive pre-torqued archwires and auxilliaries root torque (ART) devices were used to complete the desired root retraction of the mandibular incisors.[14]

Patients with hypodontia often need to have complex interdisciplinary treatment, especially when there are multiple missing teeth. Orthodontic treatment focuses on space distribution and pre-prosthetic alignment to facilitate restoration of the occlusion.[15] The present patient had a complex problem involving skeletal, dental, and functional elements: skeletal Class III (prognathic mandible), anterior crossbite, bilateral canine Class III relationships, and a right molar Class III occlusion. In order to resolve the dentofacial asymmetry, the best option would be to expand the maxillary arch by placing two implant restorations on UR6 and UL5. This would improve the prognathic facial profile and achieved a Class I molar relationship with retroclined mandibular incisors. Because the patient was concerned with extra cost of the implant restorations and more invasive surgical procedure, the current treatment plan involving extractions was chosen, with informed consent that

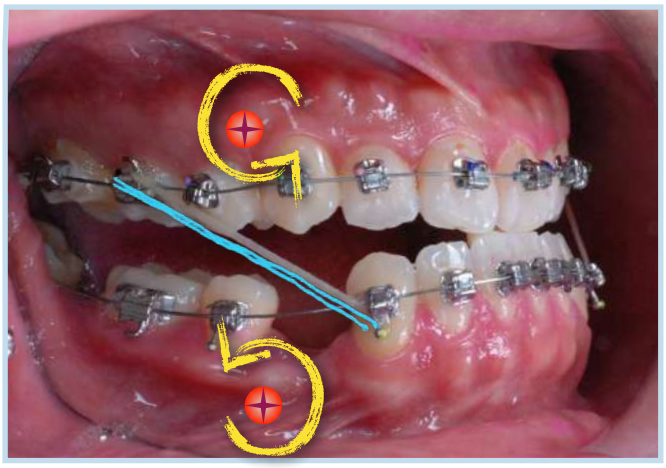


Fig. 19:
Class III elastics produced counterclockwise moments around the center of rotation in both arches, which flared maxillary incisors and tipped mandibular incisors lingually.

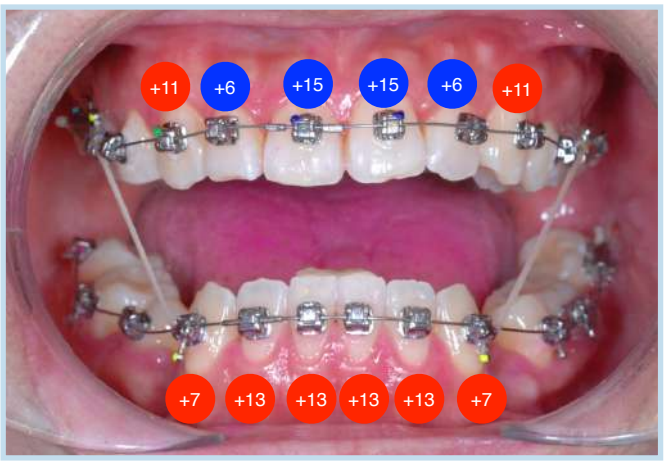


Fig. 20: *Bracket Torque Selection.*
Standard torque brackets were bonded on the upper incisors. Upside-down low torque brackets were used on the lower incisors to express high torque and high torque brackets on the lower canines to provide more labial crown torque while retracting the lower anteriors to correct the anterior crossbite.

while the overall outcome would be acceptable, the dental midlines and molar relationships could be compromised. After 30 months of active treatment, the patient was satisfied with his improved facial profile, extraction space closure, and overall dental alignment, although dental midline deviation on the lower arch was present and Class I molar relationship on one side was not achieved. The patient was able to have functional occlusal contact on both arches. For skeletal malocclusions, a dental midline deviation of 3mm is often acceptable.[16]

Conclusions

Diagnosis of Class III malocclusion with anterior crossbite requires careful evaluation based on Lin's 3-Ring Diagnostic System in order to achieve a good outcome. Anterior crossbites can be treated with appropriate bracket torque selection and Class III mechanics. The key to dentofacial asymmetry treatment is to achieve a harmonized outcome, with mutual understanding between the clinician and the patient that minor discrepancies are acceptable.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE **43**

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 = 1+2+2+2+2+2+1+1

Total = **13**

OVERBITE

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

Total = **5**

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 = **1**

OCCLUSION

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

Total = **8**

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = **4**

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. = **4**

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 = **8**

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)	**2** x 1 pt.	= **2**
Missing teeth, congenital	**1** x 2 pts.	= **2**
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:

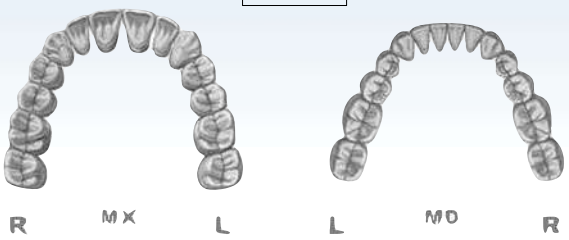
Total = **4**

Cast-Radiograph Evaluation

Total Score: 8

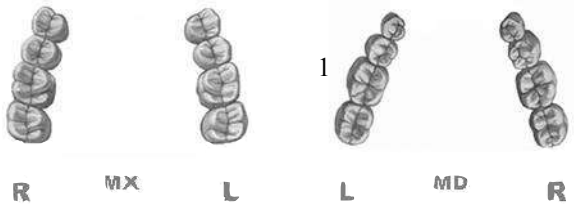
Alignment/Rotations

0



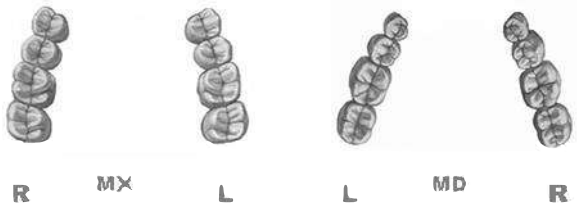
Marginal Ridges

1



Buccolingual Inclination

0

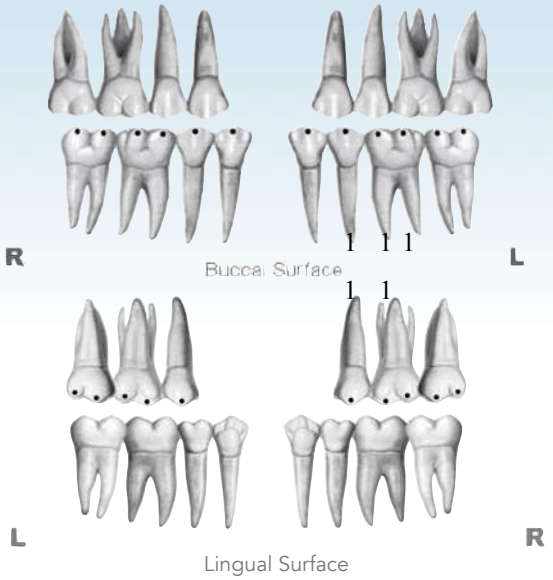


Overjet

0

Occlusal Contacts

5

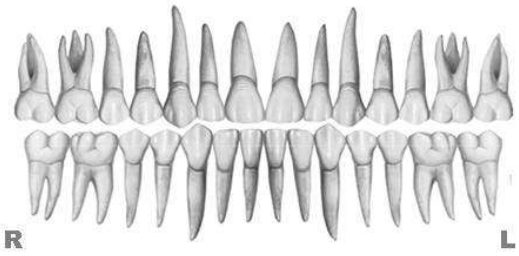


Occlusal Relationships

2

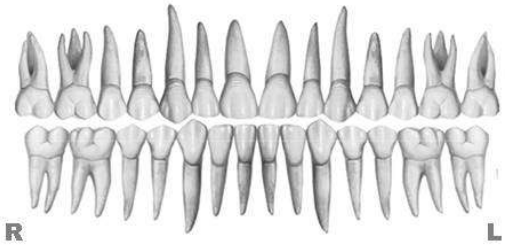
Interproximal Contacts

0



Root Angulation

0



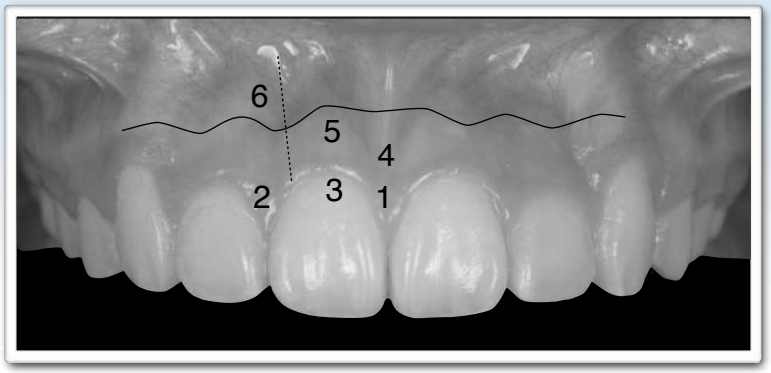
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score = 5

1. Pink Esthetic Score

Total = 2

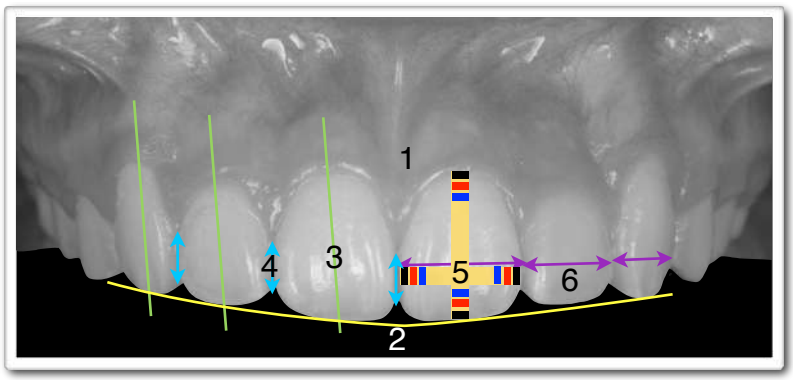


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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 = 3



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

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PPAELAX ALLEN, ANTERIOR

PPAELX ALLEN

PPAELPX ALLEN, POSTERIOR

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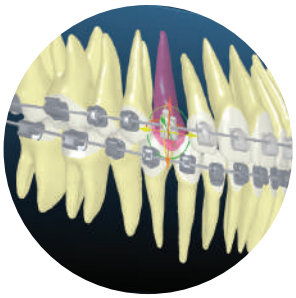

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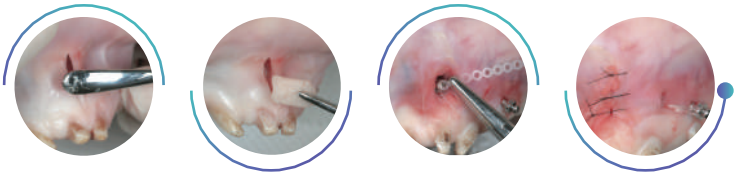

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Day 3 **VISTA Lecture & workshop**

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3. Suture technique

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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.

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全新改版的 2023 年貝多芬高效 Damon 矯正大師系列課程，是由**國際知名講師張慧男醫師親自規劃及授課**，課程特色強調由臨床病例帶動診斷、分析、治療計畫擬定與執行技巧，本年度亦特別加入最新的**數位矯正與隱形牙套**的內容，並邀請了貝多芬牙科集團各院院長演講**特別矯正專題**。

此外，透過數位影片反覆觀看，結合矯正與電腦教學，課堂助教協助操作，讓學員在短時間能快速上手，感染**「熱愛矯正學，熱愛學矯正」**的熱情。

名額有限，一年僅有一次機會在台完整體驗 Damon 矯正大師課程，錯過只能等明年囉！

Module 1 - 4/13

1. Selecting your ideal first case
2. Bonding position
3. Bonding + BT + ceph tracing
4. TADs + space closing + hook + spring
5. Finishing bending & fixed retainer

Practice: Clinical photography (黃亭雅, 陳韻如醫師)

Module 2 - 5/11

1. Four stages of efficient orthodontic treatment
2. Simple and effective anchorage system
3. Extraction vs. non-extraction analysis

Practice: Patient photo management (金牛頓工程師)

Module 3 - 6/8

1. Soft & hard tissue diagnostic analysis
2. Big overjet correction
3. Damon diagnosis & fine-tuning

Practice: Ceph tracing (金牛頓工程師)

Module 4 - 6/29

1. Excellent finishing
2. Retention & relapse

Practice: Ceph superimposition & measurement (金牛頓工程師)

Module 5 - 7/13

1. Simplify your system
2. Extraction vs. non-extraction

Practice: Case report demo (陳俊宏醫師)

▲ **Computer training (Mac): 1:30-3:00 pm**

Module 6 - 7/27

1. Class III correction
2. Class II correction

Topic: Early orthodontic treatment (曾淑萍醫師)

Module 7 - 8/10

1. Upper impaction
2. Lower impaction
3. Gummy smile correction

Topic: Modified VISTA (蘇荃璋醫師)

Module 8 - 8/24

1. ABO DI, CRE workshop (林彥君醫師)
2. Open bite

Topic: Modified 2X4 appliance in ortho treatment (徐玉玲醫師)

Module 9 - 9/7

1. Implant-ortho combined treatment
2. Asymmetry

Topic: Impacted cuspid treatment (張譯文, 張瑜珍, 黃亭雅, 陳韻如醫師)

Module 10 - 9/21

1. Minor surgeries in orthodontics
2. Digital orthodontics

Topic: Ortho-viewed interdisciplinary treatment (徐重興醫師)

Module 11 - 9/28

1. Aligner & TADs
2. Keys to aligner learning

Topic: Pre-aligner treatment (林詩詠醫師)

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報名專線 湧傑 Yong Chieh

北區 邵美珍	中區 張馨云	南區 蔡淑玲
02-27788315 #120	04-23058915	07-2260030

LINE@ 官方帳號

Facebook 官方帳號

Premolar Substitution of Missing Canine with Crowding and Midline Deviation

Abstract

History: *A 29-year-old female presented with chief complaints of crooked teeth and crowding.*

Diagnosis: *Lower facial height, convexity, and lip protrusion were within normal limits. Bimaxillary retrusion (SNA, 76˚; SNB, 73˚; ANB, 2.5˚) and a high mandibular angle (SN-MP, 42.7˚) were noted. Both upper and lower incisors were within normal limits (U1 to SN, 102˚; U1 to NA, 5.5mm; L1 to MP, 95.1˚; L1 to NB, 4mm). In the right buccal segment, the molars were Class I, but the upper right canine and the upper left first molar were missing. There was >10mm of crowding in the lower arch, and the upper dental midline was shifted 4mm to the right. The Discrepancy Index was 23.*

Treatment: *Following extraction of two mandibular first premolars, all teeth were bonded with a Damon Q® passive self-ligating bracket system. An infrazygomatic crest bone screw was inserted buccal to the upper left second molar. A power chain applied to the upper arch corrected the midline deviation and closed the upper left first molar extraction space. In addition, premolar substitution for the missing upper right canine was performed. Both arches were detailed and finished.*

Outcome: *After 29 months of active treatment, all teeth were aligned, and all extraction spaces were closed. The upper right first premolar was substituted for the missing upper right canine. The midline discrepancy was corrected to 1mm after the active treatment. The final alignment and dental esthetics were satisfactory as evidenced by an ABO Cast-Radiograph Evaluation score of 12, and the IBOI Pink & White Esthetic Score of 4. Both the patient and the clinician were satisfied with the final outcome.*

Conclusions: *Missing canines usually have a history of ectopic eruption, impaction, or trauma. Premolar substitution is an attractive treatment option, but may result in substantial midline deviation. Orthodontic bone screws play an important role in correcting midline deviation with asymmetric mechanics. (J Digital Orthod 2023;69:30-45)*

Key words:
Midline deviation, premolar substitution, IZC bone screw, asymmetric mechanics, temporary skeletal anchorage devices (TSADs), passive self-ligating brackets

Introduction

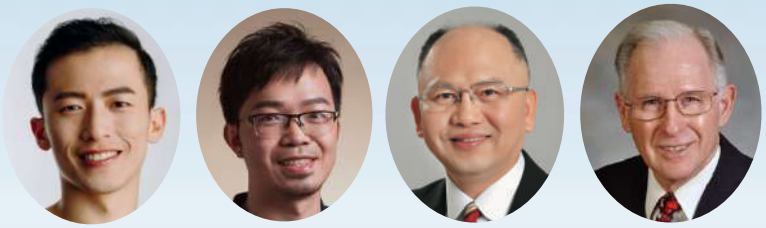
The dental nomenclature for this report is a modified Palmer notation with four oral quadrants: upper right (UR), upper left (UL), lower right (LR), and lower left (LL). From the midline, permanent teeth are numbered 1-8.

The management of midline deviation resulting from unilaterally missing teeth is challenging. In the treatment of midline correction, bone screws play an essential role for asymmetric mechanics. This case report demonstrates the combined use of passive self-ligating (PSL) brackets, bone screws (BSs), premolar substitution, and extractions for a desirable treatment outcome.

History and Etiology

A 29-year-old female sought orthodontic consultation due to unesthetic maxillary anterior dentition and crooked teeth (Fig. 1). No contributing medical or dental histories were reported. Clinical examination revealed a straight

Maurice Huang,
Training Resident, Beethoven Orthodontic Center (Left)
Joshua S. Lin,
Associate Director, Beethoven Orthodontic Center (Center left)
Chris Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Center right)
W. Eugene Roberts,
Editor-in-chief, Journal of Digital Orthodontics (Right)



facial profile. Overbite and overjet of the central incisors were within normal limits (WNL), and the right buccal segment was Class I. The upper midline was shifted 4mm to the right (Fig. 2). The UR3 was missing, and the space was closed by drift of adjacent teeth; the UL6 was also missing (Fig. 3). There was >10mm of crowding in the lower arch. The panoramic and lateral cephalometric radiographs revealed impaction of lower third molars (Figs. 4 and 5).

