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In early March, 2023, five of Beethoven's young orthodontists participated in the Graphy Shape Memory Aligner Summit Symposium and the training at Graphy's head office in Seoul, South Korea. The sessions focused on a newly innovated material with shape memory effect, which was cleverly implemented in the production of aligners by the Korean company. With new innovation follow the questions of whether to, and when to, adopt the new idea. Among the five participating doctors disagreement exists. As to Dr. Chang, he has his own decision in mind but is also aware that prediction is difficult. The important thing is that orthodontics is continually evolving, and there is nothing more exciting than that!

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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

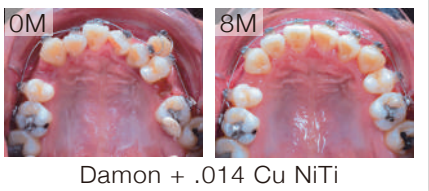
Damon Master

(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**



Damon + .014 Cu NiTi

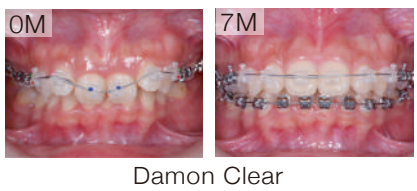
Excellent Finishing

(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**



Damon Clear

Screws & Aligners

International Workshop English Class

The workshop demonstrates how to incorporate TADs and minor surgeries in complex orthodontic treatment, combining world-class lectures, model and surgical hands-on practices, and clinical observation.

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

2024

Class - **11/12-14**

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)

Prediction is Difficult

Last month, we were fortunate enough to have been invited to participate in the first Graphy Shape Memory Aligner Summit Symposium, which was held in Seoul, South Korea. Five of our most active and dynamic young orthodontists had been appointed to participate in this event focusing on the materials and technologies of the next generation in aligners, thanks to the arrangements of my good friend, Dr. Kenji Ojima.

I started to learn orthodontics 35 years ago. At that time, there was an emerging trend which used a new material called shape-memory alloy, a material which remembers its original shape. It was used in NASA's space shuttles since shuttles made from this material could change their shape when entering into the absence of gravity of outer space, and then return to the original shape upon re-entering Earth's atmosphere. This idea inspired orthodontists to consider that this material would be most suitable for applications used in orthodontic correction, as placing crooked wires on the dentition which would return to perfectly curved lines would effectively bring the teeth into an ideal position. Therefore, this shape-memory alloy was applied to orthodontic wires, and of course, many other products, such as glasses frames and women's bras. This application caused a great shock in the field of orthodontics. Similarly, now that Graphy, Inc., from South Korea has recently launched aligners made from shape-memory material, surprisingly it has not attracted considerable attention. The aforementioned Korean symposium provided us with the perfect opportunity to seek a better and clearer understanding of these new aligners.

The evolution of any new technology follows an adoption lifecycle, which includes stages from innovators, early adopters, early majority, late majority, to laggards. Not everyone is able to invent as innovators do, but everyone is able to be an early adopter. However, there are potential crises which early adopters face, such as unforeseen consequences and irresolvable issues, and these may put them under significant pressure. Hence, the opinions of the five young orthodontists participating in the event were polarized. Some believed that it was necessary to adopt them as soon as possible, while others believed that more observation would be advisable and therefore would be better to join the early majority after the product is more mature. Personally, I have often tended to join the early majority. This time, though, is an exception as this technology is just too innovative and too revolutionary. We plan on allocating enough resources to accelerate our entry into this field. Even though there may be setbacks along the way, we are willing to venture on and overcome them. I hope our prediction about this next step of technological evolution will be accurate. Yet, prediction was, has been, and always is notoriously tricky, and you need to be mentally prepared to bear the consequences of your decisions.

It is exciting to see how orthodontics is continually evolving, and this should help us all as we continue along our path to glory.

Chris Chang PhD, ABO Certified, Publisher of JDO

Skeletal Class III Malocclusion with a High Mandibular Plane Angle Treated with Four First Premolar Extractions

Abstract

History: *An 18yr-8mo-old female presented with chief complaints of a prognathic mandible and a protrusive lower lip.*

Diagnosis: *Cephalometric analysis revealed a skeletal Class III relationship (SNA, 75.5˚; SNB 77.5˚; ANB, -2˚), as well as reduced facial convexity (-1˚) and a high mandibular plane angle (SN-MP, 39˚). A functional shift was noted. The upper and lower midlines were both deviated 2 mm to the right of the facial midline, and the chin was also shifted to the right. An intraoral assessment revealed a bilateral full-cusp Class III malocclusion with anterior crossbite. Mild crowding was evident in the upper and lower arches. The Discrepancy Index (DI) was 30.*

Treatment: *A Damon® system appliance with passive self-ligating brackets was applied to correct the malocclusion after extraction of four first premolars. Anterior bite turbos and early light short Class III elastics were used to correct the anterior crossbite. Space closing was also accomplished with elastics. The active treatment was 29 months with no temporary skeletal anchorage devices used.*

Results: *Improved dentofacial esthetics and occlusal function were achieved after the treatment. The overjet was corrected, and the lower lip was retruded. The Cast-Radiograph Evaluation (CRE) score was 16, and the Pink and White esthetic score was 2. The posttreatment panoramic radiograph shows complete space closure and good root parallelism.*

Conclusions: *This case report demonstrates that the use of passive self-ligating brackets helps resolve skeletal and dental Class III malocclusion. Neither orthognathic surgery nor temporary skeletal anchorage devices were necessary. (J Digital Orthod 2023;70:4-21)*

Key words:
Skeletal Class III, full-cusp Class III, anterior crossbite, midline deviation, passive self-ligating brackets, temporary skeletal anchorage devices (TSADs)

** 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.*

Introduction

The patient was an 18 year-8 month-old female with chief complaints of a prognathic mandible and a protrusive lower lip. The pre-treatment facial and intraoral photographs are documented in Fig. 1.

During oral examination, an anterior crossbite was the most obvious feature. Furthermore, a bilateral full-cusp Class III malocclusion was also noted. Mild crowding appeared in the upper and lower dentitions. A skeletal Class III malocclusion was confirmed according to the results of the cephalometric analysis.

After a thorough analysis of the clinical data, orthognathic surgery was considered unnecessary. Therefore, two camouflage treatment options were carefully considered: extraction and non-extraction.

After discussing the pros and cons of each option with the patient, the treatment plan which involved

Hsuan Cheng Chu,
Training Resident, Beethoven Orthodontic Center (Left)
Chun-Hung Chen,
Associate Director, 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)

extraction of four first premolars was chosen. After 29 months of active treatment, an excellent result was achieved without temporary skeletal anchorage devices (TSADs).

Diagnosis

The cephalometric analysis (Fig. 2; Table 1) revealed a skeletal Class III malocclusion (ANB, -2°). The mandibular plane angle was high (SN-MP, 39°; FMA,

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

32˚). The lower incisor was slightly flared (L1-to-MP, 93˚), and the upper incisor had a decreased axial inclination (U1-to-SN, 102.5˚). There were no signs of Class III dental compensation. The facial profile was concave (G-Sn-Pg', -1˚) with a retrusive upper lip (-3 mm to the E-line) and a protrusive lower lip (1 mm to the E-line). An increased vertical dimension of occlusion was revealed (%FH: Na-ANS-Gn, 55%).

The panoramic radiograph (Fig. 3) was consistent with good dental health. No dental caries was present, and no periodontal bone destruction was detected. Three wisdom teeth were either fully or partially erupted and reasonably well-aligned (Fig. 3). Plaster casts revealed a negative overjet, mild crowding in the upper and lower arches (upper: 4 mm, lower: 3 mm), and bilateral full-cusp Class III molar relationship (Fig. 4). Temporomandibular joint (TMJ) morphology was normal in the open and closed positions (Fig. 5). There were no signs nor symptoms of temporomandibular dysfunction (TMD).

The upper and lower midlines were deviated 2 mm to the right of the facial midline. The chin was also shifted 2 mm to the right. Gingivitis was present

Fig. 2: *Pre-treatment cephalometric radiograph*

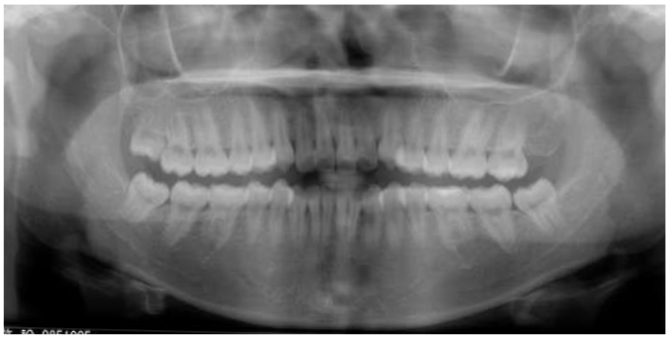


Fig. 3: *Pre-treatment panoramic radiograph*

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-TX	POST-TX	DIFF.
SNA˚ (82˚)	75.5˚	75.5˚	0˚
SNB˚ (80˚)	77.5˚	77.5˚	0˚
ANB˚ (2˚)	-2˚	-2˚	0˚
SN-MP˚ (32˚)	39˚	37˚	2˚
FMA˚ (25˚)	32˚	30˚	2˚
DENTAL ANALYSIS			
U1 TO NA mm (4mm)	8	6	2
U1 TO SN˚ (104˚)	102˚	107˚	5˚
L1 TO NB mm (4mm)	7.5	1	6.5
L1 TO MP˚ (90˚)	93˚	86˚	7˚
FACIAL ANALYSIS			
E-LINE UL (-1mm)	-3	-4	1
E-LINE LL (0mm)	1	-4	5
%FH: Na-ANS-Gn (53%)	55%	55%	0%
Convexity:G-Sn-Pg' (13˚)	-1˚	-1˚	0˚

Table 1: *Cephalometric summary*

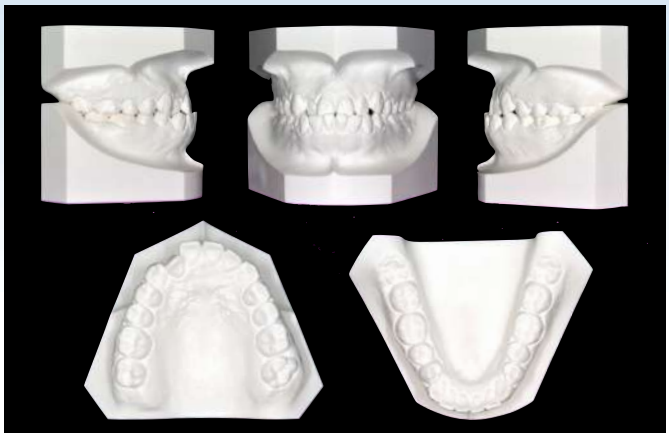


Fig. 4: *Pre-treatment study models (casts)*

Fig. 5 :
Pre-treatment TMJ transcranial radiographs show the right (R) and left (L) sides in the rest and open positions. From the left to right are: right TMJ rest, right TMJ open, left TMJ open, and left TMJ rest.

around UR2 and lower anterior teeth. A mild functional shift (2 mm anteriorly) was noted (Fig. 6).

The American Board of Orthodontics (ABO) Discrepancy Index (DI) was 30 as shown in the subsequent Worksheet 1.[1] The most significant problem was the anterior crossbite (10 points).

Treatment Objectives

1. Correct the anterior crossbite by retracting the lower anterior teeth.

Fig. 6:
Functional shift: (left) Centric relation; (right) Centric occlusion

2. Improve facial esthetics, and correct the protrusive lower lip.

3. Achieve Class I molar and canine relationships.

Treatment Alternatives

According to Lin's 3-Ring Diagnosis,[2] orthognathic surgery was unnecessary, so two camouflage treatment options were considered.

Option 1: Extract 3rd molars to provide space for lower arch retraction, and use TSADs on the buccal shelves as anchorage. This option has the advantage of extracting fewer teeth than option 2.

However, the disadvantages are obvious:

1. It is time-consuming to retract the whole lower arch and relieve the crowding.

2. It is an inefficient approach to correct the lower lip protrusion. Option 1 achieves less lower incisor retraction than option 2.

Option 2: Extract all 1st premolars and 3rd molars to relieve crowding, and correct the molar relationships by moving the upper molars anteriorly and retracting the lower anterior teeth.

The advantages of this option are more efficient lower lip retraction and faster crowding relief due to 1st premolar extraction spaces. The disadvantage is that more extractions are required.

After a thorough clinical data analysis and discussion with the patient, option 2 was chosen - extraction of all 1st premolars and 3rd molars. Anterior bite turbos and Class III elastics were also used to assist with the correction.

Treatment Progress

The archwire sequence is summarized in Table 2; treatment progress is documented from the right buccal, frontal, left buccal, upper occlusal, and lower occlusal views, respectively (Figs. 7-11). The detailed treatment mechanics are presented in Table 3.

A 0.022-in Damon® Q fixed appliance (Ormco, Brea, CA) with passive self-ligating (PSL) brackets was

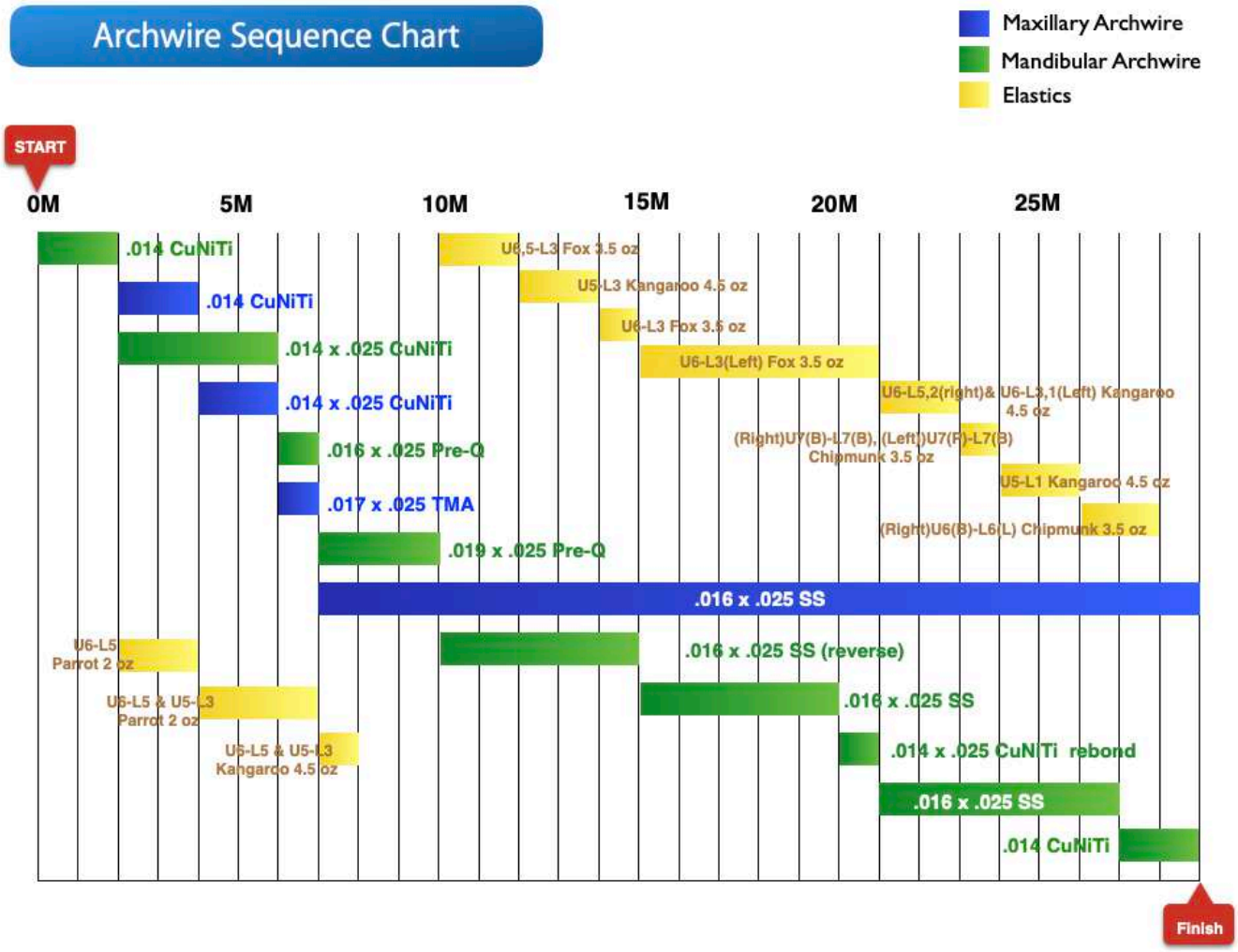


Table 2:
The archwire sequence chart is a treatment timeline for the procedures involved in managing the malocclusion: archwire changes, adjustments, and elastics. Posterior intermaxillary relationships were corrected with contraction adjustments. (Pre-Q = pre-torqued)

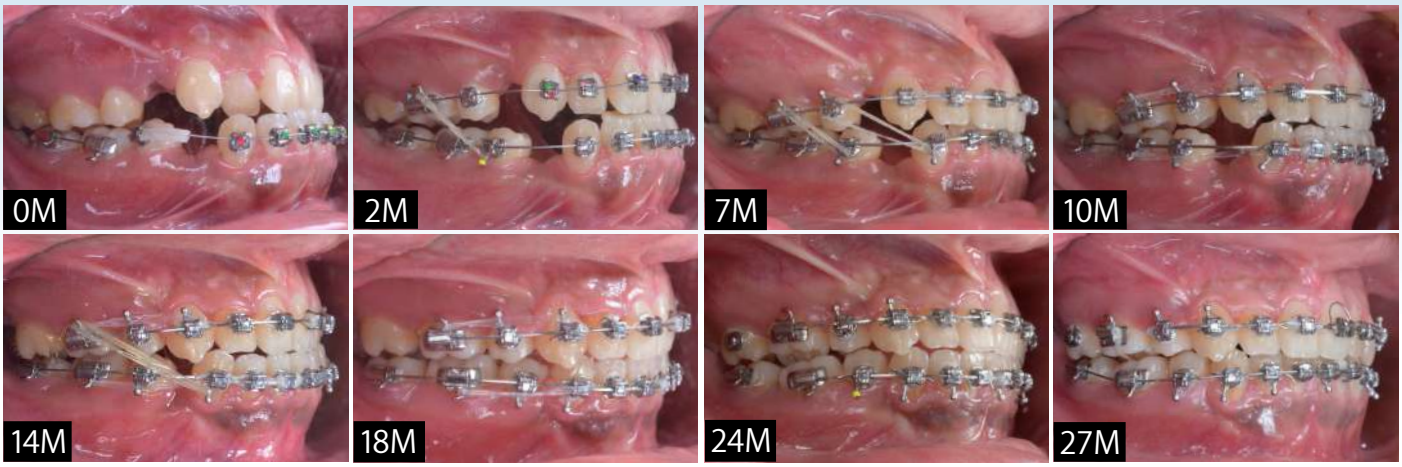


Fig. 7: Treatment progression from the right buccal view is shown from the start (0M) to twenty-seven months (27M) of treatment.

