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The ideal inclination of IZC screw is in an uprighting position with the screw head away from soft tissue. It can be inserted in attached gingiva or movable mucosa.

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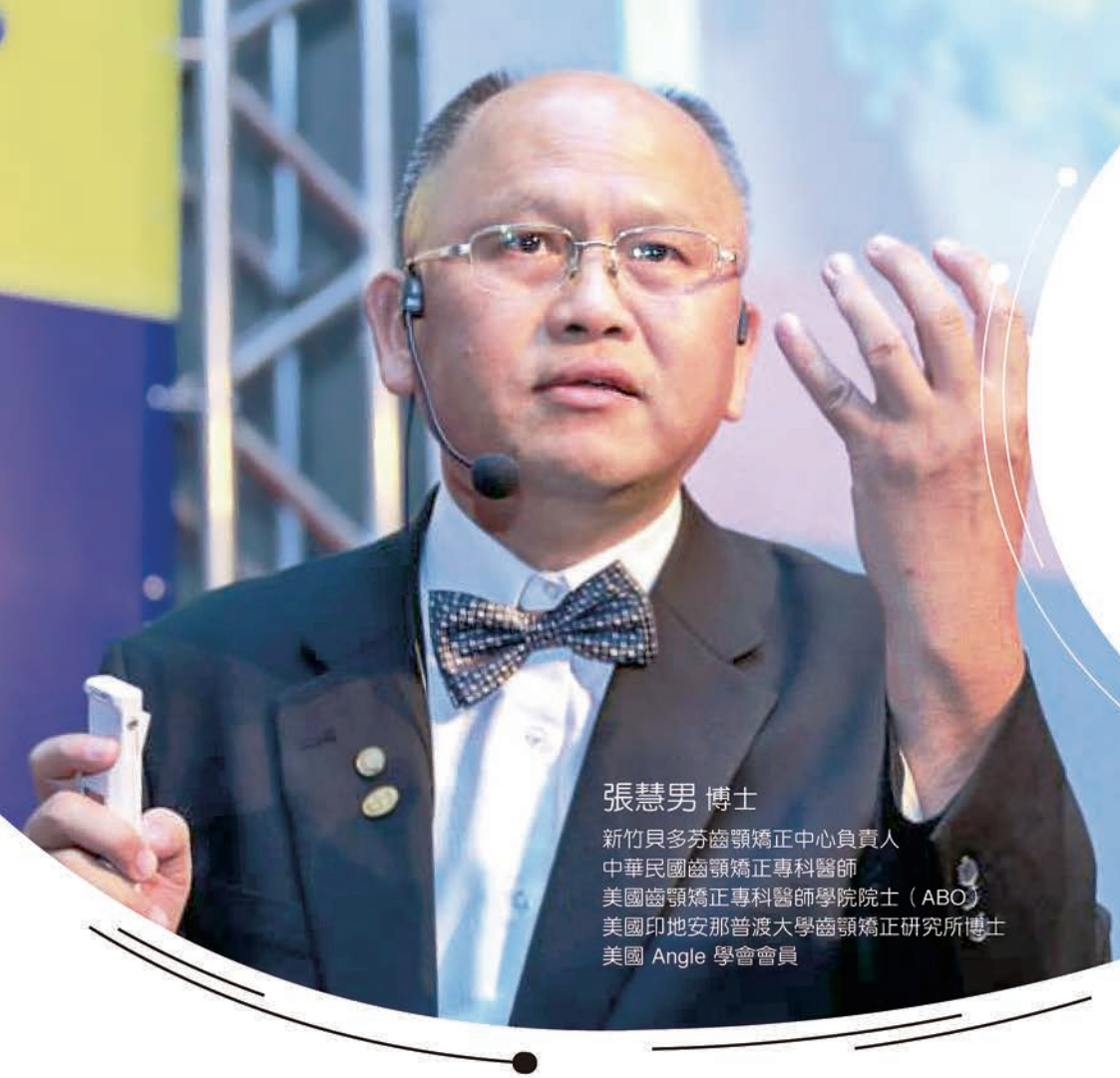

2018-19
熱愛學矯正

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。

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新竹貝多芬齒顎矯正中心負責人
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Damon Master
(Thu) 9:00-5:00 中文授課

The Beethoven Damon Master Program, created by Dr. Chris Chang, is a two-year clinical program. Its hands-on orientation features case study-based diagnosis, analysis, treatment planning andresult 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.

Year 1 2018
Module 1 - 5/17/18' Module 4 - 8/2
Module 2 - 6/21 Module 5 - 9/27
Module 3 - 7/5 Module 6 - 6/27.29.30（擇一）

Year 2 2018-19
Module 1 - 10/18 Module 4 - 1/3/19'
Module 2 - 11/22 Module 5 - 2/14
Module 3 - 12/20

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 turning excellent finishing into attainable goals.

