JDO

Journal of Digital Orthodontics
International Journal for Orthodontists and Implantologists

Vol. 75 July 1, 2024

As we walk through a curved trial leading to Dr. Chang's newly completed backyard getaway, running along two sides of the house to where they converge is a cactus garden. The location basks in sufficient hours of glorious sunlight, creating a perfect environment for these colorful yet low-maintenance plants.

ISSN 2523-9406
977 2523940 002

This journal is available for free download at iJDO.pro.

2024-25 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) 9:00-17:00 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.

2025

Module 1 - 3/13
Module 2 - 4/17
Module 3 - 5/1
Module 4 - 5/15
Module 5 - 5/22
Module 6 - 6/5
Module 7 - 6/19
Module 8 - 7/3
Module 9 - 7/17
Module 10 - 7/31
Module 11 - 8/14

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 XVI

Module 1 - 4/16
Module 2 - 5/21
Module 3 - 6/18
Module 4 - 7/9
Module 5 - 8/13
Module 6 - 9/10
Module 7 - 10/22
Module 8 - 11/5
Module 9 - 12/10
Module 10 - 1/14/25'
Module 11 - 2/18

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.

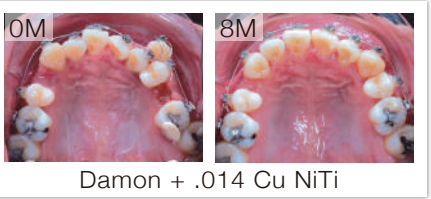
course@newtonsa.com.tw

2024

Class - 11/26-28

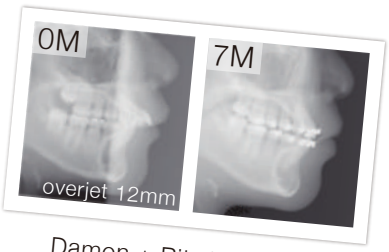
2025

Class - 11/25-27



Damon + .014 Cu NiTi

Damon Clear



Damon + Bite Turbo + Early Light Short Elastic

每次上課請依最新一期 JDO 公告為主

報名專線
湧傑 Yong Chieh

北區 邵美珍 02-27788315 #120
中區 張馨云 04-23058915
南區 王慧靜 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)

AAO is indeed a grand institution, with a long history, but I often feel as if it's like a family. This is most unique, especially in such a large association, having a feeling this close and intimate.

Whenever I have had the privilege of being invited to speak in the AAO annual meeting, the internal excitement starts as I prepare to show my friends and family what I have learned since we last met. This excitement continues to boil and intensifies to elevated levels during my delivery. Most importantly, I can still feel the rush when I talk to the audience and fellow participants long after my presentation has concluded. My excitement is basically all year round.

I am sure that I am not the only speaker or participant who feels this way, AAO not only allows us to share, but also allows us all a chance to listen and learn from esteemed colleagues at the top of their game. What better way could there be to learn and progress? Every year the latest technology and clinical skills within our community are shared. Therefore, annually, we receive the best and the most up-to-date information in our field. Is there any other organization that can offer this high level of quality education? As far as I am concerned, the answer is a definite no. I always encourage all the orthodontists I know to become members of this fine association to enhance their knowledge, skills, and career.

Better yet, there are almost no barriers in this meeting. It doesn't matter where you come from. Whether it's Europe, Asia, or Latin America, you won't be treated any differently, and I always feel most welcome here. Even though the name suggests differently, this is truly an international body.

Furthermore, I feel AAO represents a beacon of world peace. And peace is indeed very difficult to achieve in today's world. If AAO continues to serve as this beacon of peace, hope, and understanding, then I think the world will be improved because of it. There is no need to emigrate to Mars as Elon Musk often suggests. A simple plane ticket to the AAO annual meeting more than suffices. We can help to improve our profession right here at the AAO annual meeting and enjoy the company of our international peers.

Chris Chang PhD, ABO Certified, Publisher of JDO

Pseudo-Class III Malocclusion with Anterior Crossbite and Bilateral Upper Transalveolar Impacted Canines: Four Premolar Extraction, Aligners, and Segmented Fixed Appliances

Abstract

History: *An 18yr-11mo-old female presented with chief complaints of anterior crossbite, multiple missing teeth, and a protrusive chin.*

Diagnosis: *The patient was diagnosed with bimaxillary protrusion combined with an anterior crossbite, bilateral upper impacted canines, unerupted UR8, and missing UR7. The Discrepancy Index (DI) was 21.*

Treatment: *Four first premolars were extracted prior to Invisalign® treatment. The upper extraction spaces were maintained to allow the impacted canines to erupt. The lower extraction spaces were closed with aligners and segmental braces. The impacted UR3 erupted spontaneously, but the impacted UL3 and UR8 did not. Following surgical exposure, they were aligned using aligners, buttons, power chains (PCs), and elastics.*

Results*: After 43 months of active treatment, this malocclusion, with a Discrepancy Index of 21 points, was treated to a Cast-Radiograph Evaluation (CRE) score of 20 points and a Pink and White esthetic score of 2 points. The impacted canines were successfully aligned, with the impacted UR8 recovered and substituted for the missing UR7. The patient was pleased with the treatment outcome.*

Conclusions*: Careful treatment planning and clinical monitoring are prerequisites for treating challenging patients. Hybrid mechanics combining the strengths of segmented fixed appliances and clear aligner therapy are effective in correcting anterior crossbite, multiple impactions, and protrusive chin. (J Digital Orthod 2024;75:4-26)*

Key words:

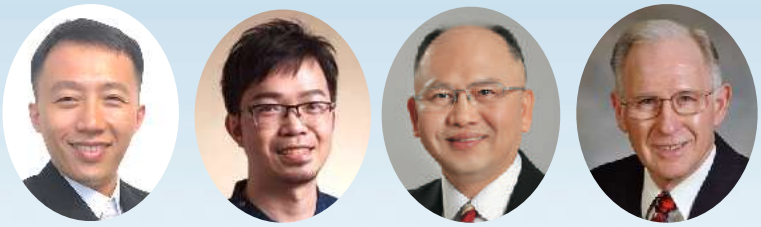
Clear aligner therapy (CAT), fixed appliance (FA), segmental fixed appliances, clear aligner, bimaxillary protrusion, four premolars extraction, anterior crossbite, functional shift, impacted canine, U8 for U7 substitution, Invisalign®, pseudo-Class III

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

Introduction

In 1997, two Stanford University students named Zia Chishti and Kelsey Wirth founded the company Align Technology.[1] Two years later, Align Technology introduced the first commercial clear aligner system called Invisalign. This system was initially only available to orthodontists, and was subsequently

Chris S. Lin,
Lecturer, Beethoven Orthodontic Center (Left)
Joshua S. Lin,
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)



accessible to general dentists. The indication was originally limited to minor alignment problems. Due to advancement in technology and materials, these removable appliances can now be applied to complex malocclusions. In 2017, Grünheid et al.[2] compared the differences between the predicted and achieved tooth positions for patients who received aligner treatment. The study found that although some planned tooth movements could not be entirely achieved, Invisalign was able to achieve predicted tooth positions with high accuracy in non-extraction patients.

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

Invisalign has sparked a worldwide trend with an increasing number of patients choosing to use them. Compared to traditional braces, there are numerous advantages such as esthetics, comfort, easy maintenance, high patient acceptance,[3] and less risk of developing white spot lesions.[4]

However, the drawbacks include high costs and an increased level of patient cooperation. Moreover, more challenging tooth movements are difficult to achieve with this system alone. Challenging teeth movements include mesiodistal tipping,[5] extrusion,[6] rotation of canines[7] and extraction space closure.[8]

The aim of this study is to present a complex treatment for bilateral upper impacted canines, anterior crossbite, and pseudo-Class III malocclusion that was treated with a combined hybrid approach.

History and Etiology

An 18-year-old female sought orthodontic consultation for multiple missing teeth and a protrusive chin. No contributing medical or dental histories were reported. Her facial profile was unesthetic due to mandibular prognathism. Clinical examination revealed a concave facial profile, lower lip protrusion, an acute nasolabial angle, and anterior crossbite (Fig. 1). An intraoral examination revealed that the UR7 was missing, and UR3, UL3, and UR8 were impacted. The overjet was -2 mm, and the overbite was 2 mm in centric occlusion (C_O). Buccal segments were Class I on the right and Class III on the left. An edge-to-edge incisal relationship was noted when the mandible was guided to the centric relation (C_R) position (Fig. 2). Panoramic radiography (Fig. 3) revealed that two upper canines were high impactions. The UR3 was positioned at the apex of UR4, whereas the UL3 was near the apex of the UL2. Lateral cephalometric radiographs indicated decreased inclination of the incisors in both arches and a relatively straight profile when the patient occluded in C_R (Fig. 4). The increased SNB angle indicated mandibular prognathism. If clockwise rotation of the mandible is achieved during orthodontic treatment, the SNB and mandibular plane angle and anterior crossbite would be improved.

Fig. 2: *In C_R, an edge-to-edge relationship and 3 mm midline discrepancy was noted, indicating a functional shift.*

Diagnosis

Facial:

- Facial Convexity: *Within normal limits (WNL) (G-Sn-Pg', 13˚)*

Fig. 3: *Pre-treatment panoramic radiograph*

- Lip Protrusion: *Protrusive lower lip*

Skeletal:

- Sagittal Relationship:
  - *Class III tendency at C_O position (SNA, 85˚; SNB, 86˚; ANB, -1˚)*
  - *Mandibular plane angle: Low angle (SN-MP, 27˚; FMA, 20˚)*

Dental:

- Occlusion: *Right Class III, left Class I molar relationship (Fig. 5)*
- Overjet: *-2 mm*
- Upper and Lower incisors: *WNL*

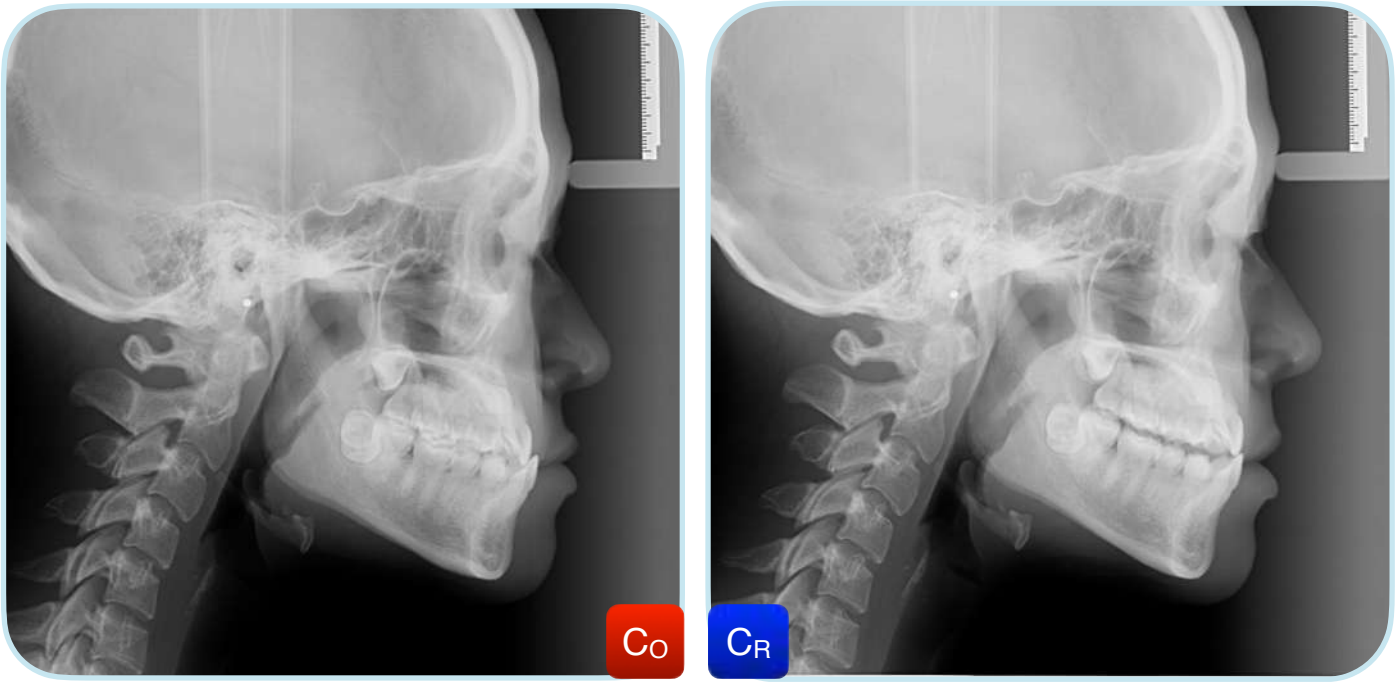


Fig. 4: *Cephalometric radiograph in the C_O (left) and C_R (right) positions. See text for details.*

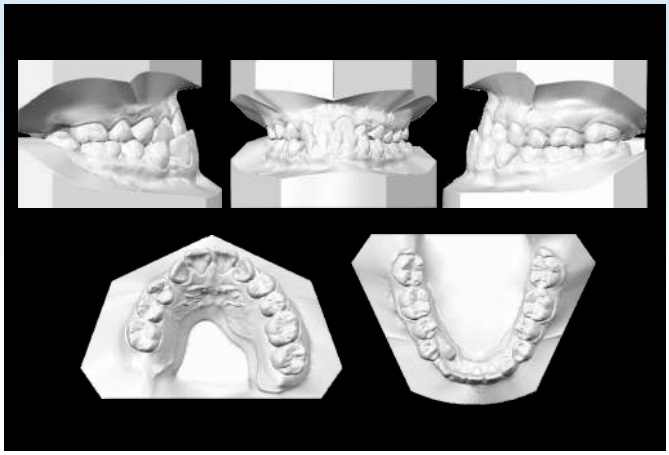


Fig. 5: *Pre-treatment digital dental models (casts)*

- Crossbite: *Upper and lower anterior teeth*
- Impaction: *The UL3 crown was transposed and impinging on the UL2 root. The UR3 was transposed impinging on the UR4 root.*

American Board of Orthodontics (ABO) Discrepancy Index (DI): 21.

Treatment Objectives

1. Level and align both arches.
2. Open the bite, and rotate the mandible posteriorly.
3. Maintain the upper incisors and retract the lower incisors to correct the anterior crossbite with aligners and anterior bite turbos.
4. Maintain the spaces for upper impacted canines to erupt.

Treatment Plan

The overall objectives were to correct the pseudo-Class III malocclusion, maintain the upper incisor positions sagittally, retract the lower arch and restore the missing UR7, impacted UR3, and UL3. Four treatment options were considered (Fig. 6).

Option 1: Remove the impacted UR8, UR3, and UL3, and substitute them with the adjacent first premolars. Then, proceed with Lefort I surgery combined with bilateral intramural vertical ramus osteotomies.

Option 2: Extract bilateral upper second premolars and lower first premolars. Retain the upper extraction spaces for the impacted canines to erupt into. Perform surgical exposure if necessary. Place one implant-supported prosthesis in the UR7 area.

Option 3: Extract four first premolars. Retain the upper extraction spaces for the impacted canines to erupt into. Perform surgical exposure if necessary, and place one implant-supported prosthesis in the UR7 area.

Option 4: Extract four first premolars. Retain the upper extraction spaces for the eruption of the impacted canines. Perform surgical exposure procedure if necessary, and substitute the missing UR7 with the impacted UR8.

The benefits of the first option are easier process for the aligner technician and less treatment time. However, this option is undesirable because (1) more surgical intervention; (2) surgical correction of the jaws complicates orthodontic finishing; and (3) substituting the premolars with the impacted

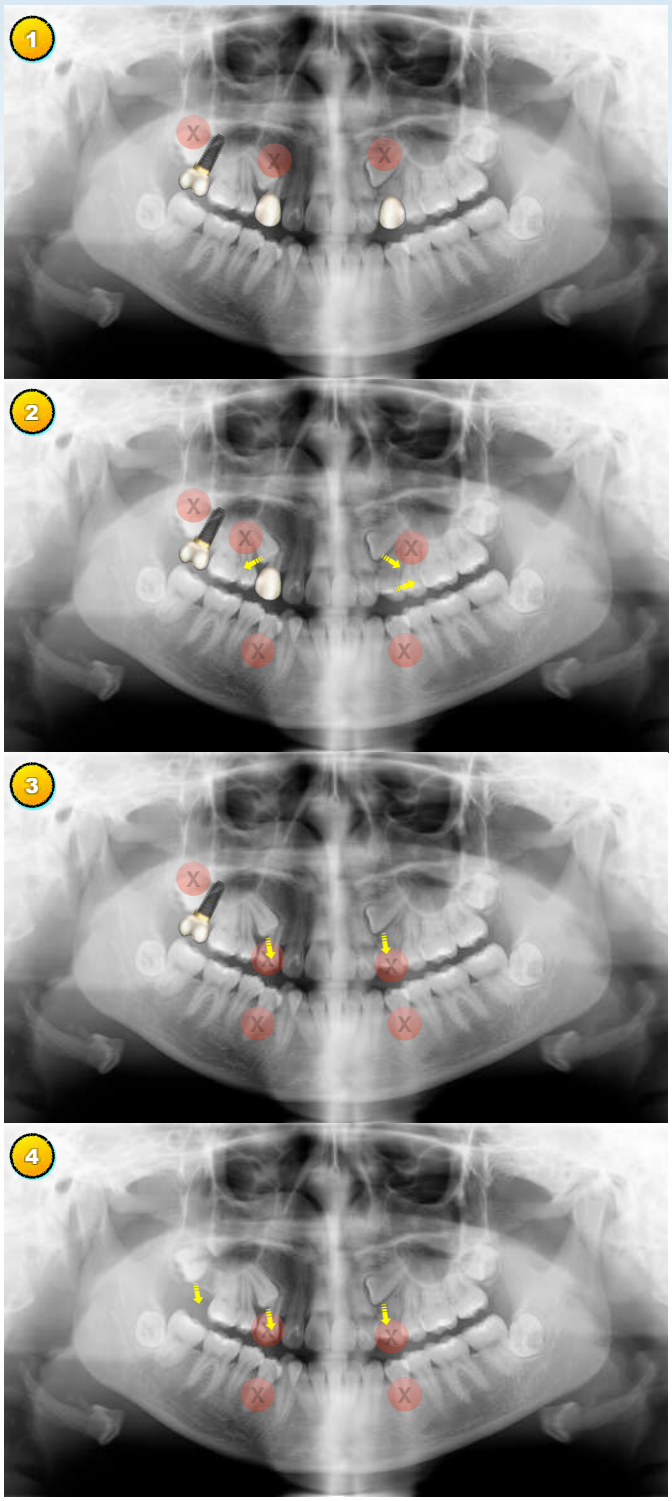


Fig. 6: *Treatment option 1-4. See text for details.*

canines would result in an unesthetic outcome and a functional compromise.

The second option proposes etraction U5s instead of U4s, which would be efficient for anterior crossbite management. However, retaining U4s may cause a barrier for the impaction.

As for the third option, extracting bilateral upper first premolars may facilitate eruption of the impacted canines, but subsequent correction of the anterior crossbite would be more time-consuming.

Compared to the third option, the fourth option reduces the patient's cost because no implant

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-TX	POST-TX	DIFF.
SNA° (82°)	85°	85°	0°
SNB° (80°)	86°	84°	2°
ANB° (2°)	-1°	1°	2°
SN-MP° (32°)	27°	31°	4°
FMA° (27°)	20°	24°	4°
DENTAL ANALYSIS			
U1 TO NA mm (4mm)	3	4	1
U1 TO SN° (104°)	107°	108°	1°
L1 TO NB mm (4mm)	5	2.5	2.5
L1 TO MP° (90°)	91°	85°	6°
FACIAL ANALYSIS			
E-LINE UL (-1mm)	-2	-2	0
E-LINE LL (0 mm)	0	0.5	0.5
%FH: Na-ANS-Gn (56%)	52%	56%	4%
Convexity: G-Sn-Pg (13°)	13°	4°	9°

Table 1: *Cephalometric Summary*

would be necessary. But this option is the most difficult clinically. All three impacted teeth will be uncovered and aligned into the occlusion.

After discussing the four options with the patient and her parents, the fourth option was chosen because it was most likely to achieve a near ideal dentofacial result in a minimally invasive manner.

Treatment Progress

iTero Element® intraoral scan (Align Technology, Inc., San Jose, CA, USA) provides a 3D dataset. The ClinCheck® (Align Technology, Inc., San Jose, CA, USA) system was used to plan the treatment and project the outcome. Both optimized and conventional attachments were applied in sequential staging (Fig. 7). The treatment was conducted in two phases: initial and refinement. Oral hygiene and aligner fit were monitored at monthly intervals.

Initial phase

The major goals of the initial treatment were to correct the anterior crossbite[9] and keep the upper extraction spaces for the impacted canines to erupt into (Fig. 8). Four first premolars were extracted before the aligner treatment started. A total of 59 sets of aligners were used over 17 months. The first 19 sets of aligners were changed every 10 days. Optimized root control attachments were used on the lower canines. Gingival bevel attachments were applied to the upper incisors. Meanwhile, no power ridges were applied to the lower incisors (Fig. 7). Conventional rectangular and

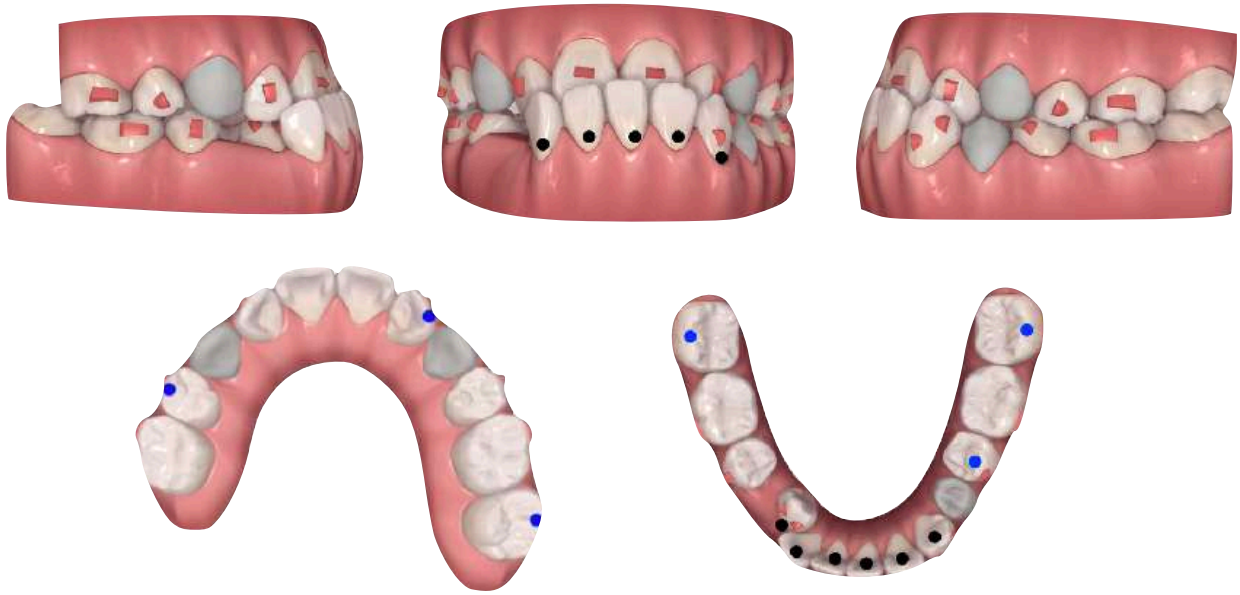


Fig. 7:
ClinCheck® treatment plan and prescribed attachments are shown for the initial phase of treatment. Blue dots indicate variably predictable tooth movement (2.5-3 mm intrusion for lower incisors; 4-6 mm root movement for LR5). Black dots indicate less predictable tooth movement (>3 mm intrusion for upper incisors; >6 mm root movement for UR3). See text for details.

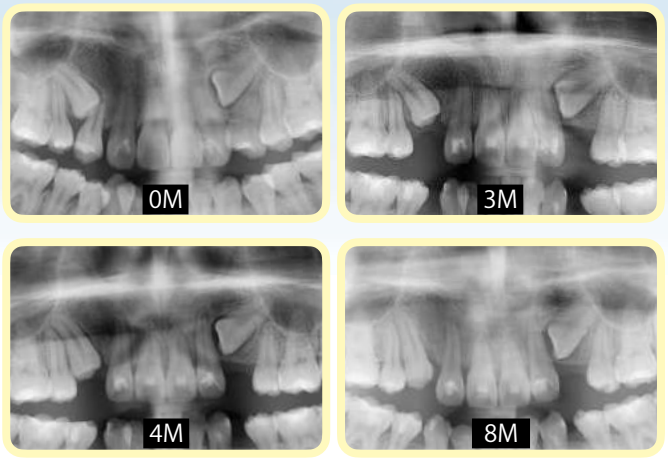


Fig. 8:
Upper right canine erupted gradually after the impinging first premolar was removed. The upper left canine did not erupt. Hence, surgical exposure was performed to facilitate eruption.

Fig. 9:
Wooden tongue depressor was bitten three times a day for two minutes each from aligner 7 (A7) onward.[9] The lower anterior bite turbo was bonded from aligners 53 (A53).

optimized anchorage attachments were provided for the posterior teeth. SmartStage® technology was also used for the lower posterior teeth to minimize any unwanted tipping.

In order to correct the anterior crossbite, the patient was instructed to bite on a wooden tongue depressor three times a day from aligner 7 onward (Fig. 9).[10] According to the Clincheck design, the anterior crossbite should have been corrected after aligner 40. However, the crossbite remained even after aligner 53. Therefore, a lower anterior bite turbo was bonded, and the patient continued to use the depressor. The anterior crossbite was corrected within three months. No Class III elastics were used during the initial phase.

The treatment progress is documented from the maxillary occlusal, mandibular occlusal, right lateral, and left lateral views, respectively (Figs. 10-13).

Following premolar extractions, the impacted upper right canine erupted spontaneously after six months (Figs. 8 and 10). Unfortunately the upper left canine failed to erupt. This was likely due to the lateral incisor blocking the pathway. Therefore, in the tenth month (aligner 32), surgical exposure of UL3 and UR8 was performed. UR3 eruption was inhibited so cross-arch elastics were applied for de-rotation and alignment (Fig. 12).

The lower extraction spaces were closed at the end of the first phase of aligners (Fig. 11). However, the lower left molars tilted mesially. Brackets were bonded on LL5-7, and a segmented archwire uprighted the molars in two months (Fig. 13).