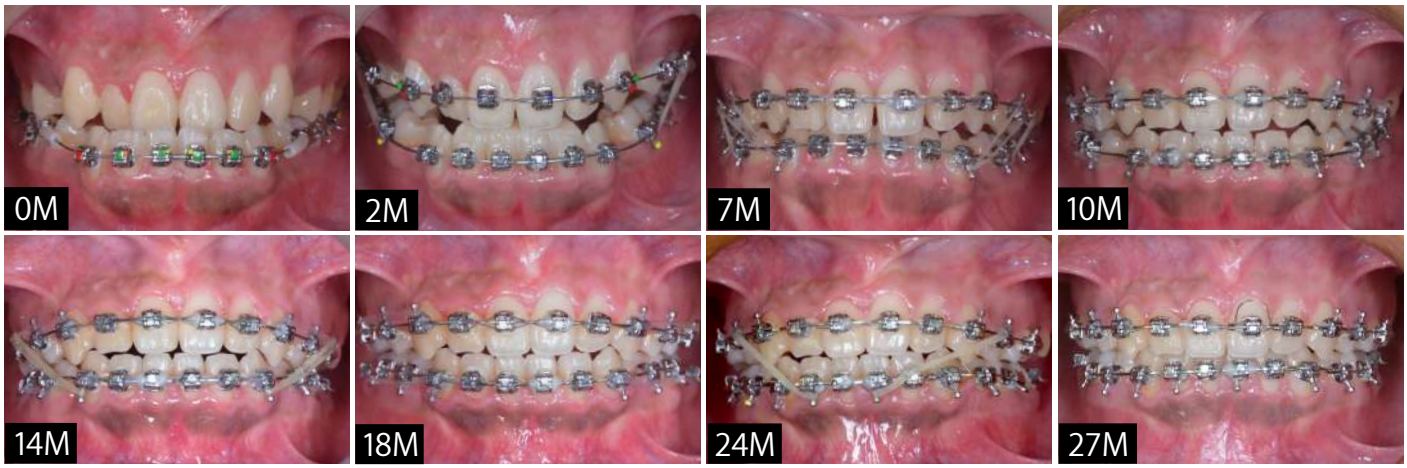


Fig. 8: Treatment progression from the frontal view is shown from the start (0M) to twenty-seven months (27M) of treatment.

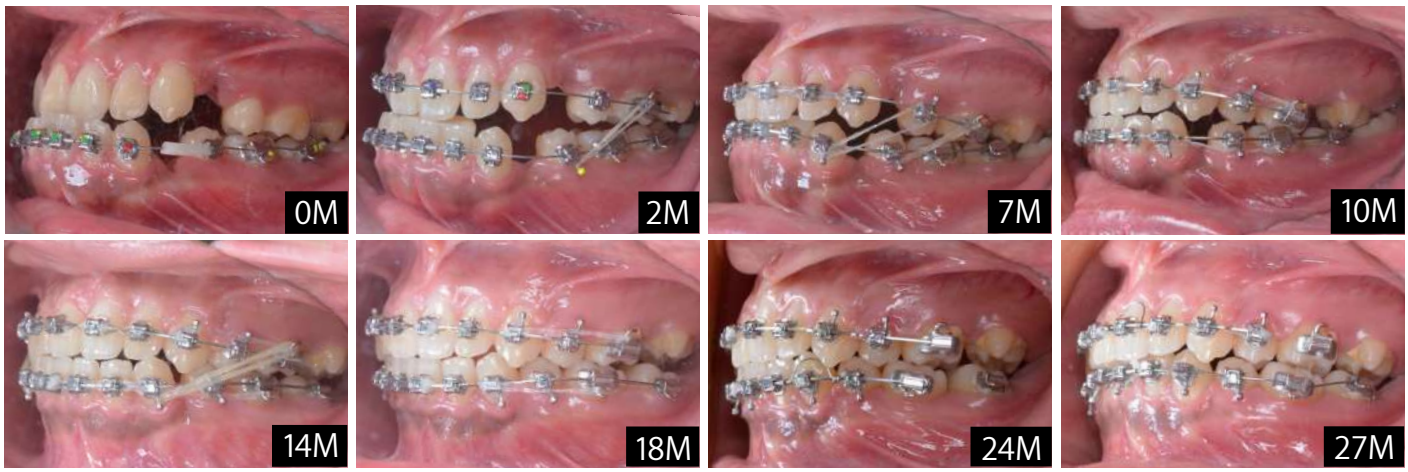


Fig. 9: Treatment progression from the left buccal view is shown from the start (0M) to twenty-seven months (27M) of treatment.

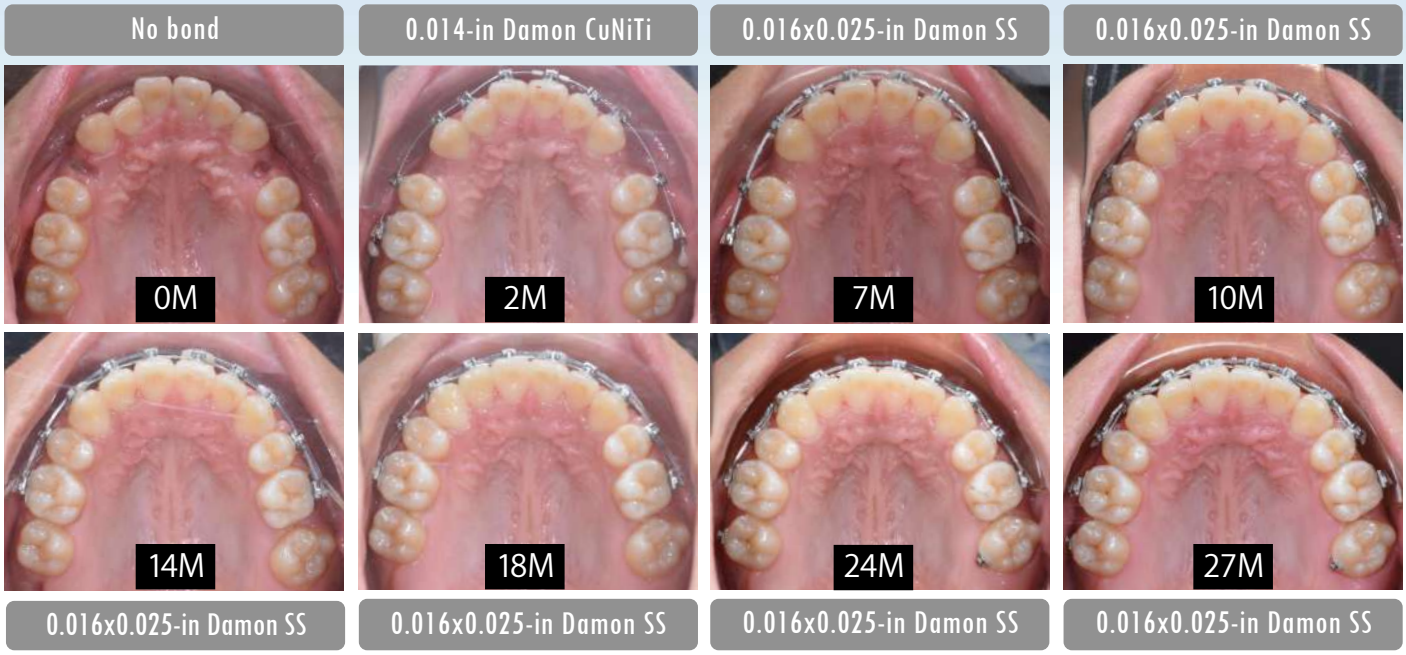


Fig. 10: Treatment progression from the maxillary occlusal view is shown from the start (0M) to twenty-seven months (27M) of treatment.

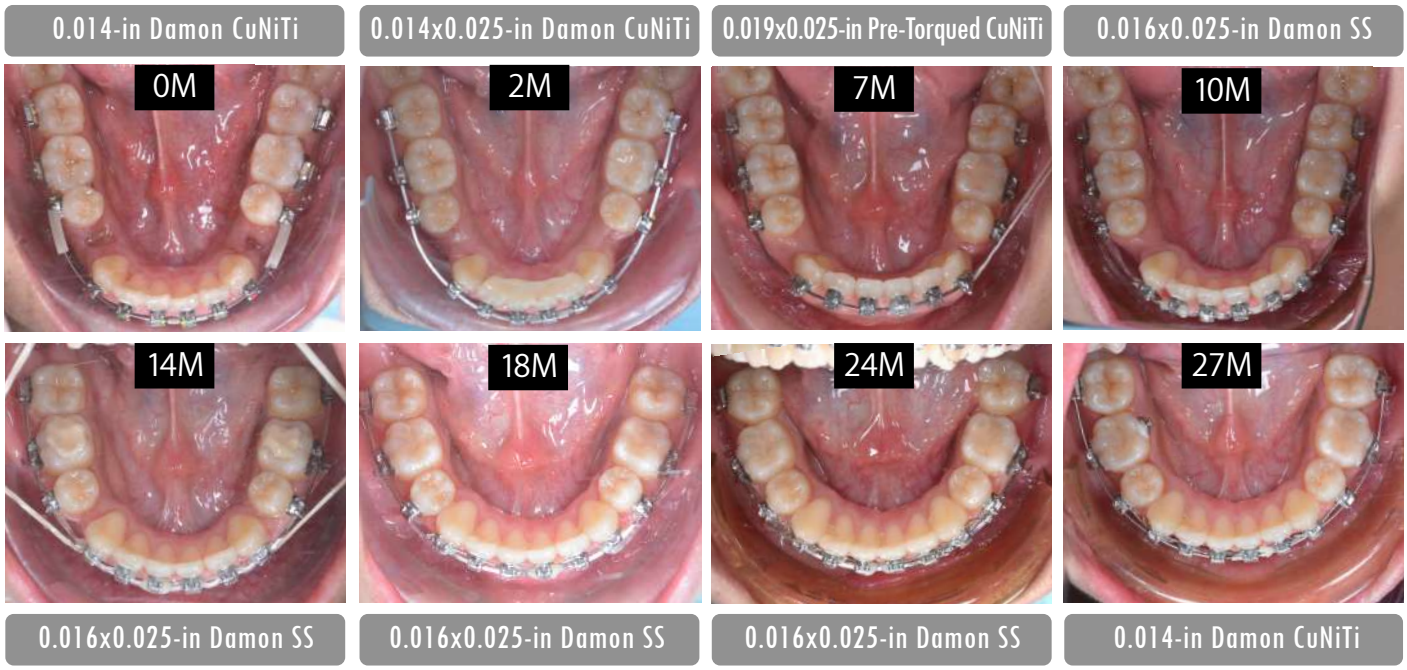


Fig. 11: Treatment progression from the mandibular occlusal view is shown from the start (0M) to twenty-seven months (27M) of treatment.

Appointment	Archwire	Notes
1 (0 month)	L : 0.014-in CuNiTi	L4s were extracted prior to treatment. Bond all lower teeth except L8s, which were planned to be extracted. High torque brackets were selected.
2 (2 months)	U: 0.014-in CuNiTi L : 0.014x0.025-in CuNiTi	U4s were extracted prior to treatment. Bond upper teeth except U7s due to the anomalous morphology of UL7. High torque brackets were selected for canines, and standard torque brackets for incisors. Build anterior bite turbos on lingual side of lower incisors to facilitate overjet correction. Start using early light short Class III elastics (Parrot, 5/16-in, 2-oz) from U6s to L5s to retract mandibular anteriors.
3 (3 months)		Rebond UL6 to adjust tooth position.
4 (4 months)	U : 0.014x0.025-in CuNiTi	Apply Class III elastics (Quail, 3/16-in, 2-oz) from U6s to L5s and from U5s to L3s to retract mandibular anteriors. Put drop-in hooks on U5s and L3s to facilitate placement of elastics. Start using power chains to close spaces.
5 (6 months)	U: 0.017x0.025-in TMA L : 0.016x0.025-in pre-torqued CuNiT	The negative overjet was corrected; anterior bite turbos were removed. Use pre-torqued archwire on the lower arch to compensate the side effects of Class III elastics.
6 (7 months)	U: 0.016x0.025-in SS L: 0.019x0.025-in pre-torqued CuNiT	Change Quail (3/16-in, 2-oz) Class III elastics to Kangaroo (3/16-in, 4.5-oz). Place stronger pre-torqued archwire on lower arch to further control the side effects of Class III elastics. Reactivate power chains to close spaces.
7 (8 months)		Stop Class III elastics. / Reactivate power chains to close spaces.
8 (10 months)	L: 0.016x0.025-in SS (reversed)	Restart Class III elastics (Fox,1/4-in, 3.5-oz) from U5s, U6s to L3s. Bent the lower archwire with reverse Curve of Spee to correct the drawbridge effect resulted from space-closing mechanics. Add 15˚ buccal crown torque for LL1, LL2, LR1, and LR2 with a 3rd order bend.
9 (12 months)		Apply Class III elastics from U5s to L3s (Kangaroo, 3/16-in, 4.5-oz). Place posterior bite turbos on LR6 and LL6. Replace power chains to close spaces.
10 (14 months)		Replaced Class III elastics (Fox,1/4-in, 3.5-oz) from U6s to L3s. Close space with power chains and power tubes.
11 (15 months)	L: 0.016x0.025-in SS	Applied Class III elastics (Fox, 1/4-in, 3.5-oz) from U6 to L3(left side) to correct Class III malocclusion. Replaced power chains and power tubes to close spaces. Changed lower archwire to normal non-reverse-Curve-of-Spee 0.016x0.025-in Stainless Steel wire.

Table 3: *Detailed treatment sequence for all procedures (Continued on the next page)*

Appointment	Archwire	Notes
12 (16 months)		Remove posterior bite turbos. Replace power chains and power tubes to close spaces.
13 (18 months)		Close space with power chains.
14 (19 months)		Replace power chains and power tubes to close spaces.
15 (20 months)	L : 0.014x0.025-in CuNiTi	Rebond LL3, LL6, LL7, and LR5 to adjust tooth positions.
16 (21 months)	L : 0.016x0.025-in SS	Change Fox (1/4-in, 3.5-oz ,left side only) Class III elastics to Kangaroo(3/16-in, 4.5-oz, bilateral) to correct Class III malocclusion.
17 (23 months)		Place buttons on UR7 (buccal side (B)) and UL7 (palatal side (P)) to facilitate elastics placement. Apply elastics (Chipmunk, 1/8-in, 3.5oz) from UR7(B) to LR7(B). Apply elastics (Kangaroo, 3/16-in, 4.5-oz) from UL7(P) to LL7(B). Cut the lower archwire from L6s. Replace power chains to close spaces.
18 (24 months)		Overjet was relapsed to -0.5 mm. Apply Class III elastics from U5s to L1s (Kangaroo, 3/16-in, 4.5-oz) to correct the negative overjet. Use torquing spring on LR3 to increase buccal root torque.
19 (25 months)		Archwire adjustment to correct the position of UR1 and UR2.
20 (26 months)		Place buttons on LR6(lingual side) to facilitate elastics placement. Apply Chipmunk (1/8-in, 3.5oz) from UR6 (B) to LR6 (L) to correct buccal crossbite. Remove torquing spring on LR3. Adjust archwire to correct the position of LL3.
21 (27 months)		Use torquing spring on UL1 to increase lingual root torque. Cut the upper archwire from U5s to facilitate occlusion adjustment.
22 (28 months)		Stop elastics. Adjust archwire to correct UR1 position.
23 (29 months)		All appliances removed. Anterior fixed retainers bonded. Removable clear overlay retainers delivered for both arches. Instructions provided for home hygiene and maintenance of the retainers.

Table 3: *Detailed treatment sequence for all procedures (Continued from the previous page)*

selected along with all specified archwires and orthodontic auxiliaries. At the start of treatment, brackets were bonded on all lower teeth except L4s and L8s. High-torque brackets were placed on the lower canines, and low-torque brackets were bonded upside down on the lower incisors to provide additional lingual root torque. The purpose of this bracket selection was to facilitate more lingual root movement of the lower anterior teeth to offset the unwanted side effects of Class III elastics and space-closing mechanics.

Two months later, brackets were bonded on all upper teeth except U4s and UR8. Standard-torque brackets were placed on the upper incisors, and high-torque brackets were placed on the upper canines. This choice of upper bracket torque selection was based on experience. Class III elastics flare the upper anterior teeth more, so low-torque brackets are more suitable. However, the space-closing mechanics may tip the upper anterior posteriorly; therefore, high-torque brackets are more appropriate. Based on these mechanics, standard torque brackets were chosen for the upper incisors as a trade-off option. High torque brackets were selected for the upper canines to prevent their roots from striking the buccal cortical bone and producing space-closing problems.

The initial upper archwire was 0.014-in copper-nickel-titanium (CuNiTi). The upper archwire sequence was 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, and 0.016x0.025-in SS. Early light Class III elastics (Quail, 5/16-in, 2-oz; Ormco) and bite turbos were placed on lingual side of the lower incisors to correct the anterior crossbite starting from the second month of treatment. By the 6th month, the anterior crossbite was already corrected.

The lower archwire sequence in the first nine months was 0.014-in CuNiTi, 0.014x0.025-in CuNiTi, 0.016x0.025-in pre-torqued CuNiTi, and 0.019x0.025-in pre-torqued CuNiTi.

In the 10th month, the lower archwire was changed to a 0.016x0.025-in stainless steel (SS) wire, which was narrowed and bent with a reverse curve of Spee to correct the bowing effect from the mechanics. After the severe curve of Spee was corrected, the 0.016x0.025-in SS archwire was changed back to a flat orientation. Thereafter, the sequence for the lower archwire was 0.014x0.025-in CuNiTi (due to bracket position adjustment), 0.016x0.025-in SS, and 0.014-in CuNiTi for detailing.

All fixed appliances were removed after 29 months of active treatment. All four 1st premolar extraction spaces were closed. Retention was accomplished with fixed and clear overlay retainers on both arches .

Treatment Results

Both arches were well aligned in a Class I occlusion with coincident dental midlines (Figs. 12-14). The overjet was corrected, and the lower lip protrusion was improved. The posttreatment panoramic radiograph shows complete space closure and no significant periodontal bone loss. Root parallelism was acceptable. A little root resorption was noted on the lower incisors. The L3s and LR5 experienced moderate root resorption. The posttreatment cephalometric radiograph documents the dentofacial correction in profile and in occlusion (Figs. 15 and 16).

Fig. 12: *Posttreatment facial and intraoral photographs document 29 months of active treatment.*

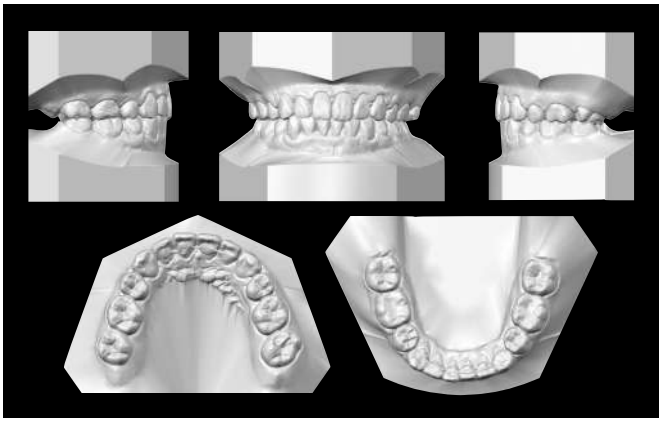


Fig. 13: *Posttreatment model(3-D image)*

Fig. 14: *Posttreatment panoramic radiograph*

Fig. 15: *Posttreatment cephalometric radiograph*

The superimposed cephalometric tracings show: (1) lower lip retracted, (2) lower incisors retracted and lingually tipped, and (3) Class III molar relationship corrected mainly by mesial movement of the upper molars.