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

Diagnosis

Facial:

- Convexity: *WNL (12˚)*
- Lip Protrusion: *WNL (-1.5mm/0mm to the E-line)*

Skeletal:

- Sagittal Relationship: *Class I relationship (SNA, 76˚; SNB, 73.5˚; ANB, 2.5˚)*
- Mandibular Plane Angle: *Increased (SN-MP, 42.5˚; FMA, 28.5˚)*

Dental:

- Occlusion: *Class I molar in the right segment*
- Overjet: *1mm*
- Upper incisor: *WNL (U1-NA, 5.5mm; U1-SN, 102˚)*
- Lower incisor: *WNL (L1-NB, 4mm; L1-MP, 95˚)*

The American Board of Orthodontics (ABO) Discrepancy Index (DI) was 23, as documented in the supplementary Worksheet 1.

Fig. 2: *Pre-treatment upper midline was shifted 4mm to the right.*

Fig. 3:
Pre-treatment upper occlusal shot shows the missing UR3 space (yellow arrow) was completely closed by the adjacent teeth. UL6 extraction space was also noted.

Treatment Objectives

1. Correct the midline discrepancy.
2. Close missing UR3 and UL6 extraction spaces.
3. Relieve crowding.

Treatment Alternatives

The objectives for full-fixed appliance treatment were to resolve the missing UR3, close the UL6 space, align the dentition, and correct the midline. Two options were considered:

Option 1 (Fig. 7): Extract two lower 1st premolars. Insert an infrazygomatic (IZC) bone screw on the left buccal side to provide definite anchorage to solve the midline deviation. Substitute the upper right premolar for the missing UR3.

Extraction of lower first premolars corrects crowding relief and facilitates upper midline correction. An IZC

Fig. 4: Pre-treatment panoramic radiograph

Fig. 5: Pre-treatment lateral cephalometric radiograph

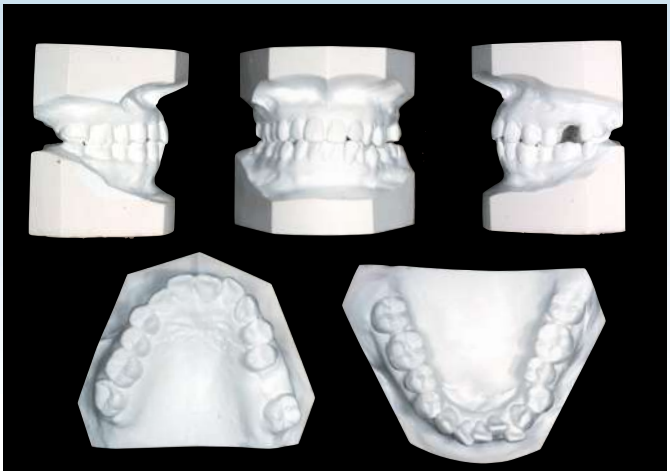


Fig. 6: Pre-treatment dental models (casts)

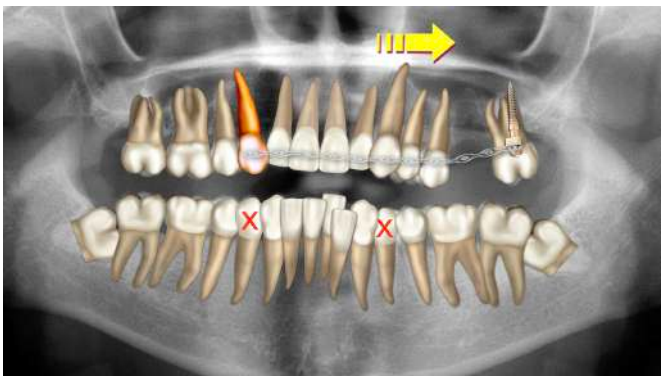


Fig. 7:
Treatment option 1. Note the substitution of UR4 (orange) for the missing UR3. See text for details.

bone screw is placed in the UL segment to correct the midline deviation.

Option 2 (Fig. 8): Extract two lower 1st premolars. Open the space between UR2 and UR4, and restore UR3 and UL6 with dental implants.

To deal with the missing teeth, place an open coil spring to create UR3 space, and maintain the UL6 extraction space for dental implants. Extract lower first premolars to relieve crowding. Compromised dental esthetics and function are to be expected.

The patient refused implant-supported prostheses because of higher risk of complications and cost. After a thorough discussion of the two options, the patient preferred the first approach.

Treatment Progress

A 0.022-in slot Damon Q® fixed appliance (Ormco, Glendora, California) with PSL brackets was selected along with all specified archwires and orthodontic auxiliaries.

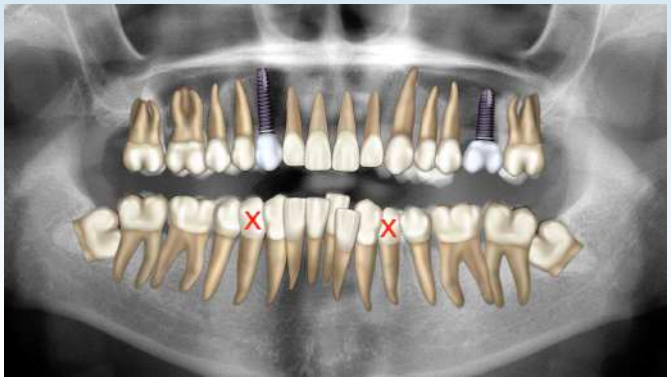


Fig. 8: *Treatment option 2. See text for details.*

The patient was referred to extract the LR4 and LL4 prior to active treatment. Damon Q® 0.022-in PSL brackets (Ormco, Glendora, CA) were bonded on the upper teeth with a 0.014-in CuNiTi archwire engaged. 1 month later, the lower dentition was also bonded with PSL brackets.

After 6 months, alignment of both arches was completed. Both archwires were changed to 0.016x0.025-in SS for space closure.

In the 12th month, an OrthoBoneScrew® (OBS, iNewton Dental Inc., Hsinchu City, Taiwan) was inserted in the left IZC. As a definite anchorage device, the IZC bone screw facilitated space closure of UL6 extraction site and midline correction (Fig. 9).

In the 16th month, the UL6 extraction space was closed and the midline deviation was significantly improved (Fig. 10).

In the 19th month, the lower extraction spaces were almost closed. A residual midline deviation remained but was WNL.

All fixed appliances were removed after 26 months of active treatment. All extraction spaces were closed. Retention was accomplished with upper and lower clear overlay retainers. Also, a lingual fixed retainer was constructed on the mandibular anterior segment (LR3-LL3).

Results Achieved

Facial esthetics and dental alignment were significantly improved after 26 months of treatment (Figs. 11 and 12). The midline deviation was corrected to an acceptable result. The missing canine (UR3) was replaced by the first premolar (Fig. 11). The UL6 extraction space was closed with a molar Class III relationship on the left and Class I on the right. The posttreatment panoramic radiograph documented acceptable root parallelism, except for LR5, UL5, and UL7 (Fig. 13).

The superimposed cephalometric tracings illustrated that both lower 1st molars were protracted due to closing of the extraction space

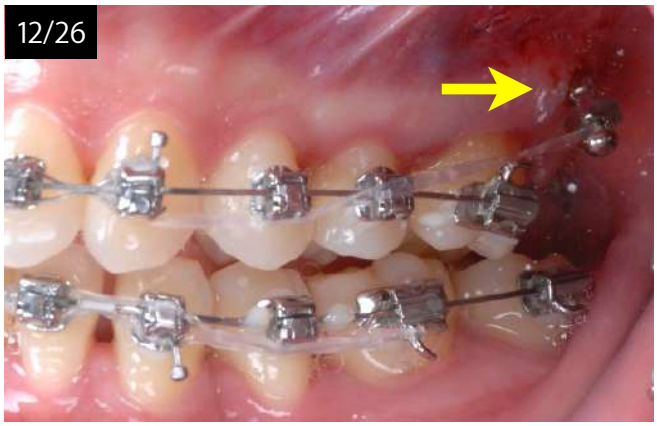


Fig. 9:
An OBS (yellow arrow) was inserted in the IZC, and a power chain was attached from the OBS to the UL4 to correct midline deviation.

with elastic force (Fig. 15). The axial inclination of the upper incisors (U1-SN) decreased 11° (105° to 94°), but the lower incisors (L1-MP) were inevitably tipped lingually (95° to 84°). The upper and lower lips were both retruded following retraction of the anterior segments. The mandibular plane angle (SN-MP) was well-maintained (Table 1).

The Cast-Radiograph Evaluation (CRE) score was 12 points, as shown in the supplementary Worksheet 2. The Pink and White dental esthetic score was 4 points (Worksheet 3). The patient was pleased with the final result.

Retention

After the fixed appliances were removed, two ESSIX® (Dentsply Sirona, Harrisburg, PA) overlay retainers were provided to retain the leveling and alignment of the dentition. A fixed retainer was placed from canine to canine on the lower arch to prevent relapse of crowding. The patient was instructed to use the overlay retainers full time for the first month and only while sleeping thereafter.

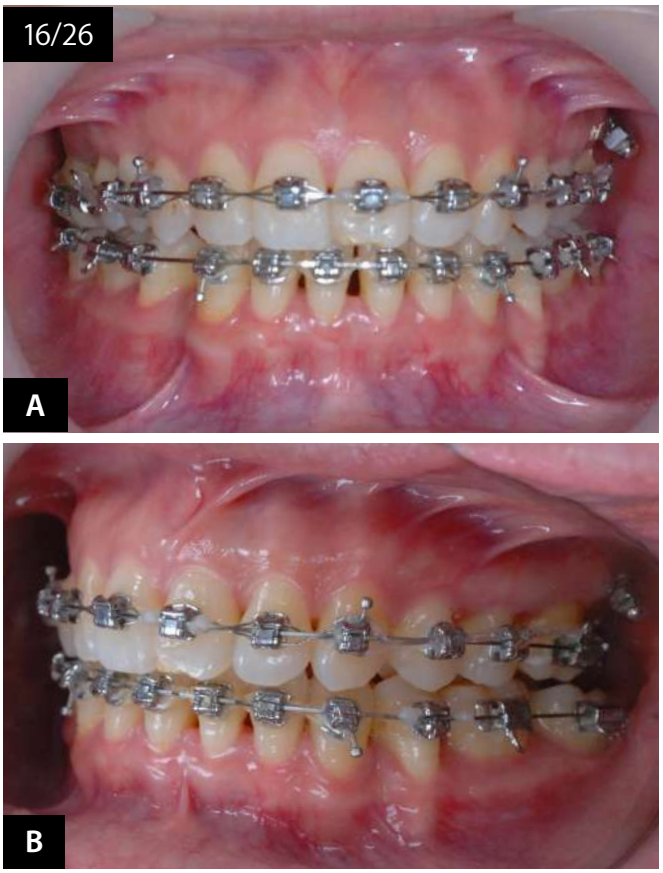


Fig. 10:
A. *By the 16th month, midline deviation was improved.*
B. *UL6 extraction space was closed.*

Fig. 11:
Premolar substitution resulted in a good outcome and acceptable occlusion on the right segment.

Fig. 12: *Posttreatment facial and intraoral photographs*

Discussion

To correct midline deviation, asymmetrical mechanics with IZC bone screw anchorage is an excellent solution. In this case, the missing UR3 space was closed by substitution of the UR4, resulting in the midline shifting 4mm to the right.

Fig. 13: *Posttreatment panoramic radiograph*

Fig. 14: *Posttreatment lateral cephalometric radiograph*

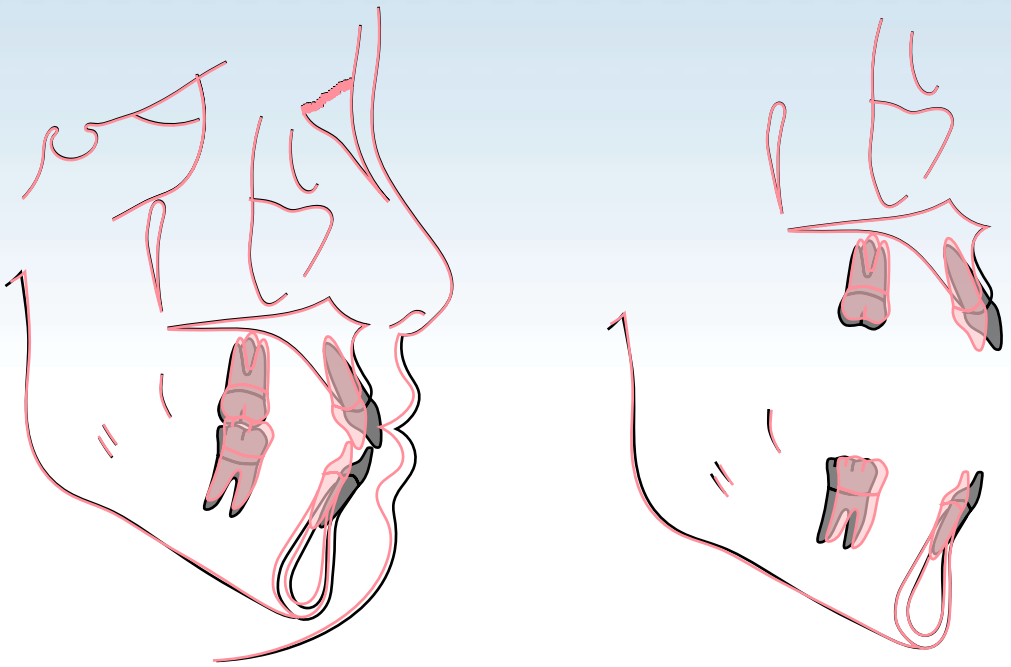


Fig. 15:
Initial (black) and final (red) cephalometric tracings are superimposed on the anterior cranial base (left), the skeletal structures of the maxilla (upper right) and the mandible (lower right).

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-TX	POST-TX	DIFF.
SNA° (82°)	78°	78°	0°
SNB° (80°)	76°	76°	0°
ANB° (2°)	2°	2°	0°
SN-MP° (32°)	41°	39°	2°
FMA° (25°)	37°	36°	1°
DENTAL ANALYSIS			
U1 TO NA mm (4 mm)	6	2	4
U1 TO SN° (104°)	105°	94°	11°
L1 TO NB mm (4 mm)	7	3	4
L1 TO MP° (90°)	95°	84°	11°
FACIAL ANALYSIS			
E-LINE UL (-1 mm)	-2	-3	1
E-LINE LL (0 mm)	0	-2	2
%FH: Na-ANS-Gn (53%)	56%	56%	0%
Convexity:G-Sn-Pg' (13°)	6°	6°	0°

Table 1: *Cephalometric summary*

Since the UL6 was extracted and there remained an extraction space, an IZC bone screw was placed buccal to UL7 to correct the maxillary dentition shift and simultaneously close the UL6 extraction space. However, another issue was lower dentition crowding; therefore, LR4 and LL4 were extracted to relieve the anterior crowding. By the end of the

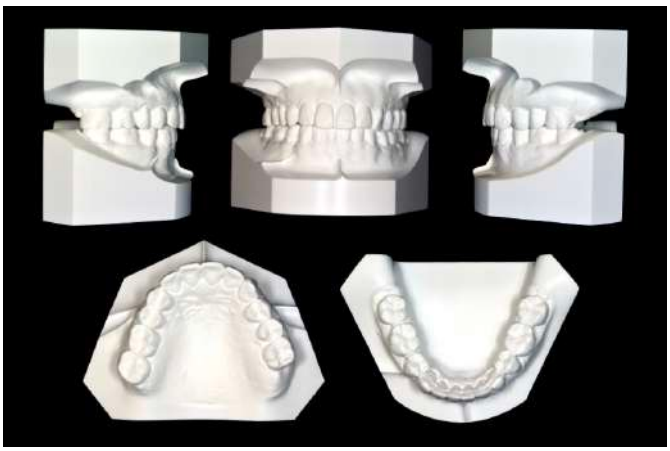


Fig. 16: *Posttreatment dental models (casts)*

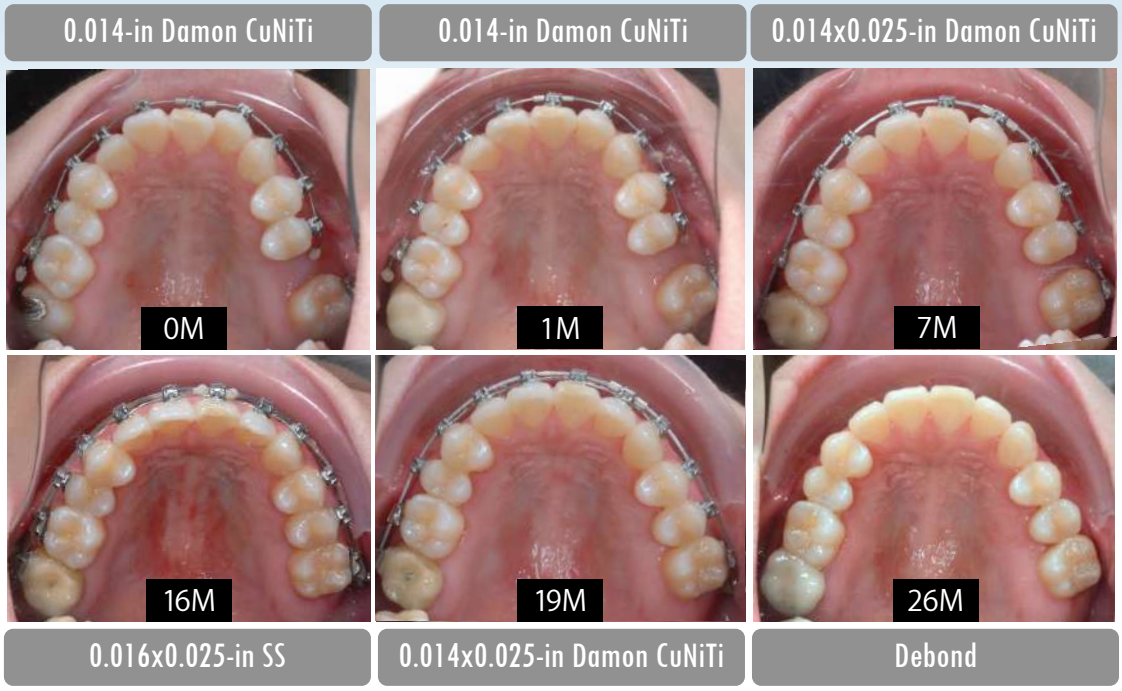


Fig. 17:
Treatment progress for the upper arch from the maxillary occlusal view is shown in months (M), and the archwire progression is specified from the start of treatment (0M) to twenty-six months (26M).