Refinement phase

Two rounds of refinement (finishing), with 39 and 23 additional aligners respectively, were conducted to close the residual spaces and align the upper left canine. The Class III molar relationship on the right was corrected by lower

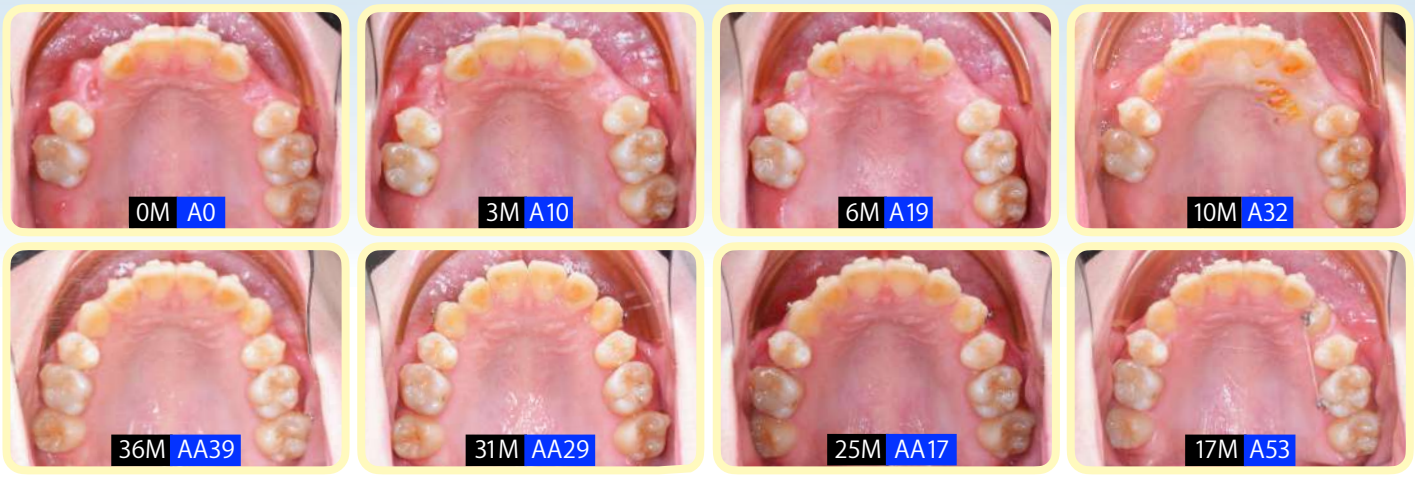


Fig. 10:
Treatment progress from the maxillary occlusal view and aligner progression are shown from the start of treatment (0M) to thirty-six months (36M) in a clockwise order.

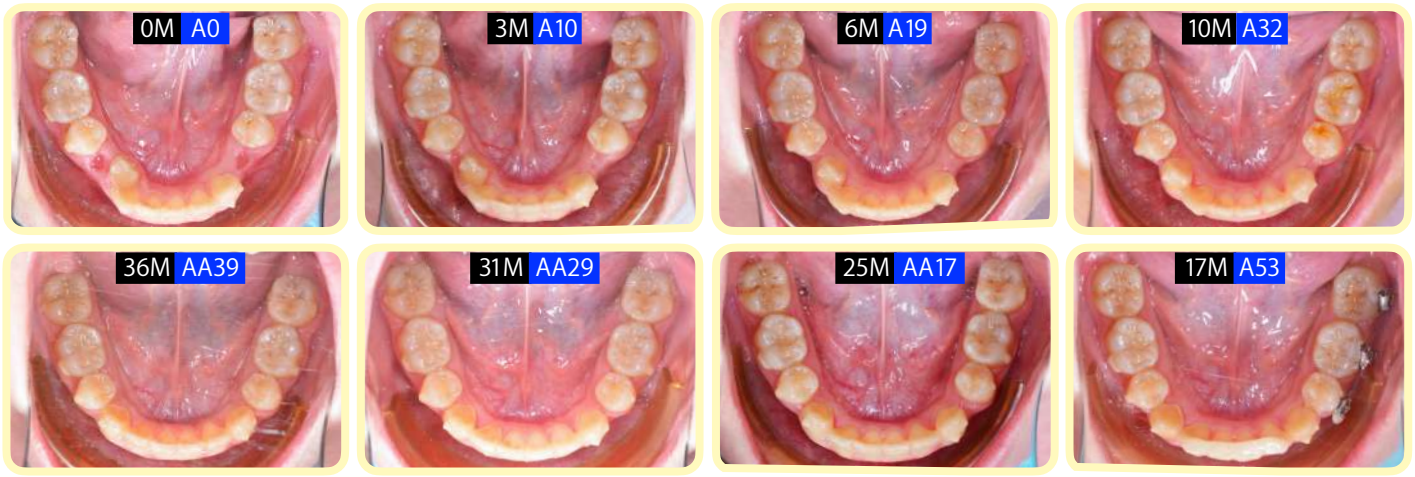


Fig. 11:
Treatment progress from the mandibular occlusal view and aligner progression are shown from the start of treatment (0M) to thirty-six months (36M) in a clockwise order.

molar distalization. In the finishing stage, heavy occlusal contacts on the posterior teeth were reduced. Subsequently, conventional attachments replaced the optimized attachments to provide predictable retention. Button cutouts were prescribed for both upper canines, and cross-arch elastics were applied for further extrusion.

Retention

Sectional twisted wires were bonded from UR2 to UL2 and LR3 to LL3 after the aligner treatment. Two ESSIX (overlay plastic) retainers were given to the patient to maintain the corrected alignment and leveling of the dentition in both arches. The patient was instructed to wear the retainers throughout the

Fig. 12:
Treatment progress from the right lateral view and aligner progression are shown from the start of treatment (0M) to thirty-six months (36M) in a clockwise order.

Fig. 13:
Treatment progress from the left lateral view and aligner progression are shown from the start of treatment (0M) to thirty-six months (36M) in a clockwise order. Note posterior open bite must close spontaneously after aligner treatment. Hopefully the posterior occlusion would settle naturally through masticatory function to achieve maximum occlusion without casing anterior bite deepening.

day during the first month and only while sleeping thereafter.

Final Evaluation of Treatment

After 43 months of active treatment, this difficult malocclusion (DI = 21) was treated to an optimal alignment with a Cast-Radiograph Evaluation score of 20 and an excellent Pink and White esthetic score of 2 (see worksheets at the end of this case report). Two main discrepancies from an ideal outcome were noted: (1) mesio-out rotation of the upper left canine, and (2) multiple open contacts of the posterior occlusion (Figs. 15 and 16). Posttreatment panoramic

Fig. 14:
Surgical exposure procedure was performed at tenth months. Soft tissue was removed by diode laser, and underlying hard tissue was trimmed with a high speed bur.

and lateral cephalometric radiographs are shown in Figs. 17 and 18, respectively. Although multiple open contacts were noted at the end of the treatment, they are expected to settle with natural masticatory function. After the functional shift was corrected, the facial profile was improved and the buccal segments were in a Class I occlusion. Superimpositions of the pre- and posttreatment cephalometric tracings reveal late facial growth, dentofacial orthopedic changes of the maxilla, and posterior rotation of the mandible (Fig. 19).

Assessment of specific objectives:

Maxilla (all three planes):

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

Mandible (all three planes):

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

Maxillary Dentition:

- A-P: *Slightly proclined incisors*
- Vertical: *Slightly intruded molars*
- Inter-Molar/Inter-Canine Width: Maintained/ Increased

Mandibular Dentition:

- A-P: *Incisors retracted*
- Vertical: *Molars up-righted*
- Inter-Molar/Inter-Canine Width: *Maintained*

Facial esthetics:

- Lateral profile was significantly improved. Clockwise rotation of the mandible was achieved (Fig. 19) .

Discussion

Due to reasons such as esthetics, comfort, and less risk of developing decay, an increasing number of patients are choosing aligners over traditional braces for full mouth orthodontic treatment. Clinicians using aligners can save a significant amount of chair time if tooth movements progress as planned without unexpected complications. To

Fig. 15: *Posttreatment facial and intraoral photographs*

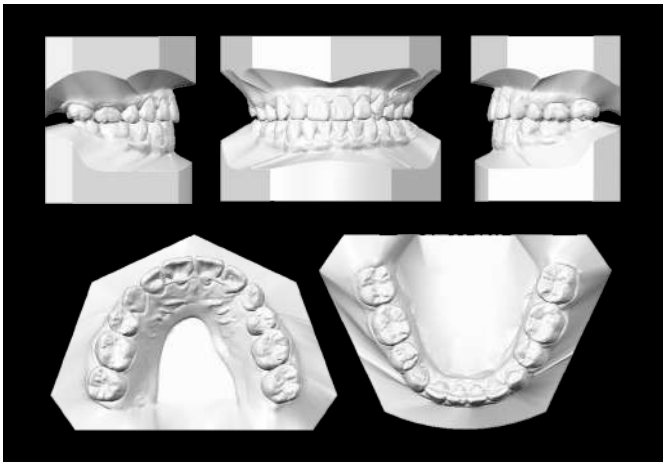


Fig. 16: *Posttreatment dental models (casts)*

Fig. 17: *Posttreatment panoramic film*

minimize occurrences of undesired outcomes, a thorough understanding of the material characteristics and the pros and cons of aligners is necessary. With fixed appliances, the archwire is engaged on the brackets bonded on the surface of the dentition. The activated archwire is elastically deformed and moves the tooth to a determined position as it returns to its original shape. Three dimensional tooth movements can usually be achieved as planned. Aligner plastic encapsulates the teeth so controlled movement requires both retention and activation. In general, the natural undercuts of the teeth provide the retention. Moments and forces for tooth movement are provided by the elastic deformation of the aligner.

Fig. 18: *Posttreatment cephalometric radiograph*

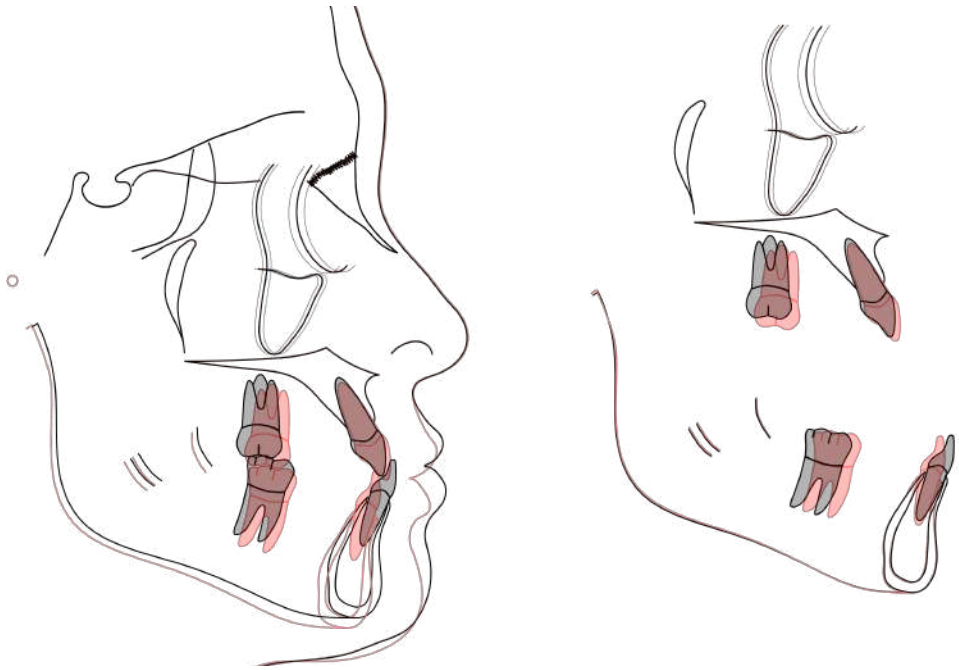


Fig. 19:
Superimposed pre-treatment (black) and posttreatment (red) cephalometric tracings show the occlusion was finished at Class I, and anterior teeth and lower molar were up-righted. Lower incisor was intruded. A clockwise rotation of the mandible was noticed.

For example, the predictability of faciolingual movement is enhanced as the entire body of the aligner undergoes elastic distortion. Subsequently, as it reverts to its original form, the aligner carries the teeth along. Conversely, achieving vertical movement requires the aligner to stretch primarily within its plastic matrix. Due to the inherent limitations of elasticity in the aligner, intrusion and extrusion is challenging.

The fundamental differences between aligner and fixed appliance

- The accuracy of tooth movements

In Kravitz et al.'s study[6] in 2009, the mean accuracy of tooth movement with Invisalign is 41%. The most accurate movement is crown tipping (47%), and the least accurate movement is extrusion (29.6%).[6] Specifically, central and lateral incisors are the most difficult teeth to be extruded. Despite having either gingival or occlusal bevels, horizontal rectangular attachments are significantly more effective than optimized ones.[11] If horizontal attachments are still ineffective, bonding metal buttons to the inner and outer surfaces of the teeth and using elastic bands around the aligner to achieve extrusion is also a viable method.

Moreover, rotation of canines[7] and premolars[12] have the lowest accuracy because they are round. Lack of purchase points restricts mechanics. An attachment for an aligner is analogous to a handle on a wardrobe or cabinet. The attachment (handle) provides retention for the overlaying aligner.[13] If placing attachments is still ineffective, button cutouts on the inner and outer sides of the aligner allows bonding of buttons to improve the situation. Overcorrection is not recommended.[14]

- Non extraction treatment

Overall, clear aligner therapy (CAT) is effective in aligning and straightening dental arches, particularly showing better results for mild to moderate crowding compared to fixed appliances (FAs) in non-growing patients.[15] Aligners are particularly adept for adjusting slight buccolingual inclinations of upper and lower incisors.[16] However, with crowding over 6 mm, incisors may protrude post-alignment using CAT.[17] Although CAT can adjust the width of canine, premolar, and molar spaces similarly to FAs, which helps relieve crowding, it struggles with arch expansion through bodily tooth movements.[17,18]

While crown tipping can be achieved with aligners alone, root movement is more challenging. Therefore, patients treated with Invisalign face relapses more than those treated with conventional fixed appliances.[19] In the last few months of orthodontic treatment, it is necessary to take panoramic films to ensure root parallelism.

- Extraction cases

Using Invisalign for extraction cases is similar to using a soft archwire in traditional orthodontics to close the premolar extraction spaces, which often leads to a drawbridge effect. Aligners, like soft archwires, lack sufficient rigidity and cannot avoid the side effects.

In 2021, Dai, Xu, and Guang[20] removed the upper first premolars from 17 patients and treated them using Invisalign G6 protocols throughout the entire

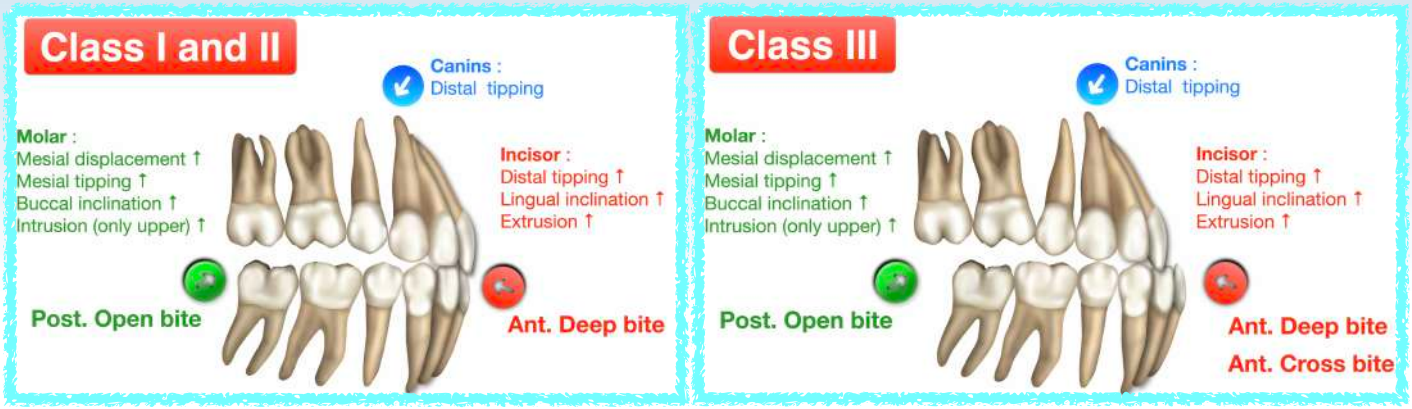


Fig. 20:
Diagrams showing the side effects of extraction cases treated with aligners only. Tooth crown movements were not fully achieved as predicted following Invisalign treatment. Differences mainly lie in mesial tipping, buccal inclination, mesial displacement, and intrusion of the first molars, as well as distal tipping, lingual inclination, insufficient retraction, and extrusion of central incisors.[20]

process. A comparison was made between the actual and expected positions of the maxillary and mandibular central incisors, canines, and first molars. It was observed that first molars achieved greater mesial tipping, medial displacement, and buccal inclination in both the maxilla and mandible. Furthermore, there was more intrusion in the maxilla and greater mesial-lingual rotation with less constriction in the mandible (Fig. 20). The canines were distally tipped in both the maxilla and mandible. Less retraction in the maxilla and greater lingual inclination and extrusion in the mandible were noted. The central incisors were extruded and tipped both distally and lingually.

Is the bowing effect predictable when closing extraction sites with aligners? For a crowded dentition, adjacent teeth require less movement after extraction, reducing the likelihood of incisor lingual tipping and molar mesial tipping. Conversely, in cases with well-aligned dentition, the larger space to be closed increases the risk of tipping side effects. If these problems are anticipated, the time wearing each set of aligners should be increased. Complementary measures such as using a segmented archwire (Fig. 21), miniscrews, Class II-V, or Class III-V elastics (defined below) should be considered (Fig. 22).

Class II-V and Class III-V elastics

Class II-V and Class III-V elastics (Fig. 22) provide an extrusion force for the tilted canines and molars as well as an uprighting moment which the G6 protocol and SmartStage® cannot provide. Moreover, Class II-V and Class III-V elastics offer the force vector for AP correction. Performing this method requires a metal button, a hook button, and 6 oz 3/8" elastics. In ClinCheck design, the precision cuts should be placed on the canines, and button cut-outs should be placed on the upper and lower first molars (Fig. 22).

Fig. 21:
The lower posterior teeth tilted mesially during extraction space closure. The braces were intentionally bonded mesio-gingivally to obtain an up-righting moment. The angulations of these three posterior teeth were significantly improved within three months.

Fig. 22:
Class II-V and Class III-V elastics require two buttons bonded on the canine and first molar respectively, one hook button bonded on the opposite first molar, and 3/8", 6.5 oz elastics. This can be used either for preventing or correcting the side effect. If there is an esthetic concern, the metal button on the canine can be replaced with a precision cut and rectangular attachment.

- ClinCheck design

In treating extraction cases, there are several suggestions for ClinCheck design:

1. Set the final overbite with 0.5 mm overcorrection.
2. Sequentially retract anterior teeth to prevent anchorage loss.
3. Increase the number of aligners to assure sufficient time for the roots to move.
4. In ClinCheck, setting the maximum anchorage for each set of aligners gives the roots more time to catch up with the movement of the crowns (Fig. 23).

Impaction management

Treating impactions with aligners requires thorough consideration for the direction of the extrusive force and its reciprocal anchorage. Indeed, anchorage may be acquired from a neighboring tooth, an antagonist tooth,

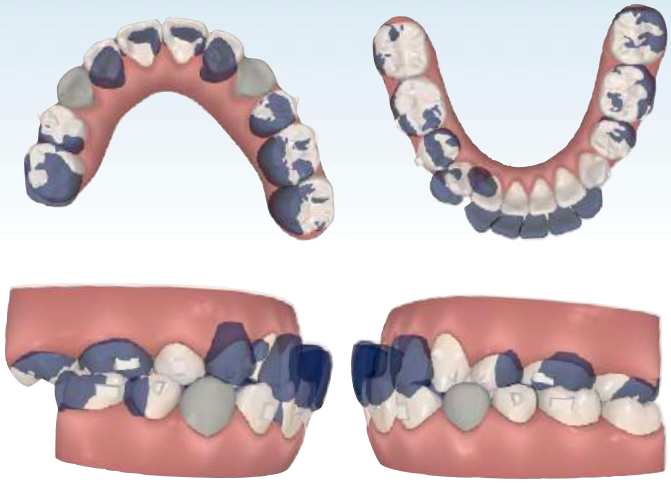


Fig. 23:
Initial treatment phase: ClinCheck treatment plan with superimposition (blue: initial arch form, white: simulated arch form after treatment). Maximum anchorage was planned in the upper arch and moderate anchorage in the lower arch.

miniscrews, and even the aligner itself (Fig. 24). When using a fixed appliance, extrusion becomes easier if brackets can be bonded to engage the archwire. With time, the fixed appliance mechanics gradually extrude the impaction .

The present patient had three impactions: UR8, UR3, and UL3. After removing the impeding upper first premolars and performing surgical exposure, UR8 and UL3 gradually erupted (Fig. 14). However, UL3 remained partially erupted and rotated. Extrusion and rotation are two of the less likely achievable movements using only aligners, so off-tracking should be anticipated. If extrusion and rotation are both necessary, rotation should be carried out first. Otherwise, incomplete extrusion or further gingival recession may occur (Fig. 24).

Anterior crossbite correction

During anterior crossbite correction, the lower anterior teeth may be trapped by the upper anterior teeth. In conventional orthodontic correction, the typical approach involves using an anterior or posterior bite turbo to increase the vertical dimension. With aligners, however, due to the thickness of the aligner itself, the bite can be opened. During ClinCheck design, attachments can be strategically placed on the occlusal surfaces. Patients can also be instructed to use a wooden tongue depressor to advance the upper anterior teeth. Both methods can expedite the correction of anterior crossbite (Fig. 25).[9,10]

Case finishing quality regarding DI/CRE scores

The meta-analysis indicates that treatment with aligners is associated with significantly worse scores in the American Board of Orthodontics (ABO) objective grading system (OGS) compared to braces,[21] which is clinically relevant. Cases treated with aligners are significantly more likely to be finished with an unsatisfactory quality according to the ABO standards, failing the ABO examination criteria (ABO-OGS score > 30) compared to those treated with braces. In absolute terms, ABO 'fail rates' are 60.6% and 38.9% for aligners and braces, respectively (Fig .26).[21]

Among the eight indicators of the ABO grading score, the clear aligner therapy (CAT) group clearly falls short of the fixed appliance (FA) group in three indicators: occlusal contacts, overjet, and root angulation.[21]

Fig. 24:
The upper left canine erupted after surgical exposure. Since extrusion movement can not be achieved with aligner alone, cross-arch elastics was applied with the antagonist tooth or opposite aligner.

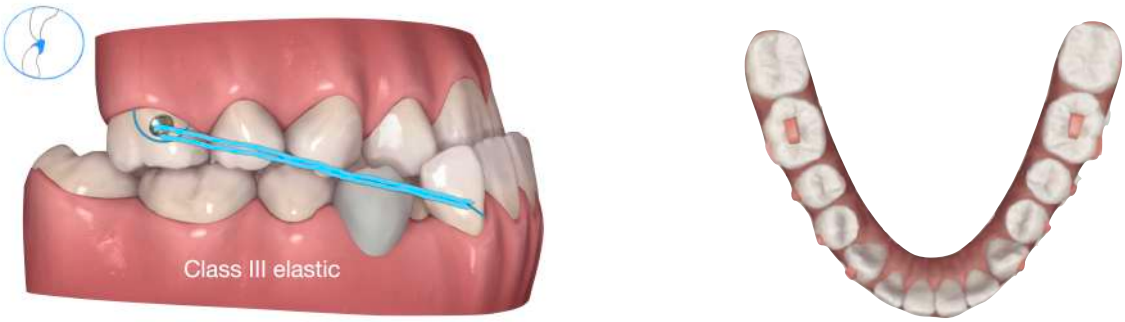


Fig. 25:
The anterior crossbite could have been corrected earlier if Class III elastics and occlusal rectangular attachments were applied from the beginning. The collision of upper and lower anterior teeth is the main obstacle for crossbite correction. Virtually planning rectangular attachments on the occlusal surfaces on the first molars might increase the inter occlusal distances while wearing aligners. The aligner was strong enough to confront the force of occlusion. Therefore, it was not necessary to bond a resin core, allowing the patient more comfort when they insert or remove aligners.

Regarding occlusion conatct, the two layers of aligner material in the posterior occlusion usually result in an open bite at the end of treatment. A suggested solution would be to cut off the last set of aligners distal to the first molars and allow the second molars to spontaneously erupt into the occlusion. Then, cut the aligners mesial to the first molars to allow the first molars to erupt. This approach could have provided posterior stops in the occlusion at the end of treatment so the premolars can erupt into the occlusion without deepening the anterior overbite.

Treatment duration

Considerable variation was seen in the effect of treatment modality on treatment duration. Extreme heterogeneity was seen across studies, so it is not possible to claim that CAT is faster or slower than FA.

Conclusions

Impactions, premolar extractions, and anterior crossbites are challenging for aligner treatment.

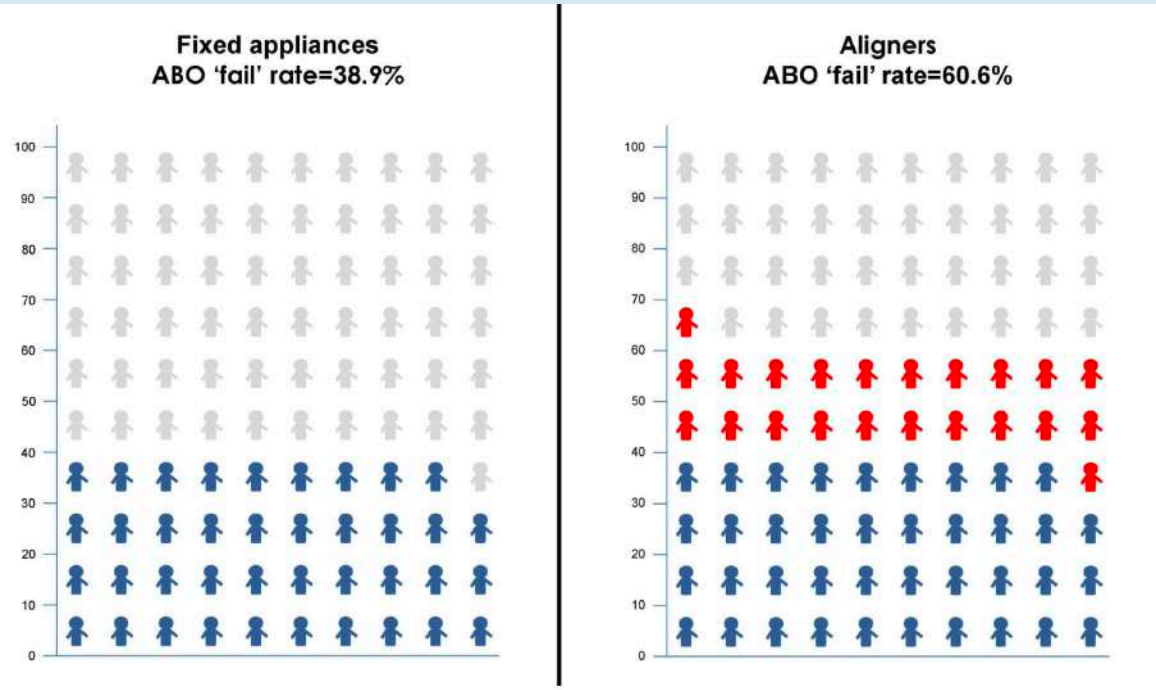


Fig. 26:
Illustration of the expected absolute risk for a case to have an ABO-OGS score of over 30 post debond when treated with aligners or fixed appliances, according to the results of the meta-analysis.[21]

Despite the type of appliance correct diagnosis, careful monitoring, and clinical judgements are the keys to attaining an ideal outcome.