The ABO Cast-Radiograph Evaluation score was 16 points, as shown in the supplementary Worksheet 2.[3] The major discrepancies were: (1) marginal ridge discrepancy (5 points), (2) mild posterior open bite (4 points), and (3) imperfect Class I occlusal relationship (3 points) as well as rotation of 2nd molars (3 points). This result is good according to the level of treatment complexity. The dental esthetics were acceptable as documented by the Pink and White esthetic score of 2, shown in the supplementary Worksheet 3.[4]

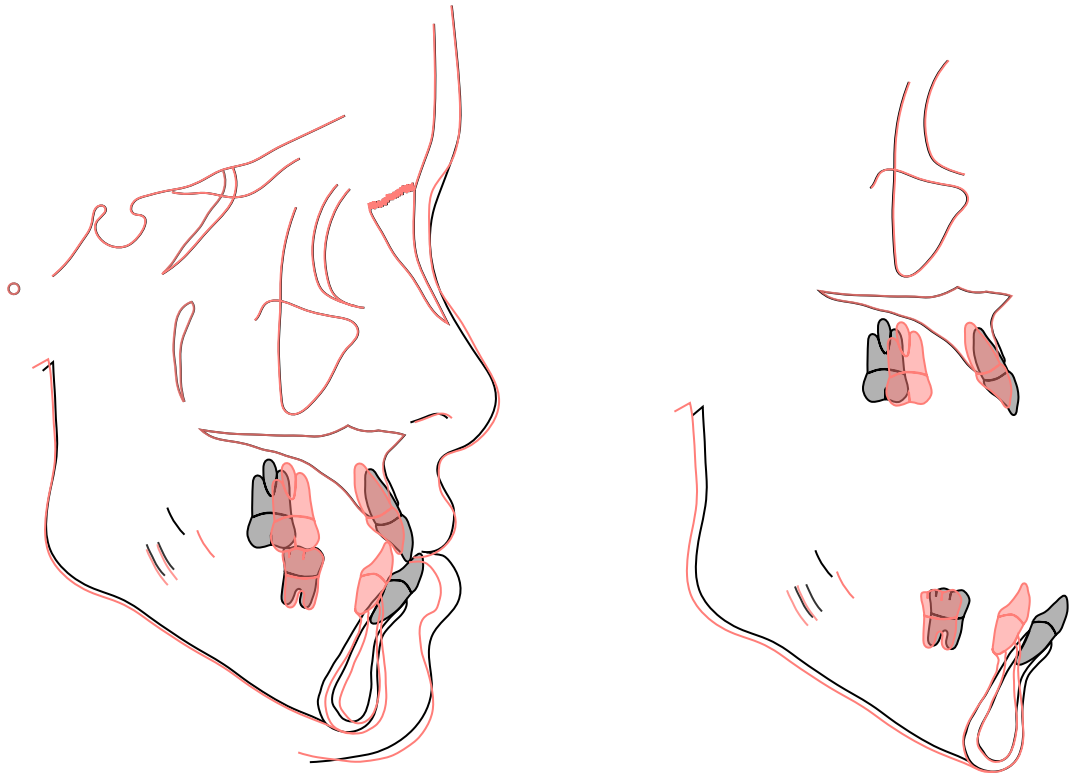


Fig. 16: *Cephalometric tracings are superimposed to show dentofacial changes from the start (black) to the end (red) of treatment.*

This camouflage treatment procedure required 29 months of active treatment, and the patient was well pleased with the outcome.

Retention

Fixed retainers were bonded on the lingual surfaces of all maxillary incisors and mandibular anterior teeth. Clear overlay retainers were delivered for both arches, and the patient was instructed to wear them full time for the first 6 months and nights only thereafter. Instructions were provided for oral hygiene and maintenance of the retainers.

Discussion

Class III malocclusion treatment is challenging primarily due to inadequate diagnosis.[5] A method called 3-Ring Diagnosis,[2] developed by John Lin, is an effective method for identifying Class III malocclusions that are amenable to conservative therapy (Fig. 17). According to Lin's 3-Ring Diagnosis, with the mandible in centric relation, there are three good indicators for non-surgical treatment: 1. orthognathic profile in C_R, 2. buccal segments that are approximately Class I, and 3. anterior functional shift to C_O. This patient had two of the three favorable indicators for non-surgical treatment: orthognathic profile in C_R and functional shift to C_O (Figs. 6 and 18). Therefore, after considering the morbidity of surgery, camouflage treatment options were recommended to and accepted by the patient.

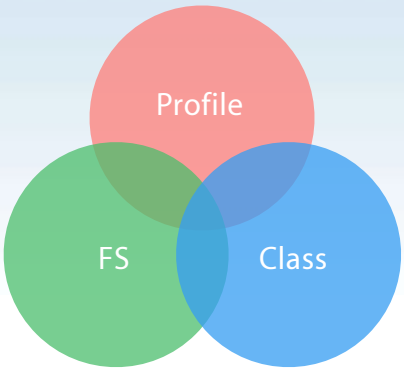


Fig. 17:
Lin's Three-Ring Diagnosis System assesses the potential for conservative correction of a Class III malocclusion with an anterior crossbite. Favorable factors are:
1. profile of the face is acceptable when the mandible is positioned in centric relation (C_R),
2. Class I buccal segments in C_R, and
3. functional shift (FS) is present from C_R to centric occlusion (C_O).

Fig. 18:
Facial profile was acceptable (orthognathic) when the mandible is positioned in the centric relation (C_R) position.

(1) Torque selection of brackets: Consider Class III mechanics and space-closing mechanics

Class III camouflage treatment usually involves intermaxillary Class III elastics which can result in increased axial inclination of the maxillary incisors

and decreased axial inclination of the mandibular incisors,[6] particularly when there is an underlaying Class III skeletal discrepancy.[7,8] If Class III mechanics are considered separately, it is wise to choose low-torque brackets on the upper anterior teeth and high torque on the lower anterior teeth. However, such space closing mechanics often cause torque issues. When closing extraction spaces, it is often necessary to use high torque brackets to increase the lingual root torque on the anterior teeth to avoid increased tipping during space closure. Therefore, bracket torque selection for the upper anterior teeth is problematic. Fortunately, experience shows that placing standard torque brackets on the upper incisors and high torque brackets on the upper canines results in good outcomes.

(2) Correction of anterior crossbite and lower lip protrusion

It is advisable to correct anterior crossbite by retracting the lower anterior teeth when the lower lip is protrusive. To correct the anterior crossbite, anterior bite turbos were placed on the lingual surface of the lower incisors in order to open the bite (Fig. 8). If possible, lower anterior bite turbos are preferred[2] since they facilitate closure of the posterior bite using early light short Class III elastics.[9,10] In this case, it only took 4 months to correct the anterior crossbite. First premolar extraction facilitated retraction of lower anterior teeth. The correction of the lower lip protrusion is then a natural consequence.

(3) Correction of full-cusp Class III molars

Class III mechanics not only retracts the lower incisors but also protracts the upper molars, which is beneficial for achieving a Class I molar relationship. In this case, the protraction of the upper molars was striking (Fig. 16). If the upper 2nd premolars were extracted instead of 1st premolars, a Class I molar relationship would have been easier to achieve; however, it would have been harder to control over-flaring the upper anterior teeth and to resolve the crowding.

Conclusions

Treatment of skeletal Class III malocclusion is a complex treatments that requires careful and thorough evaluation. Lin's Three-Ring Diagnosis System is useful for determining whether the case can be managed conservatively or not. As is clearly shown in this case, it is more beneficial for the patient to choose a conservative approach than to undergo orthognathic surgery. After thorough analysis, planning, and communication, the 1st premolars were extracted to provide spaces for lower lip retraction, to relieve the crowding, and to correct the molar relationship. The active treatment time was 29 months, and both the patient and the clinician were very pleased with the outcome.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 30

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 = 10

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 = 2

OCCLUSION

Class I to end on	=	0 pts.
End on Class II or III	=	2 pts. per side _____ pts.
Full Class II or III	=	4 pts. per side 8 pts.
Beyond Class II or III	=	1 pt. per mm. additional _____ pts.

Total = 8

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° 1 x 2 pts. = 2

≤ 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	1 x 2 pts.	= 2 UL7
Impaction (except 3rd molars)	_____ x 2 pts.	= _____
Midline discrepancy (≥ 3mm)	@ 2 pts.	= _____
Missing teeth (except 3rd molars)	_____ x 1 pt.	= _____
Missing teeth, congenital	_____ x 2 pts.	= _____
Spacing (4 or more, per arch)	_____ x 2 pts.	= _____
Spacing (Mx cent. diastema ≥2mm)	@ 2 pts.	= _____
Tooth transposition	_____ x 2 pts.	= _____
Skeletal asymmetry (nonsurgical tx)	@ 3 pts.	= _____
Addl. treatment complexities	_____ x 2 pts.	= _____

Identify:

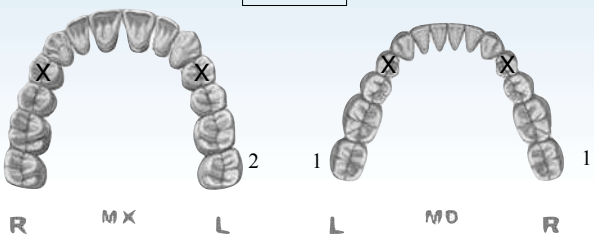
Total = 2

Cast-Radiograph Evaluation

Total Score: 16

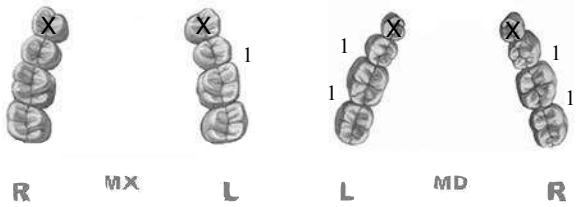
Alignment/Rotations

4



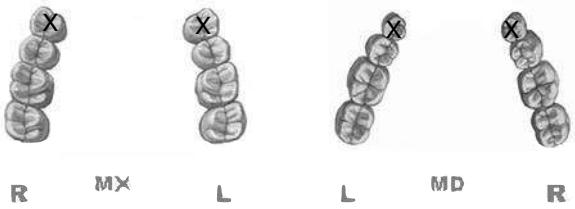
Marginal Ridges

5



Buccolingual Inclination

0

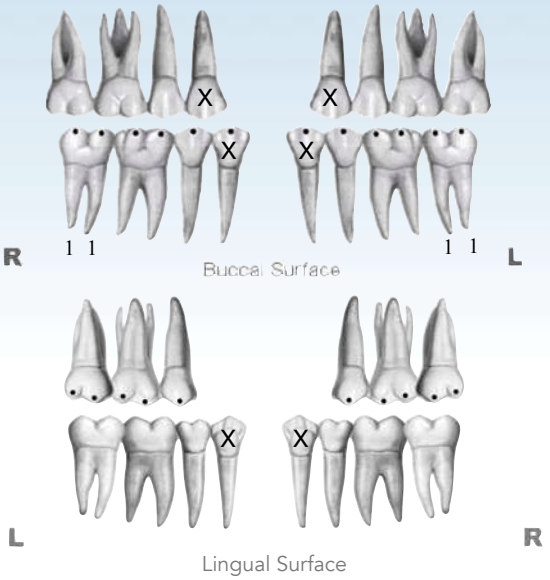


Overjet

0

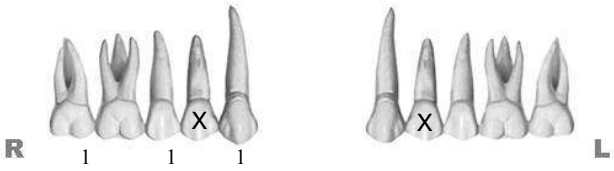
Occlusal Contacts

4



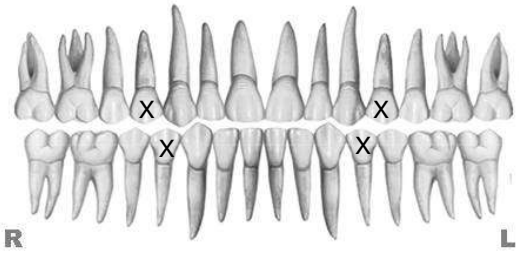
Occlusal Relationships

3



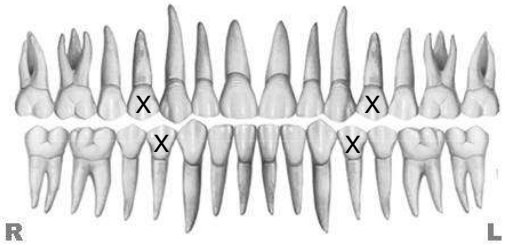
Interproximal Contacts

0



Root Angulation

0



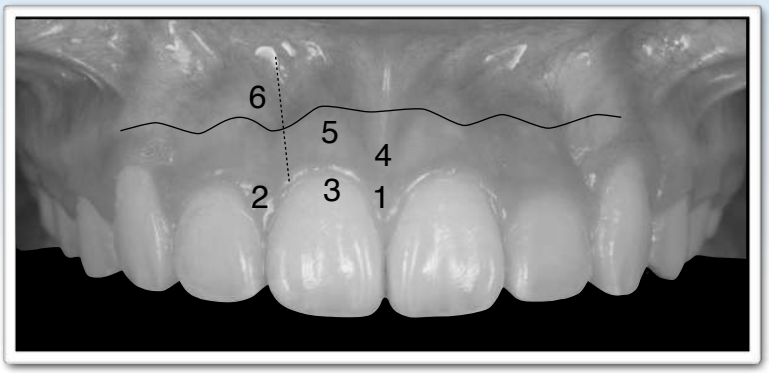
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink and White Esthetic Score

Total Score = 2

1. Pink Esthetic Score

Total = 1

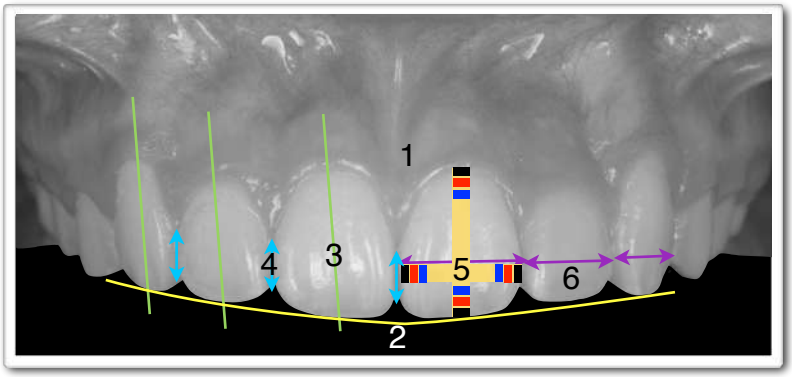


1. M and D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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

2. White Esthetic Score (for Micro-esthetic)

Total = 1



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

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

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* Early bird rate ends two months prior to the course date.

Dr. Chris Chang

DDS, PhD. ABO certified, Angle Midwest member, director of Beethoven Orthodontic Center, Taiwan

Dr. Chang 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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DAY 2 **Lecture, chair-side observation**

Lecture topic: Screws & Aligners

DAY 3 **VISTA & 4 other minor surgeries for orthodontic practice**

Hands-on workshop

DAY 4 **Keynote workshop**

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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。

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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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Q：能量越強越好 ?!

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優　點　短時間快速聚合樹脂

缺　點
- 機身容易發燙
- 高熱導致牙髓損傷
- 過熱當機

理想的光聚機

能　量　每秒光能量1100-1130mW/cm2變換

散　熱　良好散熱系統，持續輸出不發燙

黏　著　連續 Curing Case 全口矯正器黏著或 Veneer Cementation 也不過熱

Part 2 -波長

Q：全波長 vs 純藍光 LED光聚機差別

全波長光聚機優缺點

優　點

適用包含非CQ-based 的 Resin Composite

缺　點
- 市面上85%以上樹脂仍以CQ-based為主
- 紫光波長能量不足，須增加照射時間
- 紫光波長能量不足，須配合輔助工具
- 價格昂貴

理想的光聚機

能　量　460-480nm的波長配合超過1200mW/cm2的能量

C/P 值　具有良好的品質以及性價比

您知道嗎？

近年來光聚機所搭配使用的電池以鋰電池為主，不會有記憶效應的問題。因此 使用完畢後就放回基座上充電，除了不會造成電池壽命減少外，也可以讓光聚機穩定在基座上避免摔到。

Part 3 -電池

Q：續電力越久越好？？

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優　點　可連續使用3-5天不用充電

缺　點　搭配高電容量的光聚機會使整體重量上升，操作不方便

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電　池　至少1個工作天使用不充電的蓄電量

重　量　良好散熱系統，持續輸出不發燙越輕巧＋方便使用

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Severe Class III Malocclusion with Deep Overbite and Blocked-Out Canines: Conservative Correction with Premolar Extractions

Abstract

History: *A 20-year-old female presented with chief complaints of a prominent chin and crowded teeth.*

Diagnosis: *Clinical examination revealed mandibular prognathism, blocked-out canines, skeletal Class III (ANB = -3˚), anterior crossbite, and deep overbite. The Discrepancy Index (DI) was 37.*

Treatment: *Bilateral upper and lower first premolars were removed to gain space for relieving the crowding and retracting the lower anterior segment to correct the anterior crossbite. A passive self-ligating (PSL) bracket system was bonded on the dentition with high-torque brackets on the lower incisors and low-torque brackets on the upper incisors.*

Outcome: *After 24 months of active treatment, this challenging full-cusp Class III malocclusion was corrected to a near ideal result. The Cast-Radiograph Evaluation (CRE) score was 19, with an excellent Pink and White dental esthetic score of 2. (J Digital Orthod 2023;70:28-42)*

Key words:

Skeletal Class III, full-cusp Class III molar relationship, first premolar extraction, passive self-ligating brackets

Introduction

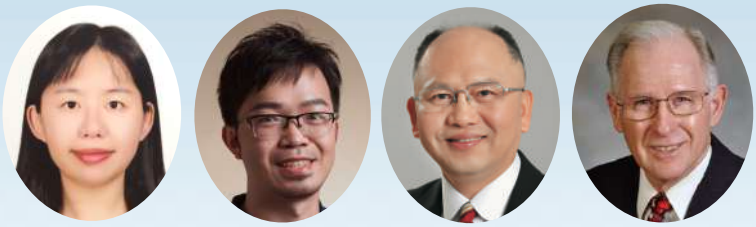
The dental nomenclature for this report is a modified Palmer notation with four oral quadrants: upper right (UR) and left (UL), as well as lower right (LR) and left (LL). Teeth are numbered 1-8 from the midline in each quadrant.

A 20-year-old female presented with chief complaints of anterior crossbite, crowding, and compromised facial esthetics (Figs. 1 and 2). The radiographic documentation of the malocclusion includes a lateral cephalometric film in centric occlusion (C_O) as well as in centric relation (C_R) positions (Figs. 3 and 4), panoramic radiograph (Fig. 6), and temporomandidular joint (TMJ) views (Fig. 7). This malocclusion was associated with skeletal Class III, anterior crossbite, and deep overbite. An anterior functional shift might have exaggerated her Class III malocclusion. To correct the full-cusp Class III and crowding, the patient and her family preferred camouflage treatment with extractions rather than orthognathic surgery to achieve an acceptable although compromised outcome.[1,2]

History and Etiology

This developmental malocclusion was associated with mandibular prognathism (SNB, 85˚). No contributing medical or dental histories were

Linda Tsai,
Training Resident, Beethoven Orthodontic Course (Left)
Joshua S. Lin,
Associate Director, Beethoven Orthodontic Course (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)



reported. Clinical examination revealed a concave facial profile, lower lip protrusion, anterior crossbite, and crowding (Figs. 1-3).

The panoramic radiograph (Fig. 6) revealed that four wisdom teeth were missing. Lateral cephalometric radiograph revealed decreased inclination of both arches and a relatively straight

Fig. 1: *Pre-treatment facial and intraoral photographs in centric occlusion (C_O)*

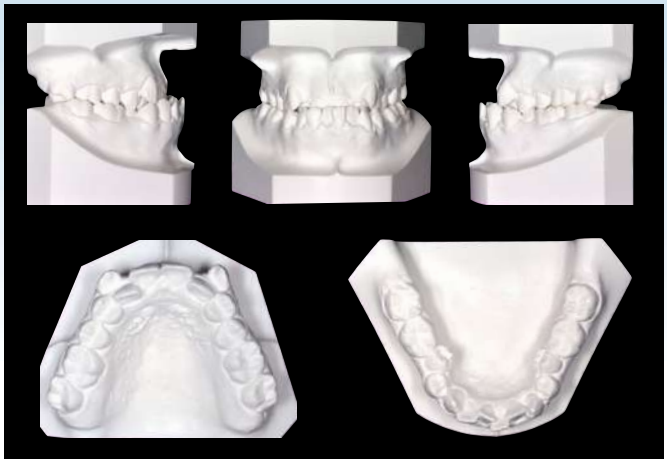


Fig. 2: Pre-treatment dental models (casts) in C_O

Fig. 3: Pre-treatment lateral cephalometric radiograph in C_O

Fig. 4: Pre-treatment cephalometric radiograph in centric relation (C_R)

Fig. 5: Pre-treatment lateral profile photograph in C_R

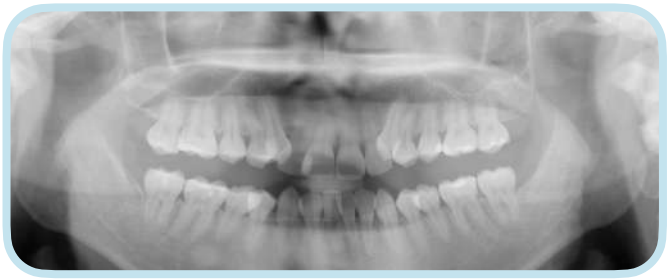


Fig. 6: Pre-treatment panoramic radiograph

profile when the occlusion was in C_R (Figs. 4 and 5). The patient declined orthognathic surgery because of the potential for severe complications.[3-5] She opted to seek conservative treatment for the problem with extractions.