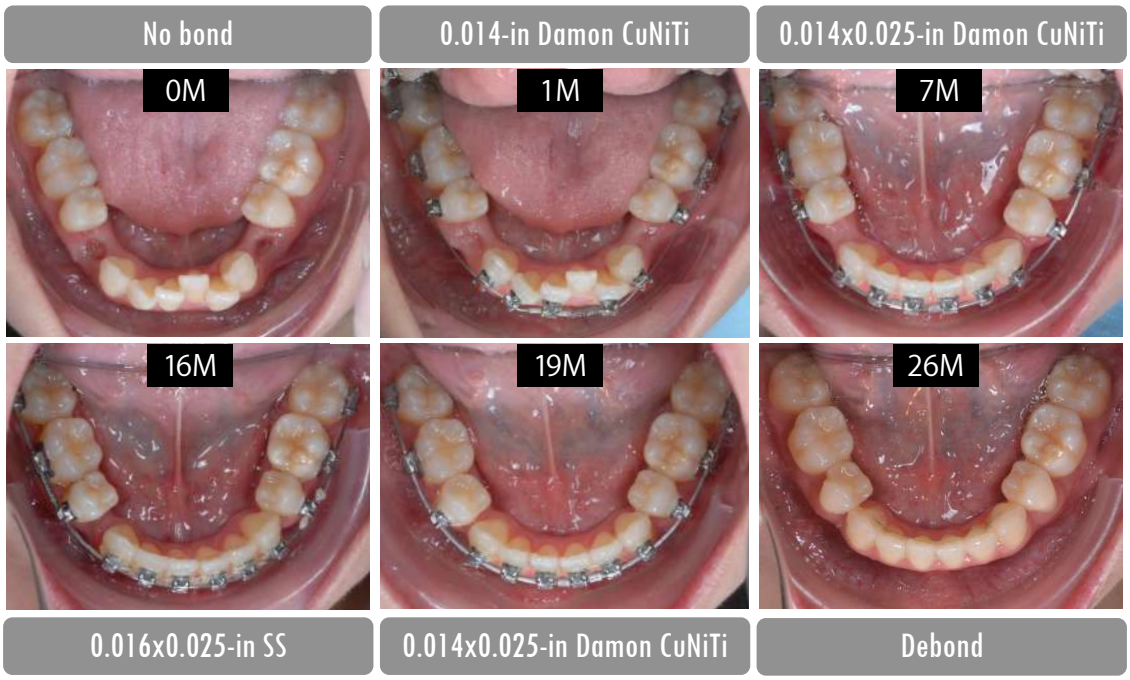


Fig. 18:
Treatment progress for the lower arch from the mandibular occlusal view is shown in months (M), and the archwire progression is specified from the start of treatment (0M) to twenty-six months (26M). Note that the lower first premolars were extracted prior to active treatment.

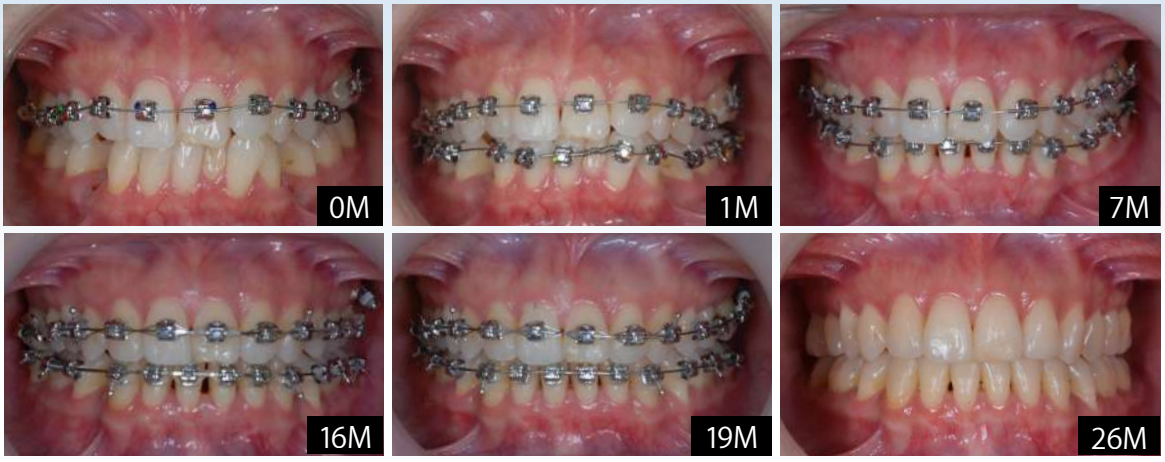


Fig. 19: *Treatment progress from the frontal view. Midline discrepancy was corrected to an acceptable result.*

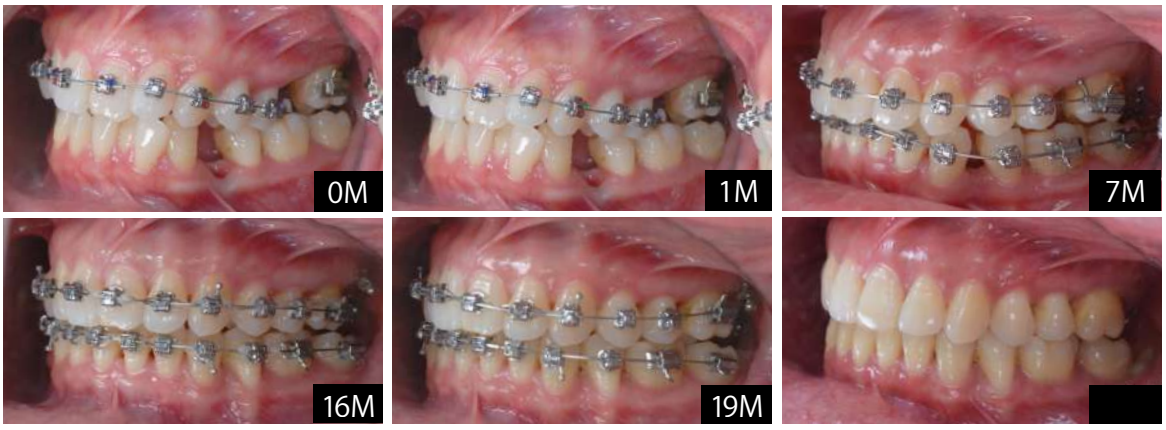


Fig. 20:
Treatment progress from the left buccal view. An IZC bone screw was placed at the buccal side of UR7 to correct midline and close UL6 extraction space. Class III molar relationship was achieved for the left segment.

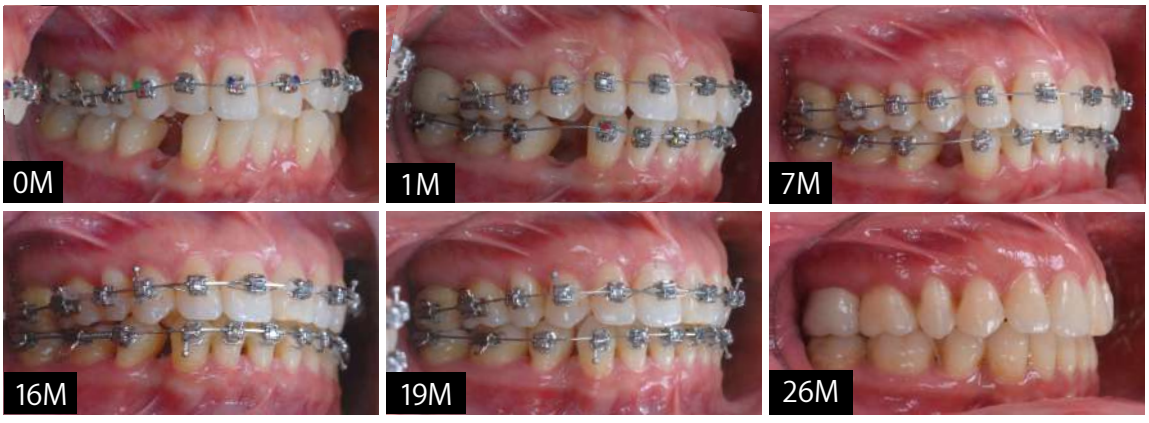


Fig. 21:
Treatment progress from the right buccal view. Premolar substitution was performed. Good occlusal relationship was achieved after 26 months of treatment.

treatment, the 4mm midline deviation was improved to 1mm (Fig. 19).

IZC bone screws

IZC bone screws are placed buccal to the roots of the maxillary molars, which provides extra-radicular anchorage for retraction of individual teeth or the entire arch. This is a very effective anchorage for correcting midline deviations.[1,2]

For the present patient, a single IZC bone screw provided firm anchorage for space closure and midline correction. The IZC screw was loaded and reactivated every month with pre-stretched power chains.[3] The power chains were tied to the maxillary anterior teeth in order to rectify the midline deviation and close the UL6 space. However, when closing molar extraction space there are several concerns regarding the maxillary sinus floor.

Moving teeth through the floor of maxillary sinus

Moving teeth through the floor of the sinus is a viable clinical option based on physiological principles[4] and is further supported by experimental studies.[5,6] Park et al.[5] reported that teeth can be moved through anatomic limitations, such as thin cortical bone or the maxillary sinus.

The maxillary sinus floor is a hard, high-density bone similar to the cortical bone.[7] Furthermore, it takes more time to achieve bone remodeling at the maxillary sinus floor, compared with the cancellous bone. The above factors explain orthodontic tooth movements and treatment outcomes.

With dental root penetration into maxillary sinus, several features can be observed during orthodontic tooth movement, such as moderate apical root resorption,[8] considerable tipping,[5] abnormal pulp vitality, and perforation of the sinus membrane.[9] While facing the clinical cases with sinus penetration, the orthodontists should carefully modify the orthodontic force system to reduce these side effects[7] and recognize that even a light constant force moves teeth through the sinus floor.

Bodily movement is generally expected but is difficult to achieve in such cases. In the article of Wehrbein et al.,[5] the authors stated that bodily or tipping movement through the maxillary sinus depends on the morphology of the antrum. Furthermore, they demonstrated that in the orthodontic movements of the maxillary teeth, greater tipping could be accomplished if there is a more vertical extension of the basal maxillary sinus in front of the tooth to be moved than with teeth moved through a more horizontal maxillary sinus base.

For our patient, the UL6 extraction space was closed in 26 months. However, the panoramic radiographs demonstrated that UL5 was tipped due to the vertical extension of the maxillary sinus, which is consistent with previous studies.[10,11]

Premolar substitution

Regarding the two main scenarios: firstly missing lateral incisors and secondly impacted canines, premolar substitution is a good solution. Missing maxillary lateral incisors affect 2~5% of the population.[12] Space closure is the preferred esthetic

option. The canine substitutes for the lateral incisor, and the first premolar fills the position of the canine.

The prevalence of impacted canines is reported to be from 0.27-2.4%,[13,14] second only to third molars.[15] In most patients, the impacted canines are ectopically positioned.[16-18] In fact, there are many cases with missing canine due to ectopic impactions or previous anomalies. While treating this kind of situation, premolar substitution is a feasible solution if conditions allowed.

For this patient, the UR3 was missing, and the space was closed by the adjacent UR2 and UR4. Therefore, premolar substitution was an effective method to treat this problem. There are 2 important tips to note for premolar substitution:

1. Bonding position

For maxillary canine substitution, it is particularly important to restore the natural contours of the gingival margins. A high-low-high gingival margin from incisor to canine is the principle to be achieved with coordinated orthodontics. To improve the gingival emersion profile, the premolar can be intruded by a more incisal bracket position (Figs. 22 and 23). In addition, intruding the premolar can eliminate the palatal cusp interference.

2. Size and shape

In comparison to the canine, the adjacent premolar has a similar buccal surface and dimensions at the cementoenamel junction (CEJ) for both mesio-distal and bucco-lingual width. To simulate a maxillary canine, the outline form of the crown should be restored by composite resin at the buccal cusp tip to make it look like a natural canine from both frontal and buccal views.

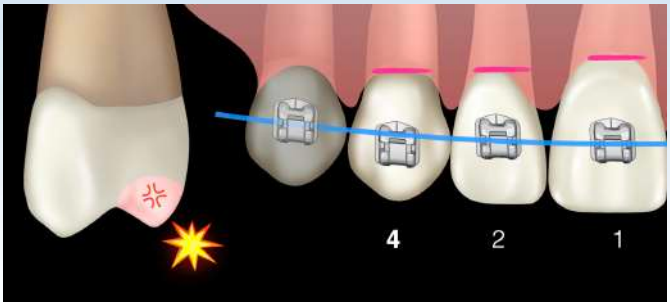


Fig. 22:
In premolar substitution, gingival margin and palatal cusp interference are usually the problems. Premolar intrusion using incisal bracket position is recommended.

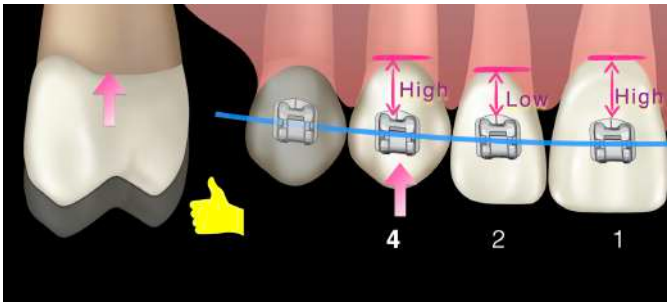


Fig. 23:
Intrude the premolar to achieve ideal gingival margins (high-low-high gingival line) and to avoid palatal cusp interference.

Conclusions

Missing canines are often encountered due to ectopic impactions or previous anomalies. Premolar substitution is an attractive option.

Furthermore, midline deviation is a common orthodontic problem. Orthodontic bone screws play an important role in correcting midline deviations

with asymmetric mechanics. As bone screws enhance the treatment efficiency, they are becoming increasingly essential in modern orthodontics.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE: 23

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 = 0

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 = 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 = 4

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. 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° 4 x 2 pts. = 8

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

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

Total = 10

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.	= 2
Missing teeth (except 3rd molars)	_____ x 1 pt.	= 1
Missing teeth, congenital	_____ x 2 pts.	= 2
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:

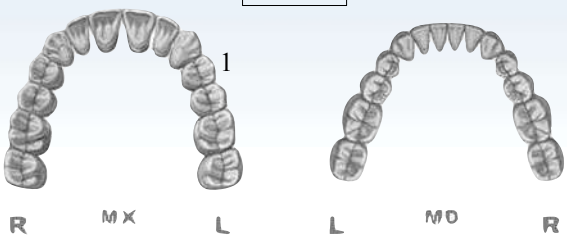
Total = 5

Cast-Radiograph Evaluation

Total Score: 12

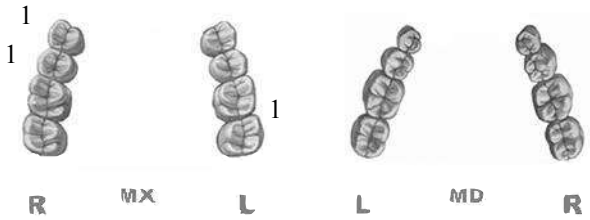
Alignment/Rotations

1



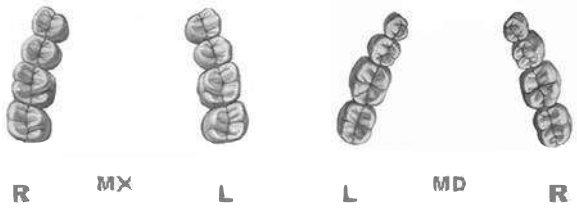
Marginal Ridges

3



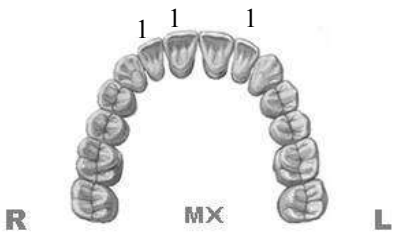
Buccolingual Inclination

0



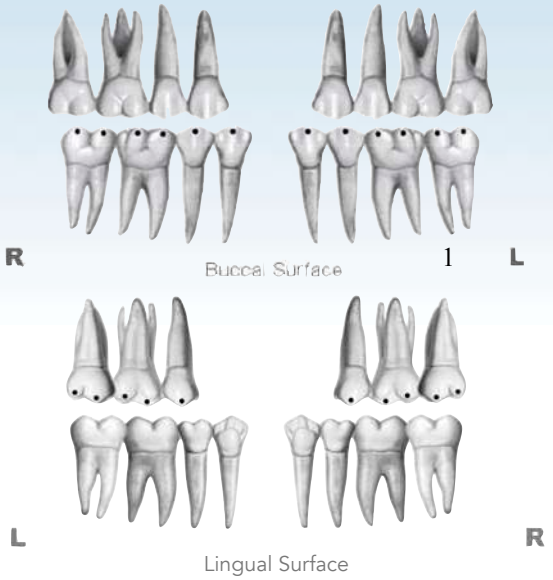
Overjet

3



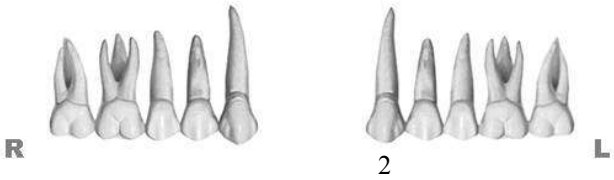
Occlusal Contacts

1



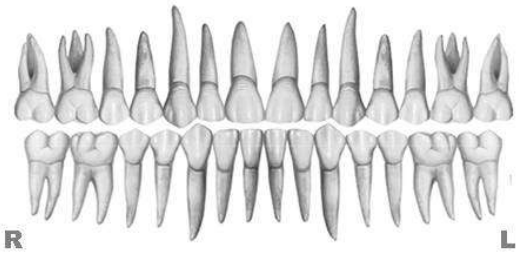
Occlusal Relationships

2



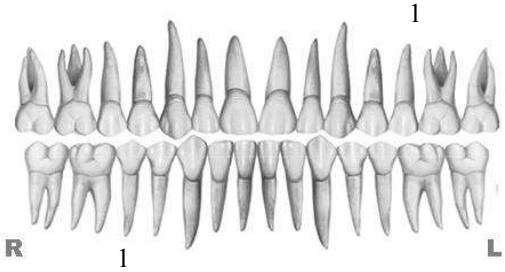
Interproximal Contacts

0



Root Angulation

2

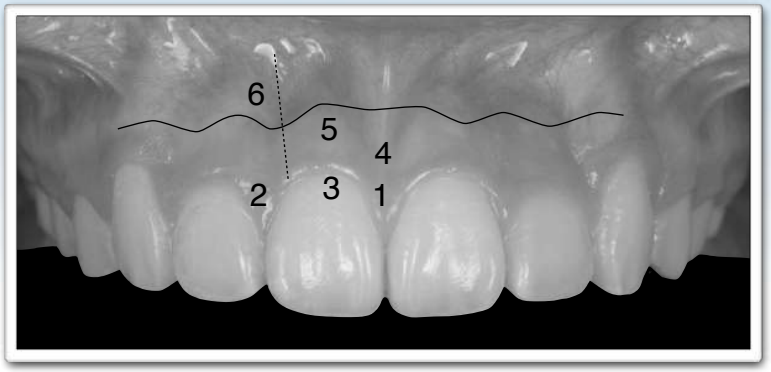


INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score = 4

1. Pink Esthetic Score

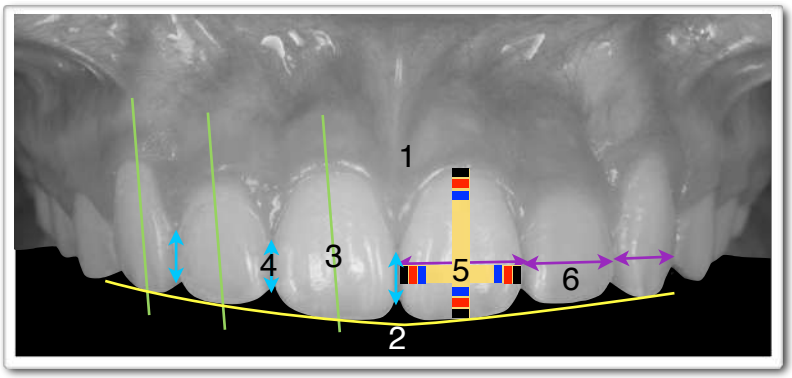


Total = 1

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 = 3

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

International Association for Orthodontists & Implantologists

Join the *iAOI* the future of dentistry!