Acknowledgements

Special thanks to Mr. Paul Head for proofreading this article.

References

1. Galan-Lopez L, Barcia-Gonzalez J, Plasencia E. A systematic review of the accuracy and efficiency of dental movements with Invisalign®. Korean J Orthod 2019;49:140–149.

2. Grünheid T, Loh C, Larson BE. How accurate is Invisalign in non-extraction cases? Are predicted tooth positions achieved? Angle Orthod 2017;87:809-815.

3. Piergentili M, Bucci R, Madariaga ACP, Martina S, Rongo R, D'Antò V. Pain and discomfort associated with labial multibracket appliances vs clear aligners. J Aligner Orthod 2019;3:205–212.

4. Buschang PH, Chastain D, Keylor CL, Crosby D, Julien KC. Incidence of white spot lesions among patients treated with clear aligners and traditional braces. Angle Orthod 2019;89:359-364.

5. D'Antò, V, Bucci R, De Simone V, Huanca Ghislanzoni L, Michelotti A, Rongo R. Evaluation of tooth movement accuracy with aligners: A prospective study 2022;15(7):2646. Available from: https://www.mdpi.com/1996-1944/15/7/2646.

6. Kravitz ND, Kusnoto B, BeGole E, Obrez A, Agran B. How well does Invisalign work? A perspective clinical study evaluating the efficacy of tooth movement with Invisalign. Am J Orthod Dentofacial Orthop 2009;135:27-35.

7. Lombardo L, Arreghini A, Ramina F, Ghislanzoni LTH, Siciliani G. Predictability of orthodontic movement with

orthodontic aligners: A retrospective study. Prog Orthod 2017;18(1):1–12.

8. Dai FF, Xu TM, Shu G. Comparison of achieved and predicted tooth movement of maxillary first molars and central incisors: First premolar extraction treatment with Invisalign. Angle Orthod 2019;89:679–687.

9. Chen B, Chang CH, Robert WE. Aligner treatment for class III malocclusion with anterior cross bite. J Digital Orthod 2021;63:42-55.

10. Hsiu E, Chang CH, Robert WE. Non-Extraction treatment of Pseudo-class III anterior cross-bite complicated by severe crowding, deep-bite and clenching. J Digital Orthod 2018;50:78–94.

11. Groody JT, Lindauer SJ, Kravitz ND, Carrico CK, Madurantakam P, Shroff B, et al. Effect of clear aligner attachment design on extrusion of maxillary lateral incisors: A multi center, single-blind randomized clinical trial. Am J Orthod Dentofacial Orthop 2023;164(5):618-627.

12. Simon M, Keilig L, Schwarze J, Jung BA, Bourauel C. Treatment outcome and efficacy of an aligner technique-regrading incisor torque, premolar denotation and molar distalization. BMC Oral Health 2014;11(14):68.

13. Chang MJ, Chen CH, Chang CY, Lin JSY, Chang CH, Roberts WE. Introduction to Invisalign® Smart technology: attachment design, and re-call checks. J Digital Orthod 2019;54:80–95.

14. Kravitz ND, Kusnoto B, Agran B, Viana G. Influence of attachments and interproximal reduction on the accuracy of canine rotation with Invisalign. A prospective clinical study. Angle Orthod 2008;78(4):682-687.

15. Pavoni C, Lione R, Lagana G, Cozza P. Self-ligating versus Invisalign: analysis of dents-alveolar effects. Ann Stomatol 2011;2(1-2):23-27.

16. Rossini G, Parrini S, Castroflorio T, Deregibus A, Debernardi CL. Efficacy of clear aligners in controlling orthodontic tooth movement: a systematic review. Angle Orthod 2014;85(5):881–9.

17. Galan-Lopez L, Barcia-Gonzalez J, Plasencia E. A systematic review of the accuracy and efficiency of dental movements with Invisalign. Korean J Orthod 2019;49:140–9.

18. Ke Y, Zhu Y, Zhu M. A comparison of treatment effectiveness between clear aligner and fixed appliance therapies. BMC Oral Health 2019;19:24.

19. Kruncio D, Magazine A, Shelton C, Freeman K. Invisalign and traditional orthodontic treatment postretention outcomes compared using the American Board of Orthodontics objective grading system. Angle Orthod 2007;77(5):864-869.

20. Dai FF, Xu TM, Guang S. Comparison of achieved and predicted crown movement in adult after 4 first premolar extraction treatment with Invisalign. Am J Orthod Dentofacial Orthop 2021;160:805-13.

21. Papageorgiou SN, Koletsi D, Iliadi A, Peltomaki T, Eliades T. Treatment outcome with orthodontic aligners and fixed appliances: a systematic review with meta-analyses. Eur J Orthod 2020;42:331-343.

Discrepancy Index Worksheet

TOTAL D.I. SCORE 21

OVERJET

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

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

Total = 6

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 = 7

OCCLUSION

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

Total = 0

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 2

BUCCAL POSTERIOR X-BITE

2 pts. Per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° -1° = 4 pts.

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

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

SN-MP

≥ 38° 27° = 2 pts.

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

≤ 26° = 1 pt.

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

1 to MP ≥ 99° 91° = 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)	2	x 2 pts.	= 4
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	1	x 2 pts.	= 2

Identify: Impacted UR wisdom tooth was substituted for the second molar.

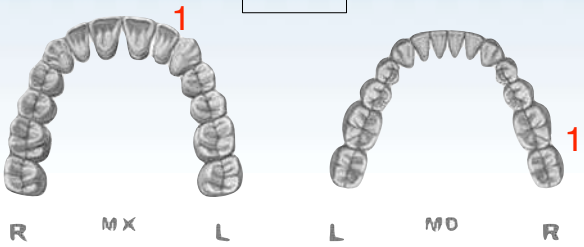
Total = 6

Cast-Radiograph Evaluation

Total Score: 20

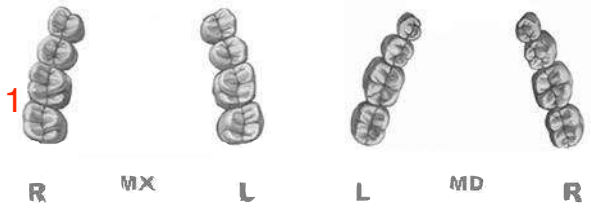
Alignment/Rotations

2



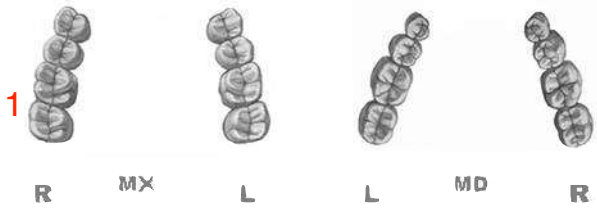
Marginal Ridges

1



Buccolingual Inclination

1

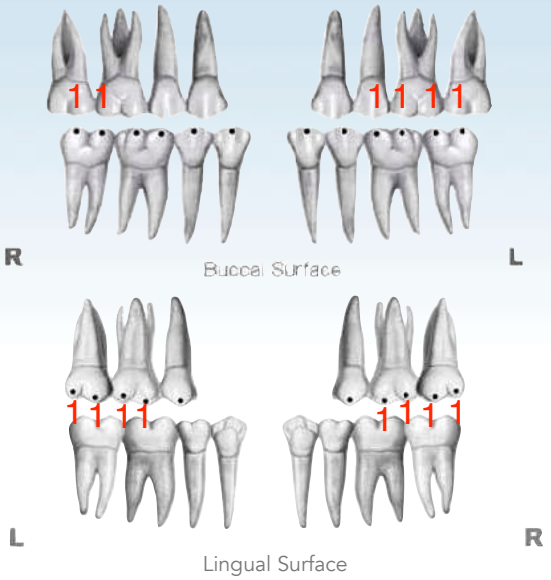


Overjet

0

Occlusal Contacts

14

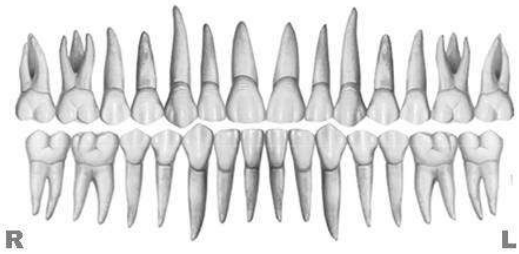


Occlusal Relationships

0

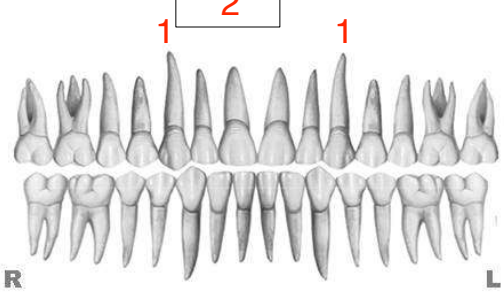
Interproximal Contacts

0



Root Angulation

2



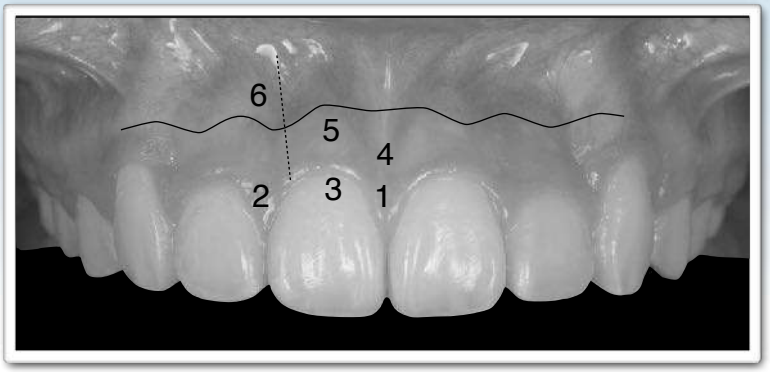
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score = 2

1. Pink Esthetic Score

Total = 0

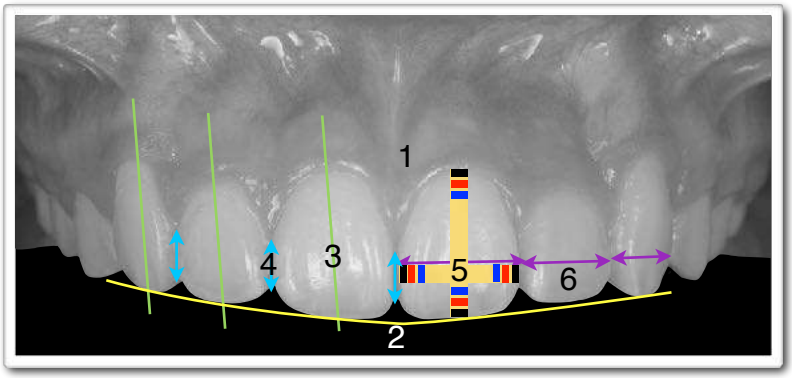


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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

2. White Esthetic Score (for Micro-esthetic)

Total = 2



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

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

OBS Super Set

Created by Dr. Chris Chang, OBS is made of medical grade, stainless steel and titanium, and is highly praised by doctors for its simplistic design, low failure rate and excellent quality. OBS is your must-have secret weapon for maximum, reliable anchorage.

Smooth Mushroom Head

For comfort & retention of elastic chain

4-way Rectangular Holes

For lever arm to solve impacted tooth

Double Neck Design

Easy hygiene control & extra attachment

Made in Taiwan

New

Titanium Higher biocompatibility*

1.5 | 1.5X8mm

Stainless Steel**

2.0 | 2.0x12mm

2.7 | 2.0x14mm (with holes)

Buy a Super Set, get ***OBS Clinical Guide*** (eBook) for free.

* TADs made of Ti alloy have a lower failure rate compared to SS when placed in thin cortical bone. These results are consistent with a biocompatibility-related tendency for less bone resorption at the bone screw interface.
Reference: Failure Rates for SS and Ti-Alloy Incisal Anchorage Screws: Single-Center, Double Blind, Randomized Clinical Trial (J Digital Orthod 2018;52:70-79)

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

iNewton +886-3-573-5676 orthobonescrew.com inewton.dental@gmail.com

iworkshop.beethoven.tw

Dental Clinic Established 1996
Beethoven

Screws & Aligners
International Workshop

Beethoven International Workshop

demonstrates how to incorporate TADs and minor surgeries in complex orthodontic treatment. Experienced practitioners get to (1) learn firsthand from the world-renowned orthodontist and lecturer, Dr. Chris Chang, (2) observe management secrets behind a highly efficient clinic, and (3) take home effective clinical tips developed by the Beethoven group to take your clinical results to the next level!

Observership at Beethoven

Chair-side observation of Dr. Chang's clinical treatment and patient communication

Master-level TAD Learning

Identify various clinical indicators for TADs and master application skills

All New Hands-on Workshop

Custom-made model designed by Dr. Fernando Rojas-Vizcaya for realistic impaction treatment practice

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

	Screws & Aligners	Keynote (optional)
2024	Nov 26-28	Nov 29
2025	Nov 25-27	Nov 28

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.

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

Prof. Dr. Paulo Fernandes Retto, Portugal

IMPACTION

Course Schedule

DAY 1 **Chair-side observation**

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 (optional) **Keynote workshop** conducted by Newton's A team

VISTA

Vertical Incision Subperiosteal Tunnel Access

HuFriedyGroup
The Best In Practice

CLEAR COLLECTION

套組1

678-800
678-801
678-802
678-803

IMORTHSM8
SIG SERIES SM THIN ORTHO CASS
(此為示意圖，不含器械)

HFKIT-CLEAR

單支加總 定價NT$48,400/組 | **特價NT$27,020/組** 56折

套組2

678-800
678-801
678-802
678-803

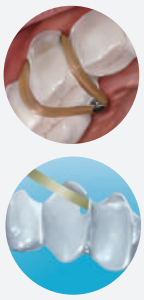
IMORTHLG8
SIG SERIES LG THIN ORTHO CASS
(此為示意圖，不含器械)

SCGC
CURVED CROWN & GOLD SCISSORS

HFCLEARKIT

單支加總 定價NT$54,500/組 | **特價NT$30,310/組** 56折

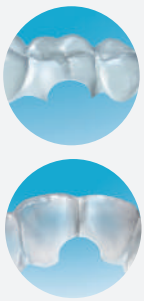
678-800
THE TEAR DROP
創造出掛橡皮筋的倒凹



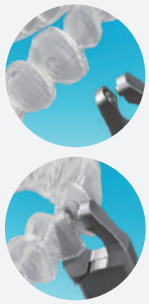
678-801
THE VERTICAL
用於調整牙齒rotations，打凹在mesial或distal side

678-802
THE HORIZONTAL
用於調整牙齒的torque，打凹在Labial或Lingual

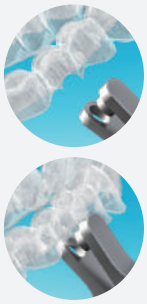
678-803
THE HOLE PUNCH
用於打洞，方便在牙齒上黏著button，或任何可以掛橡皮筋的裝置。亦可用來減少牙套邊緣對軟組織的壓力



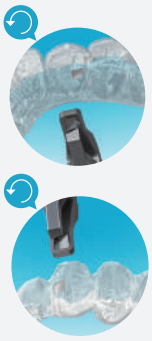
678-804
THE SPOT
用於壓在牙齦側，可以加強隱形牙套的佩戴強度



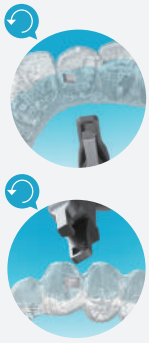
678-805
THE PETITE PUNCH
較原始Hole punch直徑小，使器械更容易深入隱形牙套



678-807
THE COUNTER CLOCKWISE WEDGE
器械可創造出楔型形狀，分別打在facial與Lingual，幫助單顆牙的旋轉



678-808
THE CLOCKWISE WEDGE
器械可創造出楔型形狀，分別打在facial與Lingual，幫助單顆牙的旋轉



678-811
THE ERASER
用於返回任何想回復的倒凹

Clenchy™

ALIGNER SEATERS

Clenchy

定價NT$3,300/50小包/100個 | 買3送1

Clenchy 2

定價NT$6,700/50小包/100個 | 買3送1

	Clenchy™	Chewies
Seats aligners with two textures	✓	✓
Offers soft and firm textures	✓	
2 in 1 aligners seating and removal	✓	
Created by a dental patient	✓	
Hygenic	✓	
Compact	✓	
Durable	✓	
Recyclable	✓	

Product Info

INSTRUMENTS

swiss dentacare QUALITY DENTAL PRODUCTS

SDC-IPR G5-ProLign Starter Kit

Utilized for Orthodontic Braces and Aligner Treatments

Includes G5-ProLign 0.5 mm

Description:

4 G5-ProLign files 0.1, 0.2, 0.3, 0.4, 0.5 mm 2 sides
2 G5-ProLign files 0.1, 0.2 mm 1 side
1 G5-UltraSoft file 6 µm 2 sides
1 CombiStrip file 6 µm (ultra-fine) polishing, 2 sides
1 CombiStrip file 15 µm (fine) contouring, 1 side
1 Hand piece NSK Ti Max X55 with Water
1 Measuring gauge 5 thicknesses
20 G5-Shanks Pink (Metal HP)
1 Nozzle for spray lubrication
1 Extractor for some instruments
1 IFU

定價NT$69,500/盒 | 特價NTS39,999

AIR ABRASION

Danville INNOVATIVE DENTAL PRODUCTS

MicroEtcher IIA™ Sandblaster

Extraoral Sandblaster, Autoclavable

定價NT$23,100/支
單件7折

Macrocab Plus Dust Collector

Self Contained Dust Collection System

定價NT$37,000/台
單件7折

ISOLATION

Contact Matrix Trial Kit

Sectional Matrix System

定價NT$5,100/盒
單件7折

MEGA V Clinical Trial Kit

Sectional Matrix System

定價NT$8,500/盒
單件7折

YONG CHIEH 湧 傑

客服專線：北區 (02)2778-8315・中區 (04)2305-8915・南區 (07)226-0030

促銷期限 2024/06/26-09/25

線上購物　即時客服

Pseudo-Class III with Anterior Crossbite, Severe Crowding, and Retained Primary Teeth

Abstract

History: *A 12yr-7mo-old female presented with a chief complaint (CC) of anterior crossbite and severe crowding.*

Diagnosis: *The patient had two retained primary teeth with impacted permanent teeth causing severe crowding and anterior crossbite. Functional shift was present. Cephalometric analysis revealed an ANB angle of 2°, SN-MP of 31.5°, and a protruded lower lip 5 mm to the E-line. The discrepancy index (DI) was 20 points.*

Treatment: *A Damon® system appliance with passive self-ligating brackets was applied to correct the dental malocclusion. Posterior and anterior bite turbos combined with Class III elastics were used to correct the anterior crossbite. Both retained primary teeth and 4 premolars were extracted to relieve the crowding. Bone screws were placed bilaterally in the mandibular buccal shelves to retract the mandibular arch. The active treatment time was 38 months.*

Results*: Retraction of the lower anterior segment and the lower lip was achieved to improve the profile. After 42 months of active treatment, the severe crowding was relieved, and the anterior crossbite was corrected with neither periodontal problems nor root resorption.*

Conclusions*: This case report demonstrates the use of a passive self-ligating appliance combined with temporary anchorage devices to effectively resolve a pseudo-Class III malocclusion with anterior crossbite and severe crowding. (J Digital Orthod 2024;75:32-47)*

Key words:

Class III malocclusion, non-surgical treatment, anterior crossbite, bite turbos, torque selection

Introduction

Anterior crossbite is defined as a dental condition characterized by the lingual position of the upper anterior teeth in relation to lower anterior teeth, which is often related to Class III malocclusion traits. Within the Class III classification, two main subtypes are recognized: true Class III and pseudo-Class III.[1] True Class III is often manifested with genetically prognathic jaw and/or retrognathic maxilla; while a pseudo-Class III is usually characterized by a functional shift, meaning the anterior positioning of the mandible may result from abnormal incisal guidance that forces the mandible forward.[1,2] Upon guiding pseudo-Class III patients to redirect their mandibles to a centric relation (C_R) position, practitioners can evaluate the overjet or edge-to-edge position of the anterior teeth.[3]

The choice between orthodontic camouflage treatment and orthognathic surgery remains contentious in treating Class III malocclusions.[4] An accurate diagnosis is crucial for effective treatment planning and improved prognosis. While true Class III features and cephalometric analyses are well-documented, the criteria for pseudo-Class III malocclusion and its dento-skeletal characteristics are poorly defined. Ambiguous criteria may lead

Yung Hsin Yang,
Training Resident, Beethoven Orthodontic Center (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)

practitioners to overtreatment if a pseudo-Class III is mistaken for true skeletal Class III because of similar anterior crossbite.[5] For clinicians evaluating anterior crossbite, it is advisable to employ Lin's 3-ring diagnostic method[6] for identifying patients with a promising prognosis.

This report presents a typical pseudo-Class III with severe crowding and retained primary teeth. Various approaches are available for addressing anterior crossbite with crowding. Huang et al.[7] introduced six methods for correcting anterior crossbite based on dental factors and skeletal diagnosis. While some clinicians advocate removable bite plates with lingual springs and tongue blade exercises,[8] this report showcases a treatment approach using Damon passive self-ligating fixed appliance (Ormco, Glendora, CA) along with anterior bite turbos.

The dental nomenclature used in this report is a modified Palmer notation. Upper (U) and lower (L) arches, as well as the right (R) and left (L) sides, define four oral quadrants: UR, UL, LR, and LL. Teeth are numbered 1-8 from the midline in each quadrant, and deciduous teeth are delineated a-e.

Diagnosis & Etiology

A 12yr-7mo-old young female presented for orthodontic consultation with concerns of dental crowding and anterior crossbite. There was no contributing medical history, and there were no signs or symptoms of temporomandibular disorder (TMD) or mandibular deviation on opening. In the front view, the patient's face appeared symmetrical, but her lateral profile showed a slightly protruded lower lip (Fig. 1). Upon redirecting her chin to the centric relation (C_R) position, a flatter profile could be attained (Fig. 2). The patient's smile revealed a conspicuous anterior crossbite, with only the lower anterior teeth visible (Fig. 1). During intraoral

CEPHALOMETRIC SUMMARY			
	PRE-TX	POST-TX	DIFF.
SKELETAL ANALYSIS			
SNA° (82°)	89°	90°	1°
SNB° (80°)	86.5°	88°	1.5°
ANB° (2°)	2°	1.5°	0.5°
SN-MP° (32°)	31.5°	34°	2.5°
FMA° (27°)	24.5°	27°	2.5°
DENTAL ANALYSIS			
U1 TO NA mm (4mm)	3	6	3
U1 TO SN° (104°)	104°	119.5°	15.5°
L1 TO NB mm (4mm)	8.5	5	3.5
L1 TO MP° (90°)	85.5°	74.5°	11°
FACIAL ANALYSIS			
E-LINE UL (-1mm)	0.5	2.5	2
E-LINE LL (0 mm)	5	3	2
%FH: Na-ANS-Gn (56%)	59%	58%	1%
Convexity: G-Sn-Pg (13°)	-11°	-5.5°	5.5°

Table 1: *Cephalometric Summary*

Fig. 1: *Pre-treatment facial photograph*

examination, a reverse overjet of -2 mm and an overbite of 6 mm were observed (Fig. 3). Severe crowding was noted, with UR2, UL2, and LR2 in lingual position (Fig. 3). Retention of the primary teeth, URc and LRe, resulted in impaction of UR3 and LR5 (Fig. 4). UL4 only partially erupted due to a lack of space (Fig. 3). The molar relationships were asymmetric, with a molar cusp-to-cusp relationship on the right side and Class I relationship on the left (Fig. 5). The dental midline was slightly shifted to the left. Cephalometric analysis (Table 1) documented an ANB angle of 2°, with a SN-MP angle of 31.5° and 5-mm lower lip protrusion to the E-line. The American Board of Orthodontics (ABO) Discrepancy Index (DI) was 20 points, as shown in the supplementary Worksheet 1.[9]

Fig. 2: *Pre-treatment records*
The left side presents patient's occlusion in centric occlusion (C_O), and the right side shows patient's occlusion in centric relation (C_R).

Treatment Objectives

The treatment objectives were: (1) Correct anterior crossbite; (2) relieve crowding; (3) retract the lower lip; (4) create ideal overbite and overjet; and (5) establish functional Class I molar and canine relationships.

Treatment Plan

Extract the retained primary teeth: URc and LRe. Additionally, remove all 4s to relieve crowding and create space for proper arch alignment while preserving the natural upper lip position. Apply posterior bite turbos and inclined anterior bite plane to rectify the anterior crossbite. Class III elastics are indicated for further correction. To optimize the mechanics of Class III elastics, select low-torque brackets for the upper arch and high-

Fig. 3: *Pre-treatment intraoral photograph*

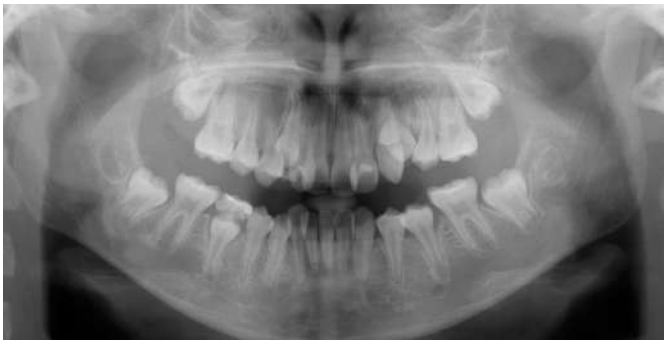


Fig. 4: *Pre-treatment panoramic radiograph*

torque brackets for the lower arch. OrthoBoneScrews® (OBSs, iNewton Dental, Inc., Hsinchu City, Taiwan) are employed as supplemental anchorage to enhance the precision of tooth movement.

Treatment Alternative

In deciding whether orthognathic surgery is necessary, the primary consideration centered

Fig. 5:
Pre-treatment study model showed a molar Class I on left side, but on the right side it was a cusp-to-cusp molar relationship.

around the Le Fort I procedure, complemented by bilateral intraoral vertical ramus osteotomies. This surgical approach was proposed as the optimal choice if the patient desired a substantial alteration in her facial appearance. It is important to note that camouflage techniques may have limitations in

reshaping the face. Considering the patient's age, delaying surgery until growth cessation is prudent. The patient and her parents refused surgery due to concerns related to hospitalization, associated high cost, and the potential risks of complications.

Treatment Progress

Extraction of the URc, LRe, and all four first premolars was scheduled to alleviate the severe crowding. A 0.014-inch slot Damon Q® (Ormco, Glendora, CA) fixed appliance, with passive self-ligating (PSL) brackets, was used. Initially, brackets were bonded on all lower teeth, excluding the second and third molars. The lingually-positioned LR2 was also left unbonded due to crowding. Instead, an open coil spring was inserted on the archwire to create space for it. Crowding was also present in the upper arch, resulting in blocked-in upper lateral incisors. Therefore, when the upper arch was bonded two months later, the two blocked-in lateral incisors were left unbonded, and open coil springs were applied to create space.

On the lower incisors, low-torque brackets were bonded in a reversed position to induce high torque effect. This choice aimed to improve lingual root movement of the lower anterior teeth to counteract potential side effect of retroclination caused by Class III elastics. Low-torque brackets were also used on the upper anteriors to encourage a more buccal root movement.