Diagnosis

Skeletal: *Mandibular Protrusion*

- Class III relationship: *SNA, 82˚; SNB, 85˚; ANB, -3˚*
- Mandibular plane angle: *SN-MP, 41˚; FMA, 34˚*

Dental:

- Occlusion: *Bilateral full-cusp Class III molar relationships*

- Overjet: *-5.5 mm*
- Upper Incisors: *Retroclined (U1-to-NA, 2 mm; U1-to-SN, 93˚)*
- Lower Incisors: *Retroclined (L1-to-NB, 5.5 mm; L1-to-MP, 81˚)*

Facial: *Relatively protrusive lower lip*

The UL-to-E-line[7,8] cephalometric measurement was -2 mm, which is consistent with a retrusive upper lip (Fig. 5). However, the mandible was protrusive with a prominent chin, so the relatively protrusive lower lip was actually the problem. Carefully evaluating lip protrusion is an essential aspect in treatment planning.

The American Board of Orthodontics (ABO) Discrepancy Index (DI)[9] was 37 points as shown in the subsequent Worksheet 1. The 19 points for overjet (OJ = -5.5 mm) in the DI worksheet indicated that it was a main issue of this case.

Treatment Objectives

After discussing available options with the patient, the following treatment objectives were established:

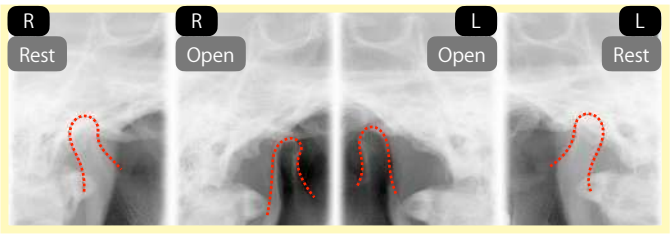


Fig. 7:
Pre-treatment TMJ transcranial radiographs show the right (R) and left (L) temporomandibular joints in rest and open positions. The condyle heads are outlined in red dotted lines.

1. Extract upper first premolars (UR4 and UL4) to resolve the space deficiency.
2. Extract lower first premolars (LR4 and LL4) to gain enough space to retract the lower anterior segment and correct the anterior crossbite.
3. Establish ideal overjet and overbite.

Treatment Alternatives

First Option: Use conventional molar anchorage to close the UR4 extraction space. With this treatment option, 70% of space closure is achieved by retracting the anterior teeth, and the remaining 30% by protracting the posterior teeth. The disadvantage of this option is the inclination of the lower incisors, which is an unfavorable outcome for the patient as her arches were already retroclined.

Second Option: The preferred orthognathic surgical option was Le Fort I with bilateral intraoral vertical ramus osteotomies. However, the patient declined surgery because of the hospitalization, high cost, and risk of complications.

Treatment Progress

All treatment and sequencing details are shown in Table 2 and illustrated in Figs. 8-10.

Two months following the prescribed extractions, 0.022" slot Damon Q® passive self-ligating (PSL) brackets (Ormco, Brea, CA) were bonded on the lower teeth with a 0.014-in copper-nickel-titanium (CuNiTi) archwire engaged. Torque selection of the lower incisors was high torque, so upside-down low-torque brackets were bonded on the lower incisors to serve

Appointment	Archwire	Notes
1 (0 month)	L : 0.014-in Damon CuNiTi	Bond all lower teeth except all 4s, which were extracted. High-torque brackets were selected.
2 (1 month)	U/L: 0.014-in Damon CuNiTi	Bond all upper teeth. Insert open-coil spring to create space for UR2 and UL2. Low-torque brackets for UL2 and UL2; high-torque brackets for UR3 and UL3 Apply early light power chains from UR3 to UR6 and UL3 to UL6. Place bite turbos on the occlusal surfaces of LR7 and LL7.
3~5 (3~8 months)	U/L: 0.014x0.025-in Damon CuNiTi	Remove posterior bite turbos. Place anterior bite turbos from LR2 to LL2. Prescribe tongue depressor to correct anterior crossbite. Apply early light short elastics (Quail, 2 oz; Ormco) from UR6 to LR5 and UL6 to LL5.
6 (10 months)	U/L : 0.017x0.025-in Damon TMA	Change early light short Class III elastics to Fox (3.5 oz) from UR6 to LR3 and UL6 to LL3 to retract the mandibular anteriors. Remove anterior bite turbos, and place posterior bite turbos.
7 (11 months)	U: 0.014x0.025-in Damon CuNiTi	Rebond UR7 and UL7.
8 (12 months)	U: 0.014x0.025-in Damon CuNiTi	Rebond UR5, UR1, UL1, UL2, and UL5. 15˚ archwire adjustment.
9 (13 months)	U/L: 0.017x0.025-in Damon TMA	Class III elastics (Fox, 3.5 oz) from UR6 to LR3 and UL6 to LL3 to retract mandibular anteriors
10 (14 months)	U/L: 0.017x0.025-in Damon TMA	Perform interproximal reduction from UR2 to UL2. Close all extraction spaces with power chains.
11 (15 months)	U/L: 0.017x0.025-in Damon TMA	Rebond LR3, LR1, UL5, and LL1. Torquing springs were applied on UR3 and UL3.
12 (16 months)	U/L: 0.017x0.025-in Damon TMA	Torquing springs were applied on LL5 and LR5.
13 (18 months)	U/L: 0.017x0.025-in Damon TMA	Perform interproximal reduction from LL2 to LR2.
16 (21months)	U/L: 0.017x0.025-in Damon TMA	Instruct patient to hook elastics from UR3 to LR5 and UL3 to LL5.
17 (22months)	U : 0.017x0.025-in Damon TMA L : 0.017x0.025-in Damon TMA	Instruct patient to hook intermaxillary elastics from UR7 to LR7 and UL7 to LL7.
18 (24months)		Remove all appliances. Place fixed retainers from 3 to 3 on both arches, and removable clear overlay retainers for both arches were prescribed for retention.

Table 1: *Treatment sequence*

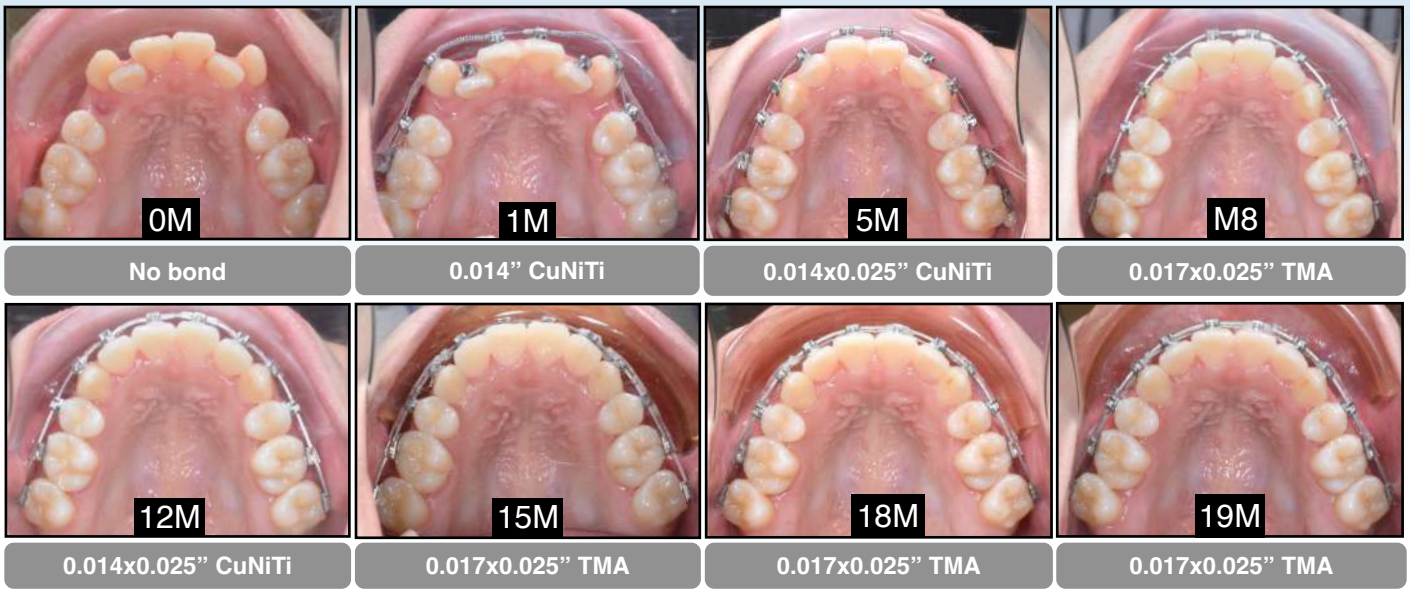


Fig. 8:
A progressive series of upper occlusal photographs show treatment progress and the archwire sequence for the upper arch in months (M) from the beginning of the treatment (0M) to nineteen months (19M).

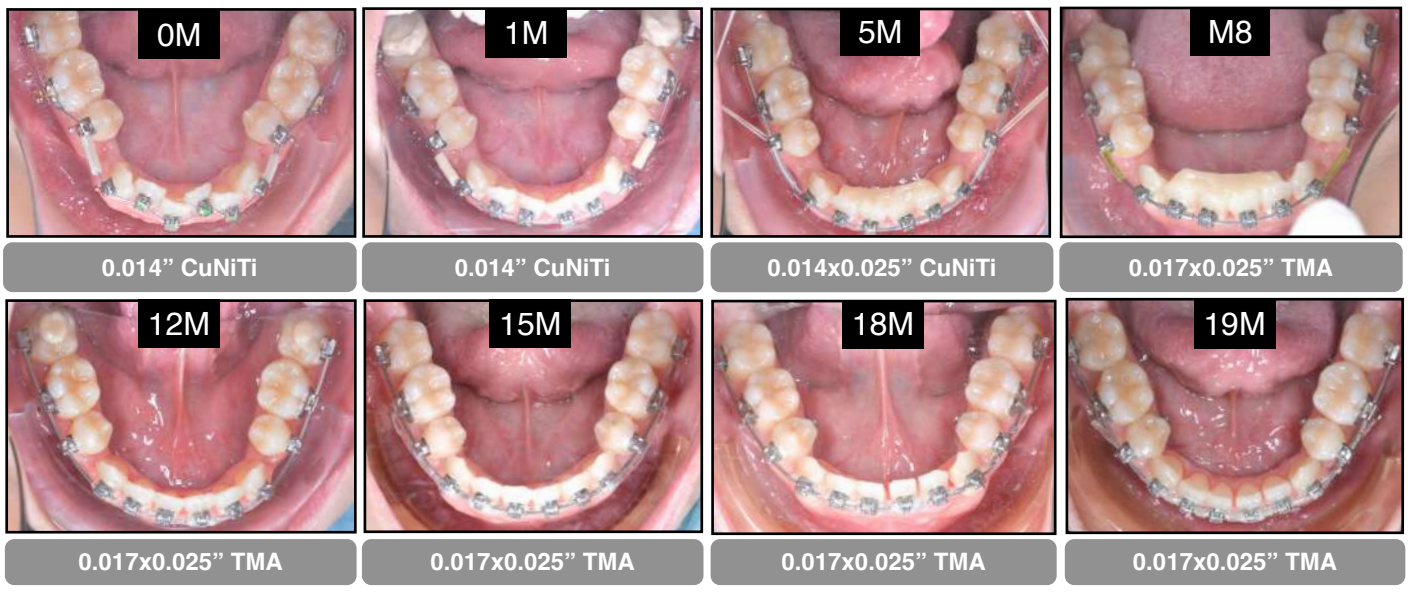


Fig. 9:
A progressive series of lower occlusal photographs show treatment progress and the archwire sequence for the lower arch in months (M) from the beginning of the treatment (0M) to nineteen months (19M).

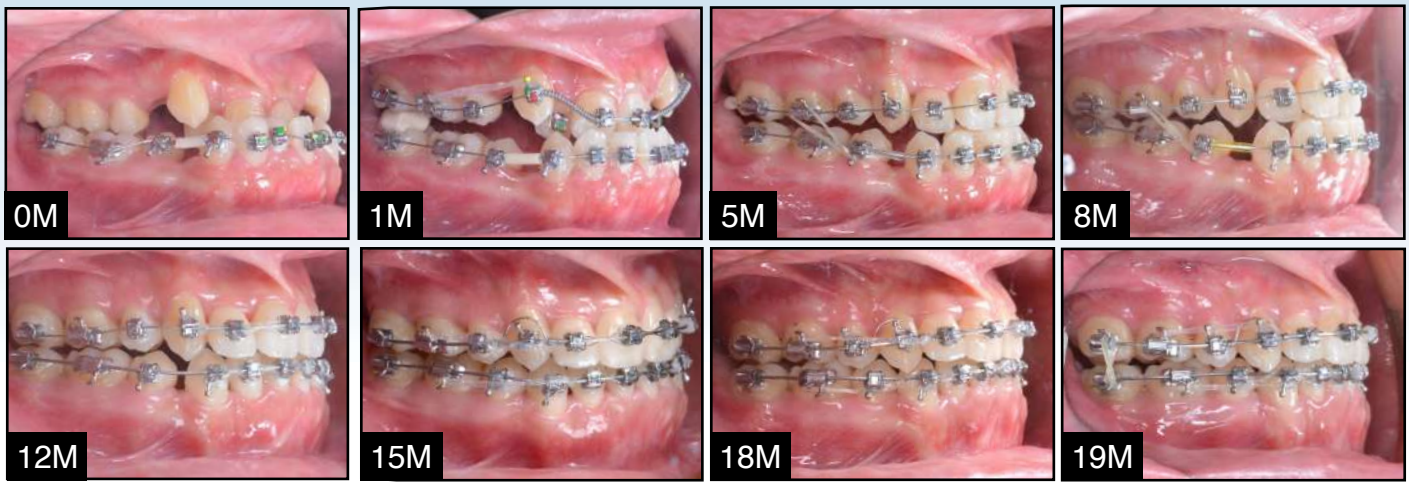


Fig. 10 :
A progressive series of right buccal photographs show treatment progress in months (M) from the beginning of the treatment (0M) to nineteen months (19M).

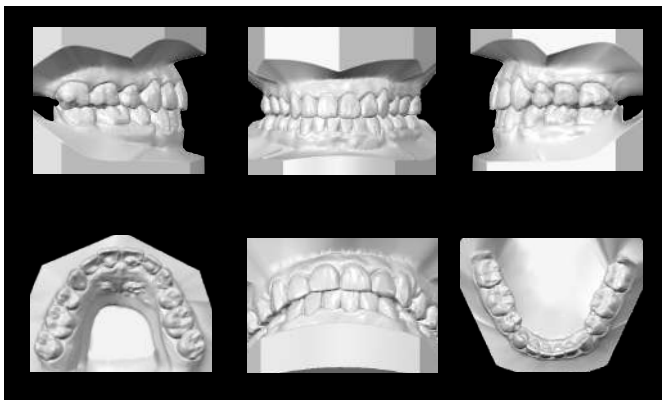


Fig. 11: *Posttreatment dental models (casts) in centric occlusion*

Fig. 12: *Posttreatment panoramic radiograph*

as high-torque brackets to provide more lingual root torque. The sequence for lower archwire was 0.014-in CuNiTi, 0.014x0.025-in CuNiTi, and 0.017x0.025-in TMA.

In the following months, the brackets were bonded in the upper arch with a 0.014-in CuNiTi archwire. The archwire sequence for upper arch was 0.014-in CuNiT, 0.014x0.025-in CuNiTi, and 0.017x0.025-in TMA. From the 5th to the 8th months of treatment, early light Class III elastics were used from U6s to L5s. In the 11th and 12th months, the brackets were re-bonded on UR7, UL7, UR5, UR1, UL1, UL2, and UL5 for better alignment, and the archwire was changed from 0.017x0.025-in TMA to 0.014x0.025-in CuNiTi for better fitting in the bracket slots.

By the 12th month, the anterior crossbite was corrected. From the 13th month till the end of the treatment, the archwires for both arches were 0.017x0.025-in TMA. In the 15th month, torquing springs were used on UR3 and UL3 to achieve more lingual root torque. In the 22nd month, intermaxillary

Fig. 13: *Posttreatment facial and intraoral photographs*

Fig. 14: *Posttreatment lateral cephalometric radiograph*

elastics were used from UR7 to LR7 and UL7 to LL7 to improve the occlusion. In the 24th month, all appliances were removed.

Retention

Fixed retainers were bonded on all mandibular and maxillary canines and incisors (3-3). Removable clear overlay retainers were also delivered for both arches for full-time wear for the first 6 months and nights only thereafter. Instructions were also given for home hygiene and maintenance of the retainers.

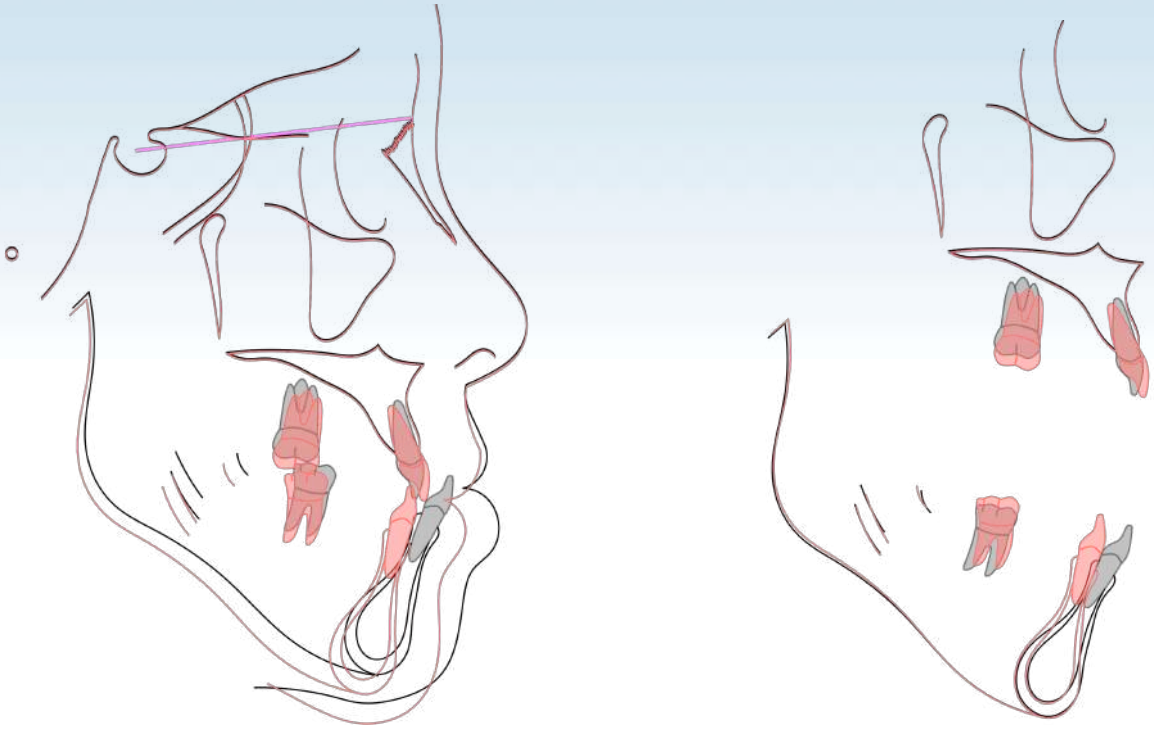


Fig. 15:
Superimposed cephalometric tracings show dentofacial changes over active 24 months of treatment (red) compared to the pre-treatment records (black). See text for details.