About our association-iAOI

International Association of Orthodontists and Implantologists (iAOI) is the world's first professional association dedicated specifically for orthodontists and implantologists. The Association aims to promote the collaboration between these two specialties and encourage the combined treatment of orthodontic and implant therapy in order to provide better care for our patients.

How to join iAOI?

Certified members of the Association are expected to complete the following three stages of requirements.

1. Member

Doctors can go to http://iaoi.pro to apply for membership to join iAOI. Registered members will have the right to purchase a workbook in preparation for the entry exam.

2. Board eligible

All registered members can take the entry exam. Members will have an exclusive right to purchase a copy of iAOI workbook containing preparation materials for the certification exam. The examinees are expected to answer 100 randomly selected questions out of the 400 ones from the iAOI workbook. Those who score 70 points or above can become board eligible.

3. Diplomate

Board eligible members are required to present three written case reports, one of which has to be deliberated verbally. Members successfully passing both written and verbal examination will then be certified as Diplomate of iAOI.

4. Ambassador

Diplomates will have the opportunity to be invited to present six ortho-implant combined cases in the iAOI annual meeting. Afterwards, they become Ambassador of iAOI and will be awarded with a special golden plaque as the highest level of recognition in appreciation for their special contribution.

For more information on benefits and requirements of iAOI members, please visit our official website: http://iaoi.pro.

iAOI Ambassador & Diplomate

國際矯正植牙大使與院士

Ambassadors

Dr. Kenji Ojima◆

Dr. 林詩詠 Joshua Lin*▲

Dr. Diego Peydro Herrero◆

Dr. 陳俊宏 Chun-Hung Chen*▲

Dr. 張銘珍 Ming-Jen Chang*

Dr. 曾令怡 Linda Tseng*▲

Ambassador（大使）：

- * *One who has published 9+ case reports in JDO.*
- ◆ *Keynote speakers for iAOI annual workshops*
- ▲ *Case report(s) published at least once in referral journals.*
- ● *Referral journals/Research paper - 3 points*
  ABO case report - 2 points
  Clinical tip - 1 point

Diplomates

Dr. 徐玉玲 Lynn Hsu▲

Dr. 李雙安 Angle Lee▲

Dr. 蘇筌瑋 Bill Su

Dr. 葉信吟 Hsin-Yin Yeh▲

Dr. 徐重興 Eric Hsu▲

Dr. 黃育新 Yu-Hsin Huang

Dr. 黃祈 Richie Huang

Dr. 邱上珍 Grace Chiu▲

Dr. 黃瓊嫥 Sabrina Huang

Dr. 鄭惠文 Joy Cheng

Dr. 曾淑萍 Shu-Ping Tseng

Dr. 林曉鈴 Sheau-Ling Lin

Dr. 張倩瑜 Charlene Chang

Dr. 林佳宏 Alex Lin▲

Dr. 林彥君 Lexie Lin▲

Dr. 林森田 Chris Lin

Dr. 黃登楷 Kevin Huang

Dr. 張馨文 Sara Chang

Dr. 李名振 Major Lee

Dr. 陳惠華 Judy Chen

Dr. 魏明偉 Ming-Wei Wei

Dr. 黃荷薰 Ashley Huang

Dr. 李彥峰 Yen-Feng Lee

Dr. 張銘津 Ariel Chang

Dr. 彭緯綸 Wei-Lun Peng

Dr. 呂詩薇 Julie Lu

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2020 排名第21名

德國國立杜易斯堡-埃森大學

Master Degree in Specialized Orthodontics

黃金陣容師資團隊

Scientific Director
德國國立杜易斯堡-埃森大學 IMC 口腔醫學院院長

Univ. Prof. Dr. Dr. Dr. h. c. mult. Ulrich Joos, FRCS, FDSRCS

德國國立杜易斯堡-埃森大學 IMC 口腔醫學院院長
德國明斯特大學口腔顎面外科醫院及門診部榮譽教授
英國皇家外科學會榮譽院士 (FRCS, FDSRCS)
德國外科基金會 DGS 創辦人
德國杜易斯堡 MVZ 醫療中心創辦人
歐洲顱顎面外科協會 EACMFS 主席

1972 年至 1979 年為其學術養成重要階段，先後完成牙醫、醫學學士，獲後感謂為口腔顎面專科醫師。1980 年於佛堡大學任教期間 (C3-Professor)，取得德國特許任教資格，後獲擔任歐洲及歐盟各國口腔顎面等外科協會副主席 (1985)，1988 至 2002 年兩度擔任歐洲顱顎面外科協會主席，德國杜易斯堡-埃森大學 IMC 口腔醫學碩士學位委員會主席 (2003)，同年獲頒百出牙口腔顎面外科協會榮譽會員，海德拉巴裂 (口蓋裂) 協會國際顧問委員會榮譽會員 (2005)，匈牙利塞格德大學榮譽博士及教授 (2012)，英國皇家外科學會榮譽院士 (2016)，30 年歐亞內培育超過 300 名口腔顎面專科醫師。

Dr. med. dent. Thomas Ziebura

- 德國明斯特大學教學醫院齒顎矯正醫師
- 德國哈姆堡顎面正形人醫師院長

Prof. Dr. med. dent. Thomas Stamm

- 德國杜易斯堡 MVZ 醫療中心齒顎矯正科主任
- 德國明斯特大學教授
- 德國齒顎矯正專科醫師

Prof. Dr. med. dent. Jörg Lisson

- IMC 德國矯正專科碩士課程負責導師
- 德國萊茵敵大學齒顎矯正系主任
- 德國牙科考試委員會主席
- 德國口腔顎面外科大學教授協會主席
- 德國齒顎矯正學會理事長

Univ. Pro. Dr. Ulrike Ehmer

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- 德國齒顎矯正及顎面整形醫學會創始會員及會員大使

Prof. Dr. med. Dr. med. dent. Alexander Hemprich

- 德國萊比錫大學醫院牙科部門院長
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- 匈牙利口腔顎面外科學會主席
- 匈牙利塞格德大學醫院醫療主任暨口腔顎面外科主任

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PD Dr. med. Dr. med. dent. Thomas Fillies

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- 德國新疆加特海專業醫院頭頸腫瘤中心主任

Univ.-Prof. Dr. med. dent. Ariane Hohoff

- 德國明斯特大學教學醫院齒顎矯正部門主任
- 德國齒顎矯正專科醫師

Dr. med. dent. Werner Schupp

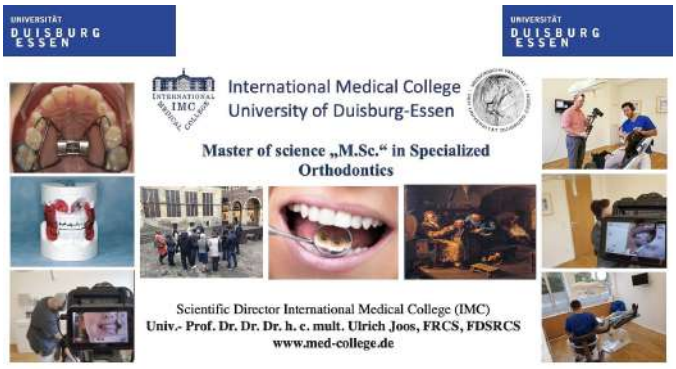
- 德國口腔正畸學會醫事會成員
- 德國齒顎矯正專科醫師
- 奧地利因斯布魯克大學教授

全球獨家歐盟臨時行醫權

歐洲唯一提供國際醫師
在當地進行實作的臨床碩士學位

課程重視臨床運用及實作技巧學程期間學員須親赴歐洲于指導教授監督下，親自執行臨床診療，學習最先進的臨床技術，應用於自身牙科診療工作。

線上遠距教學＋德國實習・工作學業兼顧



1 線上互動式教學
即時發問立即回饋

2 完整案例分析及最新技術分享
即時應用於每日臨床工作

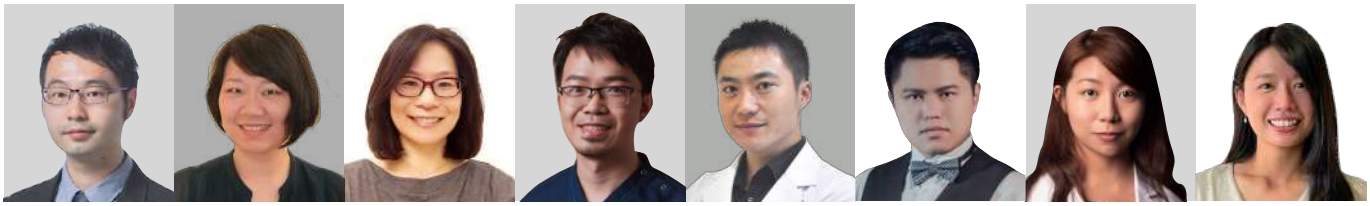
3 兩年碩士課程包含德國實習兩次
實際參與現場課程與執行診療

Beethoven International
Orthodontic Specialty Course

德國國立杜易斯堡-埃森大學
IMC齒顎矯正專科碩士學位先修課程

UNIVERSITÄT DUISBURG ESSEN

INTERNATIONAL IMC MEDICAL COLLEGE



Dr. Bill Su	Dr. Yulin Hsu	Dr. Shu Ping Tseng	Dr. Joshua Lin	Dr. Eric Hsu	Dr. Bear Chen	Dr. Lexie Lin	Annie Chen
VISTA surgical techniques	Early orthodontic treatment	Early orthodontic treatment	Treatment for impacted teeth	Research design	ABO DI & CRE	ABO case report	Academic writing

Beethoven International Orthodontic Specialty Course, 是德國國立杜易斯堡-埃森大學 IMC 齒顎矯正專科碩士學位所特別增設的先修課程，由國際知名講師張慧男醫師親自規劃及授課，課程特色強調由臨床病例帶動診斷、分析、治療計劃擬定與執行技巧，亦加入最新的數位矯正與隱形牙套的內容，並邀請了貝多芬牙科集團各院院長演講特別矯正專題。

除包含原貝多芬矯正大師班的課程內容外，另外加入了骨釘與 VISTA 術式的操作課程，並新增了學術文章寫作與演講的訓練，讓醫師在進入德國碩士班之前，做好更充分的準備。

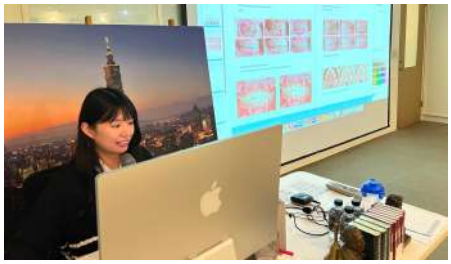
想要取得歐洲正式矯正碩士學位資格又苦惱時間不足的醫師，本先修課程是追求您目標的最佳途徑！

課程修畢即取得德國碩士班入學資格

全球目前只有三個機構擁有此先修課程資格，想要取得歐洲齒顎矯正碩士的台灣醫師，此課程為最有效率的選擇。

全新規劃的術式實作

本課程全新規劃的術式實作特別採用了由國際知名的西班牙臨床大師 Dr. Fernando Rojas-Vizcaya 所設計含阻生牙的新式牙齒模型，與歐洲課程接軌，臨床操作更易上手。



學術文章寫作訓練

本課程除了課堂演講與模型操作課程外，亦加入了學術文章寫作訓練。醫師可以學習如何有技巧並且有效率的撰寫學術文章，讓之後的碩士論文與文章發表更游刃有餘。

Beethoven Dental Clinic Established 1996

03-5735676#217 Chester Yu

yuebucy@newtonsa.com.tw

Beethoven
Damon Master Program

Course Schedule

66hrs

Module 1

1. Selecting your ideal first case
2. Bonding position
3. Bonding + BT + Ceph tracing
4. TADs + space closing + hook + spring
5. Finishing bending & fixed retainer

Practice: Clinical photography

Module 2

1. Four stages of efficient orthodontic treatment
2. Simple and effective anchorage system
3. Extraction vs. Non-extraction analysis

Practice: Patient photo management

Module 3

1. Soft & hard tissue diagnostic analysis
2. Big overjet correction
3. Damon diagnosis & fine-tuning

Practice: Ceph tracing

Module 4

1. Excellent finishing
2. Retention & relapse

Practice: Ceph superimposition & measurement

Module 5

1. Simplify your system
2. Extraction vs. non-extraction

Practice: Case report demo

Module 6

1. Class III correction
2. Class II correction

Topic: Early orthodontic treatment

Computer training (Mac): 1:30-2:30 pm

時間：週四全天（9 am - 5 pm）

地點：金牛頓藝術科技（新竹市建中一路 25 號 2 樓）

Module 7

1. Upper impaction
2. Lower impaction
3. Gummy smile correction

Topic: Modfied VISTA

Module 8

1. ABO DI, CRE workshop
2. Open bite

Topic: Modified 2X4 appliance in ortho treatment

Module 9

1. Implant-ortho combined treatment
2. Asymmetry

Topic: Impacted cuspid treatment

Module 10

1. Minor surgeries in orthodontics
2. Digital orthodontics

Topic: Ortho-viewed interdisciplinary treatment

Module 11

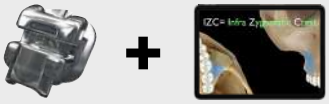
1. Aligner & TADs
2. Keys to aligner learning

Topic: Pre-aligner treatment

Special lecture: 1:30-2:30 pm

費用含課程視訊*、iPad、課程電子書與材料。

*贈送之課程視訊提供兩年時間串流觀看。



透過數位影片反覆觀看，結合矯正與電腦教學，課堂助教協助操作，以及診間臨床見習，讓學員在短時間能快速上手，感染「熱愛矯正學，熱愛學矯正」的熱情。

Beethoven
Clinical Education

此訓練課程除了新增學術文章寫作與演講的訓練，也加入了骨釘與VISTA術式等操作課程，醫師不僅可以就近學習張慧男醫師的技術與經驗，亦同時培養醫師期刊寫作的能力與高效簡報的技巧。

34hrs

ABO Writing Training

Medical Writing Training

Medical writing skills are crucial for clinicians, educators and researchers. This training contains academic medical writing on case reports. Participants will have a chance to publish articles for journals like Journal of Digital Orthodontics (JDO).

Presentation Workshop

The presentation workshop designed to help participants utilize the most frequently used presentation tools in Keynote to manage patient clinical records and create simple but effective patient communication presentation.

VISTA & 4 other Minor Surgeries for Orthodontic Practice

VISTA Hands-on Workshop

The VISTA (vertical incision subperiosteal tunnel access) surgical techniques for impacted cuspids will discuss the following topics:

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

TADs & Surgeries Hands-on Workshop

The workshop covers bonding on a typodont, TAD placement, and 4 minor surgeries for orthodontic practice.

*全系列課程修畢，完成兩篇案例報告文章後，即可取得赴德國碩士班進修資格證書。

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2023-2024 第十五年度

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：

2023　4/18、5/16、6/13、7/11、8/15、9/12、10/3、11/7、12/19

2024　1/9、3/12

- **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**

全新的第十五年度 2023-24 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。

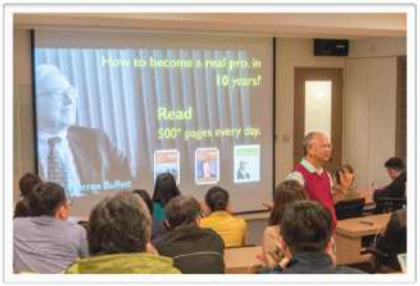
每月一次的課程之中，包含了：

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。

2023-24 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

Finding the Happy Medium: Buccal Shelf Screws as a Minimally Invasive Approach to Treat Severe Skeletal Class III Malocclusions

Abstract

History: *An 18-year-old male presented with chief complaints of an underbite and difficulty chewing.*

Diagnosis: *The skeletal Class III malocclusion (SNA, 83°; SNB, 88.5°; ANB, -5.5°) was associated with proclined upper incisors (U1 to SN, 113.5°) and retroclined lower incisors (L1 to MP, 81.5°). The Discrepancy Index (DI) was 65.*

Treatment: *Early light short Class III elastics were used to correct the malocclusion. Low torque brackets were selected for the upper incisors, and high torque brackets for the lower incisors to provide better root torque control. Two miniscrews were inserted in the buccal shelves (BS) to retract the lower arch.*

Outcome: *After 29 months of active treatment, this severe, challenging skeletal Class III was corrected to an acceptable result. The occlusion was stable and the patient was pleased with his facial profile. The Cast-Radiograph Evaluation (CRE) was 29, and the dental esthetic (Pink & White) score was 3.*

Conclusions: *It is good to bear in mind that "nothing is perfect; find the happy medium". It is important for the clinician to understand when to stop the treatment and to reach an outcome that is acceptable to both the clinician and the patient. (J Digital Orthod 2023;69:54-70)*

Key words:
Skeletal Class III, buccal shelf miniscrews, passive self-ligating brackets, Class III intermaxillary elastics, anterior root torque spring

The dental nomenclature for this paper is a modified Palmer notation with four oral quadrants: upper right (UR), upper left (UL), lower right (LR), and lower left (LL). From the midline, permanent teeth are numbered 1-8, and deciduous teeth are delineated a-e.