When bonding upper brackets, two bite turbos (glass ionomer cement, GIC) on both L6s were placed. An anterior bite plane was also bonded on the lower anterior teeth to open the bite for anterior crossbite correction. Early light Class III elastics (Quail, 3/16-in, 2 oz; Ormco) from U6 to L5 on both sides were introduced for 3 months to correct anterior crossbite (Fig. 6).

In the fifth month (5M), after alignment of the lower incisors, anterior bite turbos were constructed with flowable resin on the lower anterior incisors to open the the intermaxillary space for correction of the anterior crossbite (Fig. 7). One month later (6M), both arches were changed to 0.014x0.025 NiTi archwire. At the same time, Class III elastics were temporarily stopped as they were exerting forces in the opposite direction of the open coil spring, making it challenging to create space for the lateral incisors.

Fig. 6:
Left: Open coil spring used to create the space for lateral incisors. Right: Posterior bite turbos were placed on L6s, and Class III elastics were applied from U6 to L5 on both sides.

Fig. 7: *Anterior bite plane on lingual side of lower front teeth*

In the 8th month, upper crowding was improved, brackets were bonded on both upper lateral incisors, power chains were applied to pull both upper lateral incisors buccally, and stronger Class III elastics (Kangaroo, 3/16-in, 4,5 oz; Ormco) were utilized. Flowable resin was used to reactivate the open coil springs for further crowding relief. The anterior bite plane was removed, and anterior bite turbos were bonded on both lower lateral incisors (Fig. 8).

In the 14th month, the upper archwire was changed to 0.014x0.025" NiTi, and the lower archwire was changed to 0.017x0.025 TMA. Drop-in hooks were attached to each canine. One month later (15M), Class III elastics were changed to Fox (1/4-in, 3.5 oz; Ormco), and were extended from U6s to L3s rather than L5s to induce a stronger Class III elastics mechanics for clockwise mandibular movement.

In the 16th month, a root torque was applied on UR1 to even the gingival margins. In the 19th month, the upper and lower teeth were nearly aligned, and the anterior crossbite was nearly corrected. Torque control was removed (Fig. 9). At this stage, the occlusion was in an edge-to-edge position. Both upper and lower archwires were changed to 0.014x0.025" NiTi, and Class III elastics were reduced to a lighter force to slow down the procedure and wait for the roots to stabilize. One month later (20M), both archwires were changed back to 0.017x0.025"TMA, and stronger elastics (Fox, 1/4-in, 3.5oz; Ormco) were used from U6s to L3s.

In the 22nd month, miniscrews were installed bilaterally in the buccal shelves as an anchorage for heavier horizontal force pulling the lower arch

Fig. 8:
In the 8th month, flowable resin was used to compress and reactivate the open coil spring (left), and lower anterior bite turbos were installed (right).

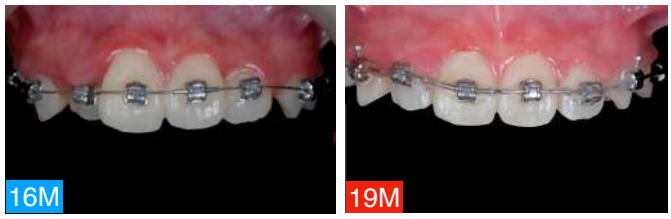


Fig. 9:
Upper right central incisors before and after torque control

backward. Two months later (24M), in addition to the Class III elastics, a power chain was used from L3 to the miniscrew on both sides (Fig. 10).

In the 27th month, Class III elastics were stopped because the lower anterior teeth were lingually inclined. A +10° bend was made on the lower archwire to give the lower anteriors a lingual root torque. Then, the lower archwire was changed to a more rigid 0.016x0.025 SS wire. The use of power chains was continued to close the extraction gaps. In the following month (28M), the lower archwire was changed to 0.014x0.025" NiTi. Two months later (30M), it was changed again to 0.017x0.025"TMA.

In the 34th month, two bite turbos on the lingual side of both U1s were bonded to disocclude the upper anterior teeth from the lower brackets. Figure-eight ties were also used on both upper and lower arches

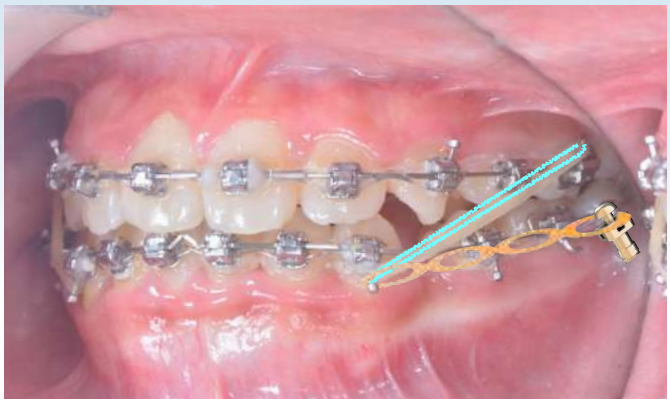


Fig. 10:
In addition to Class III elastics (blue line), a horizontal force from the miniscrew to L3 was engaged with a power chain to pull the whole lower arch backward.

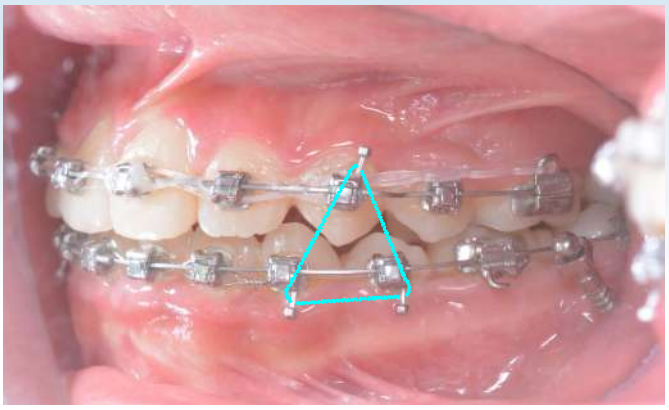


Fig. 11:
An elastic was hooked from U3 to L3 and L4 bilaterally to close the occlusion gap.

from 3 to 3, assisted by power chains to close the gaps. After 5 months (39M), bilateral elastics from U3s to L3s and L4s were prescribed and used for 3 months to close the occlusion gap (Fig. 11).

Treatment Result

Following 42 months of active treatment, there was a remarkable improvement in the patient's facial esthetics (Fig. 12). Molar Class I relationships were achieved on both sides. The posttreatment panoramic radiograph confirmed the desirable alignment of root structure (Fig. 13) The superimposed cephalometric tracings illustrated a 3-mm proclination of the maxillary incisors, due to the correction of the anterior crossbite (Fig. 14). The treatment also resulted in a 15.5˚ increase in the axial inclination of the upper incisors (U1-SN), shifting from 104˚ to 119.5˚, as well as a corresponding 11˚ decrease in the axial inclination of the lower incisors (L1-MP), from 85.5˚ to 74.5˚. These changes resolved the anterior crossbite. Concurrently, the retraction of the anterior segments led to retrusion of the lower lip. Note the mandibular plane angle (SN-MP) remained stable, as outlined in Table 1. The Cast-Radiograph Evaluation (CRE) score was calculated at 8 points, as depicted in the supplementary Worksheet 2. Pink and White esthetic score was calculated at 4 points, as depicted in the supplementary Worksheet 3. Full treatment progress is documented in Figs. 15-17. The pre- and posttreatment cephalometric radiograph along with the 3D models are documented in Figs. 18 and 19.

Discussion

Orthodontists must establish a precise diagnosis and develop a suitable treatment strategy to attain a desirable non-surgical result. Lin's 3-Ring Diagnosis (Fig. 20) indicated conservative treatment was feasible, while Chang's extraction decision chart (Table 2) provided an alert that extractions were needed to manage the asymmetry, protrusion, and crowding.

Fig. 12: *Posttreatment facial and intraoral photographs*

Fig. 13: *Posttreatment panoramic radiograph*

Class III mechanics

Class III camouflage treatment can result in greater axial inclination of the upper incisors and reduced axial inclination of the lower incisors.[10] In this context, low-torque brackets installed upside down are commonly recommended for the upper incisors to promote greater lingual root torque and facilitate buccal root movement when Class III elastics are utilized. Additionally, pre-torqued archwires are

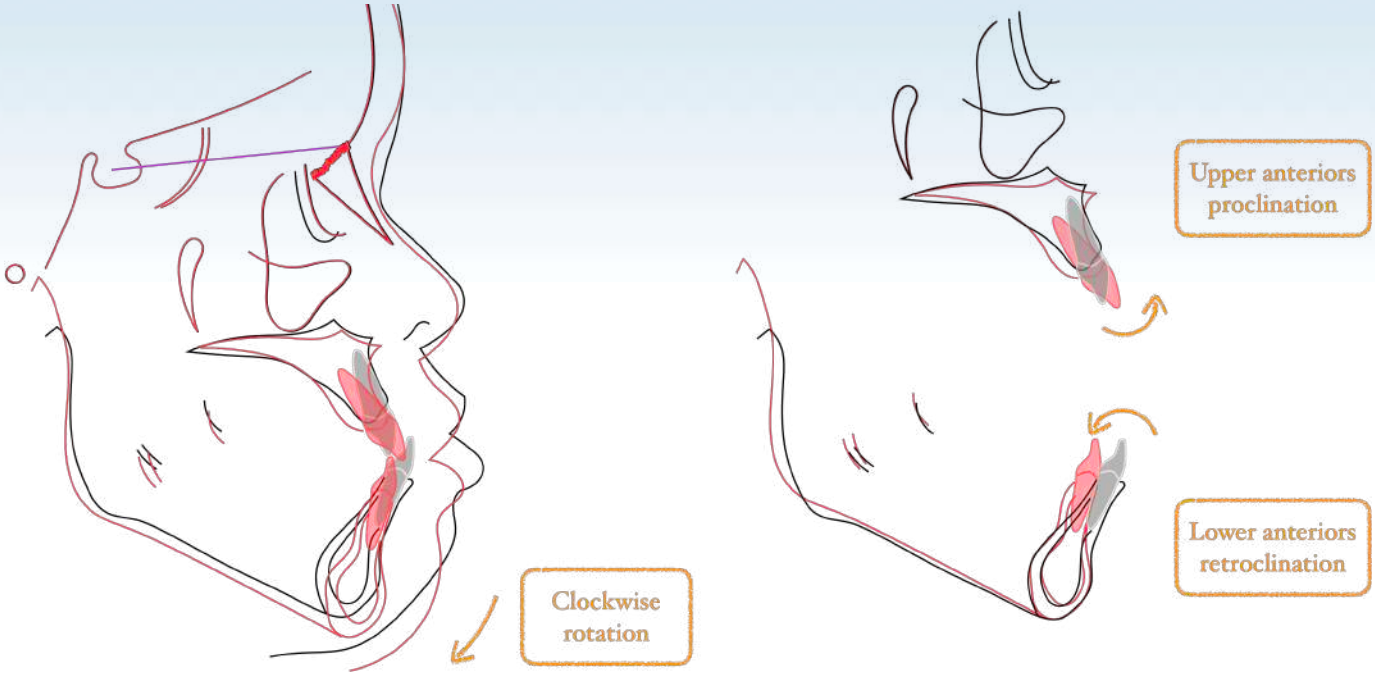


Fig. 14:
Superimposed cephalometric tracings (black: pre-treatment; red: posttreatment) show a clockwise rotation of the mandible, proclination of the upper anteriors, and retroclination of the lower anteriors, which resulted in retrusion of the lower lip.

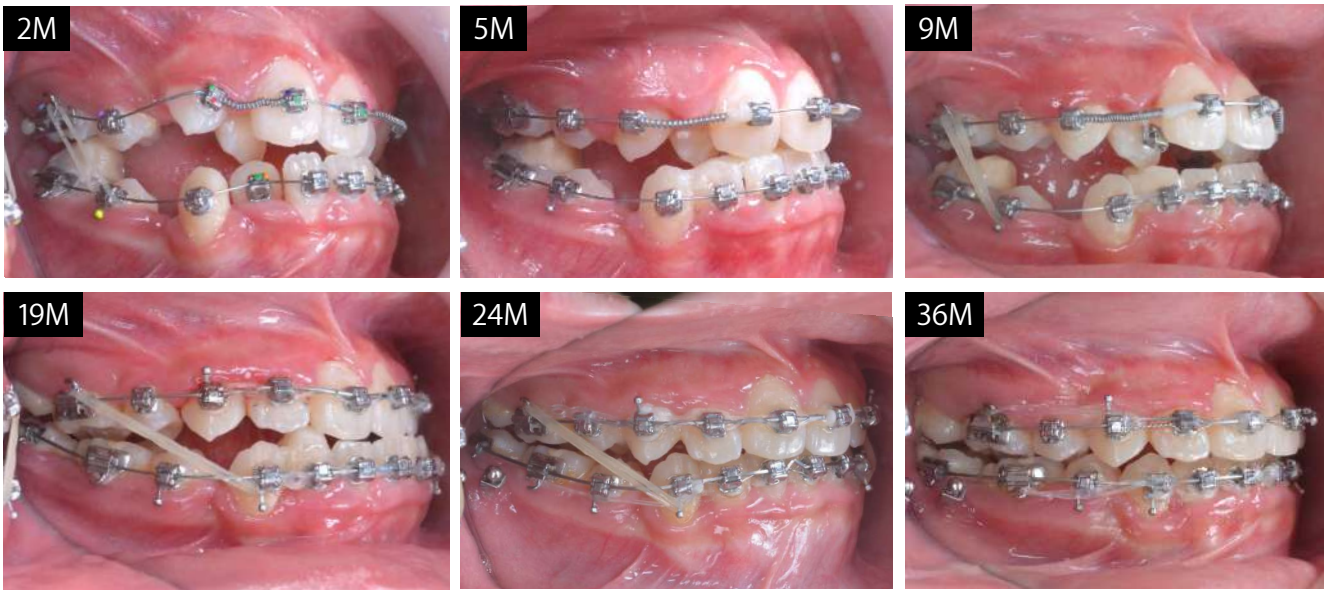


Fig. 15: *Treatment progression from the right buccal view is shown in months (M).*

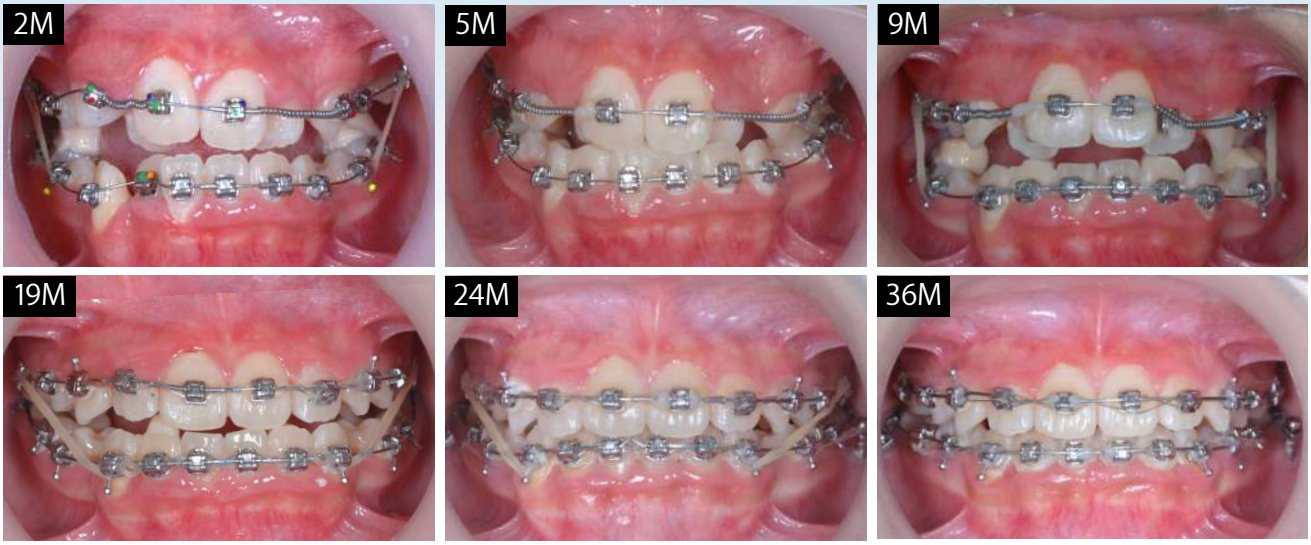


Fig. 16: *Treatment progression from the frontal view is shown in months (M).*

Fig. 18:
The pre- (left) and posttreatment (right) cephalometric radiographs

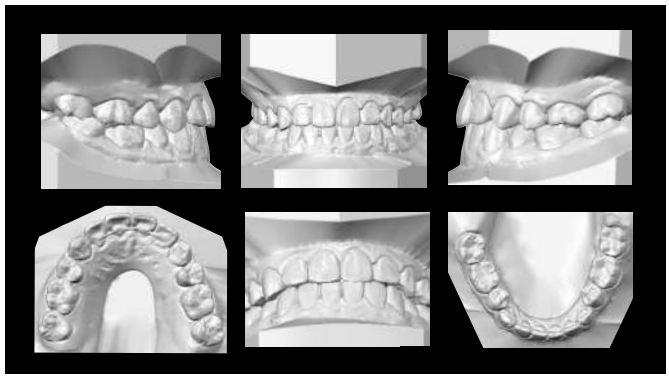


Fig. 19: *Posttreatment 3D casts*

incorporated into the lower arch to enhance the lingual root torque of the anterior teeth.

Extraction protocol for mandibular arch retraction

Extraction spaces were strategically planned to address severe crowding and facilitate lower arch retraction. The patient presented with retained primary teeth, including the upper right canine and lower right second molar. To address the Class III malocclusion, extraction of the primary teeth were scheduled, as well as the partially erupted, impacted premolars. This approach facilitated correction of anterior crossbite and crowding.

Posterior and anterior bite turbos

Bite turbos open the bite, and can be positioned either in the anterior or posterior region of both dental arches. However, it is essential to consider

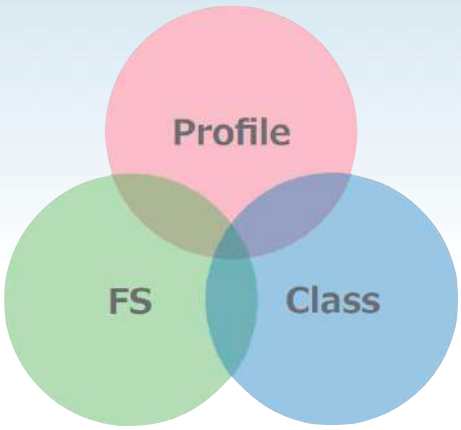


Fig. 20:
Lin's three-ring diagnosis system assesses the potential for conservative correction of a Class III malocclusion with an anterior crossbite. Favorable factors are: (1) facial profile is acceptable when the mandible is positioned in centric relation (C_R); (2) Class I buccal segments in C_R; and (3) functional shift (FS) is present from C_R to centric occlusion (C_O).

	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: *Chang's extraction decision chart*

specific limitations when deciding whether or not to opt for this treatment option. In particular, it is not advisable to place bite turbos on teeth (1) that are relatively weak, such as upper lateral incisors, (2) that have previously undergone endodontic treatment or exhibit periodontal concerns, (3) with extensive restorations or temporary crowns, (4) that are isolated to avoid detrimental stress, or (5) teeth designated for movement as part of the overall treatment plan.[11] Bite turbos played a pivotal role in correcting the anterior crossbite. They served vital functions, including preventing premature contact on brackets, reducing tooth wear (especially in patients with parafunctional habits), promoting arch development, and creating the required interocclusal space for successful crossbite correction. A well-designed protocol for bite turbo placement and usage helped enhance dental function and esthetics while minimizing complications and adverse outcomes.[12]

Anterior bite plane/bite turbos

When addressing anterior crossbites, employing lower incisor bite turbos is an effective treatment strategy. Flowable resin is usually the preferred material for crafting these lower anterior devices due to easy adjustment to attain the desired bite opening. Furthermore, the vertical dimension of the bite turbo should be carefully designed to create the necessary intermaxillary space to ensure proper occlusion and alignment throughout active orthodontic treatment.

In Class III malocclusions, the use of anterior bite turbos can aid patients in achieving enhanced dental function and esthetics.[13] In this case, the bite

turbos were strategically implemented to accelerate the initial orthodontic treatment phase. Simultaneously, intermaxillary Class III elastics were employed, utilizing the entire upper dentition as anchorage to retract the lower dentition.

Temporary skeletal anchorage devices (TSADs)

The inclusion of TSADs in this treatment is essential for lower arch retraction anchorage. In contrast to Class III elastics, TSADs offer a more robust osseous anchorage, effectively preventing excessive proclination of the upper incisors.[14] The placement of buccal shelf bone screws was positioned outside the root area, rather than between the roots. This strategic placement allowed for the retraction of the entire mandibular dentition without any interference with root movements of the teeth.[15]

Conclusion

Successful treatment of severe crowding and retained primary teeth in a pseudo-Class III case was accomplished without the need for orthognathic surgery. A combination of anterior and posterior bite turbos, along with Class III elastics, yielded satisfactory results for the patient. To address the severe crowding, a treatment approach involving the extraction of four premolars complemented by the initial use of open coil springs was adopted. Additionally, the key to managing an unfavorable facial profile lay in the effective retraction of the lower arch. This was achieved without compromising the axial inclination of the anterior teeth, thanks to the invaluable assistance of absolute anchorage provided by TSADs. Careful torque selection for the lower incisor brackets, combined with a pre-torqued archwire, counteracted the anticipated severe distal tipping of the lower incisors during space closure with the application of Class III elastics.

References

1. Ngan P, Hu AM, Fields HW, Jr. Treatment of Class III problems begins with differential diagnosis of anterior crossbites. Pediatr Dent 1997;19:386-395.

2. Akan B, Veli I. Comparison of dental arch and mandibular-maxillary base widths between true and pseudo-Class III malocclusions. Am J Orthod Dentofacial Orthop 2017;151:317-323.

3. Rabie AB, Gu Y. Diagnostic criteria for pseudo-Class III malocclusion. Am J Orthod Dentofacial Orthop 2000;117:1-9.

4. Eslami S, Faber J, Fateh A, Sheikholaemmeh F, Grassia V, Jamilian A. Treatment decision in adult patients with class III malocclusion: surgery versus orthodontics. Prog Orthod 2018;19(1):1-6.

5. Gravely JF. A study of the mandibular closure path in Angle Class III relationship. Br J Orthod 1984;11:85-91.

6. Lin JJ. Creative orthodontics blending the Damon system and TADs to manage difficult malocclusions, 2nd ed. Taipei, Taiwan: Yong Chieh. 2010. pp. 263-271.

7. Huang YH, Chang CH, Roberts WE. Correction of anterior crossbite complicated with two supernumerary teeth. Int J Orthod Implantol 2013;31:44-60.

8. Ulusoy AT, Bodrumlu EH. Management of anterior dental crossbite with removable appliances. Contemp Clin Dent 2013;4:223-226.

9. Cangialosi TJ, Riolo ML, Owens SE, Jr., Dykhouse VJ, Moffitt AH, Grubb JE et al. The ABO discrepancy index: a measure

of case complexity. Am J Orthod Dentofacial Orthop 2004;125:270-278.

10. Ferreira FP, Goulart MD, de Almeida-Pedrin RR, Conti AC, Cardoso MA. Treatment of Class III malocclusion: Atypical extraction protocol. Case Rep Dent 2017;2017:4652685.

11. Chen B, Chang CH, Roberts WE. Class III camouflage treatment: Premolar extractions, bite turbos, and differential space closure. J Digital Orthod 2020;60:40-55.

12. Lin A, Chang CH, Roberts WE. Pseudo-Class III malocclusion in an adolescent treated with mandibular bone screws and bite opening to enhance late maxillary growth. J Digital Orthod 2021;61:4-22.

13. Shu PW, Chang K, Chang CH, Roberts WE. Asymmetric skeletal Class III malocclusion with missing molars and deep anterior crossbite. J Digital Orthod 2023;69:4-22.

14. Huang S, Chang CHN, Roberts WE. A severe skeletal Class III open bite malocclusion treated with nonsurgical approach. Int J Orthod Implantol 2011;24:28-39.