Treatment Result

After 24 months of active treatment, both the patient and the clinician were satisfied with the outcomes (Figs. 11-14). Correcting the anterior crossbite improved the patient's profile because the lower lip was retracted. Both arches were well aligned in a near ideal Class I occlusion with coincident midlines. Posttreatment panoramic radiograph showed good axial alignment of the dentition (Fig. 12), and cephalometric superimpositions revealed that the mandibular incisors were retracted about 7 mm with acceptable axial inclination (Fig. 15). These results indicated the retroclination of lower anterior teeth would become worse without the high-torque brackets in the archwire. The 2 mm flaring of the maxillary incisors

	Ext.	Not
1. Profile	Protrusive	Straight
2. Md. angle	High	Low
3. Bite	Open	Deep
4. Ant. inclination	Flaring	Flat
5. Crowding	> 7mm	None
6. Decay/missing	Present	????
7. P't perception	OK	No
8. Etc...		

Table 2:
According to Chang's extraction decision chart, the current case presented favorable factors for an extraction treatment, including a protrusive facial profile and crowding > 7 mm.

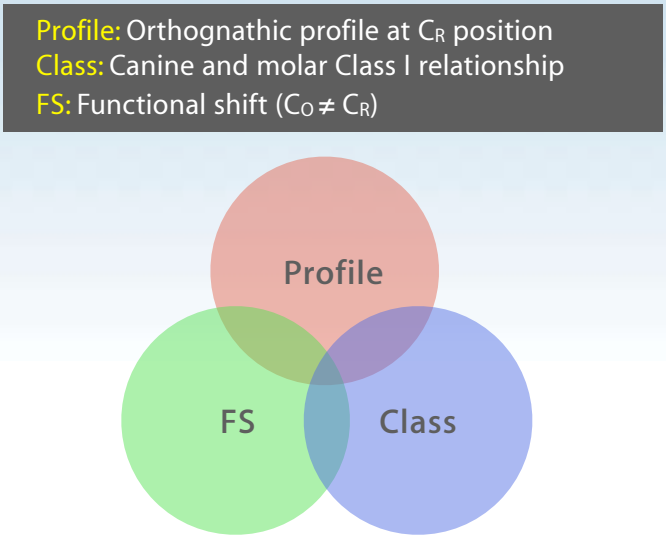


Fig. 16:
Lin's Class III diagnostic system evaluates whether Class III malocclusion patients require surgery or not based on profile, functional shift, and dental classification.

from the original anterior-posterior (A-P) plane was acceptable. Although the data in the chart was not perfect, the result was satisfactory for a severe skeletal Class III malocclusion. Using Class III elastics may rotate the mandible clockwise by extrusion of the lower molars, and retracting the lower incisors improved the profile by correcting the protrusive lower lip (Fig. 15).

The Cast-Radiograph Evaluation (CRE)[10] score was 19 points, as shown in the supplementary Worksheet 2. The major residual discrepancies were the buccolingual inclination (3 points), occlusal contacts (10 points), and occlusal relationship (3 points). Dental esthetics were acceptable with a Pink and White esthetic score of 2, as shown in Worksheet 3. After 24 months of active treatment, the patient was very pleased with the outcomes achieved by this conservative treatment.

Discussion

Orthognathic surgery is a treatment method for malocclusions with skeletal or dentoalveolar anomalies that cannot be corrected with tooth movement alone.[3] This patient's overjet was -6 mm, and her molar discrepancy was 5 mm Class III. According to the American Association of Oral and Maxillofacial Surgeons, she may need an orthognathic surgery, because the horizontal overjet is zero or negative and the A-P molar discrepancy is ≥ 4 mm Class III. However, camouflage treatment could solve the problem with an acceptable compromised result that is associated with less pain and minimal surgery.

1. Lin's 3-Ring Diagnosis and Chang's Extraction Table

Lin's 3-Ring Diagnosis[11,12] should be used to evaluate whether Class III malocclusion patients are eligible for a camouflage treatment or not (Fig. 16). The patient's profile was good in centric relation (C_R), with an orthognathic profile (acceptable facial balance), buccal segments near Class I, and an A-P functional shift of ~3 mm into maximal intercuspation. To achieve a more functional occlusion, Class III malocclusion patients may subconsciously protrude the mandible and result in incisal interference. A non-surgical treatment may be feasible by correcting the functional shift and increasing lower facial height.

Chang's[13,14] extraction decision table (Table 2) provides good indications for designing the treatment plan. Since both arches of this patient were crowded, four bicuspid extractions could efficiently relieve the crowding while maintaining the nasolabial angle.

CEPHALOMETRIC SUMMARY			
	PRE-TX	POST-TX	DIFF.
SKELETAL ANALYSIS			
SNA° (82°)	82°	83°	1°
SNB° (80°)	85°	82°	3°
ANB° (2°)	-3°	1°	4°
SN-MP° (32°)	41°	45°	4°
FMA° (25°)	34°	38°	4°
DENTAL ANALYSIS			
U1 TO NA mm (4 mm)	2	4	2
U1 TO SN° (104°)	93°	102°	9°
L1 TO NB mm (4 mm)	5.5	4	1.5
L1 TO MP° (90°)	81°	66°	15°
FACIAL ANALYSIS			
E-LINE UL (-1 mm)	-2	-2	0
E-LINE LL (0 mm)	4	-1	5
%FH: Na-ANS-Gn (53%)	56%	56%	0%
Convexity: G-Sn-Pg' (13°)	-1°	0°	1°

Table 3: *Cephalometric summary*

Fig. 17:
Upside-down low torque brackets (-11°) results in high-torque (+11°) in the lower arch. See text for details.

2. Torque selection

When lingually-tipped lower incisors (L1-MP, 81°) are retracted, torque is best controlled using high-torque brackets. Turning low-torque brackets upside down is a good way to produce high-torque effect on the lower arch (Fig. 17).[15] Otherwise, placing a pre-torqued archwire such as 0.016x0.025-in or 0.019x0.025-in NiTi can also produce high torque effect. When comparing the pre-treatment and posttreatment cephalometric measurements (Table 3; Fig. 15), there was substantial incisor torque loss (81-66°).

3. Bite turbos

Bite turbos (glass ionomer cement or glass ionomer resin, occlusal bite raisers) placed in the posterior segment are effective to open the bite and prevent premature occlusal contact on brackets. Using bite turbos in the anterior segments is an effective and efficient way to correct an anterior crossbite. All teeth were aligned in eight months.

Conclusions

To decide the treatment plan for Class III malocclusion requires a thoughtful evaluation. Lin's 3-Ring diagnosis can help to determine if the problem is suitable for conservative treatment or requires orthognathic surgery. When camouflage treatment was deemed feasible, Chang's extraction table clarified that the deficiency of space could be relieved by extraction effectively and efficiently. With the right torque selection, desirable outcomes were achieved in only 24 months. In retrospect, the

treatment time could be reduced with a thorough diagnosis, a well thought out treatment plan, and clinical tips. Since the L1-to-MP angle was 66° in the end, stability and maintenance of the occlusion need long-term follow-up.

Acknowledgments

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 37

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 = 19

OVERBITE

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

Total = 2

ANTERIOR OPEN BITE

0 mm. (Edge-to-edge), 1 pt. per tooth
Then 1 pt. per additional full mm. Per tooth

Total = 0

LATERAL OPEN BITE

2 pts. per mm. Per tooth

Total = 0

CROWDING (only one arch)

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

Total = 7

OCCLUSION

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

Total = 6

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° _____ x 1 pt. = _____

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

SN-MP

≥ 38° = 2 pts.

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

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

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

Total = 0

OTHER (See Instructions)

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

Identify:

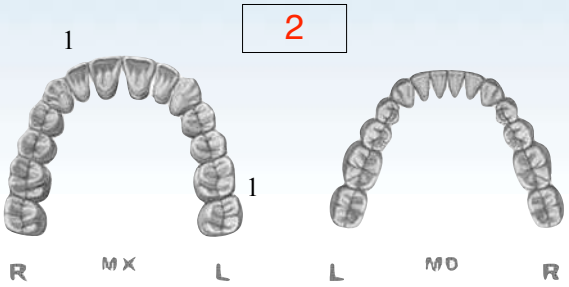
Total = 0

Cast-Radiograph Evaluation

Total Score: 19

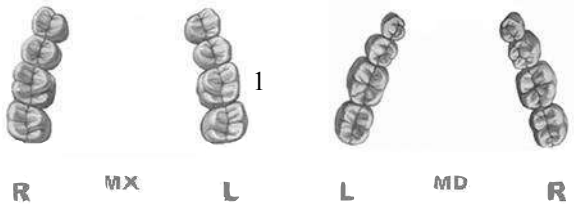
Alignment/Rotations

2



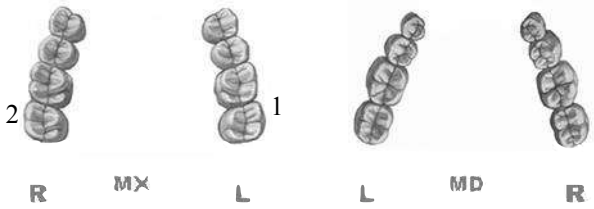
Marginal Ridges

1



Buccolingual Inclination

3

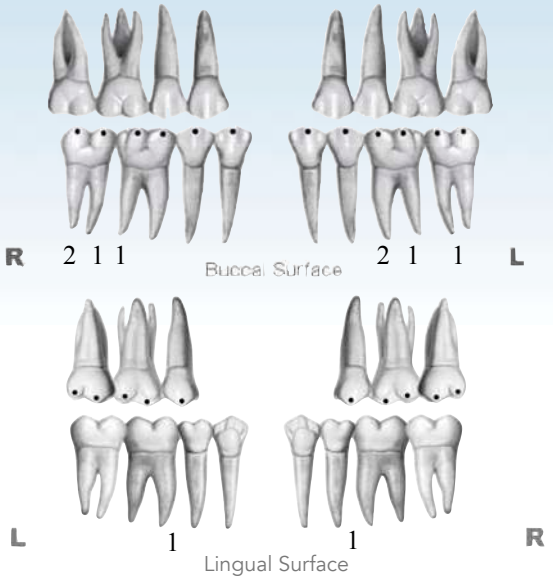


Overjet

0

Occlusal Contacts

10

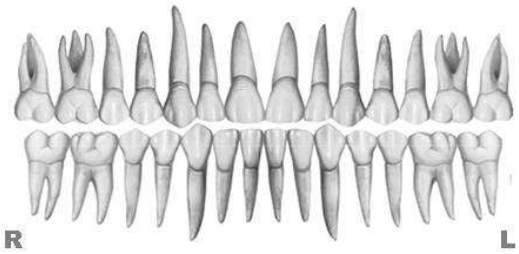


Occlusal Relationships

3

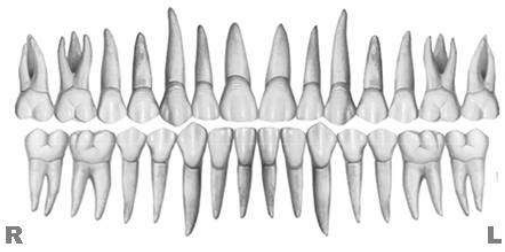
Interproximal Contacts

0



Root Angulation

0



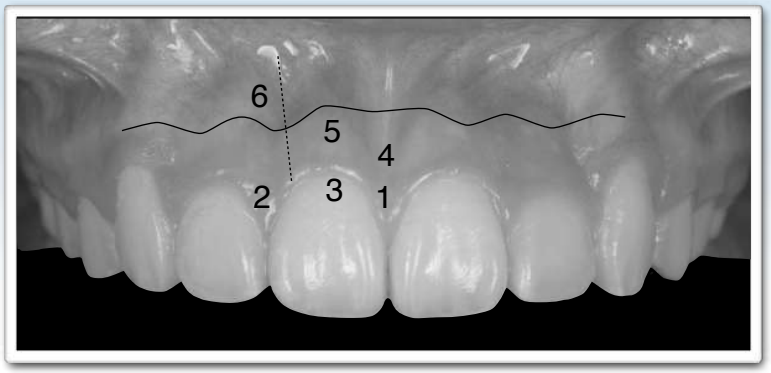
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score = 2

1. Pink Esthetic Score

Total = 1

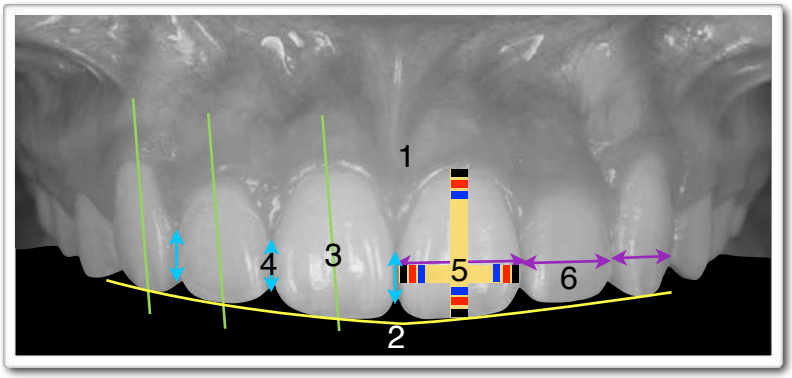


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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 = 1



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

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

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買 6|6 6|6 (共80顆) 贈 7|7 7|7 (共80顆) **20** 人份

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動物圈

贈 Power Chain x 5 卷

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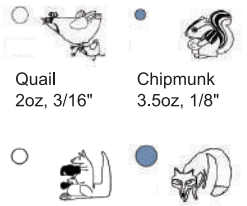
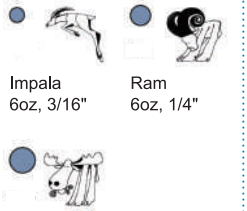


Aligner 熱銷動物圈



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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

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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

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Joy Cheng

Dr. 曾淑萍
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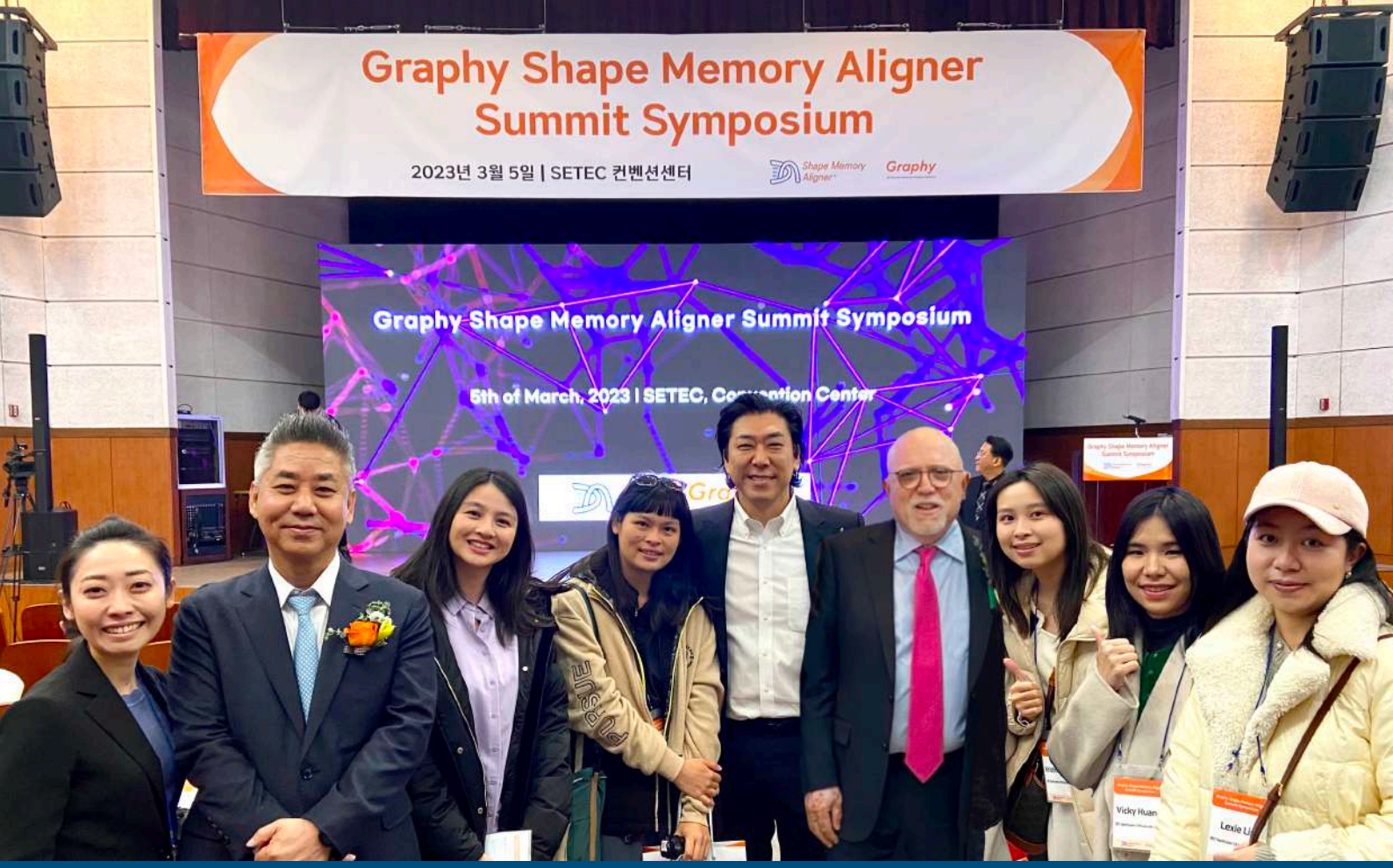
Dr. 張銘津
Ariel Chang

Dr. 彭緯綸
Wei-Lun Peng

Dr. 呂詩薇
Julie Lu



Graphy Shape Memory Aligner Summit Symposium

Thank you, Graphy team, for hosting this amazing symposium and training session in early March, 2024. Beethoven's doctors who went to Korea for the event were greatly impressed. I believe the presence of my Masters, Dr. Nanda, Dr. Kenji, and Dr. Kim, also truly made the sessions fruitful for the participants on many levels. I'm glad that my girls had the chance to meet them all.

They were inspired not only by the backbone belief behind the whole Graphy team, but also after witnessing the actual aligner printing procedures and learning about the new material, TC-85, especially its shape memory effect. If I can put it this way, TC-85 has the characteristics of a CuNiTi archwire that I've never imagined a resin can have! Hope one day I get to see for myself and feel as inspired as they did.

I send my congratulations, especially to its inventor Mr. Sim, on such unique invention of the material and its ingenious combination with direct 3D printing approach to produce aligners. I believe it will revolutionize our profession soon.

Beyond the training, thank you so much still for the special care that you've arranged to make our group feel welcomed. They had a blast, especially since COVID had trapped us in for so long. Hope to get to visit Graphy myself someday in the near future.