Introduction

An 18-year-old male with a chief complaint of a protruded mandible presented for orthodontic consultation (Figs. 1 and 2). Radiographic documentation of the original malocclusion is a lateral cephalometric film (Fig. 3) and panoramic radiograph (Fig. 4). From the intraoral view, the distance between the mesiobuccal cusp of the upper first permanent molar and the mesiobuccal groove of the lower first molar was bilaterally 11mm (Fig. 5). In the anterior region there was a negative overjet from canine to canine. The cephalometric analysis showed that it was skeletal Class III (SNA, 83°; SNB, 88.5°; ANB, -5.5°). Normally orthognathic surgery would be the recommended treatment option for this kind of patient; however, both the patient and his parents refused surgery. Since the profile of the patient in centric relation (C_R) was acceptable, a non-surgical approach was decided upon (Fig. 6).

Kristine Chang,
Training Resident, Beethoven Orthodontic Center (Upper left)
Jenny Chang,
Training Resident, Beethoven Orthodontic Center (Upper center)
Laurel Shern,
Training Resident, Beethoven Orthodontic Center (Upper right)
Chris H. Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Lower left)
W. Eugene Roberts,
Editor-in-chief, Journal of Digital Orthodontics (Lower right)

Diagnosis

Skeletal:

- Skeletal Class III: *SNA, 83°; SNB, 88.5°; ANB, -5.5°*
- Mandibular Plane Angle: *SN-MP, 28.5°; FMA, 21.5°*

Dental:

- Overjet: *-5mm*

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

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

Fig. 3: *Pre-treatment lateral cephalometric radiograph*

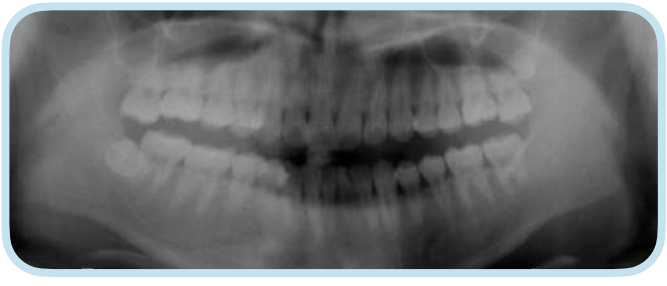


Fig. 4: *Pre-treatment panoramic radiograph*

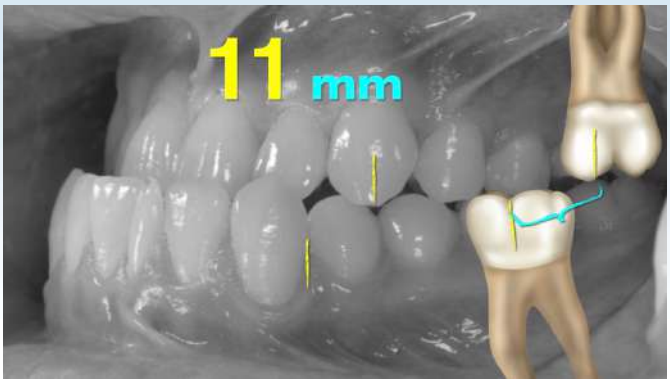


Fig. 5:
The distance between the mesiobuccal cusp of the upper first permanent molar and the mesiobuccal groove of the lower first molar was 11mm.

- Anterior crossbite: *Canine to canine*
- Upper incisors: *Tipped anteriorly (U1-NA, 6mm; U1-SN, 113.5°)*
- Lower incisors: *Tipped posteriorly (L1-NB, 4mm; L1-MP, 81.5°)*
- Facial: *Retrusive upper lip (-4mm to the E-line)*

The American Board of Orthodontics (ABO) Discrepancy Index (DI) was 65 points as shown in the subsequent Worksheet 1.

Treatment Objectives

After a discussion of the different options with the patient, the following treatment objectives were accepted:

1. Retract the whole lower arch.
2. Correct the negative overjet.
3. Improve lip profile.

Treatment Alternatives

After a thorough diagnosis, three treatment options were proposed to the patient:

Option 1: Orthognathic surgery

Due to the large 11mm Class III molar relationship associated with a severe skeletal discrepancy (ANB, -5.5°), orthognathic surgery was suggested to set back the mandible using intraoral vertical ramus osteotomy. However, according to Lin's Three-Ring Diagnosis system, if the facial profile is acceptable in central relation (C_R), the patient is a good candidate for conservative dentoalveolar treatment.[1,2] Furthermore, both the patient and his parents refused surgery.

Option 2: Extraction

Extract UR5, UL5, LR4, and LL4 to improve the Class III molar relationship and achieve camouflage treatment outcomes by closing the extraction spaces. However, due to the patient's straight profile, by the time the spaces are closed, the retroclined lower anterior teeth would be even more lingually positioned, resulting in an unpleasant concave profile.

Option 3: Non-extraction

Chang's decision-making table for extraction was consulted.[3] The profile of the patient in C_R was straight (Fig. 6), and there was no dental crowding, so non-extraction treatment along with lower arch retraction was a suitable option. However for this patient, it was necessary to extract LR8 in order to retract the lower arch. This approach can be very challenging because absolute anchorage is essential when retracting the whole arch. With the help of OrthoBoneScrew® (OBS) (iNewton Inc., Hsinchu City, Taiwan) as anchorage, the third treatment option was considered the most suitable approach for both the clinician and the patient.

Treatment Plan

Orthodontic camouflage treatments for Class III malocclusion may result in an increased axial inclination of the upper incisors and decreased axial inclination of the lower incisors, particularly if there is an underlying Class III skeletal discrepancy.[4] Thus, in order to correct the Class III malocclusion, there were 3 key points:[5]

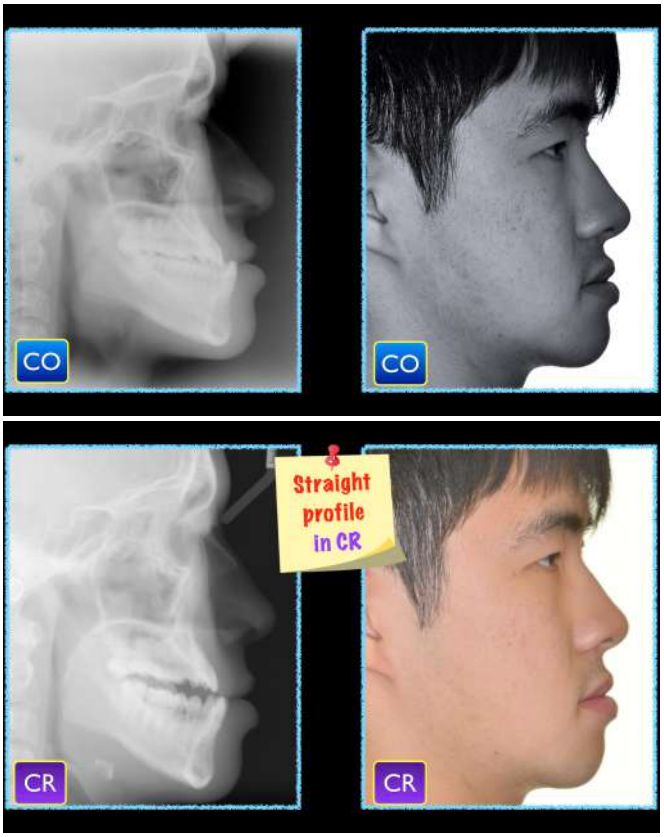


Fig. 6:
Patient's profile in centric occlusion (C_O) and centric relation (C_R)

1. Early light short elastics (ELSE)

Early light short Class III elastics were chosen to protract the upper arch and retract the lower arch, in order to improve the molar Class III relationship. However, Class III elastics may proline upper incisors and distally tip lower incisors (Fig. 7).

2. Torque selection

Low-torque brackets were chosen for the upper anterior teeth and high-torque brackets for the lower anterior teeth to compensate for the mechanics of Class III elastics. Since there are no high-torque brackets available for lower teeth, upside-down low-torque brackets were substituted as high-torque brackets.

3. Buccal shelf screws

As the patient preferred a non-surgical approach, buccal shelf (BS) screws were used as a minimally invasive approach. Temporary skeletal anchorage devices (TSADs) in the mandibular buccal shelves are suitable anchorage for retracting the entire lower arch to conservatively correct Class III malocclusions.

When power chains are hooked on the miniscrews, the line of force is occlusal to the center of resistance of the mandible, thus producing a moment that rotates the occlusal plane and retracts the whole dentition (Fig. 8).[6]

Treatment Progress

Two months following the prescribed extractions, a 0.022-in slot Damon Q® passive self-ligating (PSL) appliance (Ormco, Glendora, CA) was bonded on the lower teeth in the first month of active treatment, and the upper teeth were engaged in the following month with a 0.014-in CuNiTi archwire. From the 6th month of treatment, the patient wore bilateral Class III elastics from U6s to L3s that were engaged on a 0.014x0.025 CuNiTi archwire. In order to retract the whole lower arch

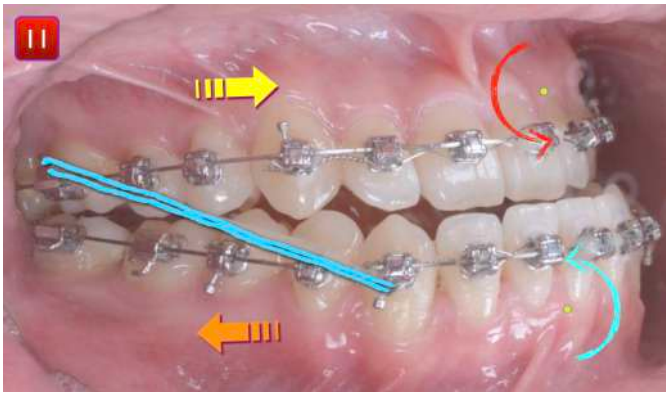


Fig. 7:
Class III elastics (blue lines) can protract the upper arch (yellow arrow) and retract the lower arch (orange arrow). However, while using Class III elastics, the side effects of upper arch proclination and lower arch retroclination are apparent (red and blue curved arrows, respectively).

Fig. 8:
Buccal shelf screws were used to retract the whole arch (WA) (green arrow). At the same time, the occlusal plane (OP) was rotated counterclockwise (blue arrow).

effectively, two miniscrews were inserted in the buccal shelves in the 11th month when the a 0.016x0.025 SS archwire was engaged. Since there is a higher play factor with a 0.016x0.025 SS archwire, the whole arch can be readily retracted easily, but there is a higher chance of torque loss. Conversely, a 0.019x0.025 SS archwire minimizes torque loss. However, as the archwire is more rigid, sliding mechanics is more difficult and it may be more uncomfortable for the patient.[7] From the 26th month until the end of the treatment, detailed adjustments were applied such as bracket repositioning, midline correction, inter-proximal reduction (IPR), and anterior root torque (ART). All treatment and sequencing details are shown in Table 1 and illustrated in Figs. 9 and 10.

Treatment Results

After 29 months of active treatment, both the patient and the clinician were satisfied with the outcome (Figs. 11-13).

Months	Archwire	Notes
0	L: 0.014 CuNiTi	Damon® appliance bonded on the mandibular arch from LR7-LL7
1	U/L: 0.014 CuNiTi	Damon® appliance bonded on the maxillary arch from UR7-UL7
4	U: 0.018 CuNiTi L: 0.014 CuNiTi	
6	U: 0.014x0.025 CuNiTi L: 0.018 CuNiTi	Apply Quail elastics (3/16-in, 2-oz) from U6 to L5 (bilateral). Drop-in hooks and power chain (PC) inserted
9	U: 0.016x0.025 SS L: 0.017x0.025 TMA	Apply Kangaroo elastics (3/16-in, 4.5-oz) from U6 to L5 (bilateral). PC
11	U/L: 0.016x0.025 SS	Apply Kangaroo elastics (3/16-in, 4.5-oz) from U6 to L5 (bilateral). Buccal shelf screws at L6 (bilateral) Expand the upper archwire.
16	U: 0.016x0.025 SS L: 0.017x0.025 TMA	Apply Fox elastics (1/4-in, 3.5-oz) from U6 to L3 (right side).
19	U/L: 0.016x0.025 SS	Apply Fox elastics (1/4-in, 3.5-oz) from U6 to L3 (bilateral). Inter-proximal reduction (IPR) performed on mandibular incisors PC + power tube (PT)
22		Remove miniscrews (BS screws). IPR on lower right quadrant between lateral incisor and canine
24		Apply Fox (1/4-in, 3.5-oz) from U3 to L6 (bilateral).
26		Apply Parrot (5/16-in, 2-oz) from U6 to L3 (bilateral). Anterior root torque (ART) from UR3-UL3
26-29		Detailing adjustments

Table 1: *Treatment sequence*

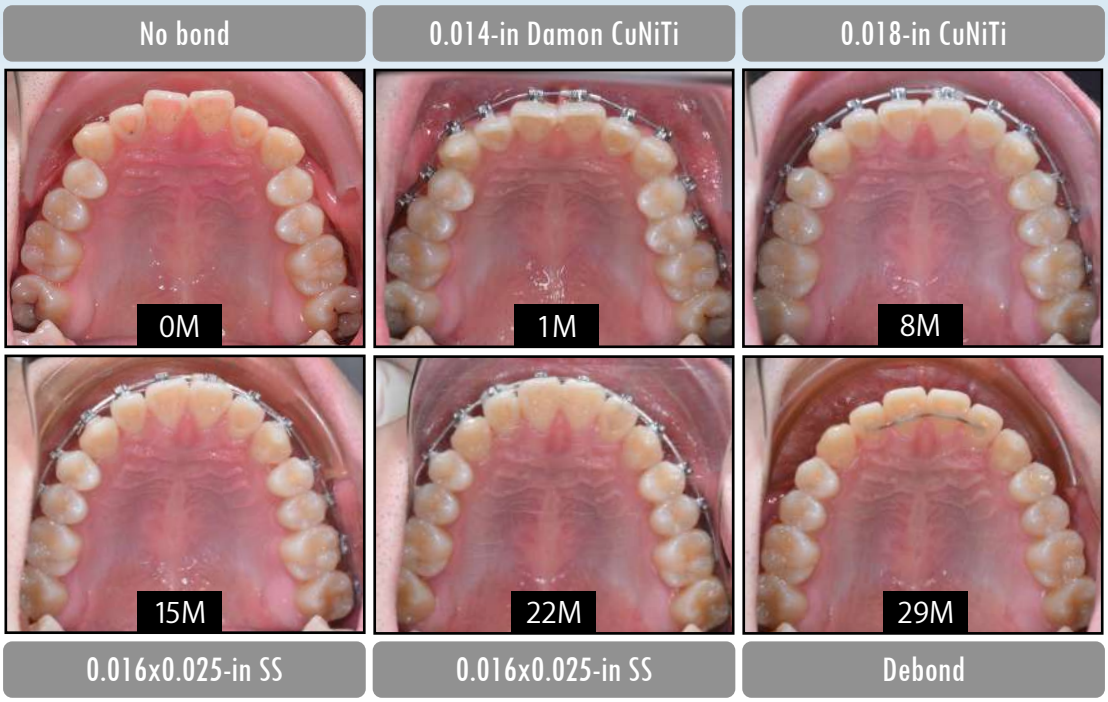


Fig. 9:
Treatment progress of the upper arch and the wire sequence are shown in months from the beginning (0M) to the end (29M) of treatment.

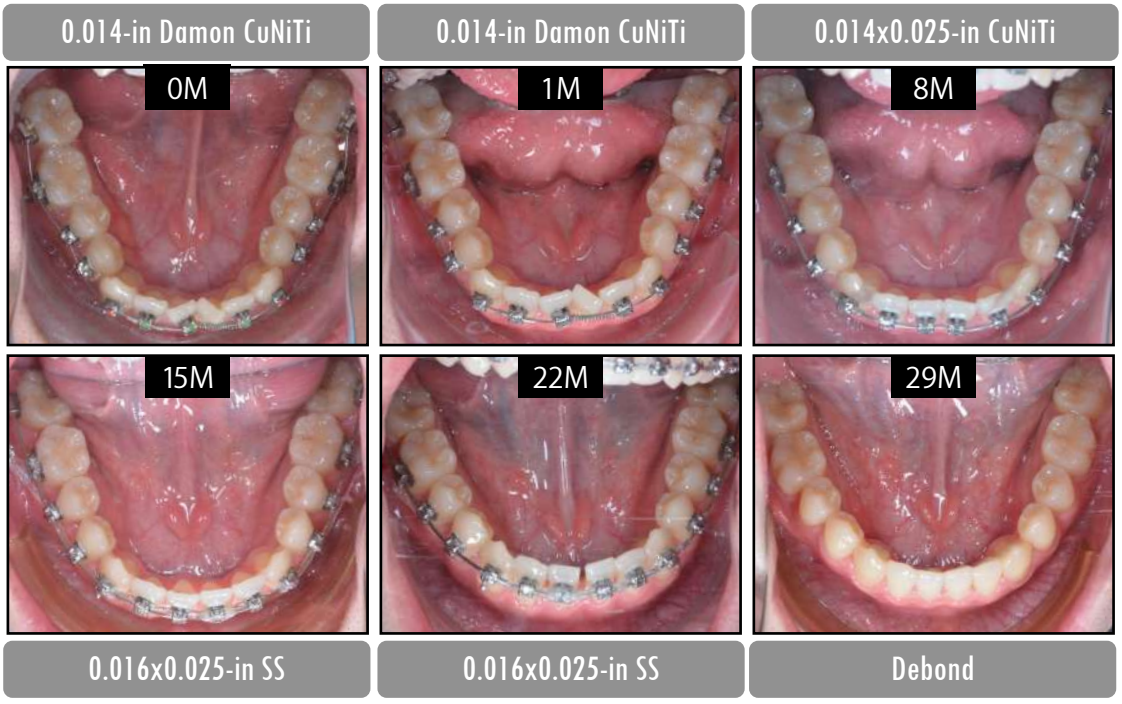


Fig. 10:
Treatment progress of the lower arch-and the wire sequence are shown in months from the beginning (0M) to the end (29M) of treatment.