15. Lin JJ, Chang CH, Roberts WE. Class III correction. Orthodontics III. Taipei, Taiwan: Yong Chieh; 2013. pp. 68-69.

Discrepancy Index Worksheet

TOTAL D.I. SCORE 20

OVERJET

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

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

Total = 9

OVERBITE

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

Total = 3

ANTERIOR OPEN BITE

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

Total = 0

LATERAL OPEN BITE

2 pts. per mm. Per tooth

Total = 0

CROWDING (only one arch)

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

Total = 7

OCCLUSION

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

Total = 0

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 1

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:

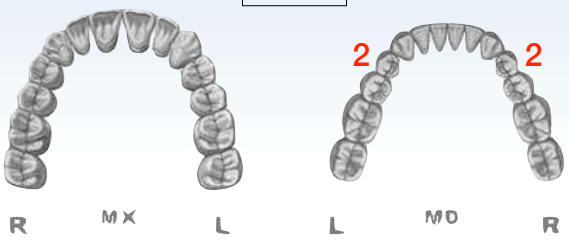
Total = 0

Cast-Radiograph Evaluation

Total Score: 8

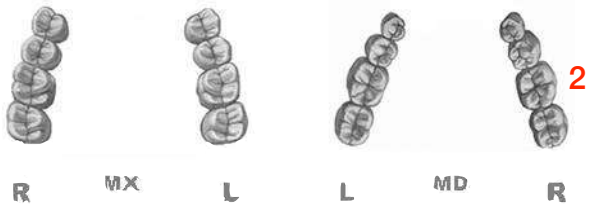
Alignment/Rotations

4



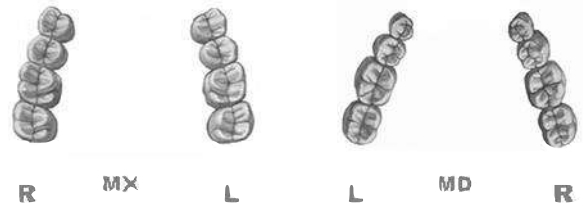
Marginal Ridges

2



Buccolingual Inclination

0

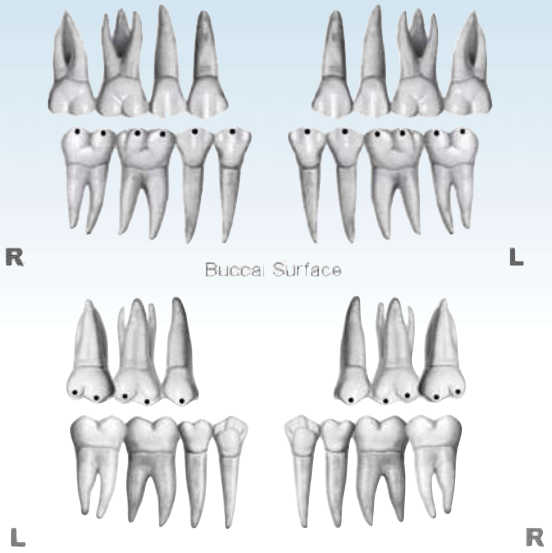


Overjet

2

Occlusal Contacts

0

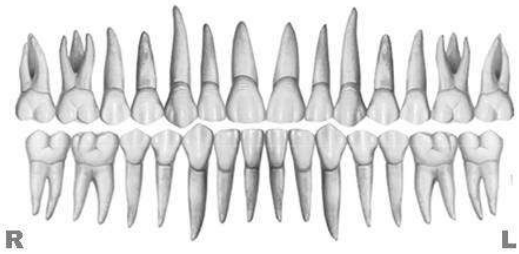


Occlusal Relationships

0

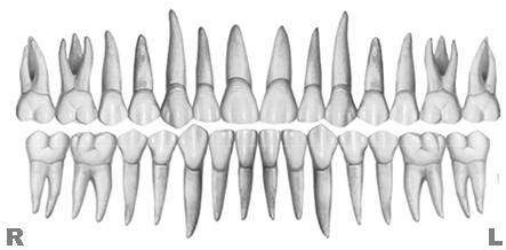
Interproximal Contacts

0



Root Angulation

0



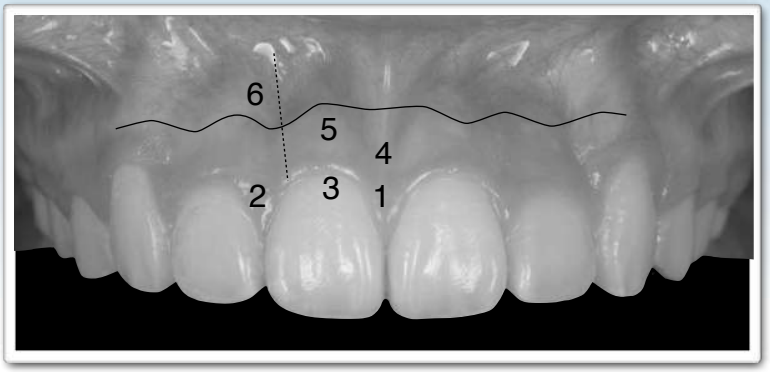
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score = 4

1. Pink Esthetic Score

Total = 1

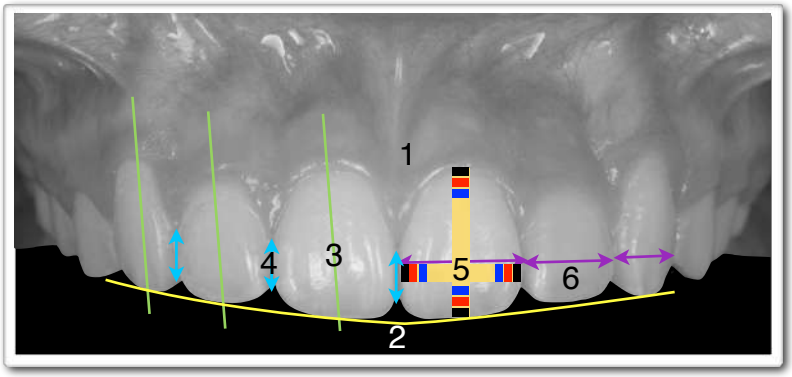


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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

2. White Esthetic Score (for Micro-esthetic)

Total = 3



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

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

International Association for Orthodontists & Implantologists

Join the *iAOI* the future of dentistry!

About our association-iAOI

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

How to join iAOI?

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

1. Member

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

2. Board eligible

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

3. Diplomate

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

4. Ambassador

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

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

iAOI Ambassador & Diplomate

國際矯正植牙大使與院士

Ambassadors


Dr. Kenji Ojima◆


44 pts

Dr. 林詩詠 Joshua Lin*▲


Dr. Diego Peydro Herrero◆


21 pts

Dr. 陳俊宏 Chun-Hung Chen*▲


18 pts

Dr. 張銘珍 Ming-Jen Chang*


16 pts

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


29 pts

Dr. 徐玉玲 Lynn Hsu▲


26 pts

Dr. 李雙安 Angle Lee▲


24 pts

Dr. 蘇筌瑋 Bill Su


20 pts

Dr. 葉信吟 Hsin-Yin Yeh▲


20 pts

Dr. 徐重興 Eric Hsu▲


18 pts

Dr. 黃育新 Yu-Hsin Huang


16 pts

Dr. 黃祈 Richie Huang


13 pts

Dr. 邱上珍 Grace Chiu▲


13 pts

Dr. 黃瓊嫥 Sabrina Huang


13 pts

Dr. 鄭惠文 Joy Cheng


13 pts

Dr. 林彥君 Lexie Lin▲


12 pts

Dr. 曾淑萍 Shu-Ping Tseng


10 pts

Dr. 林曉鈴 Sheau-Ling Lin


10 pts

Dr. 張倩瑜 Charlene Chang


10 pts

Dr. 林佳宏 Alex Lin▲


10 pts

Dr. 林森田 Chris Lin


6 pts

Dr. 黃登楷 Kevin Huang


6 pts

Dr. 張馨文 Sara Chang


6 pts

Dr. 李名振 Major Lee


6 pts

Dr. 陳惠華 Judy Chen


6 pts

Dr. 魏明偉 Ming-Wei Wei


6 pts

Dr. 黃荷薰 Ashley Huang


6 pts

Dr. 李彥峰 Yen-Feng Lee


5 pts

Dr. 張銘津 Ariel Chang


4 pts

Dr. 彭緯綸 Wei-Lun Peng


4 pts

Dr. 呂詩薇 Julie Lu

iNewton

Dental Products

Must-Have Secret Weapons

Autoclavable

Double Retractors 2.0

Double Retractors x2, Black Board x2

While keeping the same lip & cheek two-way design, the new Double Retractors 2.0 is upgraded to medical grade PPSU.

NEW

Stainless Steel Mirror 2.0

Strong, durable stainless steel, autoclave-proof, the specially designed size, improved shape and thickness ensure maximum intra-oral view without sacrificing patient comfort.

Bite Turbo 3.0

Handle x1, BT molds x6, BT extended molds x6, Button molds x6

Designed by Dr. Chris Chang, the new Bite Turbo 3.0 allows you to solve all kinds of deep bite and large horizontal overjet. A simple and powerful tool you should add to your kit!

orthobonescrew.com +886-3-5735676 inewton.dental@gmail.com

2025 第四届 张慧男正畸大师班


全新重启的 2025 贝多芬张慧男正畸大师系列课程是由国际知名讲师张慧男医师亲自规划及授课，课程特色强调由临床病例带动诊断、分析、治疗计划拟定与执行技巧。

本年度特别新增两天的课程，加入最新的隐形牙套内容，让学员可以物超所值地学习最新正畸趋势！透过数位视频反覆观看，课堂助教协助实操，让学员在短时间能快速上手，感染“热爱正畸学，热爱学正畸”的热情。

名额有限，一年仅有一次机会完整体验正畸大师课程，错过只能等明年啰！

2024/12月课程地点：五星级厦门五缘湾凯悦酒店（厦门，湖里区，湖里区日圆二里五号）

(后续课程地点待公布)

课程 1- 6/1, 12/22('24)

1. 如何选择第一个病例:建立自信
2. 精准的托槽定位法
3. 高效正畸治疗“四步法”
4. 病例总结和讨论
5. 托槽粘结+BT(合垫)+头影测量

练习：临床摄影技术

课程 2 - 6/2, 12/23('24)

1. 简单高效的支抗系统的运用
2. 拔牙与否的诊断分析
3. 病例总结和讨论
4. 实操：微种植支抗系统 + 间隙关闭法 + 牵引钩的使用 + 弹簧的使用

练习：头影测量；完成患者照片记录（模板）

- **第三届学员补课日期：**
  2024/12/22-23

  (第三届学员可参加本届实体课程，需事先登记以利教室准备。)

- **本届学员方案二选一：**
  1. 参加 2024/12/22-23 实操课程，2025/6/1-2 可现场听课复习不实操
  2. 参加 2025/6/1-2 现场实操课程

课程 3 - 6/22

1. 戴蒙系统的诊断与微调
2. 正畸完成后的效果评判
3. 病例总结和讨论
4. 实操：弓丝的弯制和固定保持器的制作

练习：指导患者拍照记录（用自己的时间）；修图技术

课程 4 - 6/23

1. 完美的结束：病例演示
2. 保持和复发：病例演示
3. 病例总结和讨论
4. 实操：演讲演示

练习：演示病例报告

课程 5 - 7/20

1. 正畸中生物力学的诊断分析
2. 正畸中软组织和硬组织的诊断分析
3. 青少年与成人正畸的诊断分析
4. 病例总结和讨论

练习：病例报告

课程 6 - 7/21

1. 对于拥挤病例拔牙与否的诊断分析
2. 如何实现上颌的压入
3. 如何实现下颌的压入
4. 病例总结和讨论

文献探讨：托槽的定位；埋伏尖牙的正畸

课程 7 - 9/14

1. 缺失牙的正畸分析：前牙缺失 vs. 后牙缺失
2. 反合的正畸分析：前牙反合 vs. 后牙反合
3. 病例总结和讨论

文献探讨：尖牙替代缺失的侧切牙的正畸分析

课程 8 - 9/15

1. 高角开合与低角深覆合病例的诊断分析
2. 美国正畸协会，DI CRE 分值测量实操
3. 病例总结和讨论

文献探讨：DI & CRE 文献

课程 9 - 10/12

1. 如何改善露龈笑；矫治器拆除的注意事项
2. 正畸结束时的微调
3. 病例总结和讨论

文献探讨：完美的正畸效果（良好的咬合；前牙的美学效果）

课程 10 - 10/13

1. 联合种植支抗的正畸治疗
2. 多学科联合治疗成人复杂病例
3. 病例总结和讨论

文献探讨：IDT

课程 11 - 11/16

1. 隐形牙套正畸
2. 隐形牙套及其挑战

文献探讨：隐形正畸前置治疗

课程 12 - 11/17

1. 隐形牙套结合支抗钉治疗
2. 隐形牙套力学

文献探讨：（待公布）

课程含案例互动与模型实操，并赠课程电子书讲义、课程视讯。

（赠送之课程视讯提供两年时间串流观看）

报名专线

金牛顿艺术科技 Newtonsa

何进辉 18960059996

潘超 18170078338

邱强 13509310501

苏佩玟 15280211624

PACKAGES

Ormco™

DAMON Q2

Damon Q2 Brackets

Bondable Tube
.022 (G/O, Accent, Peerless)

A Damon Copper Ni-Ti Wire
size .014 / .014 x .025

B Damon Stainless Steel Wire
size .016 x .025

C Damon TMA Low-Friction Wire
size .017 x .025

- Brackets x 200個
- Tubes x 80個
- Archwires A x 40條, B x 20條, C x 20條

10人份套組 特價NT$149,999/組

- Brackets x 600個
- Tubes x 240個
- Archwires A x 120條, B x 60條, C x 60條

30人份套組 特價NT$369,999/組

DAMON CLEAR 2

Damon Clear2 / Clear Brackets

Bondable Tube
.022 (G/O, Accent, Peerless)

A Damon Copper Ni-Ti Wire
size .014 / .014 x .025

B Damon Stainless Steel Wire
size .016 x .025

C Damon TMA Low-Friction Wire
size .017 x .025

- Brackets x 200個
- Tubes x 80個
- Archwires A x 40條, B x 20條, C x 20條

10人份套組 特價NT$189,999/組

- Brackets x 600個
- Tubes x 240個
- Archwires A x 120條, B x 60條, C x 60條

30人份套組 特價NT$459,999/組

YONG CHIEH 湧 傑

促銷期限 2024/3/26-9/25 客服專線：北區 (02)2778-8315・中區 (04)2305-8915・南區 (07)226-0030

線上購物　即時客服

BANDS

BANDS
Ultima™ First Molars
Washbon™ Second Molars

定價NT$110/個 | **買100個以上75折**

ELASTICS AND POWER PRODUCTS

Zoo Pack Elastics
Intraoral Elastics

定價NT$3,300/盒 | **買3送1** | **買10送6**

Power Chain
Generation II (open / close / wide)

定價NT$2,700/卷 | **買3送1** | **買10送6**

BONDING AGENTS

Enlight Syringe Refill
Highly Filled Light-Cure Adhesive

定價NT$2,500/4g/支 | **買3送1** | **買10送6**

Ortho Solo Bottle Refill
Universal Sealant and Bonding

定價NT$2,800/5ml/瓶 | **買3送1** | **買10送6**

Optiband Ultra Syringes
Single-Paste, Light-Cure Band Cement

定價NT$5,500/9g/5支/盒(S)
定價NT$9,900/18g/10支/盒(L) | **買3送1** | **買10送6**

Grengloo Syringe Refill
Two-Way Color Change Adhesive

定價NT$5,200/4g/支 | **買3送1** | **買10送6**

Blugloo Syringe Refill
Two-Way Color Change Adhesive

定價NT$4,900/4g/支 | **買3送1** | **買10送6**

INTRAORAL APPLIANCES

Damon Q2
Drop-in Hooks

定價NT$3,200/盒 | **買3送1** | **買10送6**

Class II Malocclusion with Impacted and Transposed Canines Treated with Modified Vertical Incision Subperiosteal Tunnel Access (VISTA) and Bone Screws

Abstract

Introduction: *A 11yr-8mo-old female presented with a chief complaint of unerupted bimaxillary right canines.*

Diagnosis: *The patient had a right end-on Class II and left full-cusp Class II dental malocclusion with an overjet of 8mm. A 100% impinging deep bite was also noted. This severe malocclusion was further complicated by an incompletely transposed and impacted maxillary right canine and a completely transposed and impacted mandibular right canine. The discrepancy index (DI) was 59.*

Etiology: *The cause of the severe impaction was a deviated path of eruption that may be related to over-retained primary canines.*

Treatment: *A right-sided infra-zygomatic crest (IZC) bone screw and a right-sided buccal shelf (BS) bone screw were used as anchorage for a modified vertical incision subperiosteal tunnel access (VISTA) submucosal procedure to retract unerupted bimaxillary right canines to their correct sagittal relationships, respectively. Bilateral IZC bone screws, Class II elastics, combined with anterior and posterior bite turbos (BTs) were used to correct the Class II malocclusion, excessive overjet, and deep bite.*

Outcome: *After 35 months of active treatment, this difficult malocclusion, with a Discrepancy Index of 59 points, achieved a Cast-Radiograph Evaluation score of 26 points and a Pink and White esthetic score of 4 points. The patient was very pleased with the treatment outcome. Final records were collected at the 1.5-year recall appointment. (J Digit Orthod 2024:75:54-74, reprinted with permission from Int J Orthod 2021;32(2):7-17)*

Key words:
Impaction, impacted and transposed maxillary canine, impacted and transposed mandibular canine, incompletely transposed impaction, completely transposed impaction, modified vertical incision subperiosteal tunnel access, VISTA, bone screw, closed eruption technique

Introduction

Recovering severely displaced, impacted canines is among the most challenging clinical problems in orthodontics. An impacted canine can lead to strenuous tooth eruption and movement, which could thereby negatively influence its esthetics and functions.[1-4] Notably, the corrective treatment for a transposed impaction becomes an even greater challenge. The standard procedure to recover impaction includes surgical exposure and forced orthodontic eruption.[5,6] Kokich[7] has proposed three surgical methods for uncovering labially impacted maxillary canines: an excisional uncovering, a closed eruption technique (CE), and an apically positioned flap (APF). Accordingly, deep and high bony impactions require treatment using the latter technique, whereas horizontal bony impactions are more suitable for the last type. Previously, the anchorage for traction of the

Joy Cheng
Resident, Beethoven Orthodontic Center (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)



impacted canines has been achieved either through adjacent anchorage of teeth or through a main wire. If the deep impaction is severely displaced, it becomes impossible to move. In such a case, the anchorage for traction cannot provide a three-dimensional force to pull back the impaction to the baseline position.

bone screws can help guide impacted canines with greater precision during eruption while avoiding unwanted movement of anchorage teeth.[7] Their other advantages include ease of placement and removal, minimal need for patient compliance, and cost effectiveness.[8] They constitute a strategic component to the treatment of impacted teeth.

Fig. 1: *Pre-treatment facial and intra-oral photographs*

The vestibular incision subperiosteal tunnel access (VISTA), as developed by Zadeh,[9,10] repositions the gingival margins coronally to correct periodontal defects in the maxillary anterior region (Fig. 2). In contrast, a modified VISTA approach, as developed by Chang,[10-14] exposes the crown of the canine surface and provides an exit tunnel for the power chain. Its advantage lies in its relief on the strain when creating a full thickness flap in the procedure, whereby bone screws play an auxiliary role as anchorage devices.

The current patient is a rare and difficult case because she had two impacted and transposed canines: maxillary right canine, an incompletely transposed impaction, and mandibular right canine, a completely transposed impaction.[15-17] The purpose of this case report is to document our use of a modified VISTA method combined with placement of bone screws for managing transposed, labial impacted canines.

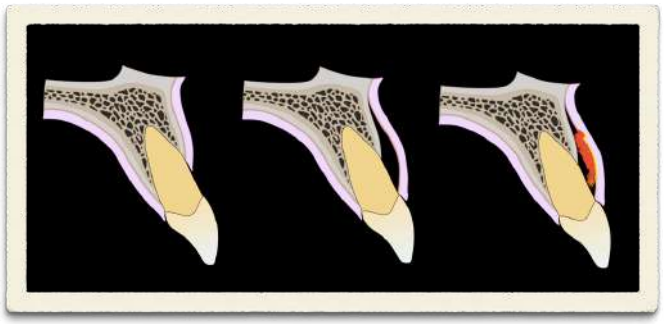


Fig. 2:
As shown from left to right, the VISTA procedure is a novel, minimally invasive approach for undermining the labial mucosa to correct soft tissue defects in the maxillary anterior region.

Diagnosis and Etiology

A 11-year-8-month-old girl presented with her parents for orthodontic consultation to evaluate her unerupted bimaxillary right canines. Clinical examinations showed that primary right canines in both arches were over-retained. In addition, the overjet was 8 mm, and the overbite was 100% impinging deep bite. Right end-on Class II and left full Class II molar relationships were noted. A 2 mm diastema was noted between the maxillary central incisors. On average, a 1 mm space was found between all mandibular teeth (Figs. 1 and 3).

A panoramic radiograph revealed that the apex of the maxillary right canine was located in the proper eruption site, but its vertical position was 12 mm apical to the alveolar crest. Besides, its crown tip overlapped the distal root surface of the maxillary right central incisor. The impacted mandibular right canine was parallel to its adjacent teeth, but its crown and root structure overlapped the root of the mandibular right lateral incisor. The

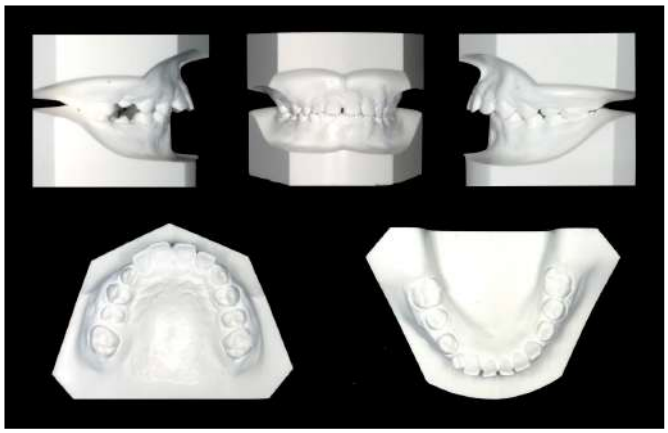


Fig. 3: *Pre-treatment study models (casts)*

Fig. 4: *Pre-treatment panoramic radiograph*

maxillary right canine was diagnosed as incomplete transposed impaction, and the mandibular right canine was diagnosed as complete transposed impaction (Fig. 4).[15-17]

Lateral cephalometric analysis of the pre-treatment data indicated a low mandibular plane angle (15°), a convex profile (G-Sn-Pg, 26°), and a protrusive upper lip (3mm to the E-Line). The bimaxillary incisors had increased axial inclination (U1 to SN, 118°, L1 to MP, 116°) (Fig. 5; Table 1). Pre-treatment CBCT images showed that the bimaxillary right canines are both labial impactions (Figs. 6 and 7). The American Board of Orthodontics (ABO) Discrepancy Index (DI) was 59 as shown in the subsequent worksheet.

Treatment Objectives

The treatment objectives were to align the bimaxillary impacted canines without causing detrimental effects on the adjacent incisors, to close all spacing, and to establish ideal overjet and overbite.

Treatment Alternatives

The ideal objective for a full fixed-appliance treatment would be to resolve the malocclusion and align the impacted cuspids. Two treatment plans were thus proposed: Option 1 would require surgical removal of the impacted canines, substituting them with the adjacent first premolar, and extracting the other two first premolars. This treatment option would warrant a shorter treatment time but would be detrimental to the patient's profile. On the other hand, Option 2 would involve a non-extraction treatment to align the transposed canines to their original positions. This would take more time to treat but would result in better esthetics and occlusion. After discussing the advantages and disadvantages of each option with the patient and her parents, we chose Option 2, the non-extraction treatment.

Fig. 5: *Pre-treatment cephalometric radiograph*

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-TX	POST-TX	DIFF.
SNA° (82°)	82°	82°	0°
SNB° (80°)	79°	79°	0°
ANB° (2°)	3°	3°	0°
SN-MP° (32°)	15°	17°	2°
FMA° (27°)	8°	10°	2°
DENTAL ANALYSIS			
U1 TO NA mm (4mm)	8	3	5
U1 TO SN° (104°)	118°	93°	25°
L1 TO NB mm (4mm)	3	1	2
L1 TO MP° (90°)	116°	115°	1°
FACIAL ANALYSIS			
E-LINE UL (-1mm)	3	-0.5	3.5
E-LINE LL (0mm)	0.5	-1	1.5
%FH: Na-ANS-Gn (56%)	52%	53%	1%
Convexity: G-Sn-Pg (13°)	26°	23°	3°

Table 1: *Cephalometric Summary*

Treatment Progress

The treatment can be divided into two phases: the first phase to correct the impaction, and the second to complete the final alignment.

Phase 1: Correct the impaction

A self-ligating fixed appliance (Damon Q®, Ormco Corporation, Brea, CA) was bonded on all maxillary permanent teeth, except for the maxillary right lateral incisor. Notably, the unbonded lateral incisor acted as a free body to avoid any interference with the path of retraction which might result in more root resorption. A 0.014-in CuNiTi archwire was then engaged. A closed coil spring was inserted between the brackets on the maxillary right central incisor and the maxillary right first premolar to create space for the impacted maxillary right canine.

One month later, the initial surgery to expose the impaction was incorporated with a modified VISTA procedure designed to coordinate with an orthodontic retraction mechanism anchored by an extra-alveolar OrthoBoneScrew® (OBS) (2x12-mm, iNewton, Inc., Hsinchu, Taiwan). The bone screw had been placed in the right infra-zygomatic crest (IZC). The first vertical incision was performed along the mesial line angle of the lateral incisor. Following the initial incision, a periosteal elevator was used to detach the periosteum and expose the impaction, after which the bone covering the crown was removed down to the cementoenamel junction (CEJ). A button was bonded to the crown of the impaction. The bone in the planned path of retraction was removed with a #4 carbide round bur to facilitate tooth movement. Then, a second incision was performed along the mesial line angle of the maxillary right first premolar to make an exit tunnel for a power chain. A power chain was attached from the button to the IZC screw. After engaging the force, the two vertical incisions were sutured using 6-0 nylon to ensure minimal damage to the mucosa (Fig. 8).[10]

The procedure to recover the impacted mandibular right canine is similar to that mentioned above. The modified VISTA procedure was applied to coordinate with an orthodontic retraction mechanism that was anchored by an extra-alveolar OBS (2x12-mm)

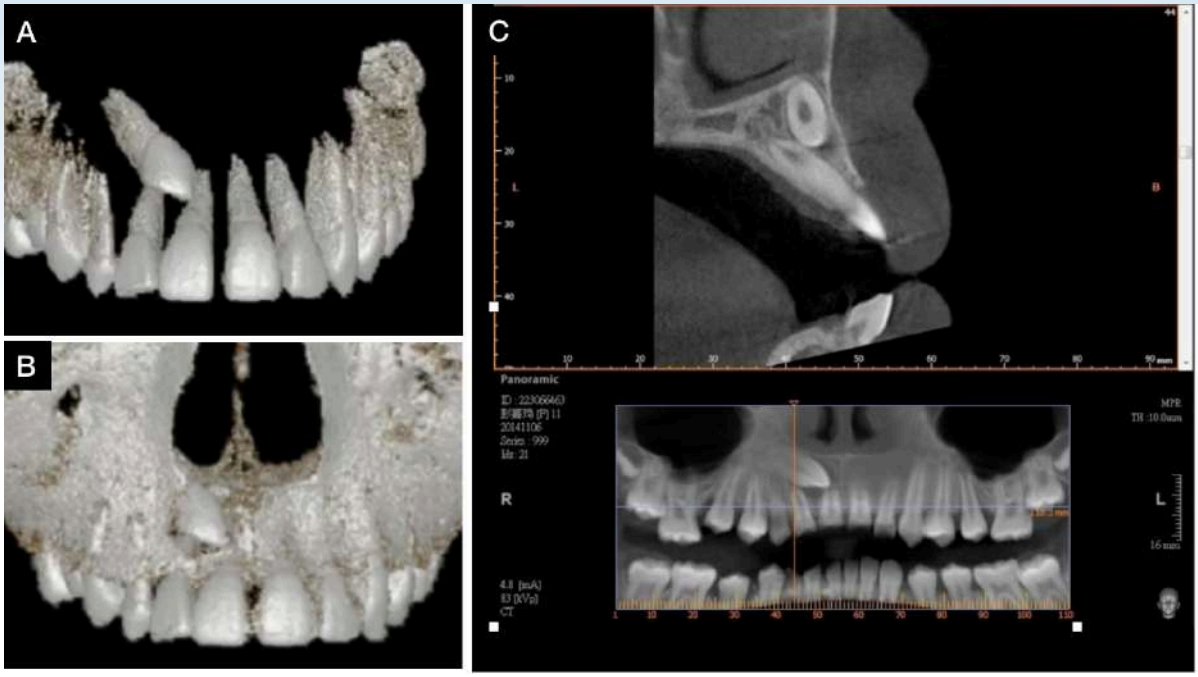


Fig. 6: *Pre-treatment CBCT*
A. 360º rotated animation around the impaction with the bone covering deleted. B. 360º rotated animation around the impaction covered with bone. C. Cross sectioned slice through the impaction

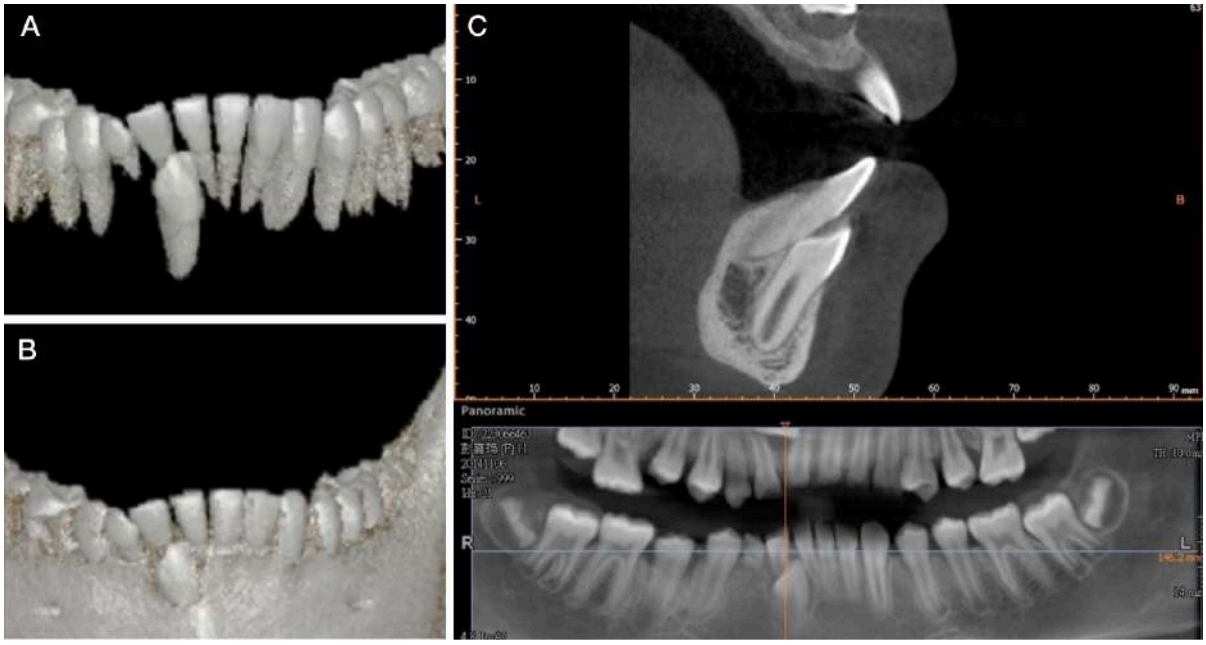


Fig. 7: *Pre-treatment CBCT*
A. 360º rotated animation around the impaction with the bone covering deleted. B. 360º rotated animation around the impaction covered with bone. C. Cross sectioned slice through the impaction

placed in the right buccal shelf (BS) (Fig. 9). Primary bimaxillary canines were then removed.