謝謝 *Graphy* 團隊主辦這次的座談會及訓練，貝多芬前往參與的醫師團隊獲益良多，尤其有Dr. Nanda、Dr. Kenji 以及 Dr. Kim 這幾位我的大師們參與其中，相信對所有與會醫師在各方面都有很大的收穫，我也很高興我的團隊能夠有機會當面認識他們。

這趟受訓除了 Graphy 團隊營運的理念外讓他們印象深刻之外，親眼見識 3D 列印牙套的完整過程、以及認識了 TC-85 這般獨特的材料也讓這幾位年輕醫師特別受到啟發及激勵，他們提到這個材料的形狀記憶效應 (shape memory effect)，我認爲它擁有 CuNiTi 線材的特性，但能出現在樹脂類的材料中，是我從來沒有想過的可能性，有機會我也希望能親眼看看、感受他們轉述時的熱情和鼓舞。

我想恭喜你們，特別是 Mr. Sim，發明了這樣特殊的材料，並將其與 3D 列印結合來製作隱形牙套，我相信在不久之後矯正界會因此有新的變革。

除了訓練課程之外，我也想特別感謝 Graphy 的精心接待，貝多芬的年輕醫師們很享受這趟旅程，尤其近三年的疫情把我們關了這麼久，在訓練後的幾天他們玩得非常開心，希望很快我也有機會能夠親自拜訪。

Chris Chang
PhD, ABO Certified, Publisher of JDO

SCIMAGO世界科研機構排名
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2019 全球第14名

TIMES德國最佳大學
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。

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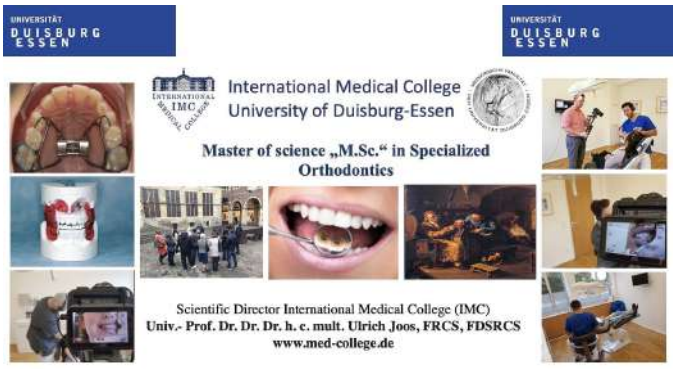
課程重視臨床運用及實作技巧學程期間學員須親赴歐洲于指導教授監督下，親自執行臨床診療，學習最先進的臨床技術，應用於自身牙科診療工作。

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。

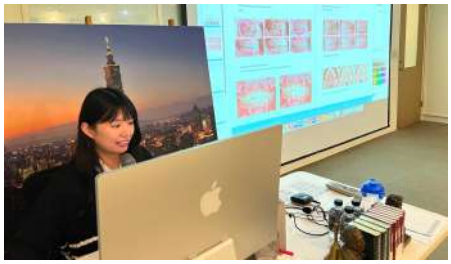
想要取得歐洲正式矯正碩士學位資格又苦惱時間不足的醫師，本先修課程是追求您目標的最佳途徑！

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

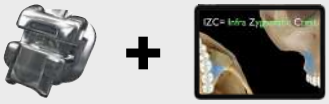
1. Aligner & TADs
2. Keys to aligner learning

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
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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

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*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。

Efficient Procedure for Precise Bonding of Aligner Attachments

Abstract

Computer-generated attachments, as specified in the ClinCheck® simulation, must be precisely duplicated chair-side on the patient's dentition. This article describes the use of flexible attachment templates for each quadrant. Windows (reliefs) for each specified attachment are filled with composite resin that is bonded on the surface of the teeth. Standard operative procedure, quality control checks, and patient training are reviewed. This article provides step-by-step descriptions and illustrations for efficiently and precisely initiating aligner therapy. This protocol is standard operating procedure at the Beethoven Orthodontic Center. (J Digital Orthod 2023;70:52-61. Reprinted from J Digital Orthod 2020;59:64-73)

Introduction

Attachments are a critical part of clear aligner systems, which are designed to deliver precise and effective control of tooth movement. For most malocclusions, the attachment bonding procedure is the first step in preparing the arches for aligner treatment.[1,2] Precision bonding of the planned attachments is essential for delivering the mechanics required to achieve the planned outcome (Fig. 1). The first three "aligners" in the series are actually 3D overlays of the digitized dentition that are specific-purpose appliances. The most critical steps in the procedure are well noted

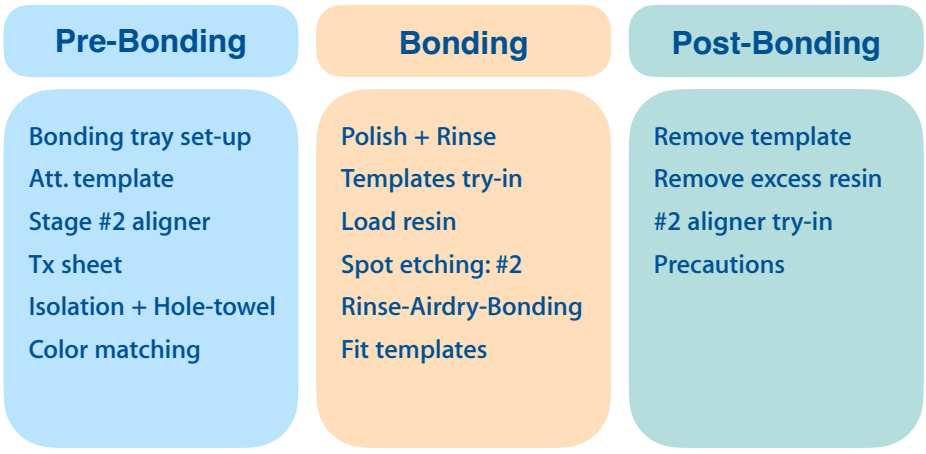

Fig. 1:
There are 3 phases (left to right) for the aligner attachment process. Multiple procedures in sequence are required for each phase. See text for details.

Joshua S. Lin,
Lecturer, Beethoven Orthodontic Course (Left)
Chris H. Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Center)
W. Eugene Roberts,
Editor-in-Chief, Journal of Digital Orthodontics (Right)



(Latin: *nota bene*) for the reader and marked with a NB in bold italics (***NB***).

Introduction to Aligners

The first overlays (Aligner set #1) are prepared on the existing dentition. They are designed to engage undercuts to achieve retention, and to accustom the patient to activation. Acclimation of the patient for fitting and removing clear aligners is the first objective of treatment. Aligner set #1 is worn all the time except when eating. Objectives are to: 1) fit each device on the entire arch; 2) seat the retention points into the undercuts; 3) continuously retain both appliances on the dentition; and 4) easily remove them when desired. Patients and their parents (if minors) are instructed to clean aligners regularly, protect them in the carrier during meals, and keep them stored any time they are not in the mouth. In addition, patients are advised that the first aligners are to prepare them for the very important second stage when the attachments are bonded on the dentition. Most are excited and eagerly await the next visit when the attachments are installed.

The second overlay is a template with voids (negative relief areas) on the surfaces of teeth that correspond to the site and shape of each attachment. After the treatment plan is completed and the required attachments are digitally fitted on

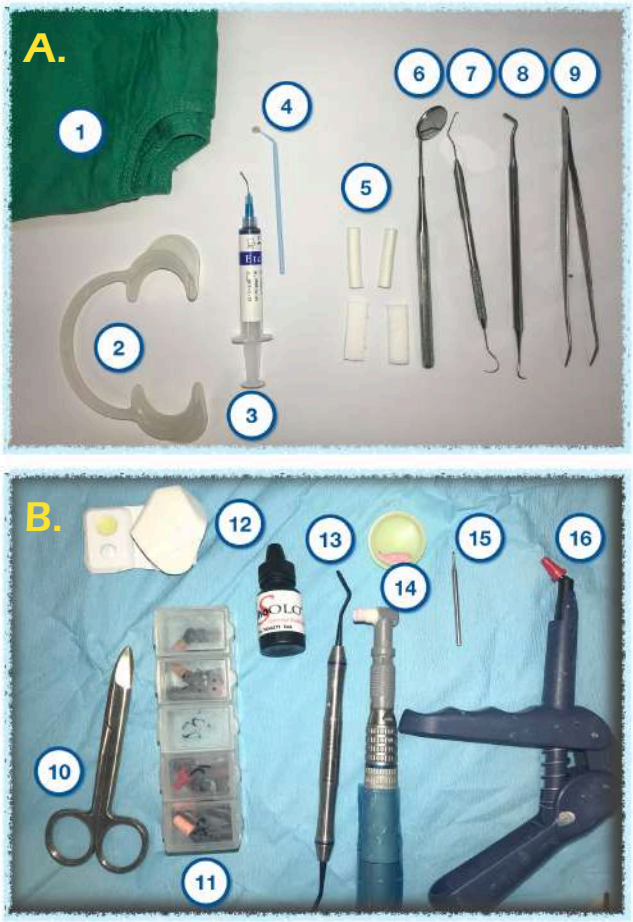

Fig. 2:
A. Doctor's chair-side desktop:
(1) Hole-towel
(2) Retractor
(3) Etching gel
(4) Small cotton wool stick
(5) Cotton rolls
(6) Mirror
(7) Probe
(8) Scaler
(9) Tweezers
B. Assistant's worktable:
(10) Scissors
(11) Differently shaded resin capsules (Tetric N-Ceram®)
(12) Container for the bonding agent (primer): OptiBond® Solo Plus™
(13) Composite resin instrument
(14) Rubber cup and pumice paste
(15) Low-speed round bur (1 mm diameter)
(16) Resin feed gun with resin capsule

the dentition, templates are constructed as overlay appliances for the precise installation of attachments. The third overlay set (Aligners #2) are appliances designed to fully engage all the attachments and apply about 0.25 mm of activation to begin aligning displaced teeth.

Attachment Installation

Efficiently bonding attachments is an important step in the treatment process. Precise and efficient bonding of the attachments is a high priority. Beethoven Orthodontic Center developed a standard protocol for achieving attachment goals.[3,4] The purpose of this report is to provide a step-by-step instruction for efficiently bonding attachments on all teeth as needed in about 12-15 minutes. Clinical experience has perfected this important process for beginning aligner treatment.

Pre-Bonding Phase

Once patients have accomplished the acclimation objectives with the first set of aligners, bonding of attachments is the next procedure.

1. Bonding Tray Set-Up

- *Doctor's Chair-side Desktop:* Hole-towel, retractor, etching gel, bonding agent, cotton rolls, mirror, probe, scaler, and tweezers (Fig. 2A)

- *Assistant's Work Area:* Scissors, shaded resin capsules (Tetric N-Ceram®, Invoclar Vivadent AG, Füstentum, Liechtenstein), bonding agent (OptiBond® Solo Plus™, Kerr Corp., Brea CA), composite resin instruments, rubber cup, pumice paste, low-speed round bur, and resin feed gun with resin capsule (Fig. 2B)

Fig. 3:
Marking the outer surface of each attachment window with a black marker pen.

2. Marking Templates and Stage 2 Aligners

Referring to the Invisalign® Treatment Overview sheet,[5,6] assistants confirm the location and specifications for each attachment, and mark the outer surfaces of the template with an indelible pen to correspond to each attachment (Figs. 3 and 4). Then each attachment template is cut in half, between the central incisors, resulting in four templates: upper right (UR), upper left (UL), lower right (LR), and lower left (LL) (Fig. 5). After this segmentation procedure, an assistant again compares the attachments for each quadrant template to the treatment overview (Fig. 4). Attachment locations are similarly marked on the post-bonding set of aligner trays (Aligners #2) to confirm the type and size of each attachment prior to the bonding procedure. The doctor then tries in the post-bonding set of aligner trays (#2) in patient's mouth to check attachment positions relative to the treatment plan (Fig. 4). In effect, there are three checks of aligner positions and specifications according to the treatment overview: two by the assistant(s) and one by the doctor (Figs.

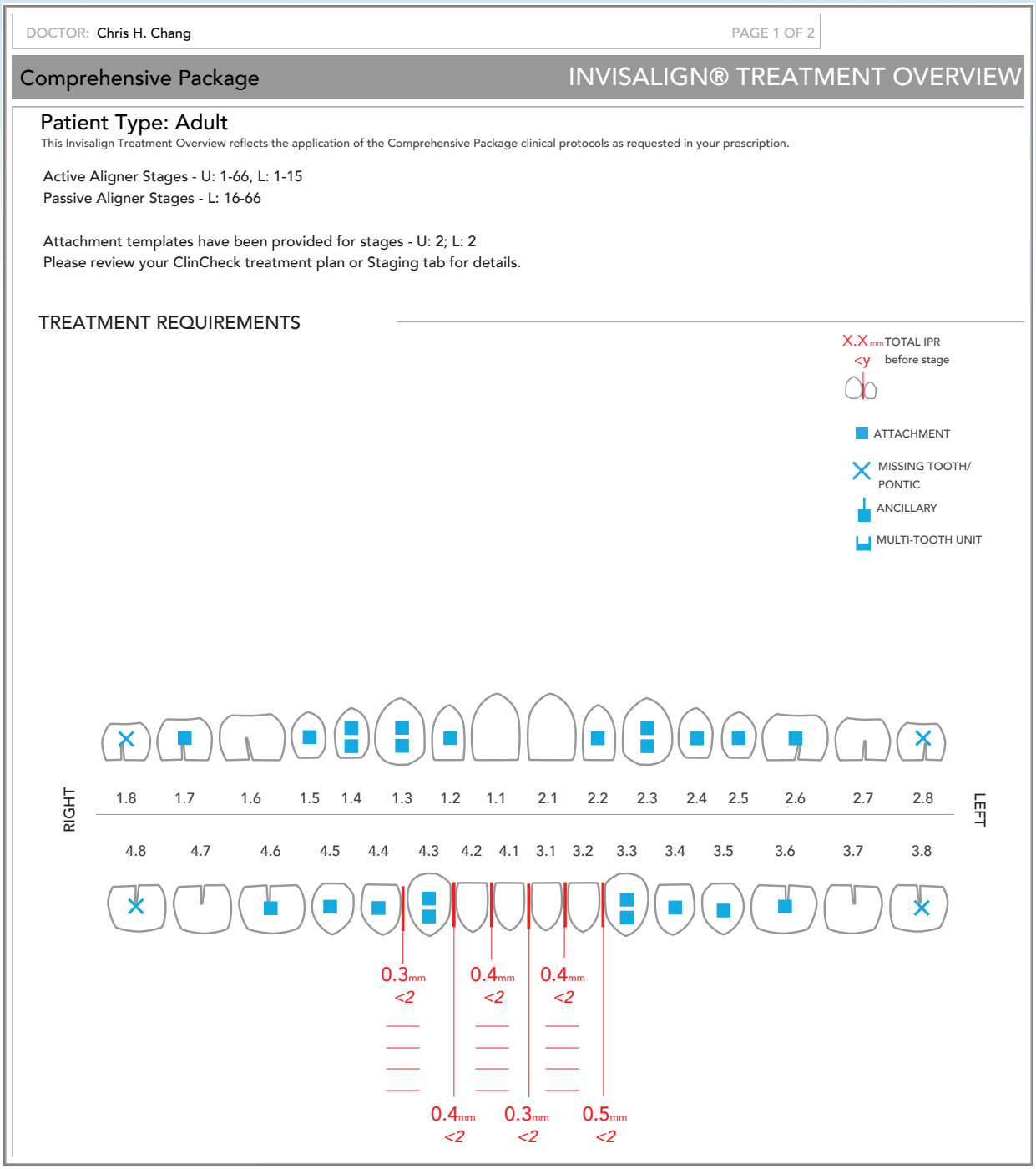

Fig. 4: *Invisalign® Treatment Overview -*
The document is downloaded from the Invisalign ClinCheck®. It summarizes the position, type, size, and shape of each attachment, as well as the location and quantity for interproximal reduction (IPR).
"Active Aligner Stages" are the stages in which there is active force to the dentition. Every active aligner is a little different in shape to the previous aligner. Therefore, patient can feel the force when replacing an active aligner with a new one. In this figure, the active aligner stages of upper dentition is from stage #1 to the last stage of #66, whereas the active aligner stages of lower dentition is from stage #1 to #15.
"Passive Aligner Stages" are the stages in which there is no force to the dentition. Passive aligners are for retention purpose only, and patient cannot feel any force when wearing passive aligners. In this figure, there is no passive aligner stage prescribed to the upper dentition and the passive aligner stages of lower dentition is from #16 to #66.
When the doctor prescribes the use of "power arm", the Treatment Overview sheet will show a symbol "Ancillary" on the corresponding tooth.

Fig. 5:
Prior to try-in, templates for bonding each arch are sectioned at the midline which results in four quadrant trays that are more convenient for clinical use.

Fig. 6:
Color-matching with shade guides helps produce inconspicuous attachments.

3-5). These multiple checks reduce chair time and mistakes by ensuring that all templates are correctly configured.

3. *Isolation and Color-Matching*

After explaining the attachment bonding process to the patient, the hole-towel and retractor are applied to isolate the teeth and reduce saliva contamination. The shade for the attachment composite is selected under ambient light conditions by the doctor using the color matching tabs (shade guides) (Fig. 6).

Fig. 7:
Fitting problem (yellow arrow) of the UL template occurs in the central incisor area which is the most crowded and irregular aspect of the arch.

Bonding Phase

(1) Polish all enamel surfaces in both arches with pumice paste and rinse thoroughly.

(2) Try in the respective template for each quadrant. Ensure that they snap into place and fit properly. Fitting and retention problems may occur in the most crowded areas resulting in displacement on either end of the template. Note any fitting problems (Fig. 7) so they can be addressed at the time of bonding by applying pressure with a finger or instrument to achieve an optimal fit. Also, try in the post-attachment aligners (#2) to ensure a proper fit.

NB: During this step, the doctor must again check the specification and location for each attachment by comparing template marks to the Treatment Overview sheet (Fig. 3). After triple-checking the templates (twice by the assistant and once by the

Fig. 8:
Acid-etching according to the marked areas on the template is accomplished for natural enamel with 37% phosphoric acid gel for 30 seconds, and for porcelain surfaces with hydrofluoric acid for 60 seconds.

Fig. 9:
After rinsing with water and air drying, an etched enamel surface has a frosty (satin) appearance.

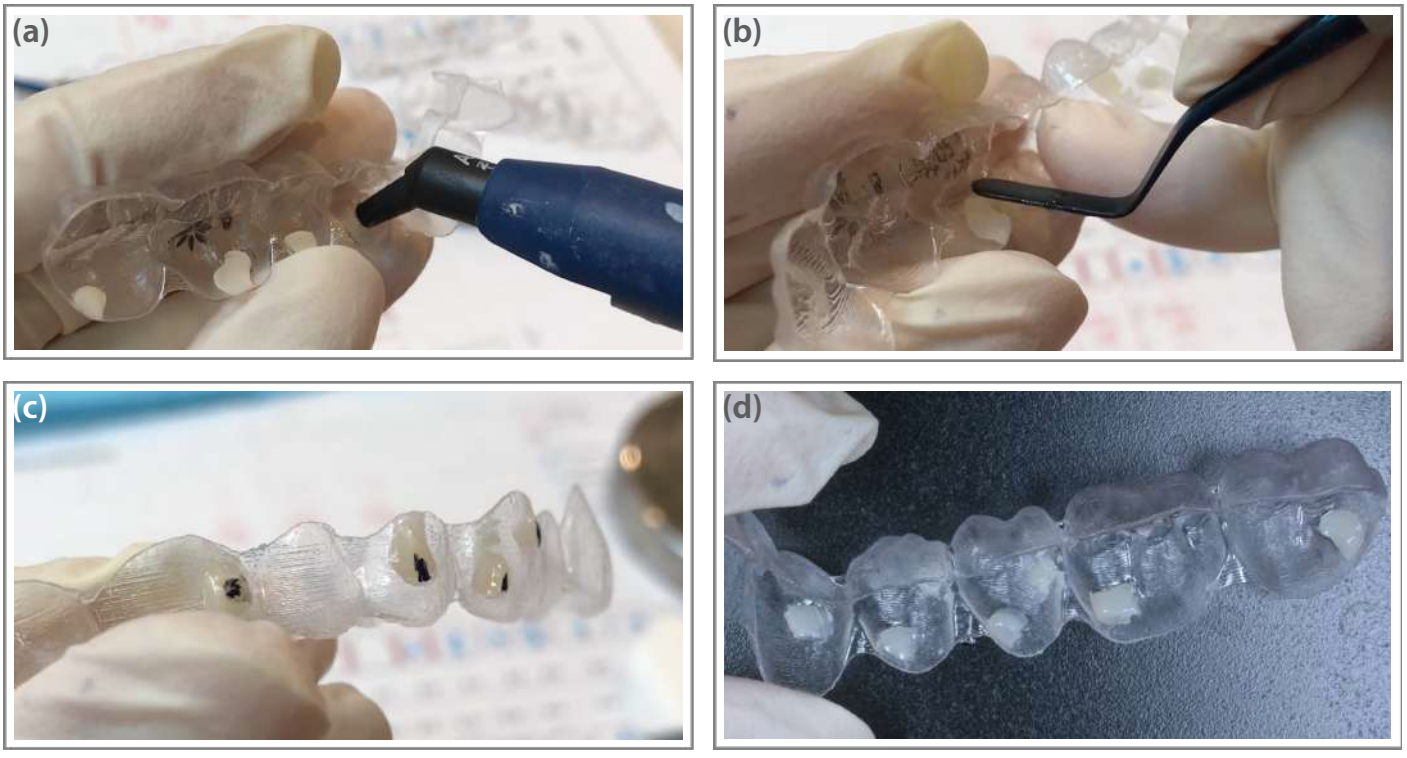

Fig. 10:
(a) Load composite resin into each attachment relief (window) with a resin-feeding gun.
(b) Adapt the resin into each window with a composite spatula.
(c) Check the buccal surfaces of the template to confirm a complete fill for each window.
(d) The lingual surface for each filled window should be slightly overfilled (convex).

doctor), the assistant then fills the attachment windows (reliefs) with composite resin.