The ABO Cast-Radiograph Evaluation (CRE) score was 29 as shown in the subsequent Worksheet 2, which is considered an acceptable result for a severe Class III malocclusion with a DI score of 65. The major residual discrepancies scored for the CRE included marginal ridges (3 points), occlusal contacts (7 points), and occlusal relationship (19 points).

Although the occlusal contacts were compromised at the end of the treatment, at the 1-year follow-up, the occlusal contacts had settled in naturally via occlusal function (Fig. 15).[8,9]

The occlusal relationship was disappointing but it must be taken into account that this was a severe 11mm Class III discrepancy that was treated with a non-surgical, non-extraction, and minimally invasive approach. The Class III molar relationship was greatly improved from 11mm to 2mm, which is almost a Class I molar relationship.

Fig. 11: *Post-treatment facial and intraoral photographs*

Fig. 12: *Posttreatment lateral cephalometric radiograph.*

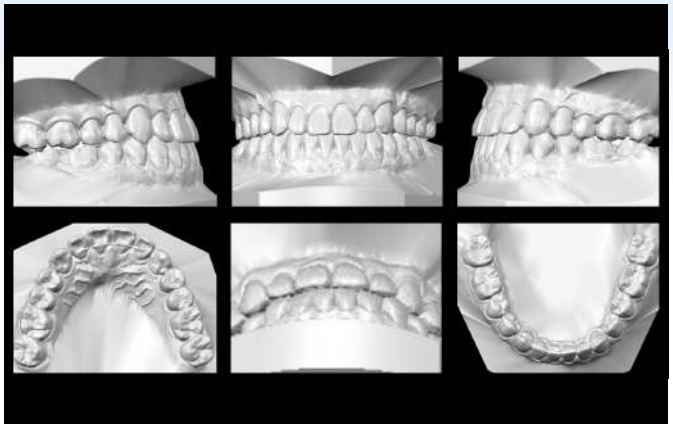


Fig. 13: *Posttreatment dental models (digital model casts).*

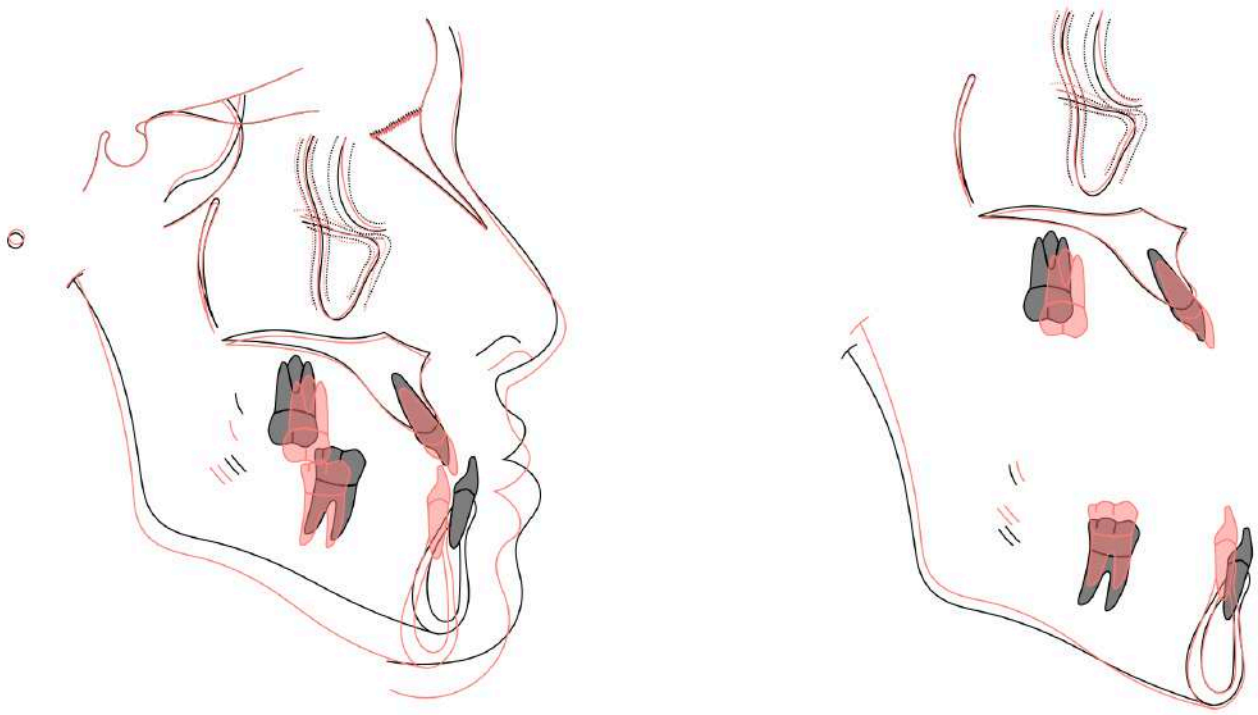


Fig. 14:
Superimposed cephalometric tracings show dentofacial changes over 29 months of treatment (red) compared to the pre-treatment position (black). The lower incisors were in a more upright position, and the Class III occlusion was corrected to Class I.

The cephalometric analysis showed an ANB improvement from -5.5˚ to -4˚. Although it is still considered a skeletal Class III, there was a major improvement in lip profile, and both upper and lower lips are within the E-line (Fig. 16).

Retention

An anterior fixed retainer was bonded on the lingual surfaces of the upper dentition from lateral incisor to lateral incisor and on the lingual surfaces of the lower dentition from canine to canine. 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, as well as for maintenance of the retainers.

Discussion

Two major Class III mechanisms: Class III elastics and miniscrews, are frequently used in order to correct negative overjets. However, there are some common side effects that regularly appear when using Class III mechanics. In the present case, there were two major side effects:

Fig. 15:
The occlusal contact was not a perfect result at the end of the treatment (29 months). However, at the 1-year follow-up, the occlusal contacts were naturally settled by occlusal function.

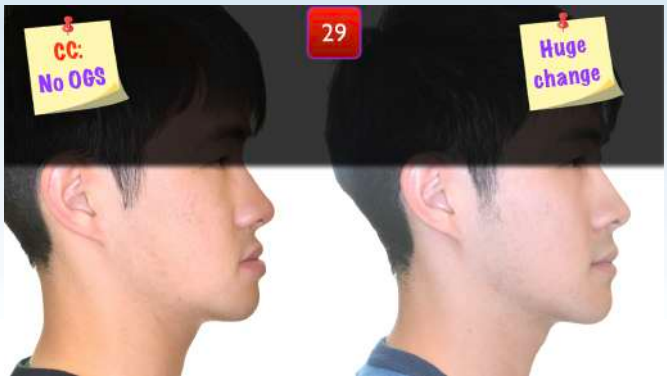


Fig. 16:
After 29 months of treatment, there was a huge improvement in lip profile without any orthographic surgery.

1. Flaring upper incisors

In order to correct a 5mm negative overjet, Class III ELSE were used to retract the mandibular arch. As Newton's third law of motion states, for every action, there is an equal and opposite reaction. Therefore, using Class III elastics to retract the lower arch will result in the upper incisors flaring out. It can be clearly seen from the lateral cephalometric radiograph that the U1-SN angle increased from 113° in the 14th month of treatment to 120° in the 26th month (Fig. 18).[10]

When the upper incisor flaring was noticed in the 25th month, the first instinct was to use Class II elastics, but later it was apparent that this was not the most efficient approach (Fig. 19).

A better solution would have been to use an anterior root torque to produce labial root torque in conjunction with infrazygomatic crest (IZC) screws to stabilize the upper incisors (Fig. 20). Another reasonable solution would have been to wear an elastic from the upper canines to the lower buccal shelf miniscrews from the 19th month onwards until

CEPHALOMETRIC SUMMARY			
	PRE-TX	POST-TX	DIFF.
SKELETAL ANALYSIS			
SNA° (82°)	83°	83°	0°
SNB° (80°)	88.5°	87°	0.5°
ANB° (2°)	-5.5°	-4°	1.5°
SN-MP° (32°)	28.5°	32.5°	4°
FMA° (25°)	21.5°	25.5°	4°
DENTAL ANALYSIS			
U1 TO NA mm (4mm)	6	8	2
U1 TO SN° (110°)	113.5°	115°	1.5°
L1 TO NB mm (4mm)	4	-1	5
L1 TO MP° (90°)	81.5°	67.5°	14°
FACIAL ANALYSIS			
E-LINE UL (-1mm)	-4	-2	2
E-LINE LL (0mm)	1	-2	3
%FH: Na-ANS-Gn (53%)	52%	58.5%	6.5%
Convexity: G-Sn-Pg' (13°)	0°	8°	8°

Table 2: *Cephalometric summary*

Fig. 17: *Posttreatment panoramic radiograph*

the miniscrews were removed. Miniscrews provide better anchorage to hold the upper dentition and therefore reduce the side effect of flaring upper incisors (Fig. 21).

2. Marginal ridges discrepancy

When retracting the whole arch, bodily movement is not easy to achieve because the orthodontic force is applied on the crowns. Since the force does not pass through the center of resistance of the tooth, it generates a moment that produces the unwanted effect of crowns tipping distally, which is clinically evident as marginal ridge discrepancies (Fig. 22).[11-14]

Marginal ridges discrepancy is a common side effect when retracting the whole arch. It is hard to prevent especially when a large negative overjet is corrected. One way to correct a marginal ridge discrepancy is to reposition the molar brackets near the end of the treatment with the mesial aspect more occlusal to move the root apex further back in order to decrease the marginal ridge discrepancy.

Fig. 18:
The SN-U1 angle formed by SN (orange lines) and maxillary incisors (blue line) increased from 113° (14th month) to 120° (26th month) due to the side effect (flaring upper incisors) of wearing Class III elastics.

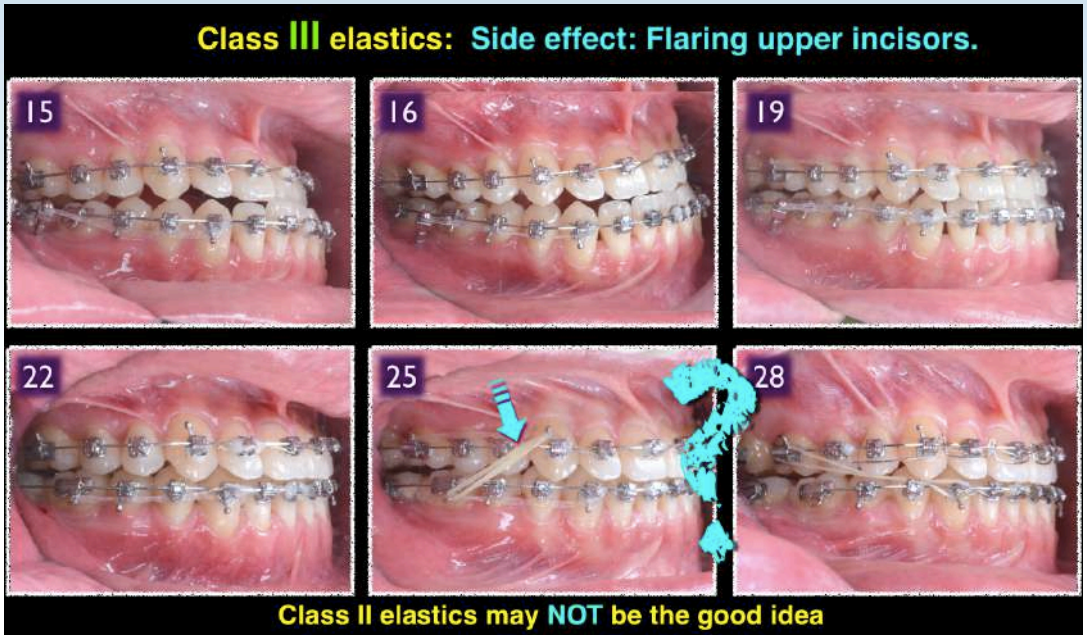


Fig. 19:
In the 25th month, Class II elastics were used in order to correct the flaring upper incisors. However, wearing Class II elastics may not have been the right choice.

Fig. 20:
A more effective and reasonable way to correct flaring upper incisors would have been to use anterior root torque (ART) to create labial root torque together with IZC screws to stabilize the upper incisors.

Fig. 21:
Another reasonable solution would have been to wear Class II elastics from U3 to BS screws (blue line) from the 19th month. This could simultaneously reduce the side effect of flaring upper incisors (light blue circle) while retracting the lower arch.

Conclusions

Sometimes, pursuing a "perfect" outcome can be tiring for both the patient and the clinician. It is good to bear in mind that "nothing is perfect; find the happy medium." It is important for the clinician to understand when to stop the treatment and to reach an outcome which is acceptable to both the clinician and the patient.

In the present case, the patient with a severe 11mm Class III molar relationship refused surgery and wanted a minimally invasive approach. It must also be taken into account that since side effects are

inevitable when using Class III mechanics, it would be nearly impossible to reach a perfect result for this case. However, by finding the happy medium, the treatment resulted in a harmonized outcome that pleased both the clinician and the patient.

Acknowledgments

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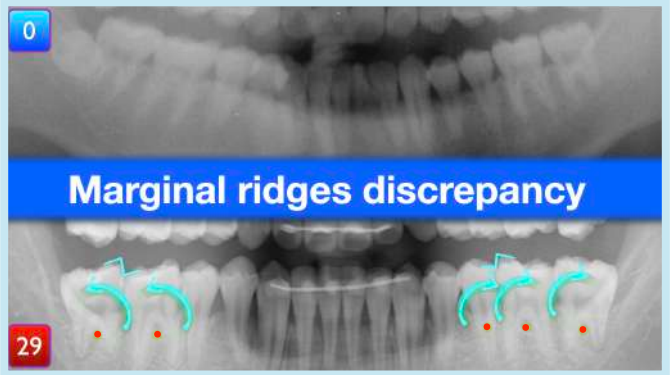

Fig. 22:
Comparison of the pre- (upper) and posttreatment (lower) panoramic radiographs. The marginal ridge discrepancies (blue step) could be clearly evaluated at the end of the treatment (29th month). It is a common side effect when retracting the whole arch because the orthodontic force is applied on the crown, not the center of resistance (red dots). Thus, the force generates a moment (blue arrow) and therefore produces an unwanted crown tip-back effect.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 65

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 = 20

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

Total = 22

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 3

BUCCAL POSTERIOR X-BITE

2 pts. Per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

Each degree < -2° 3 x 1 pt. = 3

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 = 7

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.	= 2
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	5 x 2 pts.	= 10

Identify: This was supposed to be an OGS case, but the patient prefers non-surgery treatment.

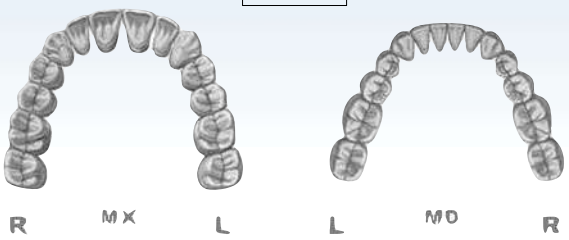
Total = 12

Cast-Radiograph Evaluation

Total Score: 29

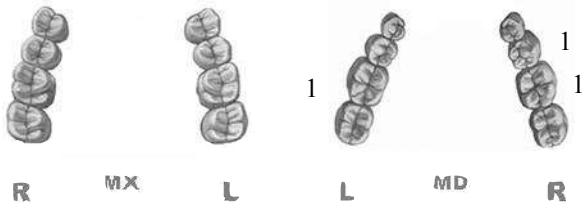
Alignment/Rotations

0



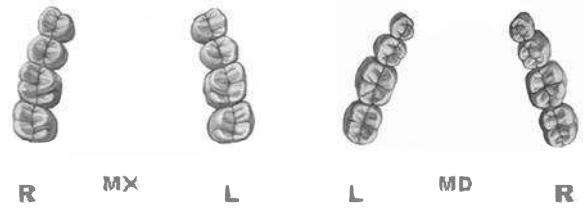
Marginal Ridges

3



Buccolingual Inclination

0

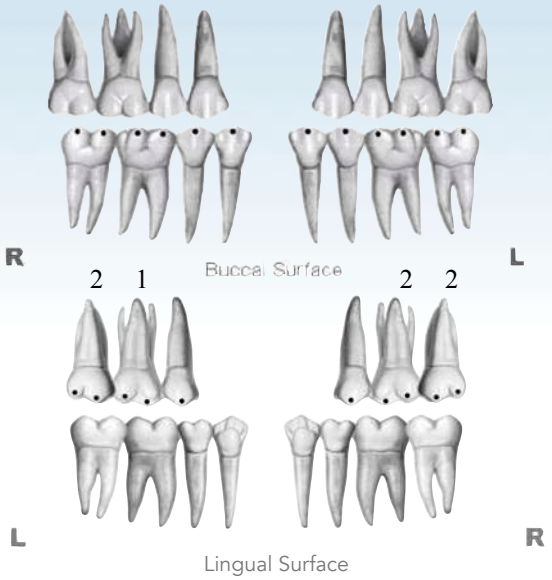


Overjet

0

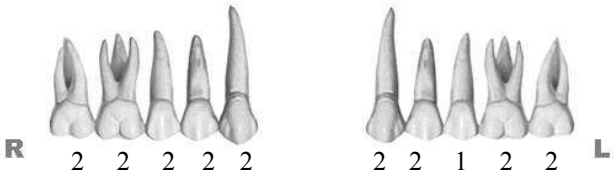
Occlusal Contacts

7



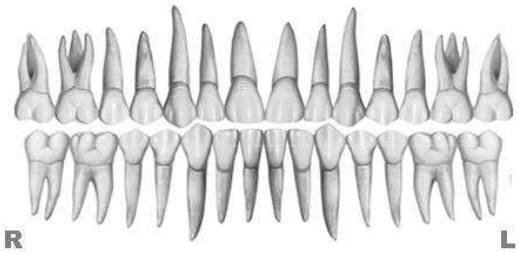
Occlusal Relationships

19



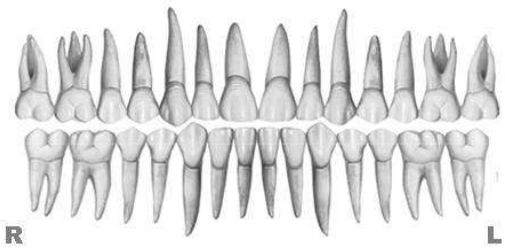
Interproximal Contacts

0



Root Angulation

0



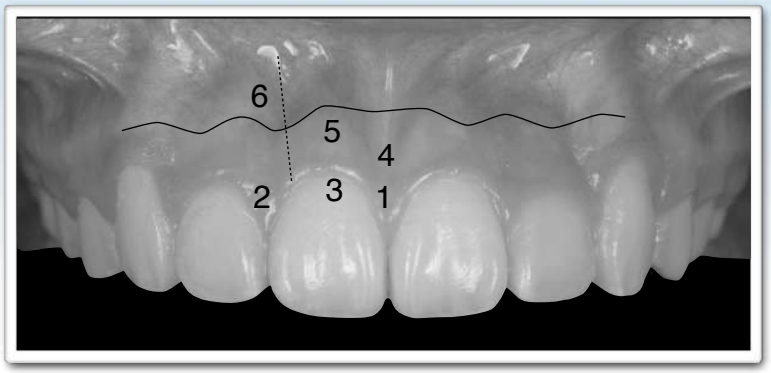
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score = 3