Finishing X
Module 1 - 8/14/18' Module 6 - 1/8/19'
Module 2 - 9/4 Module 7 - 3/19
Module 3 - 10/16 Module 8 - 4/16
Module 4 - 11/13 Module 9 - 5/14
Module 5 - 12/11 Module 10 - 6/25
Module 11 - 7/23

Damon, OBS & VISTA International Workshop
English Class

The workshop provides a 2.5 day, advanced hands-on program to experienced Damon users. The program includes world-class lectures, model and surgical hands-on workshops and clinical observation on patient care and clinic management.

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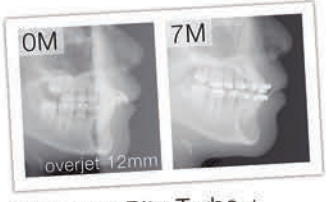
2018
Class 1 - 5/22-25 Class 2 - 12/04-07
Insignia workshop - 9/9-10

2019
Class 1 - 5/21-24 Class 2 - 12/03-06

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

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Digitally doing your patients justice

I believe that most practising Orthodontists have already become acquainted with the new possibilities of digital treatments and a lot are already using them. This direction is unstoppable. The only uncertain thing is how long it will last for, until a new and even better treatment modality appears.

As Orthodontics changes, so too should the way it is taught change. We are now able to see how the treatment will end before we even start, using computer simulation. If we can talk to and discuss with experienced practitioners, then, once our plan has been established the appliance will execute the digital plan.

Even before treating a case, it is possible to rehearse using computer simulation without having to move any actual teeth. Therefore, you will immediately have got the experience of about 100 similar cases, without having done a single one!! Previously this would have taken you up to 5 years of working, now you can do it in about 5 – 10 hours!!

So, who can help you? Your best friend, the internet!! If you have 50 Orthodontists as online friends, then you can use the internet to have 50 mentors, who can advise and discuss the ways to treat a case, giving you a remarkable resource to choose the most suitable treatment plan according to the patients' best interests and preferences. This is really doing the patient justice!!

Does this mean that the internet will one day replace graduate programs? I doubt it, but only time will tell. Learn from the internet, which is so up-to-date and is continually being updated on an almost daily basis. I'm sure that if our founding father Dr. Angle were alive today, he would have his own YouTube channel and would have been on the cutting edge of digital orthodontics and its pedagogy.

Please move with these digital times and join us marching on the digital path to glory.

Chris Chang DDS, PhD, Publisher of JDO.

Class II Malocclusion with Crowding, Missing LR2 and Ectopic Eruption of UR3 is Treated Conservatively with Maxillary Retraction

Abstract

***Introduction**: A 22-year-old female presented for orthodontic consultation to evaluate a chief complaint: high upper right canine (UR3).*

***Diagnosis**: Clinical and radiographic examination revealed a convex facial profile (G-Sn-Pg' 18°), slightly protrusive lips (E-line: UL 1mm, LL 3mm), mentalis strain, upper dental midline deviation to the right, congenitally missing LR2, Class II malocclusion, ectopic labial eruption of the UR3, maxillary crowding 8-9mm, a relatively low mandibular plane angle (SN-MP 30, FMA 20). The Discrepancy Index was 27 points.*

***Treatment**: All permanent teeth were erupted including third molars. Following extraction of all four third molars, a passive fixed self-ligating (PSL) appliance was installed. At the same appointment, infrazygomatic crest (IZC) bone screws were inserted to provide posterior skeletal anchorage to retract both arches. Additional space was achieved by slightly expanding both arches, and interproximal reduction (IPR) as needed. Initial alignment was achieved via a 0.014-in and 0.014x0.025-in copper nickel titanium (CuNiTi) archwire. As the maxillary buccal segments were retracted, the bite was opened with an anterior bite turbo. Maxillary buccal segments were differentially retracted with elastomeric chains anchored with the IZC bone screws. Active treatment time was 23 months.*

***Outcomes**: The upper dental midline was about 2mm right of the facial midline. The lower arch was finished in Class I on the left side and Class III on the right to compensate for the missing LR2. Vertical dimension of occlusion (VDO) and lower facial height (LFH) were increased about 2mm, resulting in 1° change in the mandibular plane angle. Despite the missing LR2, a good compromised occlusion was achieved as evidenced by a Cast-Radiograph Evaluation (CRE) of 21 and Pink & White Esthetic Score of 6 points. The maxillary incisors were retracted ~3mm to reduce lip protrusion and achieve lip competence. The decreased lip protrusion helped mask the increase in LFH, so no change in facial convexity (18°) was evident.*

***Conclusion**: This challenging malocclusion with an ectopic erupted canine (DI=27), was treated conservatively in 23 months to a good dental alignment (CRE=21). PSL brackets, IZC bone screw anchorage and Class III elastics were effective mechanics for alignment and retraction of the maxillary arch to relieve crowding and provide space to align an ectopically erupted UR3. (J Digital Orthod 2018;50:4-20)*