(3) Use the marked post-attachment aligners and the doctor's chair side laptop computer to identify areas of enamel requiring etching. Spot etch only the area to be bonded with a 37% phosphoric acid gel for enamel, or hydrofluoric acid for porcelain (Fig. 8). Thoroughly rinse with water and dry. The etched areas should have a frosty appearance (Fig. 9). Insert cotton rolls between the teeth and tongue for saliva control. Apply the bonding agent (primer): OptiBond® Solo Plus™, but do not apply the curing light.

(4) Load the shade-matched composite into the windows of the attachment template, slightly overfilling each area (Fig. 10).

Fig. 11:
After coating each etched attachment area with primer, the resin-filled trays are seated on the two left quadrants, and the patient bites on a cotton roll to ensure a good fit to tooth surfaces.

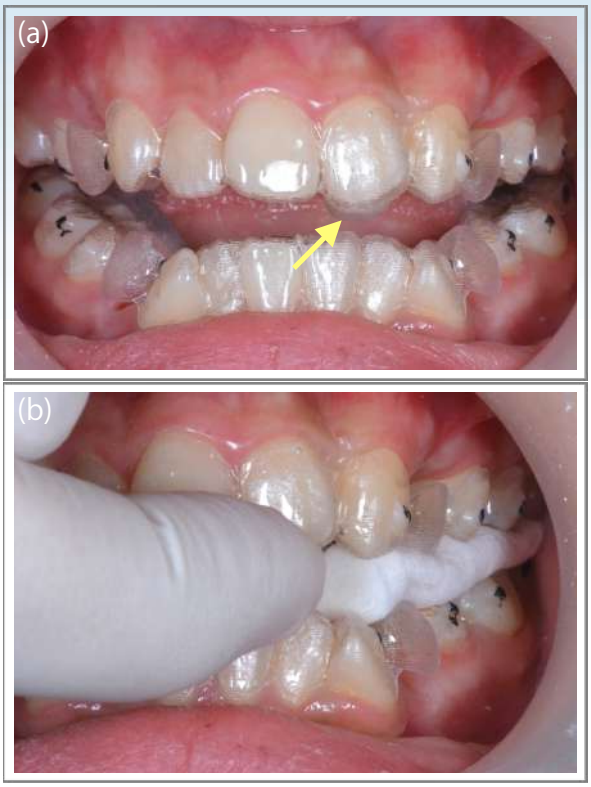

Fig. 12:
(a) A problem with the fit of the UL template was noticed at the try-in (yellow arrow). It must be corrected with finger or instrument pressure prior to curing the resin.
(b) The patient continues to bite on a cotton roll, while an instrument or finger is used to press the ill-fitting area so that it conforms properly to the surfaces of the teeth prior to utilizing the curing light.

NB: To improve efficiency, the doctor performs the etching procedure (Fig. 8) at the same time the assistant loads composite into the template windows (Fig. 10).

(5) After air blowing the uncured primer to a thin layer on each tooth, the UL and LL templates loaded with composite resin are seated in sequence. Then the patient bites on a cotton roll to seat the templates, i.e. tightly adapt the templates to the surfaces of the teeth (Fig. 11).

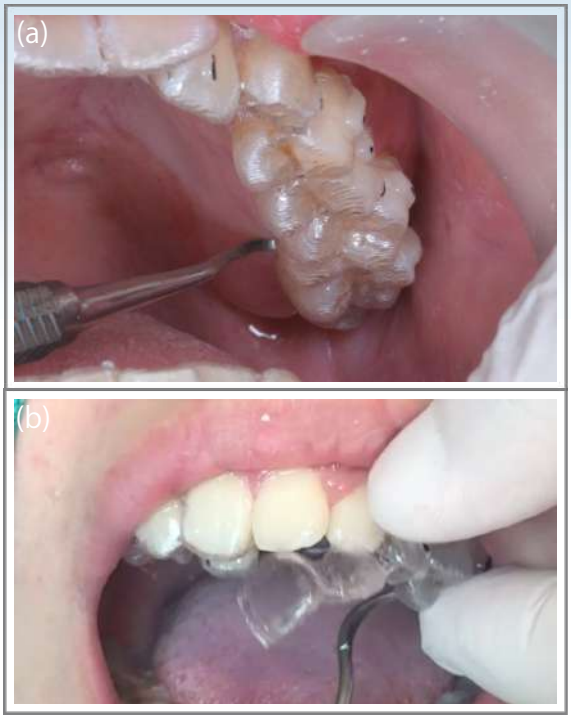

Fig. 13:
(a) After the composite is completely cured, use a large scaler to dislodge the palatal or lingual posterior surface of each template. (b) Protect the cheeks and lips with the operator's fingers when the attachment template is gently rotated to the buccal and removed from the mouth.

NB: Particularly for severely crowded incisors, a gap between the template and the surfaces of the teeth may occur after the patient bites on the cotton roll (Fig. 11). The problem is best resolved by pressing the fingers or an instrument to seat as much as possible the distorted section of the template prior to applying the curing light (Fig. 12).

(6) After the bonding procedure is completed for all four quadrants, additional irradiation with the curing light from all angles is necessary to ensure that primer and composite resin are completely cured.

Fig. 14:
Clean flash and residual bonding resin around each attachment with an 1 mm diameter round bur in a straight handpiece. Avoid water-cooling to better visualize the margins of the attachments. Remove excess inter-proximal resin with dental floss.

Post-Bonding Phase

(1) After curing is complete, use a large hook-type scaler to dislodge the distal ends of the template on the lingual surface, and then carefully remove it to the buccal to avoid damaging the template or attachments (Fig.

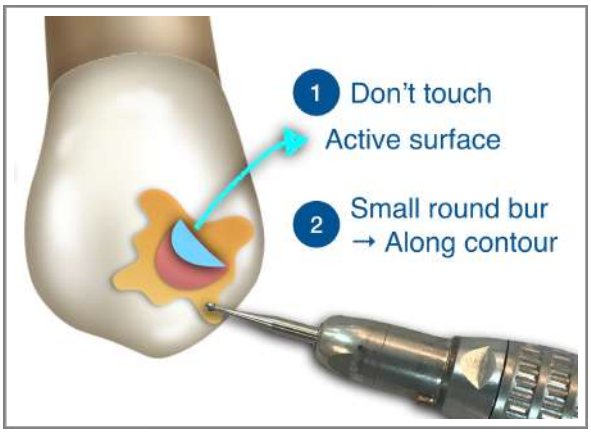

Fig. 15:
Avoid contacting the active surfaces of optimized attachments.

13). The templates are removed sequentially and properly stored. They may be needed when replacing or repairing an attachment(s) during treatment.

NB: Keep the templates in the patient's Invisalign® treatment box. The attachment templates should never be given to the patient.

(2) Clean all excess flash and residual bonding resin from around the attachments with a small round bur in a straight handpick (Fig. 14). Dental floss is effective for removing excess resin or composite from interproximal areas.

NB: Rotate the bur at a slow speed with blown air to clear excess resin as it is removed. To more easily distinguish the margin of each attachment, avoid water irrigation. Never touch the active surfaces of optimized attachments (Fig. 15) because their shape and orientation are critical for the planned treatment objectives.

(3) Instruct the patient to completely engage all attachments when the post-attachment aligners are seated. Emphasize proper hygiene for the aligners and all enamel surfaces (Fig. 16). White spots are much less common for aligner compared to fixed appliance treatment, but placing aligners over teeth coated with plaque can result in generalized decalcification.[7]

Discussion

Precise placement of attachments helps ensure optimal tooth movement as prescribed in ClinCheck®. This is probably the most important step for achieving desired outcomes.[8] The standard bonding

Fig. 16:
An upper panel of three intra-oral photographs reveals the original malocclusion. A similar lower panel shows the dentition after attachments are bonded and Aligner set #2 are seated to activate alignment.

procedure for attachments at Beethoven Orthodontic Center involves multiple checks by different personnel (Figs. 3, 5-7) to ensure adherence to the specification for each attachment: shape (type), shade, relative prominence, and location. Furthermore, excessive humidity (moisture contamination) is controlled with cheek and lip retraction and lingual cotton rolls to isolate the tongue. These are important steps for achieving optimal polymerization, bond strength, and desired dimensions for each attachment.[9]

Conclusions

Attachments bonded with this established procedure facilitate the patient and dental team to enjoy a highly effective and relatively comfortable treatment experience. A full-mouth attachment bonding procedure can be accomplished in 12-15 minutes. This approach for rapidly and precisely bonding all attachments optimizes the efficiency of treatment to reduce chair time and improve outcomes.[10]

Acknowledgements

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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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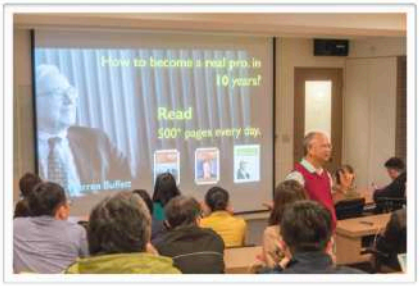

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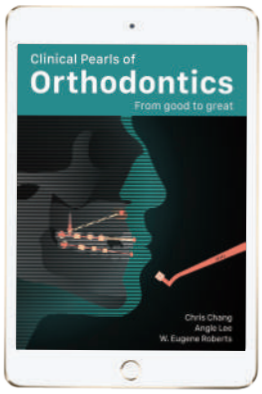

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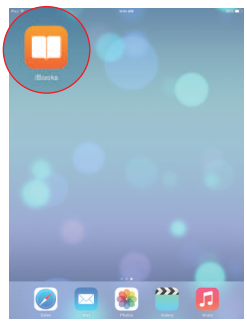

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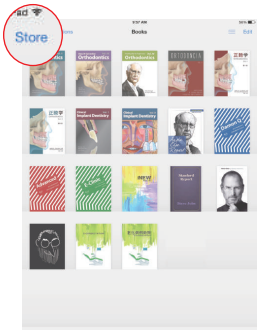
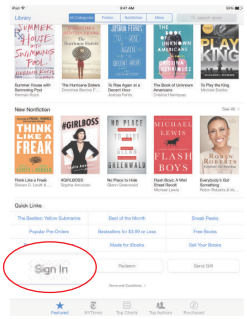
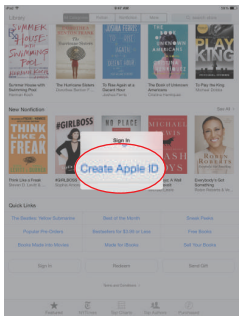


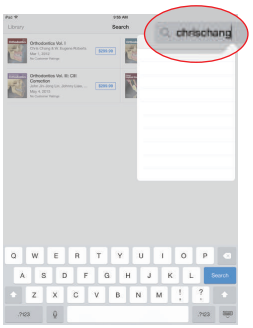
2. Click "Store."



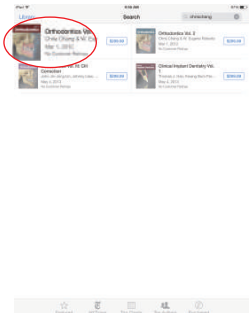
3. "Sign in" with your Apple ID.



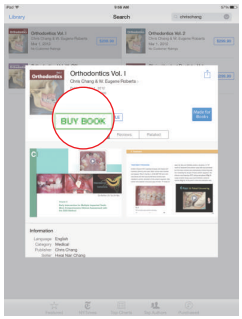
4. "Create Apple ID" if you don't have one.



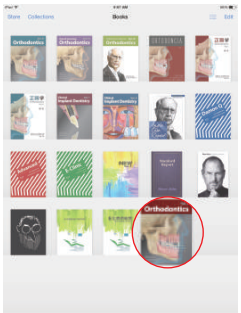
5. Search for "chrischang."



6. Click the book's icon.



7. Check the price and click "BUY BOOK."



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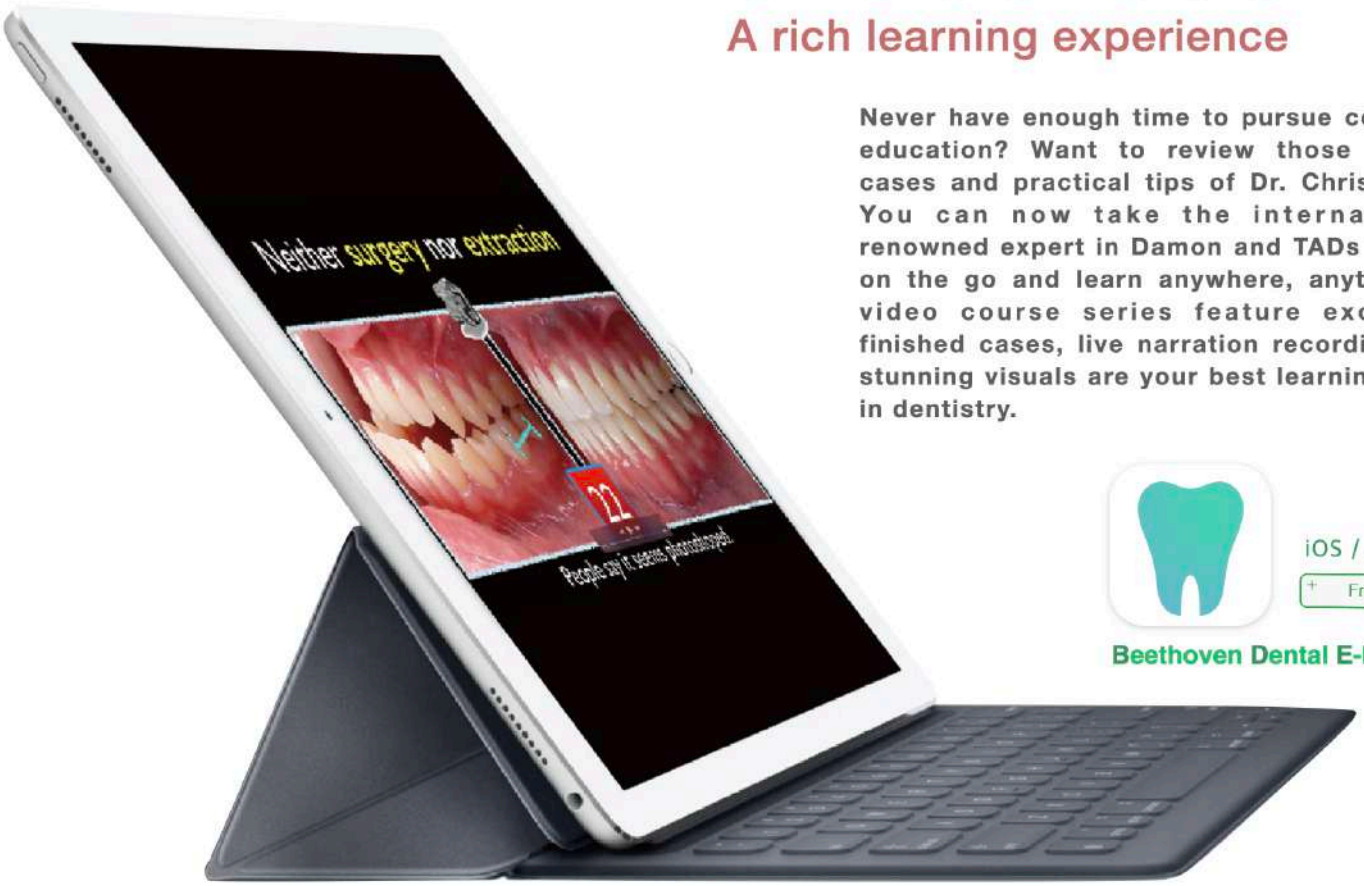

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non-narrated

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E-Implant

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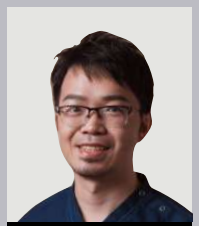
2023 Beethoven

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

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

時間：週四全天 (9 am - 5 pm)

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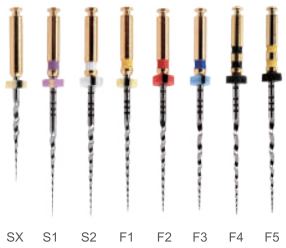

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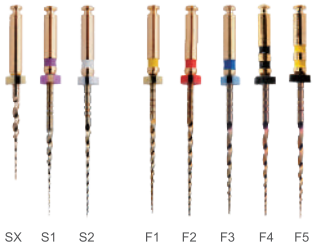
HEAT-TREATED FIREWIRE™ NiTi



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The EdgeTaper Platinum™ and the EdgeTaper™ is designed to be compatible with most handpieces and operates at the ProTaper® and ProTaper Gold® parameters. This familiar sequence will ensure the switch to EdgeTaper Platinum™ or EdgeTaper™ will be seamless. EdgeTaper™ is not heat treated making it more like ProTaper®, files are strong with memory. EdgeTaper Platinum™ features our Heat-Treated Firewire™ NiTi making it strong and more flexible with 90° curves. EdgeTaper Platinum™ tests at twice the cyclic fatigue as ProTaper Gold® and 6 times the cyclic fatigue as ProTaper®.

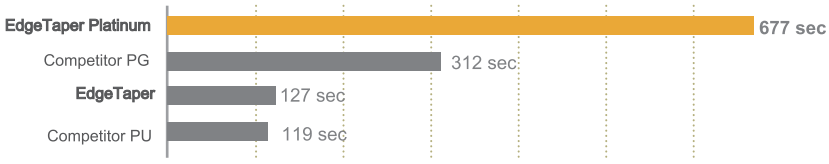
Both file systems have a bloated triangular cross section with a progressive changing taper. Available in lengths 21mm, 25mm, 31mm with six of the same size file in each pack. Experience the new standard in file safety and canal centering ability.

The EdgeGlidePath™ Heat Treated FireWire® NiTi file system features the legendary flexibility and strength that EdgeEndo is known for. It replaces as many as 8 instruments to create a glidepath faster, with far less effort. Replaces #15, 20, 25, 30, 35 hand files in a step-back technique and a #1, 2 & 3 Gates Glidden. EdgeGlidePath works with existing handpieces and operates at the ProGlider® parameter.

EdgeGlidePath has a triangular cross section with the taper and tip size of 19, maximum flute diameter is 1mm (varying taper). Available in lengths 21mm, 25mm, and 31mm with four same size files in each pack.