1. Pink Esthetic Score

Total = 1

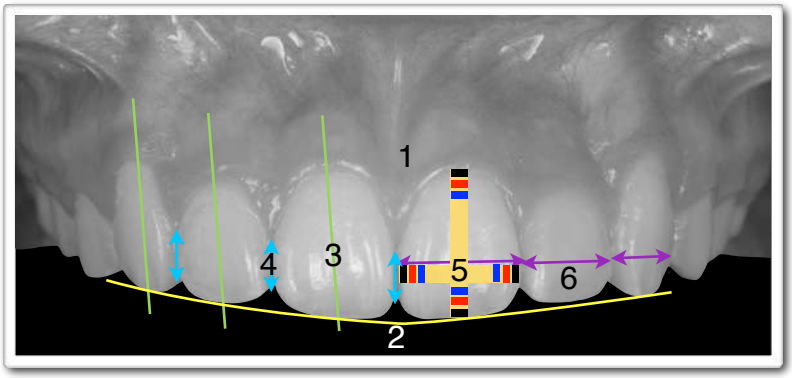


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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 = 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

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

2023 Beethoven

Clinical Education

Beethoven Clinical Education 主要針對修習過 Damon Master Program、並想要繼續獲取更進階臨床與學術訓練的醫師所專門設計的課程。此訓練課程除了新增**學術文章寫作與演講的訓練**，也加入了**骨釘與 VISTA 術式**等操作課程，醫師不僅可以就近學習張慧男醫師的技術與經驗，亦同時培養醫師**期刊寫作**的能力與**高效簡報**的技巧。

修習完 Damon Master Program 與本課程，並完成**兩篇案例報告文章**後，即可取得赴**德國碩士班進修資格證書**。此系列課程能讓醫師在進入德國碩士班之前，做好最充分的準備。


Dr. Chris Chang


Dr. Joshua Lin


Dr. Eric Hsu

ABO Writing Training

Medical Writing Training-1 5/18

Medical Writing Training-2 6/1

Medical writing skills are crucial for clinicians, educators and researchers. This training contains academic medical writing on case reports. Participants will have a chance to publish articles for journals like Journal of Digital Orthodontics (JDO).

Presentation Workshop 6/15

The presentation workshop designed to help participants utilize the most frequently used presentation tools in Keynote to manage patient clinical records and create simple but effective patient communication presentation.

VISTA & 4 other Minor Surgeries for Orthodontic Practice

VISTA Hands-on Workshop 7/6

The VISTA (vertical incision subperiosteal tunnel access) surgical techniques for impacted cuspids will discuss the following topics:

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

TADs & Surgeries Hands-on Workshop

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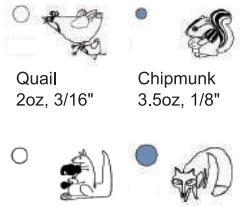

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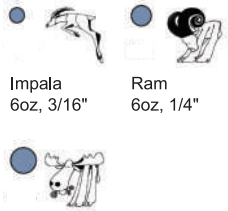

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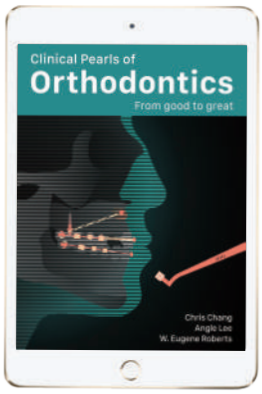

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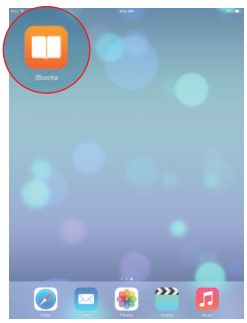

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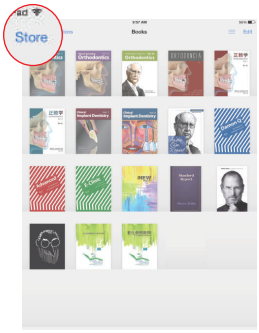

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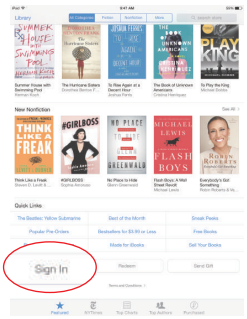

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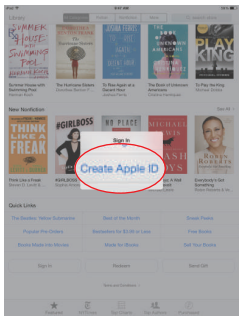

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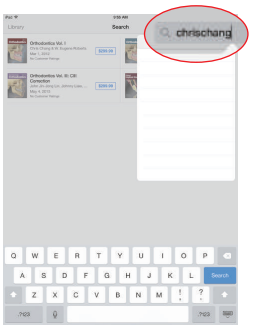

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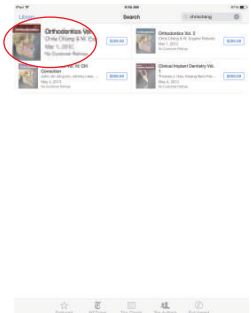

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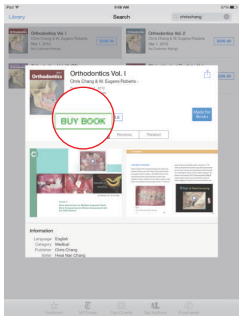

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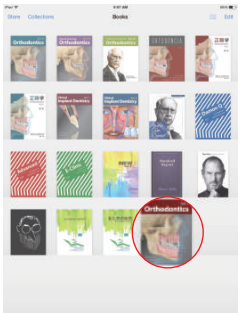

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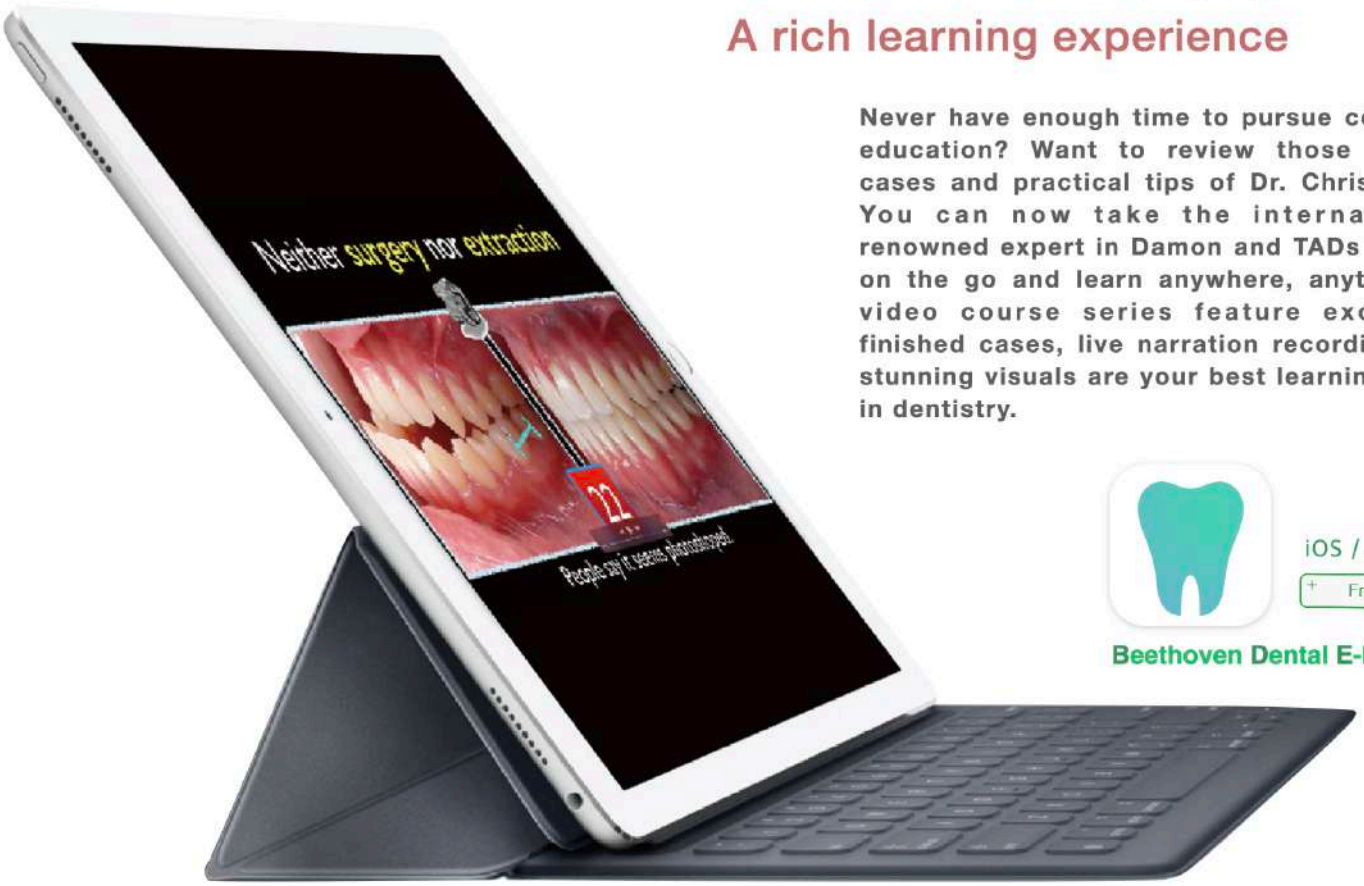

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Feedback on Beethoven's e-Courses

通過潘老師（潘超醫師）知道了張老師的課程，購買了 2019 年正畸大師的課程和支抗釘 (bone screw) 課程，2019 年正畸大師課，我做了 40 頁的筆記，內容真的非常豐富，聽了第一節課就感覺到值了，還和朋友分享。

想分享的感受實在太多了，之前研究生學的修復，畢業後做了矯正，零基礎進入這個專業，現在工作 1 年半了。先聽了張老師支抗釘的課試試水，半年後又忍不住買了正畸大師，用1個月聽完，做筆記，反思自己手上的患者，疫情在家裡封閉4個月反覆回味，4個月後再來看手上的患者，發現原來看不懂的患者可以看懂了，診斷的速度變得更快了，放棄了原來很多複雜的方法，患者輕鬆，自己也輕鬆。並且聽完張老師的課後，對自己提出了一些小要求：

1. 學習拍照，建立檔案；
2. 患者來之前就把思路想好，避免患者在椅子上躺超過1個小時的時間，很累，自己彎腰也很累；
3. 對手上的一些步驟盡量標準化，形成 routine，節省自己的時間；
4. 遇到什麼問題先自己想想，不向老師打伸手牌，這樣做之後收穫反而比直接請教老師還多；
5. 練習基本功。

現在每天晚上回家來，對著患者的檔案分析，一坐一個小時，感覺很有滋味，從反思檔案中也學到很多。本來就很喜歡矯正這個專業，覺得它可以為患者帶去快樂與美，患者在我這裡看到自己的變化經常笑眯眯的來和走，張老師的課讓我更加覺得學習矯正很值得。這個課的價值超過了買下的價格。張老師除了教矯正之外，還傳遞了一些其他的人生智慧，讓剛剛組建家庭，手忙腳亂的我，又重新思考自己的人生方向，比如：

- 理財：

1. 有簡單的生活方式，不養成花錢的習慣，這樣負擔就不會很重；
2. 有了錢先投資給診所，因為診所是賺錢的工具，住家可以住就行了。

- 如何生活：

1. 診所需要有窗戶，這樣抬頭時候心情才會好；
2. 不只讀書，需要鍛鍊身體，身體很重要，他每天都打高爾夫。

- 關於工作：

1. 最好的開業年紀：35-40歲，一開始先在公家單位磨練，因為醫療有一定危險性；
2. 器械再貴，都沒有醫生的時間貴，也沒有心情貴，末切鉗子買好一些；
3. 正畸是一種藝術，高爾夫、繪畫、小提琴、吉他中得到的練習和思維方式，帶回到正畸當中去；
4. 3 分鐘沒有想出這個患者的治療方案，就會讓助理打印出來治療方案，放在自己家裡的牆上，看到了就想一想。現在也在學習這種辦法，把知識點貼在廁所牆上看，還需要繼續實踐。

另外，在公立醫院工作，除了做矯正之外，還需要承擔給學生教學的任務，聽了張老師的教學之後，發現張老師的語言很接地氣，可以用幾句簡單的句子把一個複雜的理論說清楚，並且張老師有效的教具，讓我對自己的教學方式產生了反思：往往用一張有用的幻燈片，幾個 actions ，一張圖表就可以說清楚的問題，何必和同學們講半個小時，還聽不明白呢？

當然也動心想購買 iPad，學習 keynote，剛出來工作，現在還需要存點錢。聽課做的筆記，其中的精華就很多了，值得去反覆的思考也值得反覆去看，每看一遍都有新的收穫。

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Reference: Failure Rates for SS and Ti-Alloy Incisal Anchorage Screws: Single-Center, Double Blind, Randomized Clinical Trial (J Digital Orthod 2018;52:70-79)

** The overall success rate of 93.7% indicates that both SS and TiA are clinically acceptable for IZC BSs.
Reference: Failure rates for stainless steel versus titanium alloy infrazygomatic crest bone screws: A single-center, randomized double-blind clinical trial (Angle Orthod 2019;89(1):40-46)

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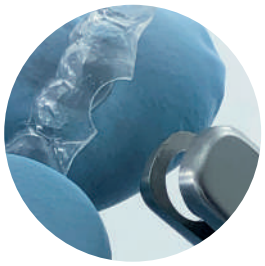

OLS-1501 Hole-Punch 6mm, TC inserts


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OLS-1505 Horizontal plier


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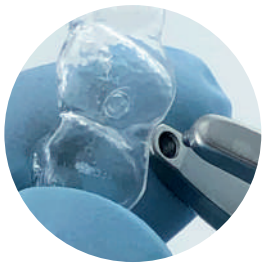

OLS-1510 Point elevation plier 1,5mm


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Chapter 8.

Maximizing Spaces and Resources - Front yard aviary with water features

"I love how you respect the tree, not just cutting it off like most people do." – *Mr. Filippo Impieri (SVP, Emerging Markets, Envista)*

Let's begin this chapter with a story of another of the Changs' neighbors, on his daily stroll. Upon passing the Changs' garage, something caught his attention and forced him to stop his steps to ponder thereupon. "The design of this garage ceiling is most curious!" he must have thought to himself. Having retired from a fairly large construction company, he is familiar with all sorts of popular front yard/garage designs that suit the lifestyles and likings of Taiwanese households, but never has he seen anything like this. A bright "*chirp!*" interrupted his train of thought as he realized the double-layered ceiling he was looking at, built with bulletproof glass on the top layer and mesh on the sides and the bottom layer, was actually an aviary – or to be more exact, part of an aviary.

As the Chang family's love for birds grows, so does the number of feathered residents in their household. Therefore, after they started planning the garage renovation, the idea of a front yard aviary followed. And this is when everything gets doubly exciting and inspiring.

In front of the house stands a 20-year-old Bishop Wood tree (*Bischofia javanica*). According to the residents' committee, it has been there since before the community was developed. Instead of having the flourishing tree removed, Dr. Chang was determined to make it an outstanding feature of the front yard aviary. However, incorporating it into the aviary design became something of a challenge. Completely containing a tree that is more than two stories tall (and still growing) within the walls of an aviary is definitely not a wise idea or solution. Furthermore, even if only the tree trunk were to be included in the aviary, with the top branches extending beyond the

Fig. 1: With a 20-year-old bishop wood, which extends beyond the mesh of the aviary, a hard+soft approach was taken during the closing of the ceiling around the tree trunks. The metal frames should reserve enough spaces around the trunks, with soft, flexible materials (such as wasted tires, canvases, hoses, ropes, etc.) neutralizing the compression formed at the connecting points.