During the 5th month, the incision around the exit tunnel for the power chain had healed well. The loop of power chain was cut to reactivate the retraction force (Fig. 10). During the 7th month, a panoramic radiograph was taken to check the position of the two impacted canines. The mesio-distal position of impacted maxillary right canine was in the correct eruption position, but its vertical position was still far from the alveolar crest. The mandibular right canine crown went back into the oral cavity, but the apex was still located between the mandibular central and lateral incisors (Figs. 10 and 11). Subsequently, the right BS screw was removed, and a left IZC screw was installed.

During the 11th month, closed eruption technique was performed because of the unexposed maxillary right canine. The bone covering the maxillary right canine was removed to attach a ligature wire from the impacted crown to the main wire (Fig. 12). The track of tooth movement was recorded in Fig. 11.

Phase 2: Complete the final alignment

Also, during the 11th month, a self-ligating fixed appliance (Damon Q®, Ormco Corporation, Brea, CA) was bonded on all mandibular permanent teeth and the maxillary lateral incisor, standard torque brackets were selected for the lower incisors, and high torque brackets were chosen for canines. An 0.014-in CuNiTi archwire was engaged. Notably, the axis of the

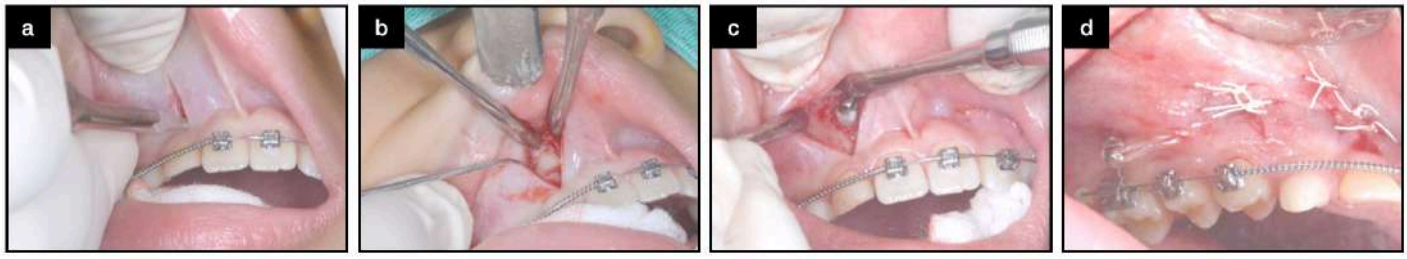


Fig. 8: *Procedure of the maxillary right canine surgery*
(a) The first incision was made along the mesial line angle of the maxillary right lateral incisor. (b) The bone covering the crown of the impaction was exposed, and then removed. (c) A button was bonded onto the crown of the impaction and all obstacles were removed. (d) a second incision was performed along the mesial line angle of the maxillary first premolar to establish a traction route for the power chain. The power chain was retracted from the IZC screw to the button. Finally, the two incision lines were closed with a 6-0 Nylon.

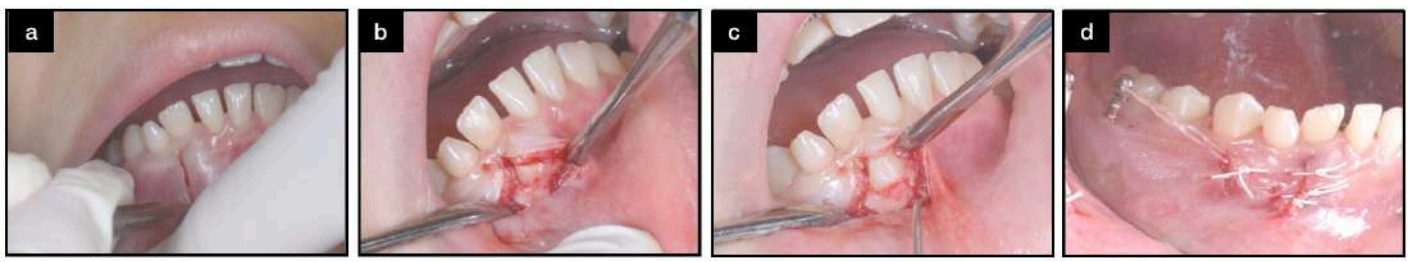


Fig. 9: *Procedure of the mandibular right canine surgery*
(a) The first incision was along the mesial line angle of mandibular right lateral incisor. (b) The bone covering the crown of the impaction was exposed, and then removed. (c) All obstacles were removed after the button was bonded onto the crown. (d) A second incision was performed along the mesial line angle of the mandibular first premolar to establish a traction route for the power chain. The power chain was retracted from BS screw to the button. Finally, the two incision lines were closed with a 6-0 Nylon.

Fig. 10: *Healing process after surgical exposure in the 5th month, 7th month, and 9th month*

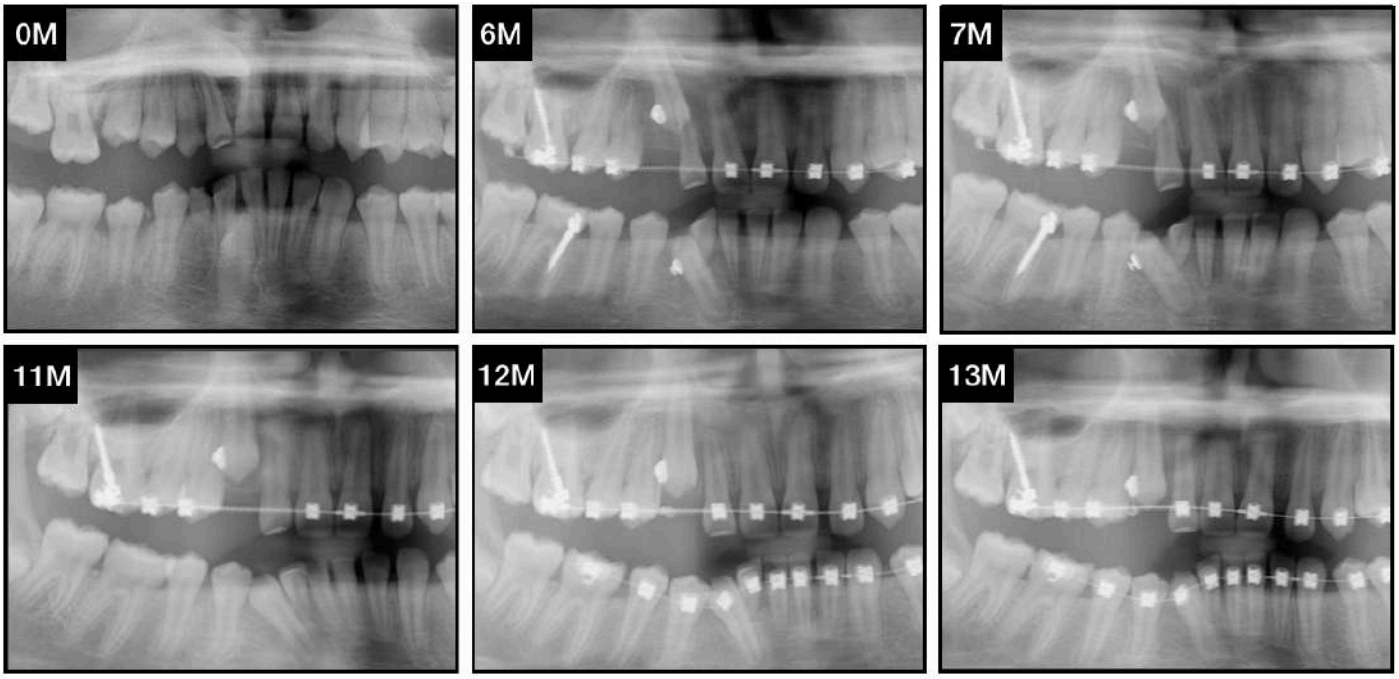


Fig. 11: *Track of tooth movement*

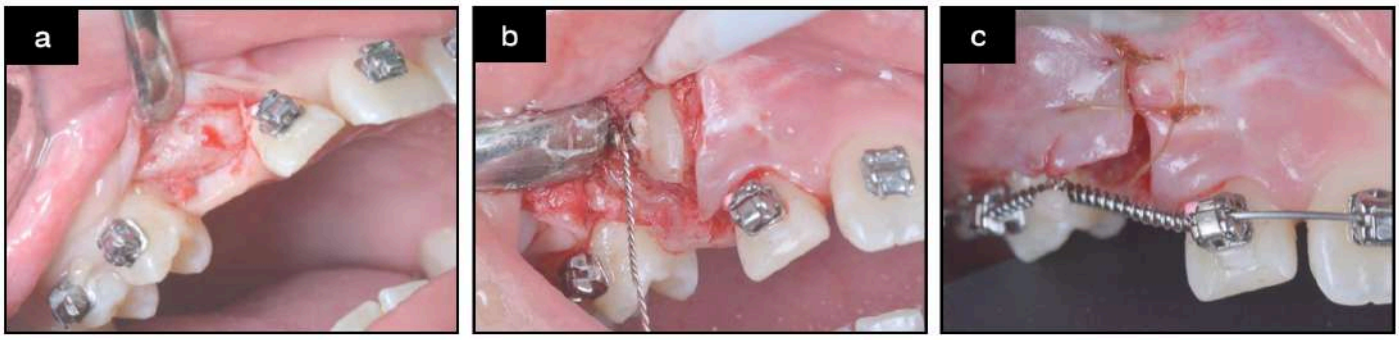


Fig. 12: *Procedure of the closed eruption technique in the 11th month*

bracket had been tilted distally relative to the axis of the mandibular right canine, such that the apex could be shifted distally in order to correct for its transposed apex (Fig. 13).

During the 14th month, the maxillary right canine had been finally completely recovered. A high torque Damon bracket was bonded. The sequence for the upper archwire was 0.014-in CuNiTi, 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, and 0.016x0.025 SS. The sequence for lower archwire was 0.014-in CuNiTi, 0.014x0.025-in CuNiTi, and 0.017x0.025-in TMA (Table 2).

During the 16th month, bite turbos were bonded on the occlusal surfaces of bilateral mandibular first molars to remove any occlusal interference. A canine

Fig. 13: *The axis of the bracket was tilted distally to the axis of mandibular right canine in order to move the apex distally.*

Class II malocclusion was observed; as such, Class II elastics (Quail 3/16-in 2-oz, Ormco, Glendora, CA) were bilaterally worn from the upper canines to the lower first molars.

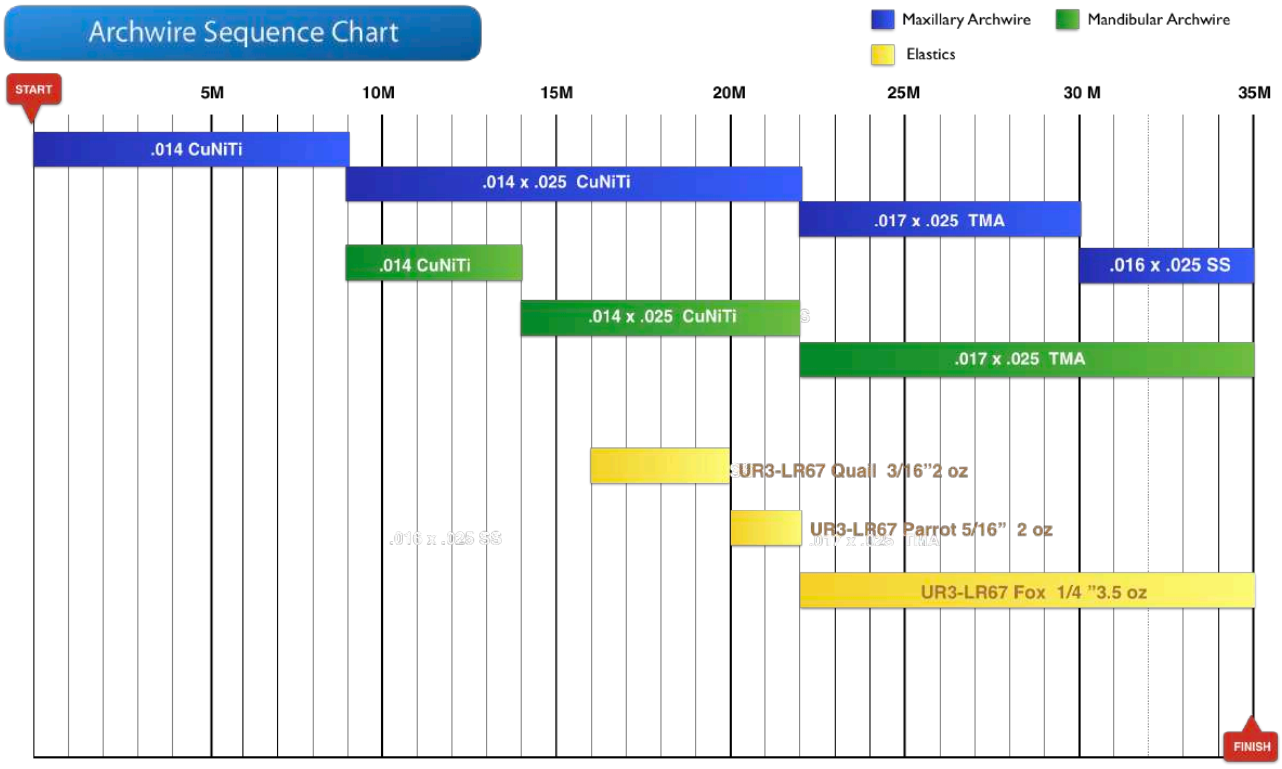


Table2: *Archwire sequence chart*

Alignment and leveling were completed in the 22nd month, but deep bite, 2mm overjet, and bilateral canine Class II relationships were still noted. In order to fix the above problems, the bite turbos were removed in the lower arch, and new ones were placed on the lingual surface of the bilateral maxillary central incisors. In addition, Class II elastics and bilateral IZC screw retraction were used. After 35 months of orthodontic treatment, all brackets were debonded, and a fixed retainer was bonded on the lower anterior incisors. Maxillary and mandibular clear overlay retainers were delivered for full-time wear for the first six months and nights only thereafter. The entire treatment sequence is documented in Figs. 14-18.

Treatment Results

The treatment results for this patient were excellent. All teeth have been well aligned in their proper positions (Figs. 19 and 20). Bilateral occlusal relationships are Class I with a normal overjet and

Fig. 14: *Frontal view of the treatment sequence is shown at treatment times in months (M): 1M, 12M, 14M, 18M, 22M, 25M,29M, and 32M.*

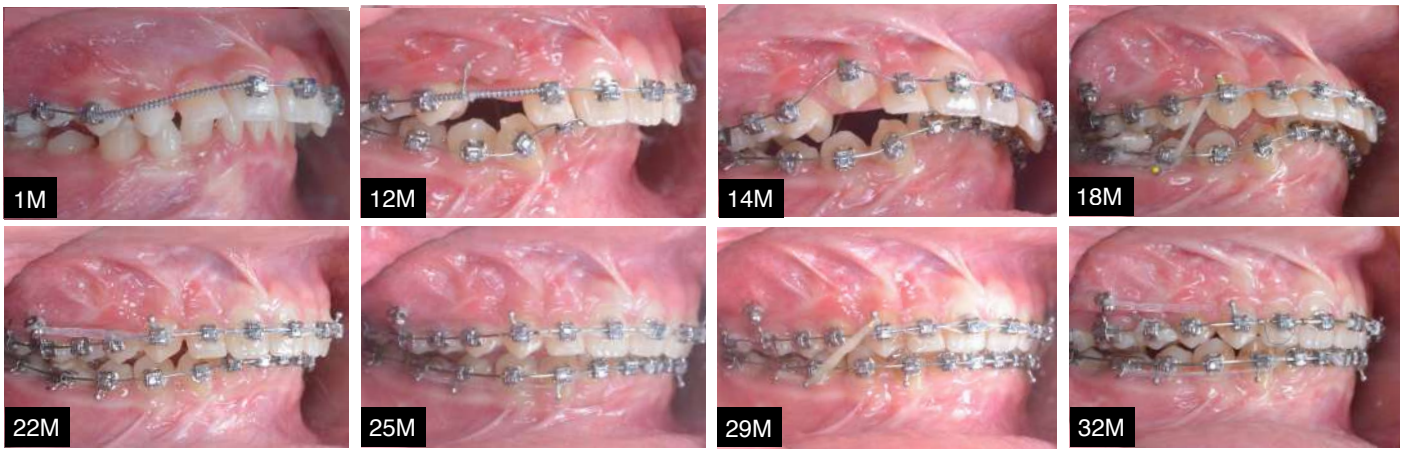


Fig. 15: *Right view of the treatment sequence. Note: the eruption procedure of the impacted bimaxillary right canines*

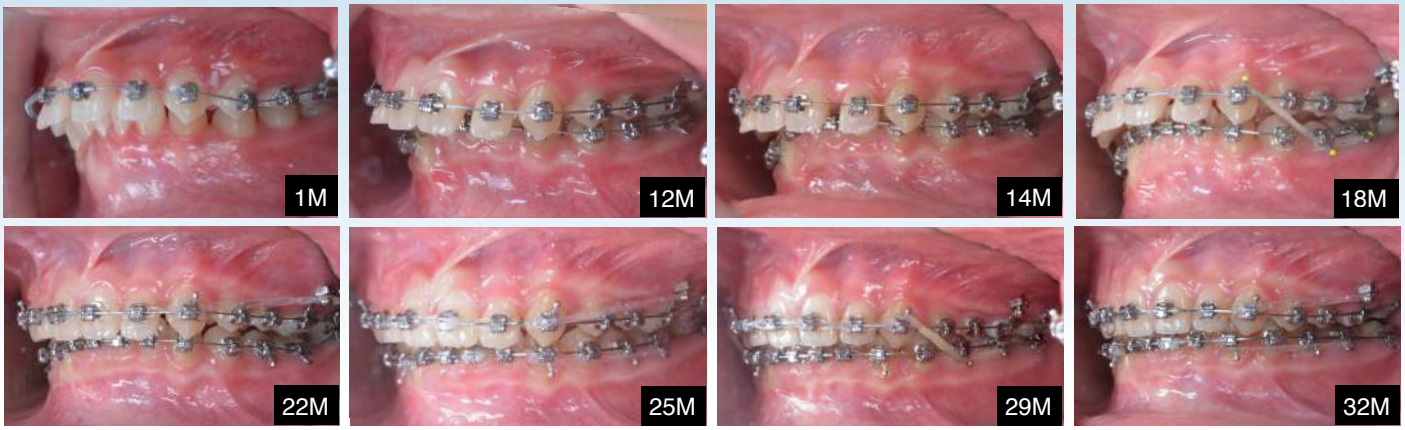


Fig. 16: *Left view of the treatment sequence. Note: the correction procedure for deep bite*

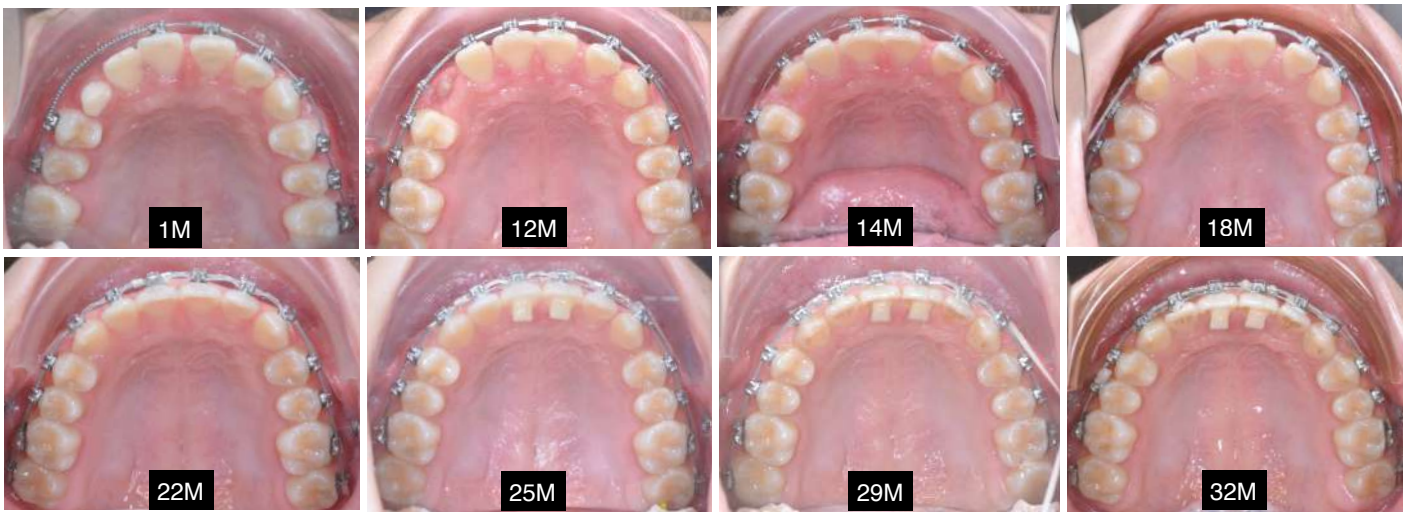


Fig. 17:
The progress of the upper arch is shown. Note: Bite turbos were boned on the lingual surface of bilateral maxillary central incisors to remove occlusal interference.

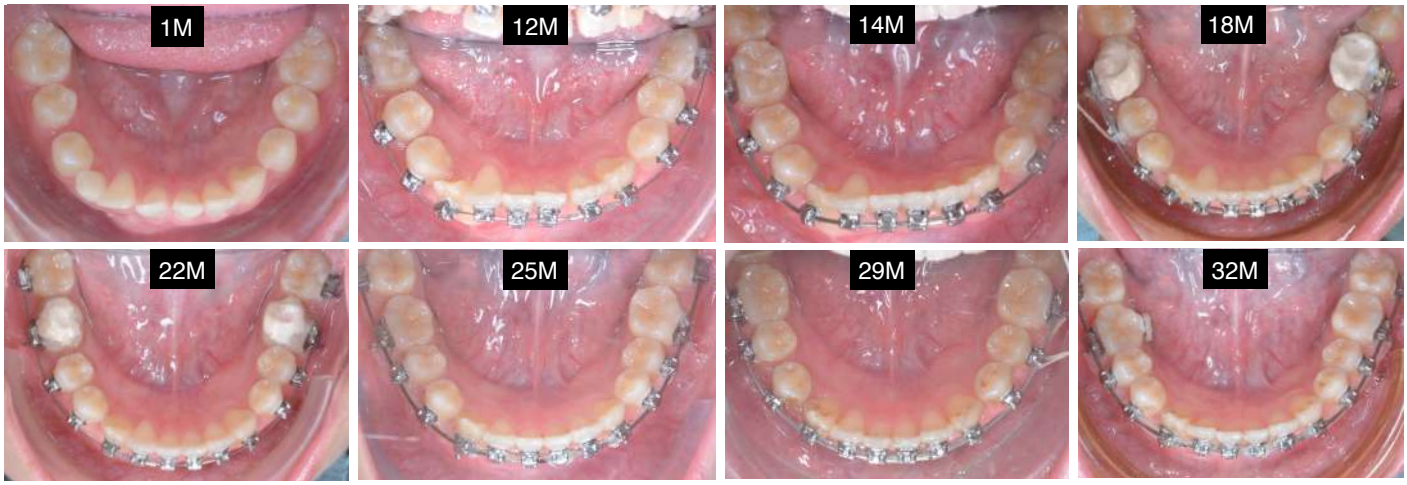


Fig. 18:
The progress of the lower arch is shown. Note: The correction procedure for distal-tilting mandibular right canine is at 12M, 14M, 18M and 22M.

overbite. All treatment objectives were successfully reached. A panoramic radiograph revealed good root parallelism (Fig. 21). The superimposed mandibular image of the post-treatment cephalometric data (Table 1) and the cephalometric superimpositions (Figs. 22 and 23) show the growth in condylar length that contributes to the increased facial height. The maxillary incisors have been retroclined by 25˚, and the mandibular incisors have moved vertically downwards. The patient was satisfied with her teeth and profile. The CRE score was 26 points as shown in the subsequent worksheet. Most of the points deducted were for the buccolingual inclination and occlusal contact. Four points were deducted from the P&W esthetic score, as documented in the supplementary worksheet at the end of this report. At the 18-month follow-up, intra-oral photographs show that the occlusion was still stable (Fig. 24).