CYCLIC FATIGUE TEST

500 RPM 90° SLOT. AVERAGE TIME TO FAILURE.*



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EdgeGlidepath™

Heat-Treated FireWire™ NiTi / 4pk

21mm	WHITE	EGP0221
25mm	WHITE	EGP0225
31mm	WHITE	EGP0231

EdgeTaper™

Assorted pack
Non -heat treated NiTi / 6pk

SX19mm,S1,S2,F1,F2,& F3: 21MM	ET21MM
SX19mm,S1,S2,F1,F2,& F3: 25MM	ET25MM
SX19mm,S1,S2,F1,F2,& F3: 31MM	ET31MM

Non-heat treated NiTi / 6pk

	ETSX19

Non-heat treated NiTi / 6pk

PURPLE	ETS121
WHITE	ETS221
YELLOW	ETF121
RED	ETF221
BLUE	ETF321
BLACK	ETF421
YELLOW	ETF521

25mm Non-heat treated NiTi / 6pk

S1	PURPLE	ETS125
S2	WHITE	ETS225
F1	YELLOW	ETF125
F2	RED	ETF225
F3	BLUE	ETF325
F4	BLACK	ETF425
F5	YELLOW	ETF525

31mm Non-heat treated NiTi / 6pk

S1	PURPLE	ETS131
S2	WHITE	ETS231
F1	YELLOW	ETF131
F2	RED	ETF231
F3	BLUE	ETF331
F4	BLACK	ETF431
F5	YELLOW	ETF531

EdgeTaper Platinum™

Assorted pack
Heat-Treated FireWire™ NiTi / 6pk

SX19mm,S1,S2,F1,F2,& F3: 21MM	ETP21MM
SX19mm,S1,S2,F1,F2,& F3: 25MM	ETP25MM
SX19mm,S1,S2,F1,F2,& F3: 31MM	ETP31MM

19mm Heat-Treated FireWire™ NiTi / 6pk

SX	ETSX19HT

21mm Heat-Treated FireWire™ NiTi / 6pk

S1	PURPLE	ETS121HT
S2	WHITE	ETS221HT
F1	YELLOW	ETF121HT
F2	RED	ETF221HT
F3	BLUE	ETF321HT
F4	BLACK	ETF421HT
F5	YELLOW	ETF521HT

25mm Heat-Treated FireWire™ NiTi / 6pk

S1	PURPLE	ETS125HT
S2	WHITE	ETS225HT
F1	YELLOW	ETF125HT
F2	RED	ETF225HT
F3	BLUE	ETF325HT
F4	BLACK	ETF425HT
F5	YELLOW	ETF525HT

31mm Heat-Treated FireWire™ NiTi / 6pk

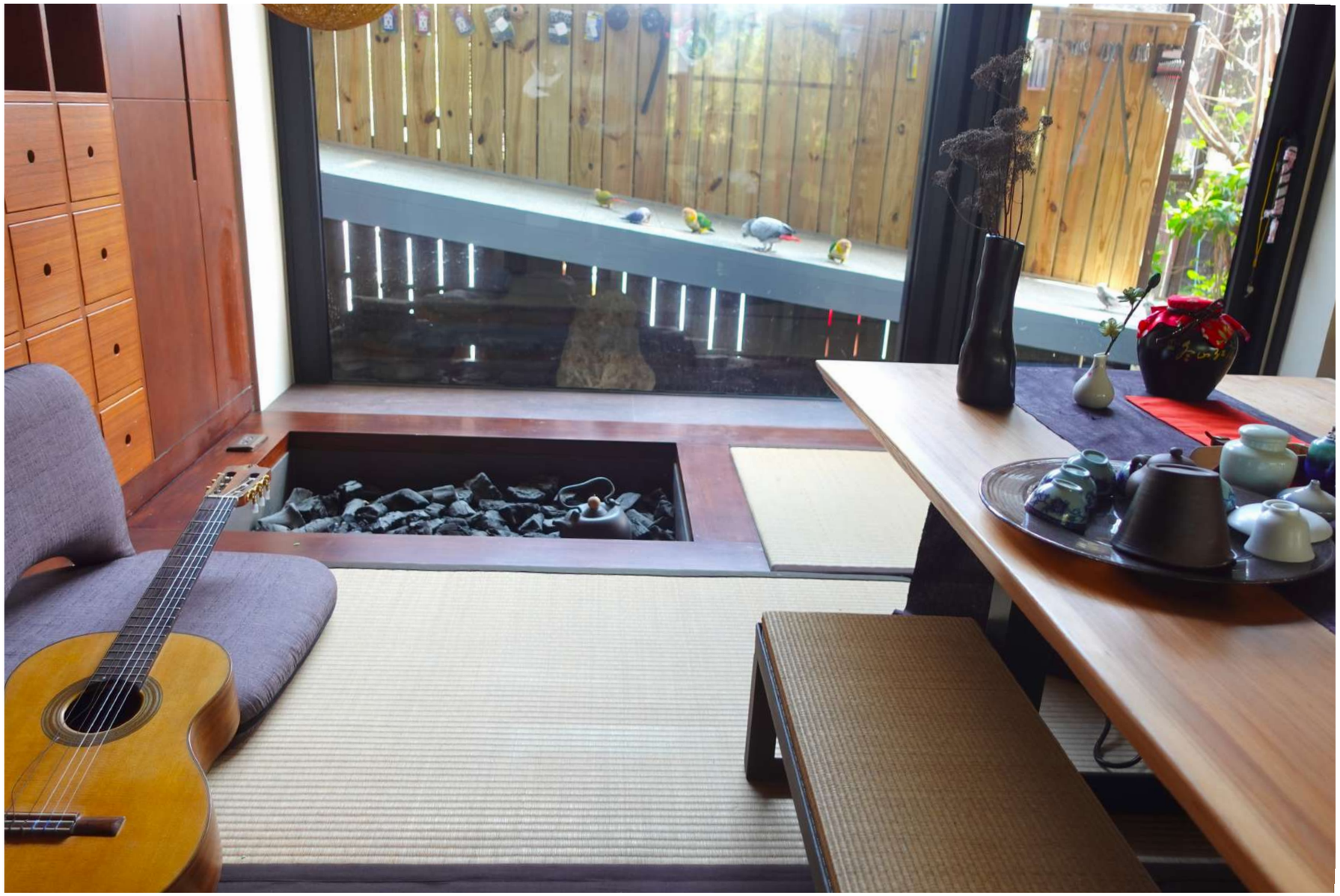
S1	PURPLE	ETS131HT
S2	WHITE	ETS231HT
F1	YELLOW	ETF131HT
F2	RED	ETF231HT
F3	BLUE	ETF331HT
F4	BLACK	ETF431HT
F5	YELLOW	ETF531HT

Taiwanese Lifestyle Through the Eyes of CC

Chapter 9.

Maximizing Spaces and Resources - Regenerating dead space & your soul

"Creativity is seeing what others see and thinking no one else ever thought."
– Albert Einstein



In housing design, there is always an inevitable sacrifice of space in order to achieve certain functions or purposes. If such spaces are big enough, they may be turned into something else; for example, the triangular space under staircases is often fitted with shelves and cupboards to serve as storage, or in older Taiwanese residences, a bathroom. However, what if the space is just too fragmentary and difficult for common uses? One such example would be the gap under an access ramp, which is more often than not filled up with solid concrete.

The need for wheelchair access for Dr. Chang's mother prompted the addition of a ramp to connect their two houses, and since the neighborhood is situated on a slope, a discrepancy in ground levels exists. As the ramp goes past Dr. Chang's spectacular front yard aviary, the logic of space extension has again been implemented in the ramp's design, similar to how the garage ceiling was converted into an aviary extension (see chapter 8).

With this idea in mind, Dr. Chang once again transformed the ramp into a facility shared by the human and feathered residents in and around the house. The surface of the ramp is obviously used for access - its most fundamental purpose. The inner edge of the ramp is securely attached to the house wall, while the outer edge is closed up with mesh and sliding windows on the upper half and a wooden fence on the lower half. On both sides of the fence, a line of utility hooks have been installed to store all kinds of tools and materials for home maintenance and gardening. Upon closer inspection, one can see that the fence has actually been cut apart along the level of the ramp, with the bottom section cleverly made into several

disguised doors allowing access to the space under the ramp, where the remaining rocks from previous construction are stacked up into piles. This is not only for storage, but also to prepare the space for its new settlers - quail!

As previously introduced in chapter 2, quail are extremely timid and therefore enjoy places with overhead covers, so consequently this semi-isolated space under the ramp makes a perfect home for them. Sand has been scattered all over the floor to cater for the quail's digging habit, while the rock piles add a dynamic to the landscape and stimulate natural foraging behavior. Though seemingly secluded, it is actually connected to the front yard aviary, allowing freedom for the quail to venture out if they prefer leafy bushes or want to enjoy some sunlight, as well as for other curious birds to seek sanctuary and seclusion. There is no need to worry that other birds or ducks will take over their space, as the differences in their instincts and habits naturally lead them to inhabit different parts of the aviary.

Fig. 1: The fence was cut along the level of the ramp, with the bottom part cleverly made into several disguised doors, which allow access to the space under the ramp.

Fig. 2: Rocks are piled up under the ramp not only for storage, but also to better accommodate the new settlers - quail. The secluded space is a perfect home for these timid ground-dwellers.

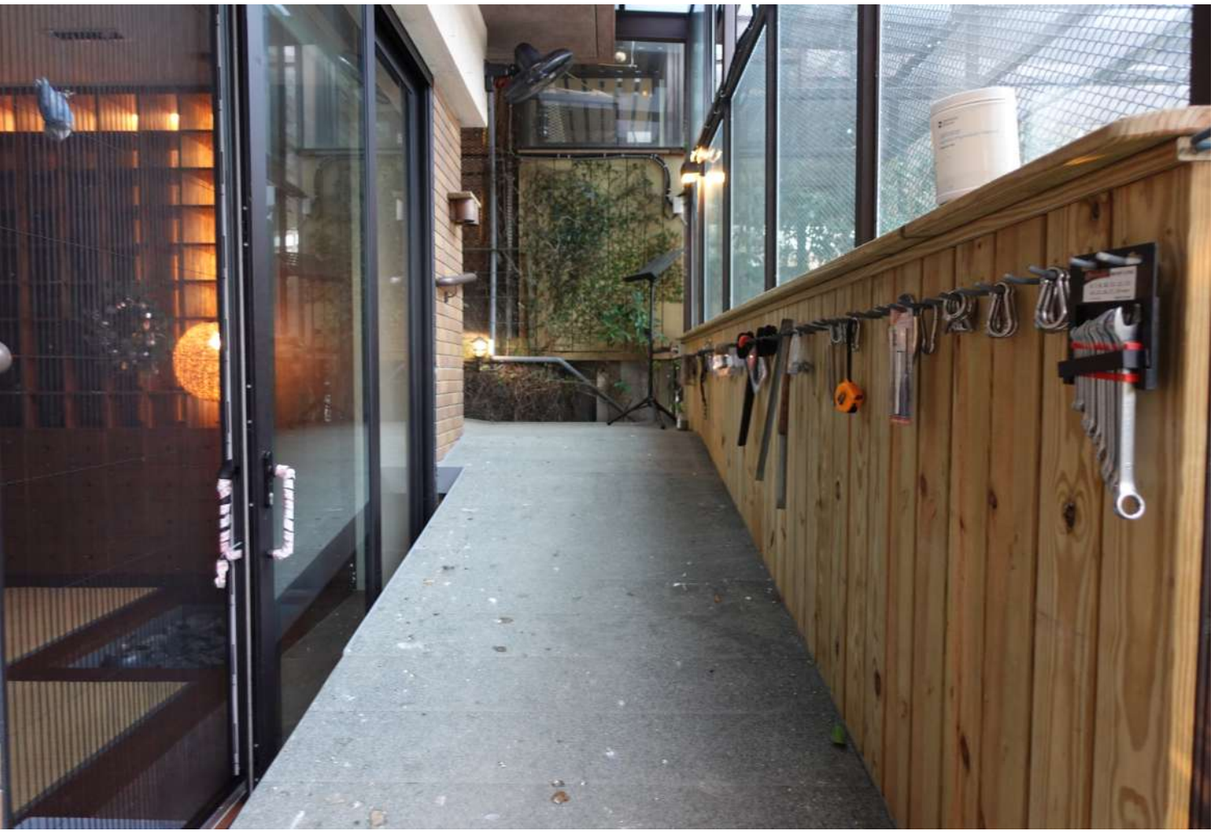


Fig. 3: (bottom left) On both sides of the fences, utility hooks are installed to store all kinds of materials and tools for home maintenance and gardening.

Fig. 4: The ramp is located inside the front yard aviary introduced in the previous chapter (chapter 8), making it another facility that can be enjoy by both human and birds.

A specific section of the ramp coincides with the tea room in the house, which is directly accessible from the ramp through a set of sliding patio doors. Between the ramp and the sliding doors, a gap of around 20cm has been left so the bottom of the glass doors can be easily reached for cleaning. As an added bonus, the tea room enjoys an excellent view into the quail's new home. When adults are immersed in the fragrance, taste, and ceremony of tea and tea-making, the kids usually gather by the glass doors, observing the quail pecking and scratching around, a scene which is otherwise rather difficult to see in an open field. This is normally when Dr. Chang is prompted to proudly pronounce, "Sure, some people have aquariums at home, but we have this!"

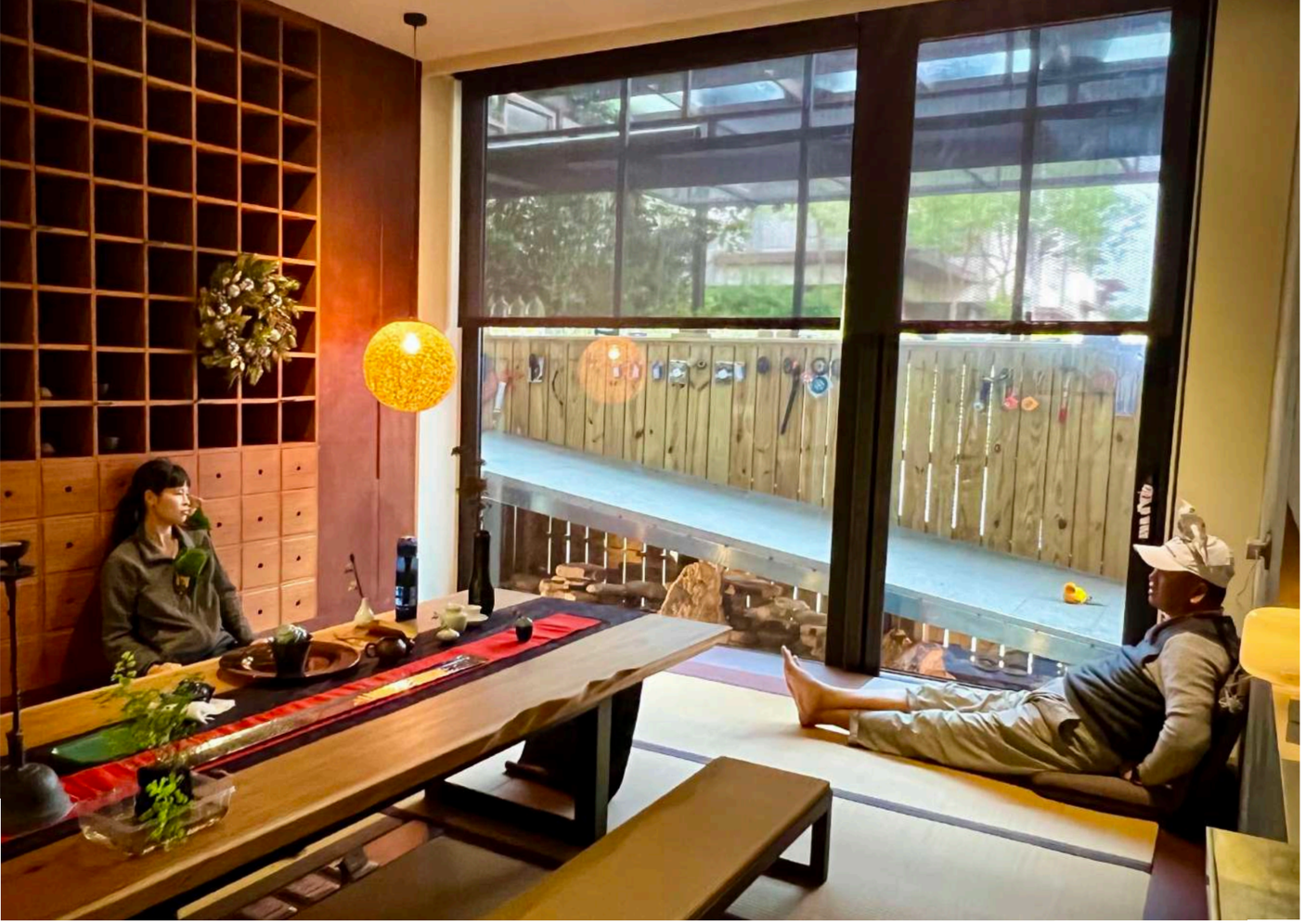


Fig. 4: The Changs' tea room is directly accessible from the ramp via sliding patio doors. When the doors are closed, the tea room provides tranquility and security. Once the doors have been slid open, the Chang family get to plunge into the embraces of their beloved birds.

Fig. 5: Dr. Chang, his daughter Kristine, and guests having a mesmerizing session of tea ceremony.

In addition to a passageway, the ramp also serves housekeeping and ecological purposes. With this creative design, the tea room seems to become an intersection that connects the outdoors and the rest of the house. It provides the tranquility and security that an indoor space can offer, while at the same time extends an open arm to welcome in the sunlight, the humming of the winds, and the birdsong of all the feathered companions around the house. Once the patio doors have been slid open, Dr. Chang and his family get to plunge straight into the bubbly joy as their endearing birds flock, perch, and chirp all over them. The slower ones, such as the Call duck with its clumsy, swinging footsteps, catch up later and loyally follow the Changs around as they stroll towards the front yard aviary to enjoy a break surrounded by nature.

Fig. 6: Some of the feathered friends who cannot get enough time with their human hosts can be found wandering in front of the patio doors, waiting patiently for Dr. Chang and his family's next break time off work.

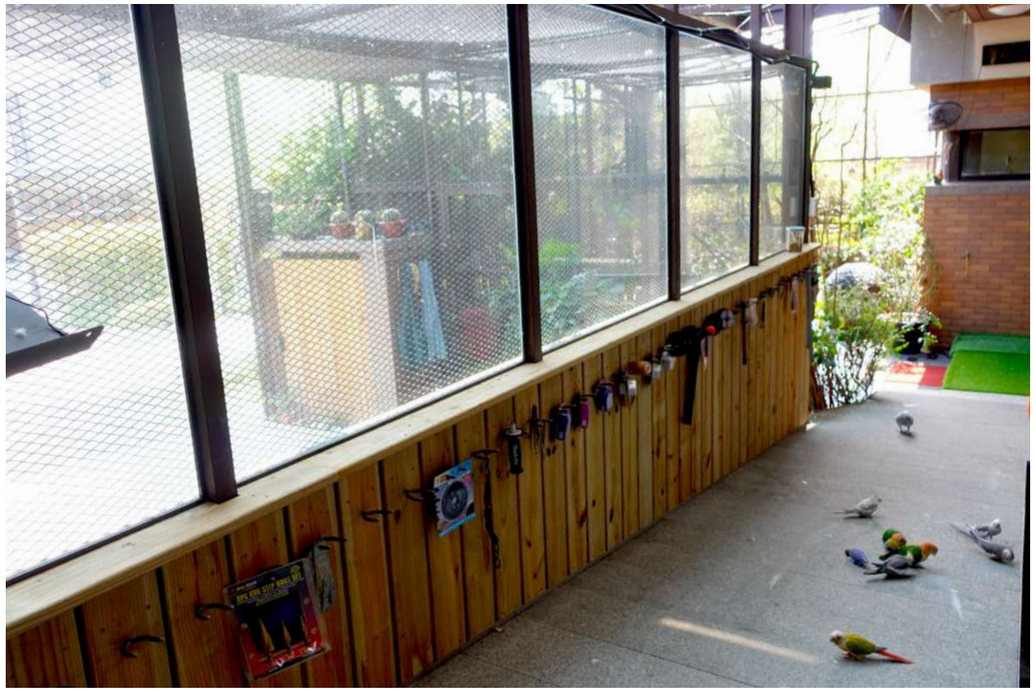


Fig. 7: From this angle, it is apparent that the ramp area is itself an extension of the front yard aviary. The fragmentary space is used to its maximum, benefitting all the living creature in and around the house.

Fig. 8: The affection between the Chang family and their birds is mutual. Through their interactions, one can really tell that the family treat them like feathered children, and reciprocally the birds reward with trust. Unlike the nervous, restless ones in the wild, they know they are safe enough to show the most vulnerable, and at the same time the most adorable side to the family.

"Creativity is seeing what others see and thinking what no one else ever thought," said Albert Einstein. Furthermore, such creative thinking is best stimulated by the necessity of the outcome to be applicable and useful. The evolution of the Changs' outdoor ramp developed from an original consideration of accessibility; however, after incorporating the needs for creating a better living environment for all creatures of the house, the ramp has become much more than just a ramp, a regenerated facility that also regenerates the Changs' souls. On the contrary, creative thinking, especially in a profession, without actually understanding the needs that have to be met, could render the outcome undesirable, spoiling the very idea of creativity and inversely limiting the scope of thinking.

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

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New Release!

In early February, 2023, Dr. Chris Chang was invited to held a lecture and a workshop at the International Congress of Orthodontics and Aligners in Avlia, Spain. Over 1,000 participants attended the lecture, and a record-breaking 130 doctors enrolled in the workshop to practice OrthoBoneScrew® installment.