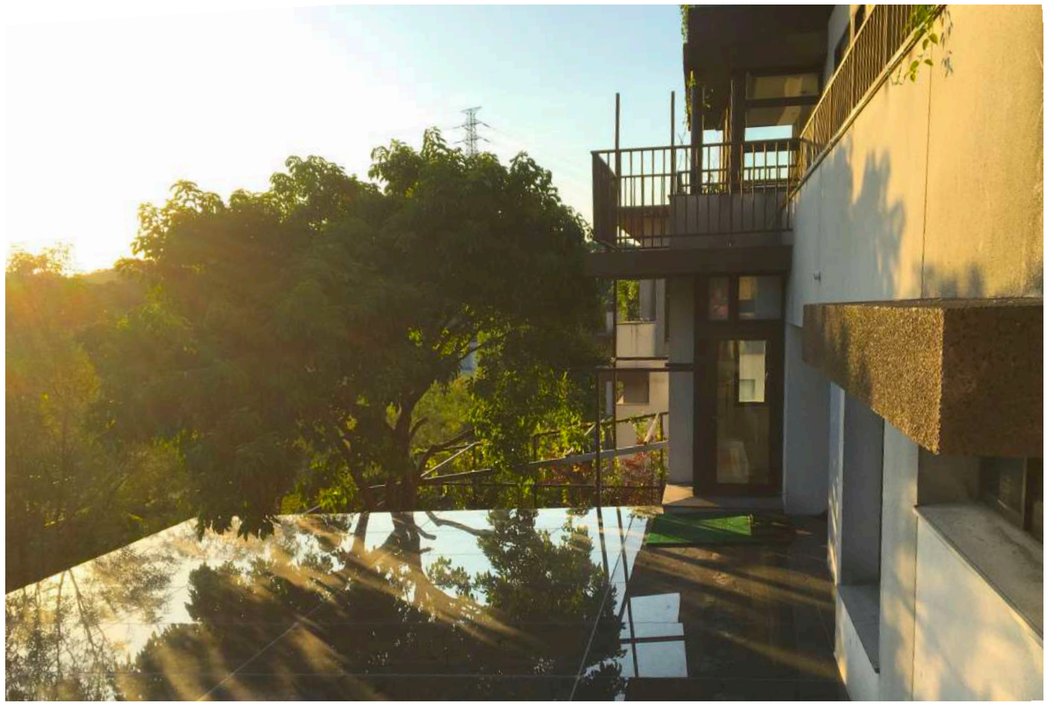


Fig. 2: Sunlight filtering through the leaves and branches of the bishop wood creates a harmonious yet splendid play between the light and the shadow. Imagine the same view without the tree. How much plainer and less intriguing it would be!

enclosure of the mesh ceilings, a crucial question remains: how should the interface be connected so as not to cause harm to the tree while at the same time making sure that the structure is firm and secure enough for the birds?

The worst thing to do would be fixating solid, metal components directly around the tree, as any changes or movements (in particular those from typhoons and/or earthquakes) could eventually snap the structures. Instead, sufficient space should be reserved between the metal components and the tree, with flexible materials tucked in-between to create buffering areas (Fig. 1). This is not only to prevent the precious birds from getting through the gaps and flying away, but more importantly, to serve as cushions so that the

Fig. 3: One particular room on the second floor looks out directly to the bishop wood. A door, which leads to the roof of the garage (the bulletproof glass top of the extended aviary) was opened to allow access from the room to the roof, which also serves as a deck for Dr. Chris's beloved cacti to sunbathe (see also page 87, top right corner).

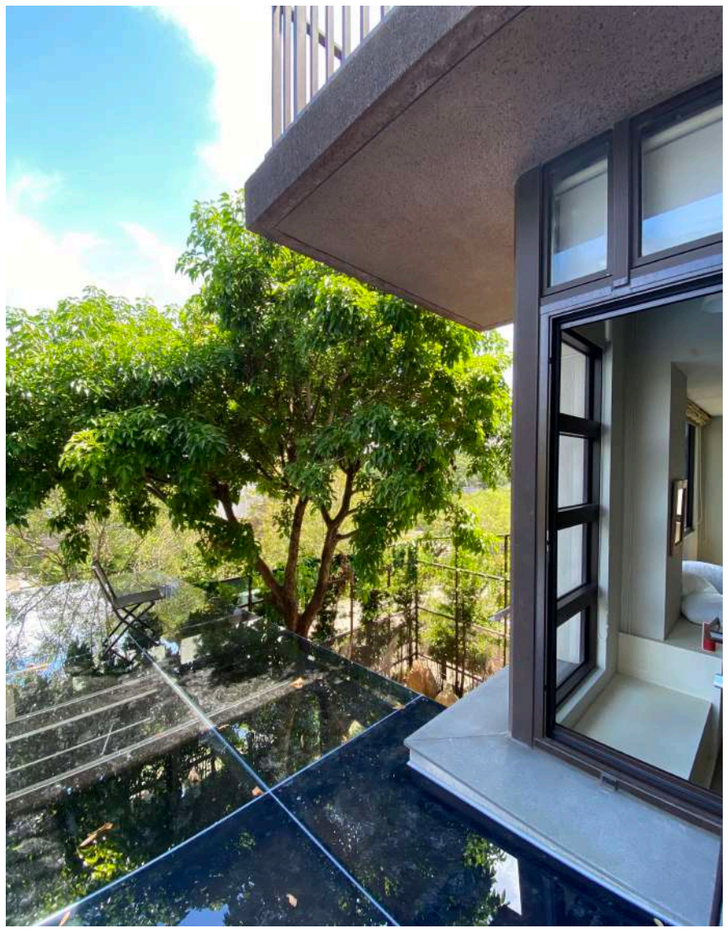


Fig. 4: Lying among the burgeoning trees and bushes, the pond adds depth and a trace of mystery to the aviary. A tap was installed on the side to dispense hot water, turning the pond into an indulgent outdoor hot tub.

compression force at the connecting points can be contained and neutralized.

The other highlights of the Changs' front yard aviary are the water features - a pond and a water fountain. A riverbed design was chosen for the pond with an eye to enhancing the feeling of being surrounded by nature. After digging out the shape of the pond, plastic liner was used as a barrier to prevent pond water from being absorbed into the ground, in other words, transforming the hole into a huge water storage tank. To avoid tearing the plastic liner, non-woven cloth was placed on both the top and the bottom of the liner as protection. On top of that, drainage trays were paved for an extra, stronger layer of barrier before stones were added in to complete the base (Fig. 5). At the corner of the pond, a cascade was created by pumping the pond water to a designated high point and letting it flow naturally back down into the pond, with a skimmer at the far low end of the pond to trap fallen leaves and branches. To elevate the level of indulgence, a tap was installed on the side to dispense hot water, which turns the pond into an outdoor hot tub!

Adding to the fun, a water fountain, also in an unadorned, stony style, was planted among the greens (Fig. 7). Like any other devices that rely on water circulation, the three essential parts are water storage,

Fig. 5: For practicality, different liners were used to build the pond; however, they are nowhere to be seen in the completed landscaping. The devil is in the details, just like how the finishing steps in orthodontic treatment are what elevate the outcome from good to great.

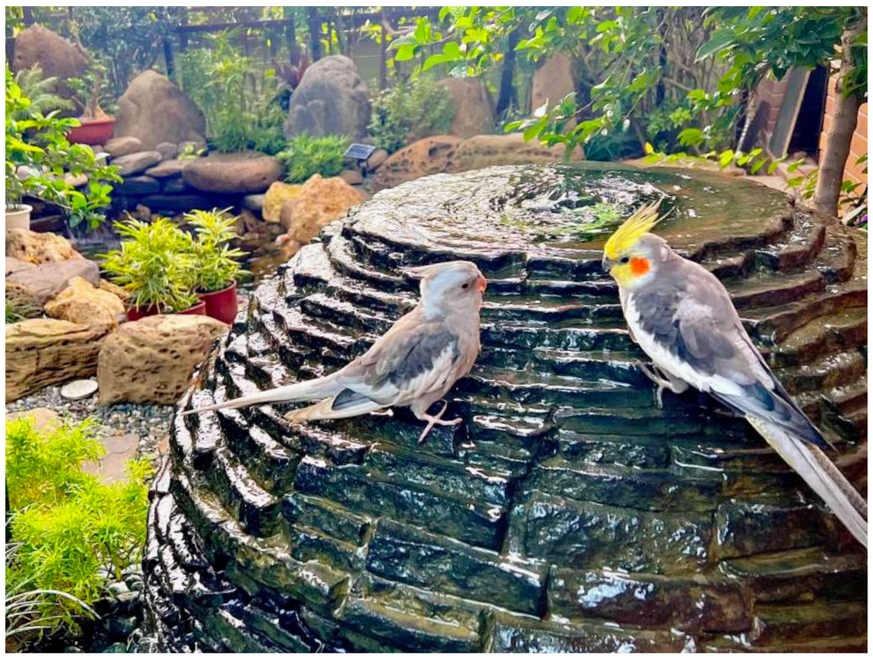
Fig. 6: Big rocks around the pond are perfect seats to enjoy an outdoor concert! It's a treat combining music, bird songs, as well as water dribbling, leaves rustling in the winds, and all the magical sounds of nature.

the filtration system, and the pump. (Revisit chapter 1 for a detailed guide on building a complete filtration system.) At the base, a hole was dug in the ground to fit the plastic storage tank of the fountain, the lid of which has several gaps that allow water to flow through. On top of that, a layer of non-woven cloth and pebbles was laid to serve a filtering function, with the latter also adding sensuous pleasure and giving the aviary landscaping a further hint of nature. Once the pump has been sat in place, the fountain exterior of choice can be installed. And voilà! The only thing remaining on the to-do list is to sit back and enjoy as the water trickles down.

The birds in the aviary are probably the biggest fans of the fountain. On the one hand, the circulation keeps the water fresh for the birds to quench their thirst. On the other, the gentle dribbling at the bottom of the fountain provides just the perfect amount of water for the birds to clean their little bodies and beautiful feathers (Figs. 8 and 9). While still water symbolizes depth and profundity, running water brings life and vitality. The Changs' front yard aviary exquisitely incorporates all these fascinating characteristics into one.

Aside from the original front yard garden area, the aviary extends all the way to the ceiling of the garage mentioned in the beginning of this chapter, making use of the vertical spaces that are often left idle. Upon being asked what happens when bird faeces land all over the car, Jenny - Dr. Chang's youngest daughter - replied with a bubbly smiling voice: "In our home, birds are far more important than cars, so that's not a problem!" Dr. Chang and his family love the new front yard aviary so much that they eat meals, work, and spend their leisure time immersed in it, especially

Fig. 7: Moving water not only brings auditory pleasure, but is also visually pleasing and soothing to look at.



Figs. 8 & 9: The fountain exterior design provides steps for the birds to perch while getting hydrated. At the bottom, the birds make use of the gentle dribbling to clean their beautiful feathers.

Fig. 10: Mr. Filippo Impieri (right) was warmly welcomed by Dr. Chang's two daughters, Jenny (center) and Kristine (left), as well as the vivid-colored birds in the aviary.

as the day and night as well as weather changes bring out all differing kinds of beauty of the space.

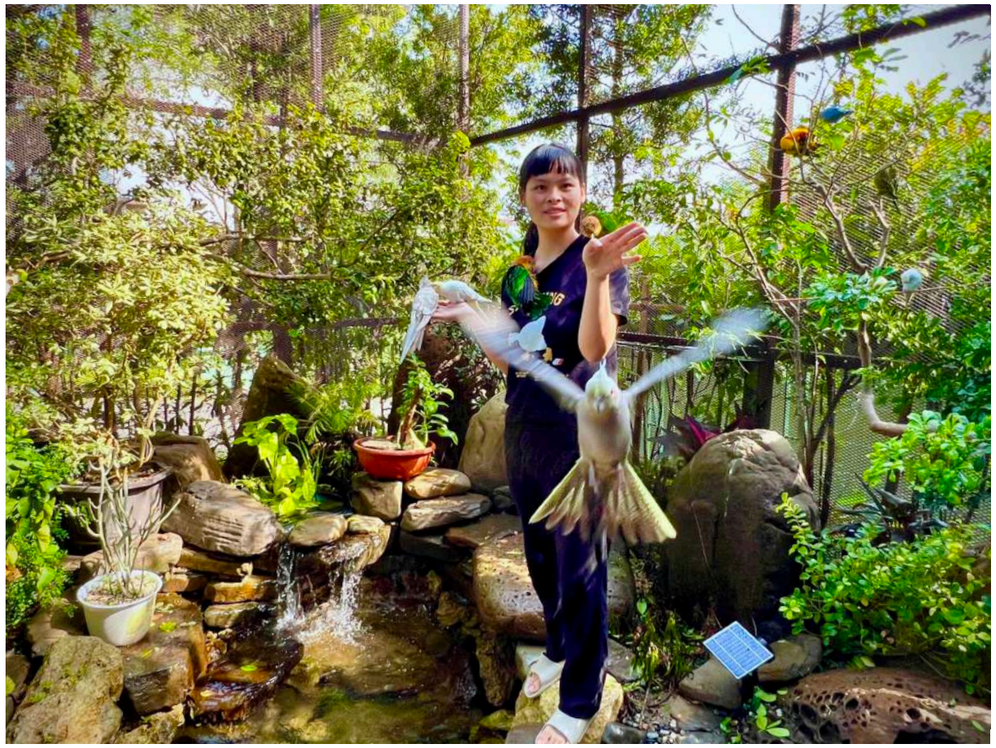
Recently with the Taiwanese border gradually reopening to the world, the Chang family had the chance of hosting their first guest from abroad, Mr. Filippo Impieri, Envista's Senior Vice President (SVP) of Emerging Markets. After being shown the newly completed front yard aviary, Mr. Impieri commented "I love how you respect the tree, not just cutting it off like most people do." Through all the spaces reserved and designed for the living creatures within the household, *respect* is the tune to which every arrangement sings and dances, and this reciprocally allows the creatures it hosts to sing and dance their natural songs and dances so beautifully to their hearts' content.

Desk editor of JDO & a wildlife enthusiast*

Annie Chen

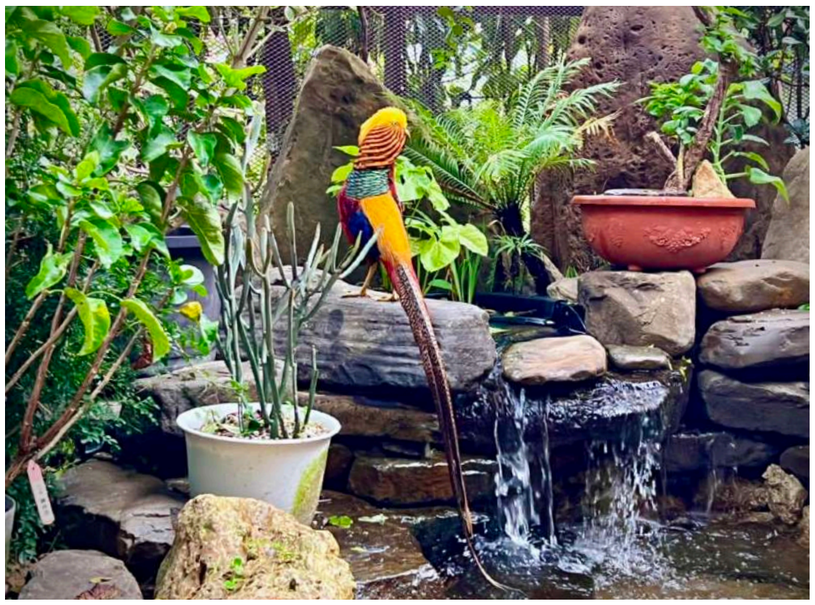
*Title bestowed by Dr. Chris Chang

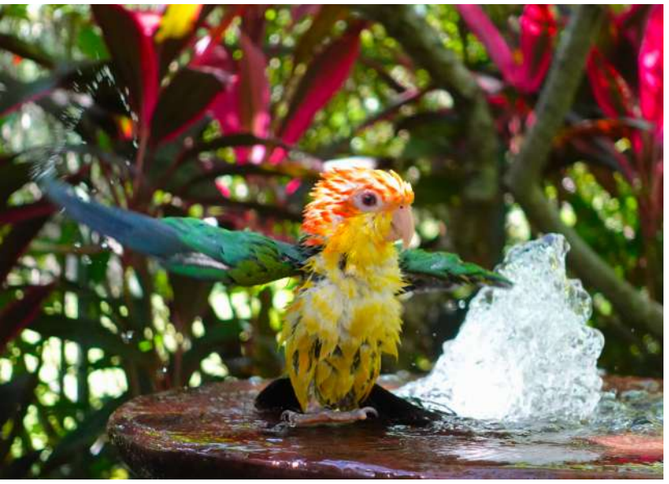
Special thanks to Mr. Paul Head for refining this article

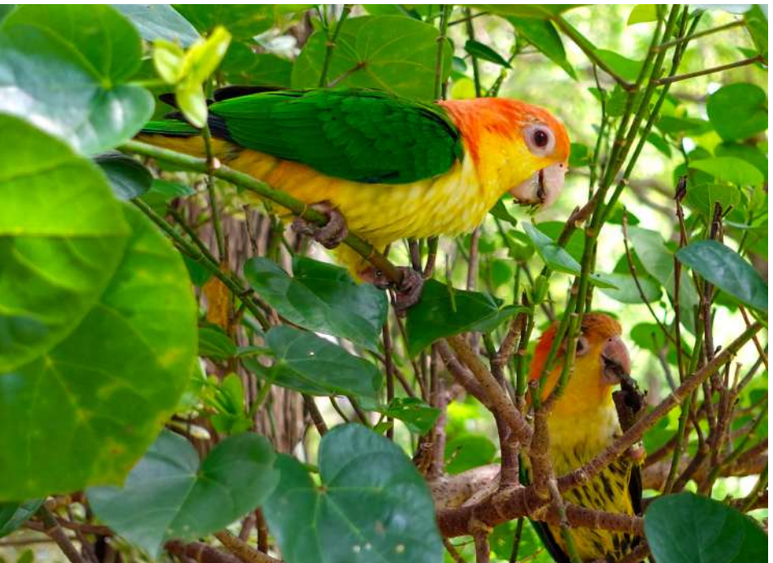


In early December, 2022, Dr. Kenji visited the Changs' residence after the TAO 2022 Annual Meeting.

Two of Beethoven's former orthodontic patients, Heather and Pei-Chien, visited the Changs' aviary at the beginning of 2023. Best wishes to them both - Heather for her ongoing professional golf journey in the U.S., and Pei-Chien for the beginning of a career as a commercial flight pilot. Enjoy the best time of your life!







Fallen branches and sticks of different thickness are fastened all around in the aviary as auxiliary perches from which the birds can find the one(s) that best suit(s) their claws. Wild berries, flowers, and seeds are also fasten on the perches to mimic their natural form in the wilderness, encouraging the birds to forage naturally.

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