Discussion

Phase 1: Correction of the impaction

According to Kokich's[7] article in 2004, there were three techniques which can recover impacted labial impactions: excisional uncovering, apically positioned

Fig. 19: *Post-treatment facial and intra-oral photographs*

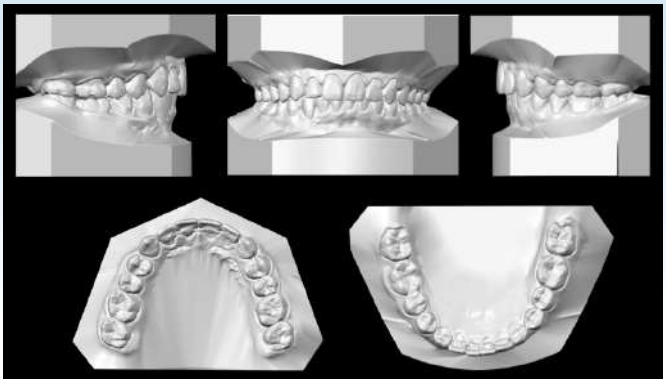


Fig. 20: *Post-treatment study models (casts)*

Fig. 21: *Post-treatment panoramic radiograph*

flaps, and closed eruption (CE) techniques. For surgical exposure of a labial or intra-alveolar impaction of a maxillary canine, Kokich identified four criteria which should be evaluated to determine the correct method for uncovering the tooth:

1. the labiolingual position of the impacted canine crown,
2. vertical position of the tooth relative to the mucogingival junction (MGJ),
3. the amount of keratinized tissue surrounding the impacted canine, and
4. the mesiodistal position of the canine crown.

Fig. 22: *Post-treatment cephalometric radiograph*

When the impaction is apical to the MGJ, either an apically positioned flap (APF) or closed eruption technique may be chosen. The closed eruption technique is more appropriate than an APF when the impaction is in a high position.[18] APF is indicated for cases where the crown of the impaction is positioned mesially and over the root of the lateral incisor.

For our patient, not only was her maxillary right canine highly impacted, but its crown tip also overlapped distal root surface of the maxillary right central incisor. Her mandibular right impacted canine was parallel to the adjacent teeth, but its crown and root structure overlapped the root of the mandibular right lateral incisor. Based on Kokich's criteria, neither CE nor APF can solve this

dilemma. The main reason for this is that Kokich did not apply bone screws in his methods that provided a three-dimensional force to help the tooth recover from such a deep and severely displaced impaction. Therefore, the surgical exposure of impacted canines was limited.

In addition to bone screws, the modified VISTA technique developed by Beethoven Orthodontic Center, originally devised by Zadeh[9] in 2011, provides a minimally invasive yet effective method to resolve such difficulty.

Presently, the criteria proposed by Kokich[7] to determine the correct method for uncovering the tooth has been modified to include the following three main criteria: 1. CBCT assessment of the labiolingual position of the impacted canine crown, 2. a proper design for surgical intervention, and 3. precise mechanical design of the force system.[10]

1. CBCT assessment of the labiolingual position of the impacted canine crown

Three dimensional CBCT imaging is essential for designing a treatment plan for the impacted canine, as it reveals the relationships between the impacted tooth, adjacent teeth, and the cortical bone. Three types of 3D images are required: 1. 360˚ rotated animation around the impaction covered with bone, 2. 360˚ rotated animation around the impaction with the bone covering deleted, and 3. cross-sectioned slices through the impaction.[19]

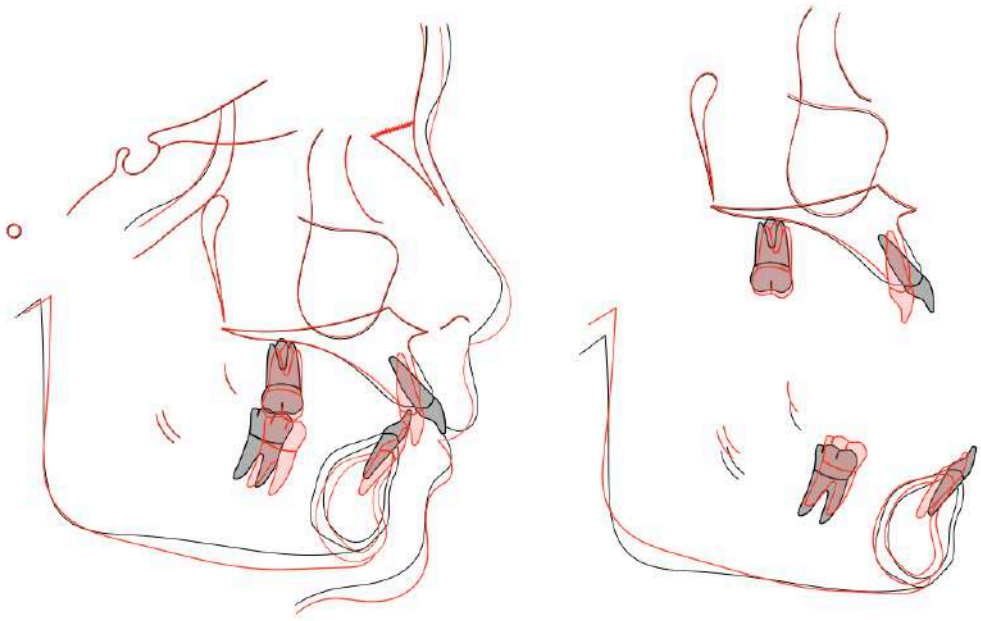


Fig. 23:
Superimposed tracings of the initial (black) and final (red) cephalometric films reveal the skeletal and dental changes that occurred during treatment. After treatment, mandibular growth, retroclination of upper incisors, and intrusion of lower incisors were observed.

Fig. 24: *18-month follow-up facial and intraoral photographs*

2. A proper design for surgical intervention

The design for surgical intervention is determined by the location of the apex, as well as the mesio-distal and vertical position of the crown tip.[20] APF is the most disadvantageous among the three techniques proposed by Kokich. Because high labial impactions were uncovered with an apically positioned flap, it would result in instability of the crown and possible reintrusion of the tooth after orthodontic treatment. This disadvantage is not observed in teeth uncovered with closed eruption technique.[7] Therefore, APF is seldom used in Beethoven's practice. The vestibular incision subperiosteal tunnel access (VISTA) method coronally repositions gingival margins to correct periodontal defects in the maxillary anterior region (Fig. 2).[7] This approach begins with a vestibular access incision which can be made through the periosteum to elevate a subperiosteal tunnel. The Beethoven group led by Chang[10-14] further adapted a modified VISTA technique for the surgical management of labially

impacted, transposed canines. The modified procedure utilizes the same subperiosteal tunneling method to produce a path for submucosal retraction of the impacted canine.[10-14] Either modified VISTA or CE is the present surgical technique used.

This procedure of the modified VISTA decreases invasive surgery, optimizes esthetic outcomes, and limits the threat of external root resorption.[10] Full-thickness flap (closed eruption technique) provides better visibility but results in shrinkage of flap and gingival recession.[21] In contrast, the modified VISTA method eliminates any substantial loss of gingival height because it does not reflect any flap. Its major drawback lies in its limited visibility related to the full-thickness flap and the surgery method and is therefore technique-sensitive.

3. Precise mechanics of force system

The force to retract impaction could be anchored in the main wire, molars, or bone screws. If the impaction is far away from the eruption site, the former two may result in archwire deformation and unwanted tooth movement. The independent force system of bone screws provides the necessary retraction force, without producing undesired side effects on other teeth.[10,18]

As mentioned previously, the patient had two canine impactions, both of which are labial impactions according to CBCT images. The cause of the severe impaction was apparently a deviated path of eruption that may be related to over-retained primary canines.[1] The impacted maxillary right canine, incompletely transposed impaction, was uncovered by the modified VISTA procedure and was retracted using an IZC screw. After ten months of retraction, the mesio-distal position of the impacted maxillary right canine was corrected, but its vertical position was still 3mm apical to the alveolar crest. At this moment, the IZC occlusal retraction was limited. Hence, the secondary surgical exposure, closed eruption technique was performed to expose the impacted crown. The bone surrounding the crown was removed, and a ligature wire was tied between the maxillary right canine button to the main wire. After three months, the impacted maxillary right canine was recovered, and a high torque bracket was bonded. The treatment then moved on to align all teeth. If the first surgical exposure had been performed with 3D lever arm[14] and bone screws were done, the secondary surgical exposure could have been avoided.

The impacted mandibular right canine, completely transposed impaction, was uncovered by modified VISTA and retracted by BS screws. After six months, the impaction was recovered; four months later, a full mouth fixed appliance was bonded on all lower teeth. In Fig. 18, the tip of mandibular right canine tilted distally at the 12th month. The axis of the bracket was tilted distally relative to the axis of mandibular right canine in order to move the apex distally to correct its transposed apex. The axis of mandibular right canine was corrected successfully during the 22nd month.

Phase 2: Alignment of all dentition

When considering whether to extract or not for the eruption site, the patient's craniodental relationship should be taken into consideration. The current patient was diagnosed as having proclined anterior incisors with an 8mm overjet, but the skeletal

relationship was Class I. Spacing was noted over bimaxillary arch, and incomplete growth of her nose and mandible was also found, due to the fact she was only 11 years old. As a result, non-extraction procedure was chosen. IZC screws, along with bite turbos and Class II elastics were used to solve the Class II malocclusion, deep bite, and 8mm overjet.

Conclusions

The treatment of impacted and transposed teeth constitutes a challenge for clinicians. For our patient with two severely impacted and transposed canines, we found it necessary to apply the following steps in devising her treatment:

1. assessing the labio-lingual position of the impacted canine crown using a three dimensional image (CBCT),
2. a proper design for surgical intervention, and
3. a precise mechanics of force system design.

Subsequently, we found that a modified VISTA method, together with application of bone screws, benefitted the patient mainly because of its minimal invasiveness, more solid recovery, and also limitation of subsequent morbidity.

References

1. Becker A, Chaushu S. Etiology of maxillary canine impaction: A review. Am J Orthod Dentofac Orthop 2015;148(4):557–67.
2. Takahama Y, Aiyama Y. Maxillary canine impaction as a possible microform of cleft lip and palate. Eur J Orthod 1982;4:275-7.
3. Sacerdoti R, Baccetti T. Dentoskeletal features associated with unilateral or bilateral palatal displacement of maxillary canines. Angle Orthod 2004;74:725-32.
4. Kılıç N, Oktay H. Orthodontic intervention to impacted and transposed lower canines. Case Rep Dent 2017: https://doi. org/10.1155/2017/4105713
5. Lee M-Y, Park JH, Jung J-G, Chae J-M. Forced eruption of a palatally impacted and transposed canine with a temporary skeletal anchorage device. Am J Orthod Dentofac Orthop 2017;151(6):1148–58.
6. Kocsis A, Seres L. Orthodontic screws to extrude impacted maxillary canines. J Orofac Orthop 2012;73(1):19–27.
7. Kokich VG. Surgical and orthodontic management of impacted maxillary canines. Am J Orthod Dentofac Orthop 2004;126(3):278–83.
8. Heravi F, Shafaee H, Forouzanfar A, Zarch SHH, Merati M. Forced eruption of palatally impacted canines using bracket-head miniscrews. J Clin Orthod 2014;48(9):576–80.
9. Zadeh HH. Minimally invasive treatment of maxillary anterior gingival recession defects by vestibular incision subperiosteal tunnel access and platelet-derived growth factor BB. Int J Periodontics Restorative Dent 2011;31(6):653–60.
10. Su CW, Chang CH, Roberts WE. Management of an impacted maxillary canine with the vertical incision subperiosteal tunnel (VISTA) technique. J Digit Orthod 2018;50:52–71.
11. Su CW, Hsu YL, Chang CH, Roberts WE. Soft tissue considerations for the management of impactions. Int J Orthod Implant 2011;24(50–59).
12. Su CW, Chang CH, Roberts WE. Soft tissue considerations for the management of impactions. Int J Orthod Implant 2013;31:100–9.
13. Chen CK, Chang CH, Roberts WE. Class III with multiple gingival recession: Vestibular incision subperiosteal tunnel access (VISTA) and platelet-derived growth factor BB. Int J Orthod Implant 2014;35:22–36.

14. Lin A, Chang CH, Roberts WE. VISTA and 3D OBS Lever-arm to recover a labially-impacted canine: Differential biomechanics to control root resorption. J Digit Orthod 2019;54:28–48.

15. Shapira Y, Kuftinec MM. Tooth transpositions: A review of the literature and treatment considerations. Angle Orthod 1989;59(4):271–6.

16. Tseng YC, Chang HP CT. Canine transposition. Kaohsiung J Med Sci 2005;21:441–447.

17. Liu PH, LaiEH YH, JZ C. Orthodontic treatment of a complete transposed impacted maxillary canine. J Dent Sci 2015;10:102e108.

18. Su CW, Chang CH, Roberts WE. Highly positioned and transalveolar impacted maxillary canine. Int J Orthod Implant 2011;24:14–26.

19. Peng WL, Chang CH, Roberts WE. Early treatment of anterior crossbite combined with bilateral maxillary labially impacted canines. Int J Orthod Implant 2016;44:46–60.

20. Hsu YL, Chang CH, Roberts WE. Early intervention for multiple impacted teeth: More comprehensive clinical assessment with the iSAS method. News Trends Orthod 2010;20:32–47.

21. Velvart P, Ebner-Zimmermann U, Ebner JP. Comparison of papilla healing following sulcular full-thickness flap and papilla base flap in endodontic surgery. Int Endod J 2003;36(10):653–9.

Discrepancy Index Worksheet

TOTAL D.I. SCORE **59**

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 = **4**

OVERBITE

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

Total = **5**

ANTERIOR OPEN BITE

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

Total = **0**

LATERAL OPEN BITE

2 pts. per mm. Per tooth

Total = **0**

CROWDING (only one arch)

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

Total = **0**

OCCLUSION

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

Total = **6**

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = **0**

BUCCAL POSTERIOR X-BITE

2 pts. Per tooth Total = **0**

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

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

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

SN-MP

≥ 38° = 2 pts.

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

≤ 26° = 1 pt.

Each degree < 26° **11** x 1 pt. = **11**

1 to MP ≥ 99° = 1 pt.

Each degree > 99° **17** x 1 pt. = **17**

Total = **30**

OTHER (See Instructions)

Supernumerary teeth	_____	x 1 pt.	=
Ankylosis of perm. Teeth	_____	x 2 pts.	=
Anomalous morphology	_____	x 2 pts.	=
Impaction (except 3rd molars)	**2**	x 2 pts.	= **4**
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)	**1**	x 2 pts.	= **2**
Spacing (Mx cent. diastema ≥2mm)		@ 2 pts.	= **2**
Tooth transposition	_____	x 2 pts.	=
Skeletal asymmetry (nonsurgical tx)		@ 3 pts.	=
Addl. treatment complexities	**3**	x 2 pts.	= **6**

Identify: One highly incomplete transverse impaction, one complete transposed impaction

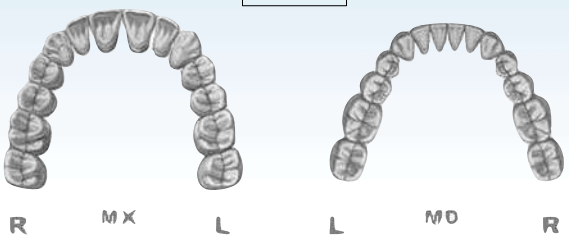
Total = **2**

Cast-Radiograph Evaluation

Total Score: 26

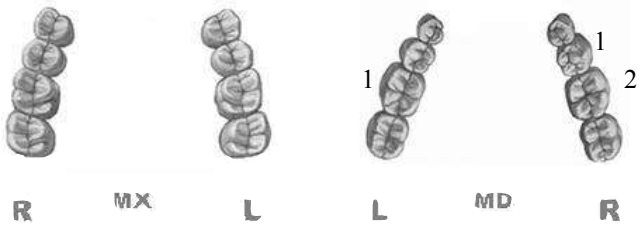
Alignment/Rotations

0



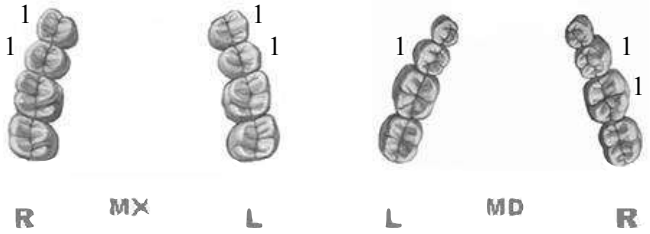
Marginal Ridges

4



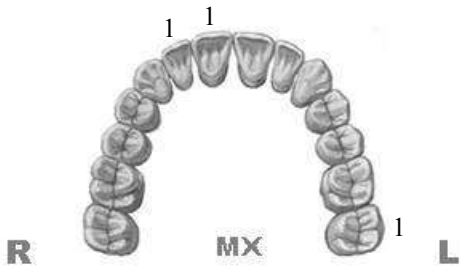
Buccolingual Inclination

7



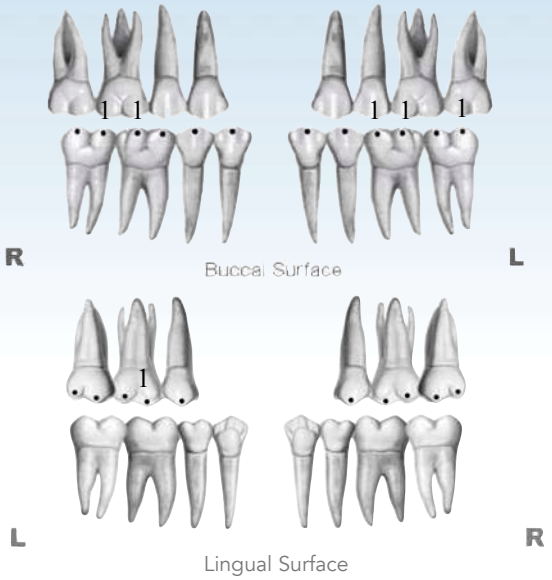
Overjet

3



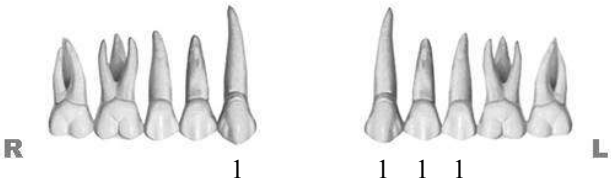
Occlusal Contacts

6



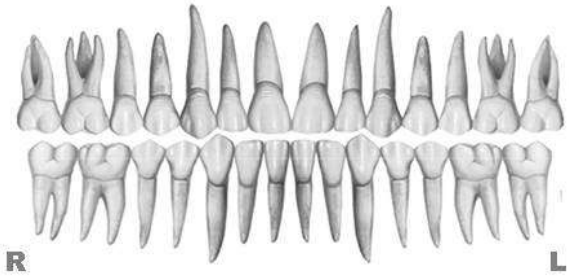
Occlusal Relationships

4



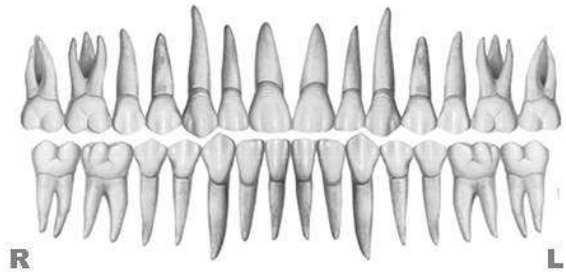
Interproximal Contacts

0



Root Angulation

0



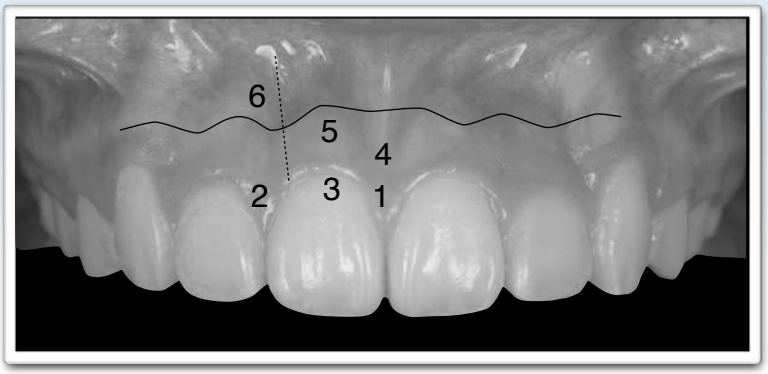
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score = 4

1. Pink Esthetic Score

Total = 0

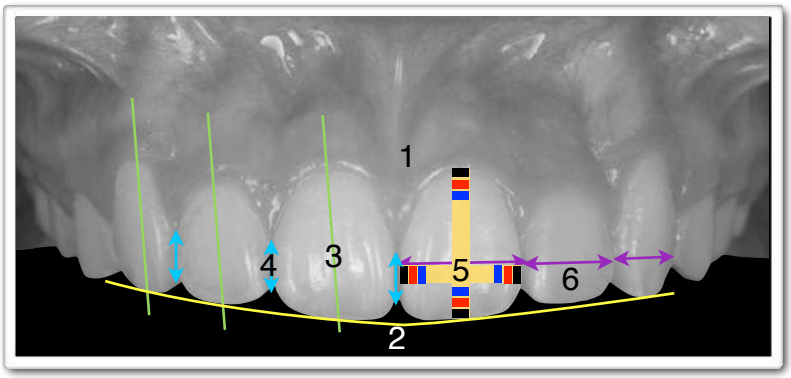


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

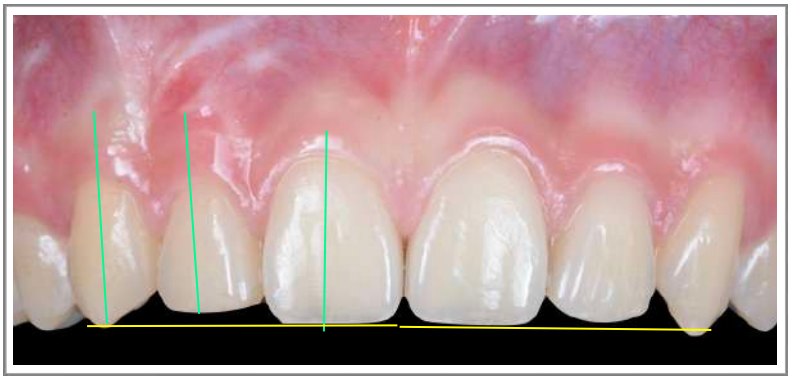
1. M & D Papillae	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	(0)	1	2
4. Level of Gingival Margin	(0)	1	2
5. Root Convexity (Torque)	(0)	1	2
6. Scar Formation	(0)	1	2

2. White Esthetic Score (for Micro-esthetic)

Total = 4



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

2024-2025 第十六年度

貝多芬 矯正精修班

時間：週二上午 09:00-12:00

地點：金牛頓教育中心（新竹市建中一路 25 號 2 樓）

上課日期：

2024　4/16、5/21、6/18、7/9、8/13、9/10、10/22、11/5、12/10

2025　1/14、2/18

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

全新的第十五年度 2024-25 貝多芬精修班，是由國際知名講師張慧男醫師主持，並偕同貝多芬牙醫團隊住院醫師群共同主講。

每月一次的課程之中，包含了：

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

2024-25 貝多芬精修班內容豐富精彩，讓您經由每個月一次的課程，在面對各式的臨床案例時，更能游刃有餘、得心應手。

學習目的：

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

報名專線：03-5735676 #218 陳小姐

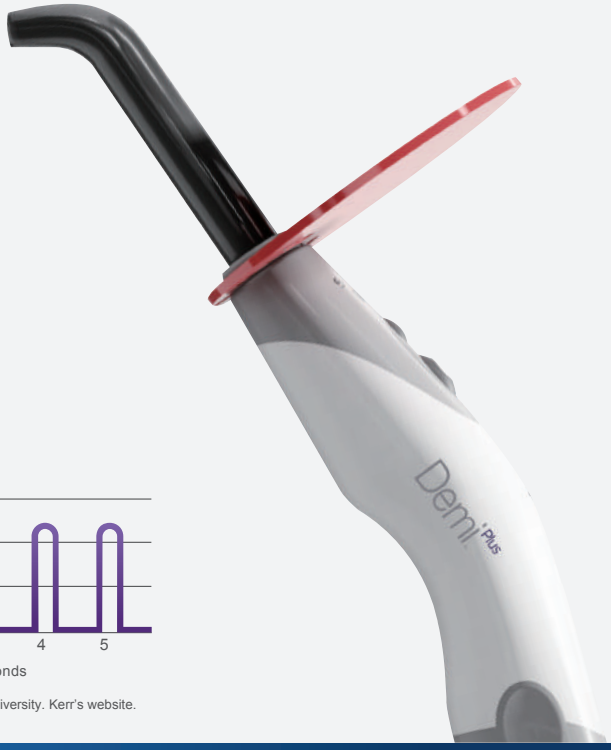
Kerr RESTORATIVES

CURING LIGHT

Demi Plus 120V Curing Light

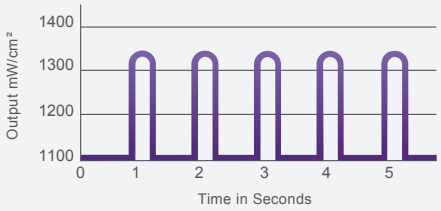
LED Light Curing System

- True 5-second cure for A3 or lighter shades.
- Extended Light Guide +28% additional reach.
- Lightweight, ergonomic design.
- Advanced Battery Design.
- Fan-Free for improved Cooling System.



PLS Technology with 5-Second Exposure

Demi Plus employs the power of Periodic Level Shifting, or PLS technology, Shifting output intensity from 1100 mW/cm2 to a peak of 1330 mW/cm2, curing cycle with a wavelength of 450 nm to 470 nm.



Source: Nova Southeastern University. Kerr's website.

Product Info

定價NT$65,000/支
買1送1

CEMENT

NX3 Dual-Cure Syringe

Universal Adhesive Resin Cement

定價NT$3,800/5g/支
買3送1 | 買10送6

NX3 Light-Cure Syringe

Universal Adhesive Resin Cement

定價NT$3,200/1.8g/支
買3送1 | 買10送6

Maxcem Elite™ Refill

Self-Etch, Self-Adhesive,
Universal Resin Cement

定價NT$6,100/10g/2支/盒
買3送1 | 買10送6

Maxcem Elite™ Chroma Refill

Self-Etch, Self-Adhesive,
Universal Resin Cement with
Cleanup Indicator

定價NT$6,100/10g/2支/盒
買3送1 | 買10送6

Silane Primer Refill

Indirect Composite Bonding Agent,
application to metal free surface
before bonding

定價NT$3,300/5ml/瓶
買3送1 | 買10送6

TEMPORARY CEMENT

Temp-Bond™ Tube / NE

Temporary Dental Cement

定價NT$2,000/盒
買2送2

YONG CHIEH 湧 傑

促銷期限 2024/3/26-9/25 客服專線：北區 (02)2778-8315・中區 (04)2305-8915・南區 (07)226-0030

線上購物　即時客服

2025 一年一度 Damon Master Program


+


全新改版的 2025 年貝多芬高效 Damon 矯正大師系列課程，是由國際知名講師張慧男醫師親自規劃及授課，課程特色強調由臨床病例帶動診斷、分析、治療計畫擬定與執行技巧，本年度亦特別加入最新的**數位矯正與隱形牙套**的內容，並邀請了貝多芬牙科集團各院院長演講特別矯正專題。

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

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

Module 1 - 3/13

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

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

Module 2 - 4/17

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 - 5/1

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 - 5/15

1. Excellent finishing
2. Retention & relapse

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

Module 5 - 5/22

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 - 6/5

1. Class III correction
2. Class II correction

Topic: Early orthodontic treatment（曾淑萍醫師）

Module 7 - 6/19

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

Topic: Modified VISTA（蘇筌瑋醫師）

Module 8 - 7/3

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

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

Module 9 - 7/17

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 - 7/31

1. Minor surgeries in orthodontics
2. Digital orthodontics

Topic: Modified 2X4 appliance in ortho treatment（李亮賢醫師）

Module 11 - 8/14

1. Aligner design
2. Comprehensive aligner treatment
3. Aligner & its challenges

Topic: Pre-aligner treatment（林詩詠醫師）

▲ **Special lecture: 1:30-3:00 pm**

時間：週四全天（9:20 am - 5:00 pm）

地點：金牛頓藝術科技（新竹市建中一路 25 號 2 樓）

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。

報名專線 湧傑 Yong Chieh

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

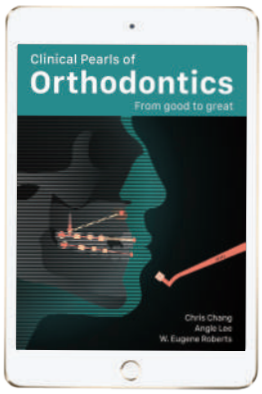
LINE@ 官方帳號

Facebook 官方帳號

e-Books

Learn it your favorite way!

Best of all



+ BUY BOOK

This book requires iBooks 3.0 or later and iOS 5.0 or later.

The World's Best e-Textbook

Beethoven Dental Encyclopedia

e-Books collection

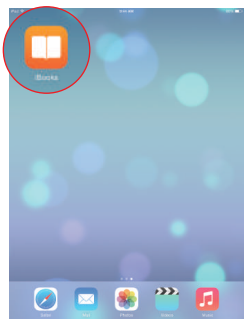
Beethoven Orthodontic and Implant Group has been publishing the International Journal of Orthodontics and Implantology since 2007. This Journal features excellently finished case reports evaluated by objective grading systems. **The Orthodontics and Implant Dentistry eBook series** is a special selection of exciting cases with interactive functions and multimedia resource. Once opening this book, your understanding of dentistry will never be the same!

Now available in iBooks Store in 51 countries:

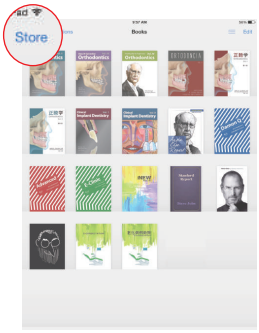
Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Bulgaria, Canada, Chile, Colombia, Costa Rica, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, El Salvador, Estonia, Finland, France, Germany, Greece, Guatemala, Honduras, Hungary, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Mexico, Netherlands, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States, and Venezuela.

Get it on iBooks

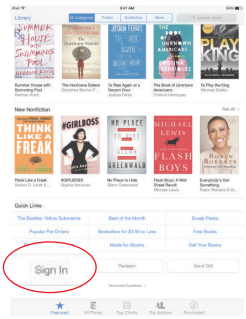
Step-by-step Instructions



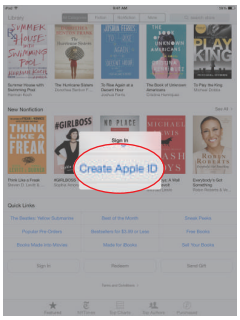
1. Launch "iBooks" app on your iPad.



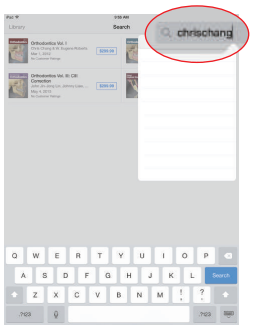
2. Click "Store."



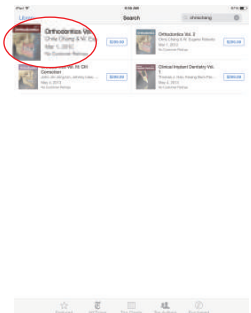
3. "Sign in" with your Apple ID.



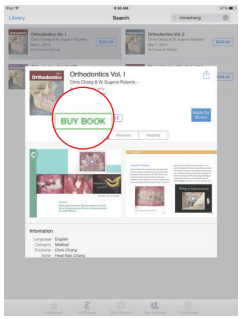
4. "Create Apple ID" if you don't have one.



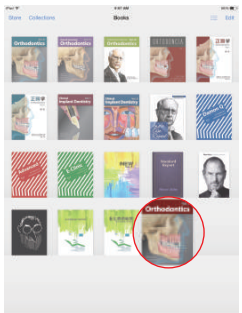
5. Search for "chrischang."



6. Click the book's icon.



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



8. Once downloaded, click the book's icon to launch the e-book and enjoy.

If you are interested in our paid video or medical products, contact **inewton.dental@gmail.com** for more information.

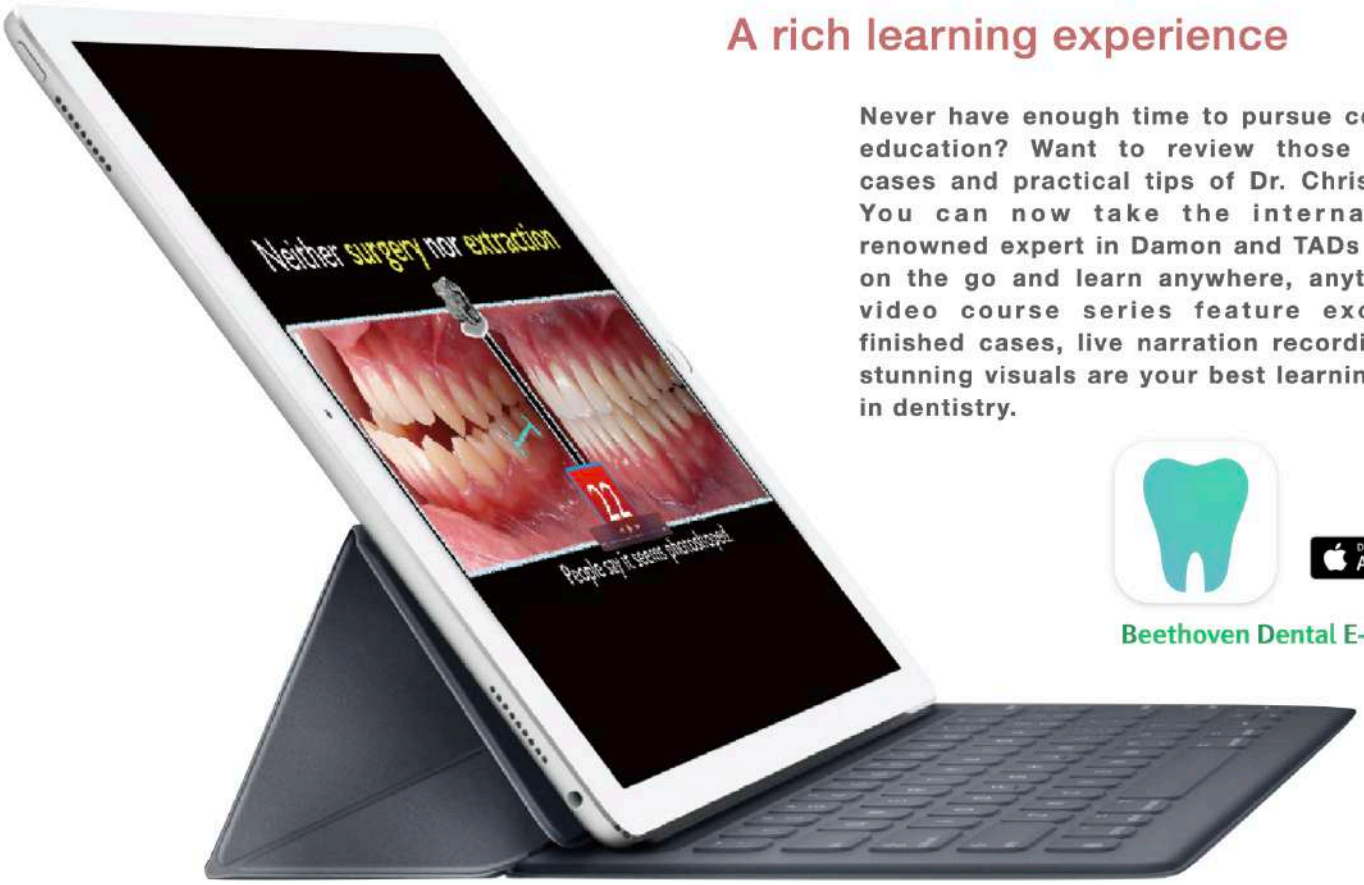
+886-3-573-5676

orthobonescrew.com

iNewton

e-Courses

A rich learning experience



Never have enough time to pursue continuing education? Want to review those amazing cases and practical tips of Dr. Chris Chang? You can now take the internationally renowned expert in Damon and TADs with you on the go and learn anywhere, anytime. The video course series feature excellently finished cases, live narration recordings, and stunning visuals are your best learning source in dentistry.

Download on the App Store

Beethoven Dental E-Learning

Series Each video course is valid for 3 years

narrated — Damon Master — **Damon Master**

narrated — E-Lecture

narrated — OBS (TAD)

non-narrated — Finishing (14 seasons)

non-narrated — Implant Forum (9 seasons)

non-narrated — Assistant

non-narrated — E-Ortho

non-narrated — E-Implant

non-narrated — E-Pedo

Note:

1. Most video courses are available in both English and Chinese and are sold separately.
2. Damon Master and OBS (TAD) are renewed annually and each renewal is to be purchased separately with a 50% discount.

iNewton +886-3-573-5676 orthobonescrew.com inewton.dental@gmail.com

Elements Gutta Percha Cartridge

23 Gauge Medium Body
25 Gauge Light Body

定價NT$5,100/盒 | 買3送1 | 買10送6

Buchanan Plugger

F .06 / FM .08 / M .10 / ML .12

定價NT$4,800/支 | 買3送1 | 買10送6

Buchanan Hand Plugger

Size #0, #1, #2

定價NT$5,100/支 | 買3送1 | 買10送6

Touch 'n Heat™ 5004

Endodontic Heat Source

定價NT$45,100/台 | 單件7折

Touch 'n Heat™ 5004 Heat Carriers

Standard Anterior / Standard Posterior
Narrow Anterior / Narrow Posterior

定價NT$4,600/支 | 買3送1 | 買10送6

Autofit Feathered Tip Gutta Percha (Non-Standard)

pkg of 100
FF / MF / F / FM / M / ML / L

定價NT$950/盒 | 買3送1 | 買10送6

Pulp Canal Sealer™ EWT

Zinc Oxide Eugenol Root Canal Sealer

定價NT$7,100/盒 | 買3送1 | 買10送6

Sealapex™

Polymeric Calcium Hydroxide
Root Canal Sealer

定價NT$2,500/盒 | 買3送1 | 買10送6

Tubli-Seal™

Zinc Oxide Eugenol Root Canal Sealer

定價NT$2,500/盒 | 買3送1 | 買10送6

線上購物 即時客服

EDGEENDO®

SHAPE

Performance.
Price.
Technology

"Let Us Help You Do Great Root Canals."

— Charles J. Goodis, DDS
Endodontist, Albuquerque, NM, USA
Founder & Owner, EdgeEndo®

UNMATCHED FLEXIBILITY


INCREDIBLE STRENGTH

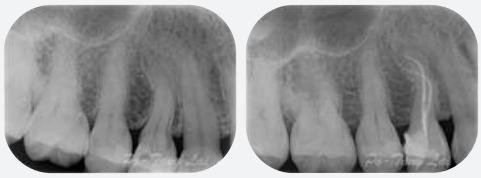

NO BOUNCE BACK


COMPATIBLE

Nickel Titanium Rotary Files

1 EdgeTaper Platinum™
Heat-Treated FireWire™ NiTi / pkg of 6

2 EdgeFile® X7
Heat-Treated FireWire™ NiTi / pkg of 6


賴博堂醫師case圖
(使用產品:EdgeFile X7)

3 EdgeTaper™
Non-Heat Treated NiTi / pkg of 6

4 EdgeGlidePath™
Heat-Treated FireWire™ NiTi / pkg of 4

5 EdgeSequel Sapphire™
Heat-Treated FireWire™ NiTi / pkg of 4

6 EdgeOne Fire™ GlidePath
Heat-Treated FireWire™ NiTi / pkg of 3

7 EdgeOne Fire™
Heat-Treated FireWire™ NiTi / pkg of 3

8 EdgeFile® XR
Non-Heat Treated NiTi / pkg of 4

定價NT$2,400/盒 | 特價NT$1,350/盒 | 20盒以上NT$1,250/盒 | 50盒以上NT$1,150/盒

Chapter 10A.

Regenerate the Land and Regenerate Myself

It is a well-known fact that resources are becoming increasingly limited; therefore, to obtain them sometimes relies on a favorable stroke of serendipity. Towards the end of April, 2023, one of the Chang family's neighbors informed them that he was planning to move to Taipei and was looking to sell his property. This presented Dr. Chang with a great opportunity, which he just had to seize. And seize it he did! The very next day, Dr. Chang visited the neighbor to make him an offer. Without much further ado, the transaction was successfully completed, and the Changs had secured their third property in the neighborhood.

What really captured Dr. Chang's heart, however, was not having one more house in his portfolio. Instead, what sealed the deal was that the property is encompassed by a 300-ping backyard (around 1,000 m^2), which, to Dr. Chang's discerning eye, looked like a diamond in the rough. The previous owner had obviously not spent as much time in the rough of many a golf course as Dr. Chang has and had therefore never really utilized it. However, their pet dog was well-known in the community for having such a large, luxurious, and personal roaming area to explore and to answer the call of nature.

In this chapter and the following four, we will be taking readers on Dr. Chang's journey of transforming the "practically unused canine convenience backyard" into his dream garden. As a "prologue" to this subseries, this current chapter aims to paint a rough picture of the "epilogue."

From the front yard, a curved trail next to the house leads to the Changs' hideaway, allowing easy access for the family but simultaneously reserving their privacy (Fig. 1). Welcoming visitors to the garden, running along two sides of the house to where they converge, is a cactus garden, the location of which basks in sufficient hours of glorious

Fig. 1: A curved trial (Dr. Chang's favorite type) leads to the Chang's hideaway, allowing easy access for the family but simultaneously reserving their privacy.

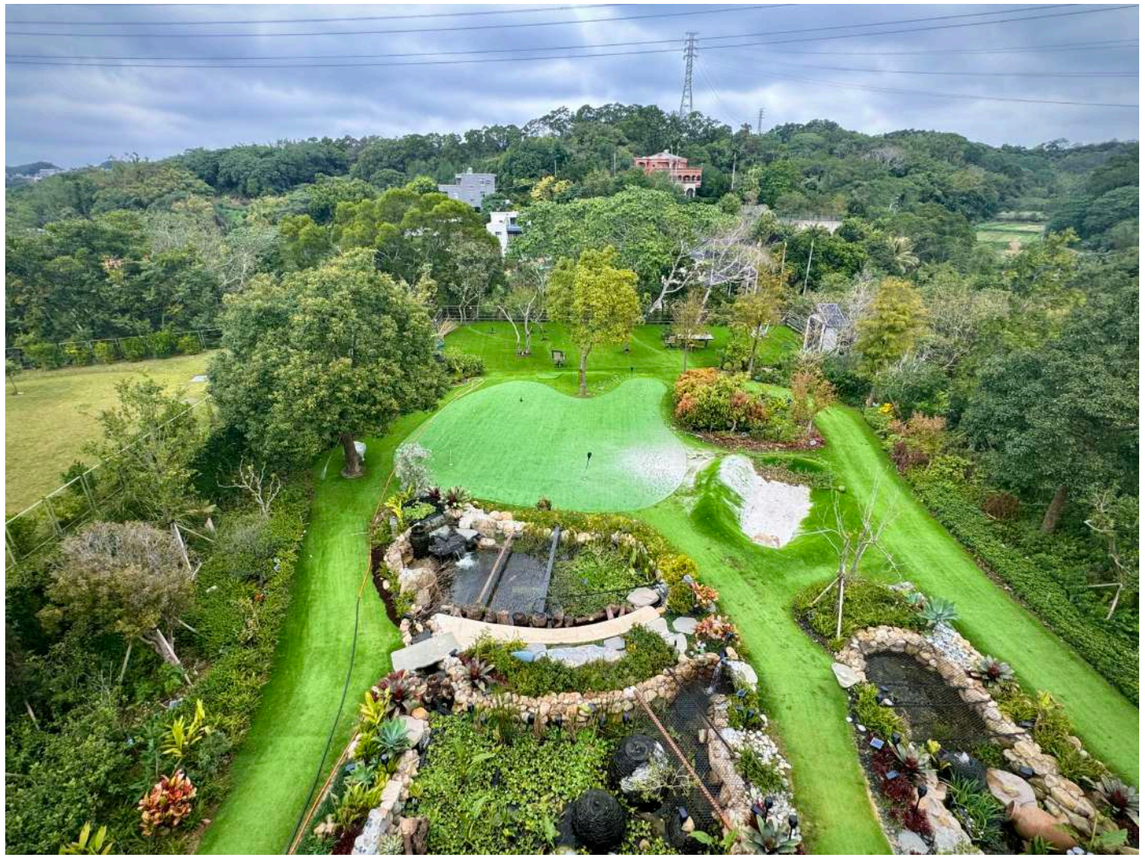


Fig. 2: The 300-ping backyard (white doted line in the upper picture), which was used no more than a pet dog's roaming land, is transformed by Dr. Chang into his family's dream hideaway, with golfing area and water ponds decorated with lush plants.

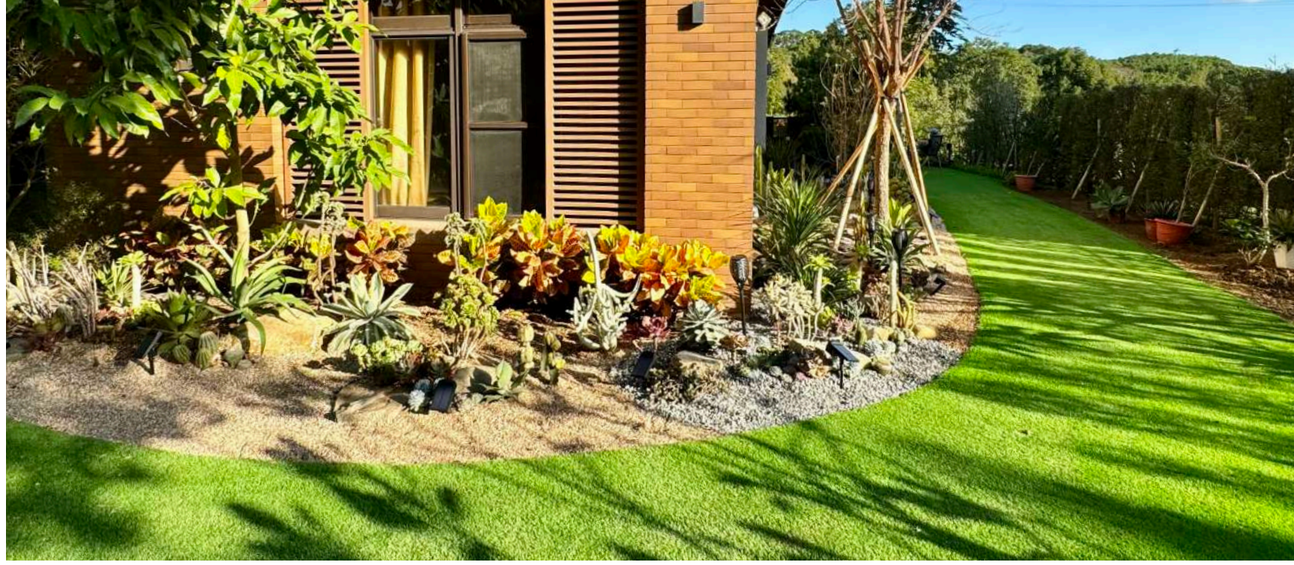


Fig. 3: Running along two sides of the house to where they converge is a cactus garden. The location enjoys sufficient sunlight, creating a perfect environment for these colorful yet low-maintenance plants.

sunlight, creating a perfect environment for these colorful yet low-maintenance plants (Fig. 3).

As we stroll on, spreading out in front of us is the main focus of attention of the garden - water ponds with lush aquatic plants on both sides of the path, a golf putting green and a bunker that mimic the terrain of a golf course, as well as flourishing trees and bushes that surround the garden area (Fig. 4), not only ensuring supplementary privacy and cool shaded retreats, but also enticing wild birds (the Changs' favorite visitors) to perch or even inhabit.

Upon seeing the garden, one might admire Dr. Chang for enjoying the acquaintance of an exceptionally talented landscape designer. A pleasing smile would mysteriously light up Dr. Chang's face as he replies: "It's actually me, and a little bit of help from my daughters" (Fig. 5).

To Dr. Chang, designs of any kind cannot merely be theories on paper. They have had frustrating experiences with hired professional designers who, although not necessary incompetent, were just unwilling to step out of their conventional ways and to fathom out the possibilities of a

client's imagination running wild. Henceforth, Dr. Chang prefers communicating directly with the construction team, whom he quite rightly praises as the true experts of their craft.

This holds true in the field of orthodontics. While research and theories are important for the continued evolution of the profession, the profession itself would have a hard time surviving if practitioners were not creative, flexible and imaginative with the knowledge and tools to solve the problems at hand.

Starting from the next chapter, we will be diving into the details of each compartment within Dr. Chang's garden. Apart from an in-depth analysis of the design, purpose and construction, there certainly will also be more of Dr. Chang's life philosophies waiting to be unearthed.

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

Fig. 4: The focus of attention of the garden is two water ponds and a golfing area that mimics the terrain on a golf course. Flourishing trees, bushes, and aquatic plants are grown here and there, inviting wild lives to come and join the fun that is provided by the land.

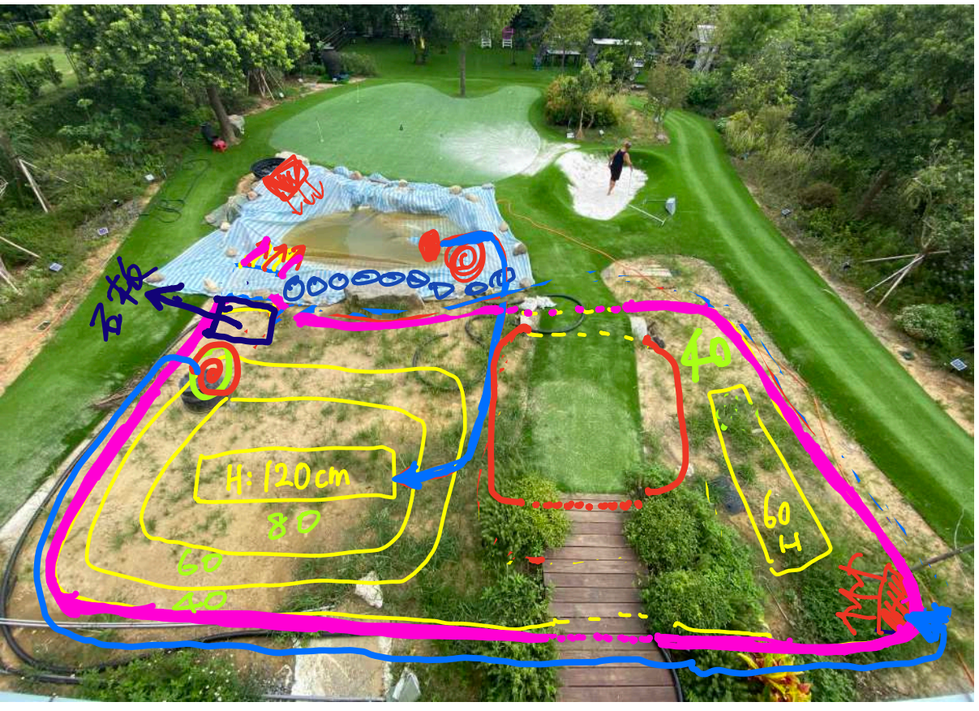


Fig. 5: After previous frustrating experiences with hired professional designers, Dr. Chang prefers to communicate directly with the construction team. Every detail of the dream garden in front of us is based on this blueprint that he sketched out in 5 minutes.

iNewton

NEW DESIGN

Stainless Steel Mirror 2.0

全新**不鏽鋼口鏡**曲線設計**更舒適**亦方便握持，一支即可拍攝全口照片，提供照相最廣可視範圍。

專利設計

鏡面改良

咬合面拍攝

側面拍攝

成像清晰

加倍舒適

無鍍膜的**不鏽鋼拋光鏡面**，可增加影像清晰度、色澤穩定度。**多道修邊工序**，可適應不同大小的口腔環境，增加患者口腔舒適感。

圓滑邊角

新品上市特惠價，詳情請洽金牛頓

這個鏡子最厲害的是頰側鏡的長度，拍頰側面不會因為鏡面長度不夠，切到前牙的影像（坊間其他這種一邊頰側鏡一邊咬合鏡的拍照鏡大多都有這個問題）。

桃園 宋醫師

它牌口鏡

不鏽鋼口鏡2.0

orthobonescrew.com　03-5735676　inewton.dental@gmail.com

"From this book we can gain a detailed understanding of how to utilize this ABO system for case review and these challenging clinical cases from start to finish."

Dr. John JJ Lin, Taipei, Taiwan

"I'm very excited about it. I hope I can contribute to this e-book in someway."

Dr. Tom Pitts, Reno, Nevadav, USA

"A great idea! The future of textbooks will go this way."

Dr. Javier Prieto, Segovia, Spain

"No other book has orthodontic information with the latest techniques in treatment that can be seen in 3D format using iBooks Author. It's by far the best ever."

Dr. Don Drake, South Dakota, USA

"Chris Chang's genius and inspiration challenges all of us in the profession to strive for excellence, as we see him routinely achieve the impossible."

Dr. Ron Bellohusen, New York, USA

"This method of learning is quantum leap forward. My students at Oklahoma University will benefit greatly from Chris Chang's genius. "

Dr. Mike Steffen, Oklahoma, USA

"Dr. Chris Chang's innovation eBook is at the cutting edge of Orthodontic Technology... very exciting! "

Dr. Doraida Abramowitz, Florida, USA

"Dr. Chang's technique is absolutely amazing and cutting-edge. Anybody who wants to be a top-tiered orthodontist MUST incorporate Dr. Chris Chang's technique into his/her practice."

Dr. Robert S Chen, California, USA

"Dr. Chris Chang's first interactive digital textbook is ground breaking and truly brilliant! "

Dr. John Freeman, California, USA

"Tremendous educational innovation by a great orthodontist, teacher and friend."

Dr. Keyes Townsend Jr, Colorado, USA

"I am awed by your brilliance in simplifying a complex problem."

Dr. Jerry Watanabe, California, USA

"Just brilliant, amazing! Thank you for the contribution."

Dr. Errol Yim, Hawaii, USA

"Beyond incredible! A more effective way of learning."

Dr. James Morrish Jr, Florida, USA

New Release!

In May, Dr. Chang was interviewed by the AAO reflecting on his 28 years of experience as a member of the big family. It is a place where orthodontists learn from each other regardless of where one is from, with the goal of collective advancement of the profession.