Key words:
Congenitally missing, lower lateral incisor, ectopic eruption, maxillary canine, passive self-ligating appliance, infrazygomatic bone screw, extra-alveolar anchorage, anterior bite turbo, arch retraction, facial convexity

History and Etiology

A 22-year-old female presented for orthodontic consultation with concerns about dental crowding (*high, blocked-out UR3*) and protrusive lips. Facial evaluation showed a convex profile (*G-Sn-Pg' 18°*), protrusive lips (*1mm/3mm to the E-line*), and slight mentalis strain when closing the lips. The full smile photograph (*Fig. 1*) revealed that the upper and lower dental midline were shifted 4-5mm to the right relative to the facial midline. The upper right canine (*UR3*) was ectopically erupted to the labial, and the lower right lateral incisor

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Dr. John Jin-Jong Lin,
Examiner of JDO, Director of Jin-Jong Lin Orthodontic Clinic (Center)
Dr. W. Eugene Roberts,
Editor-in-chief, Journal of Digital Orthodontics (Right)

(*LR2*) was congenitally missing. Molar and canine relationships were asymmetric Class II bilaterally (*Fig. 2*). The panoramic radiograph (*Fig. 3*) documents that all 31 permanent teeth are erupted, and the cephalometric radiograph (*Fig. 4*) showed increased axial inclination of the upper and lower incisors, as well as protrusive, incompetent lips. Figure 5 is a frontal radiograph of the head showing that the upper and lower incisors are deviated to the right ~5mm. Lateral cephalometric measurements are shown in Table 1.

Fig. 1: Pre-treatment facial and intraoral photographs

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

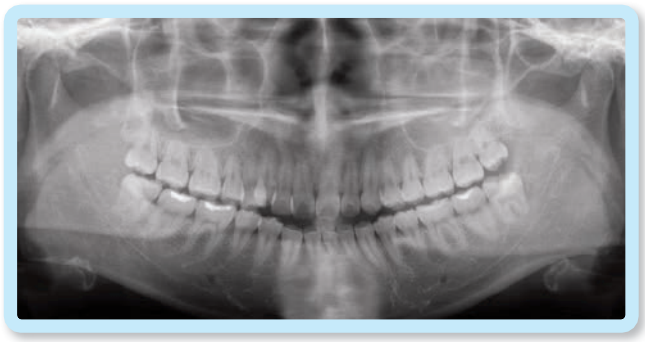


Fig. 3: Pre-treatment panoramic radiograph

Fig. 4: Pre-treatment lateral cephalometric radiograph

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA° (82°)	82°	82°	0°
SNB° (80°)	79°	78°	1°
ANB° (2°)	3°	4°	1°
SN-MP° (32°)	30°	31°	1°
FMA° (25°)	20°	21°	1°
DENTAL ANALYSIS			
U1 To NA mm (4 mm)	9 mm	6 mm	3 mm
U1 To SN° (104°)	113°	106°	7°
L1 To NB mm (4 mm)	11mm	9 mm	2 mm
L1 To MP° (90°)	111°	107°	4°
FACIAL ANALYSIS			
E-LINE UL (2-3 mm)	1 mm	0 mm	1 mm
E-LINE LL (1-2 mm)	3 mm	3 mm	0 mm
%FH: Na-ANS-Gn (53%)	54%	56%	2%
Convexity: G-Sn-Pg' (13°)	18°	18°	0°

Table 1: Cephalometric summary

Diagnosis

Facial:

- Profile: *Convex (G-Sn-Pg' 18°), deceased mandibular plane angle (FMA 20°)*
- Frontal: *Brachyfacial form*
- Nasolabial Angle: *Within normal limits (WNL)*
- Protrusive Lips: *1mm/3mm to the E-line*
- Lip Competence: *Hypermentalis strain with lips closed*

Skeletal:

- Sagittal Relationships: *SNA 82°, SNB 79°, ANB 3°*
- Low mandibular plane angle: *SN-MP 30°, FMA 20°*

- Facial asymmetry: *Chin point is deviated to the right ~5mm (Fig. 5).*

Dental:

- Midlines: *5mm/4mm upper and lower to facial*
- Missing Teeth: *LR2*
- Sagittal: *Angle Class II molar and cuspid bilaterally*
- Overjet: *4mm*
- Overbite: *0.5mm (5%)*
- Crowding: *10mm in the upper arch and 0mm in the lower arch.*
- Third molars: *4 third molars were fully erupted, but posterior space was inadequate.*
- Arch form: *Tapered lower arch but more U-Shaped upper arch*

The American Board of Orthodontics (*ABO*) Discrepancy Index (*DI*)[1] was 27 points as shown in the worksheet at the end of this report.

Fig. 5:
Pre-treatment posterior-anterior (P-A) view radiograph of the head.

Treatment Objectives

1. Facial esthetics: *Retract relatively protrusive lips and establish lip competence.*
2. Level and align both arches
3. Correct overjet and overbite
4. Retract the lips and control the VDO to relieve mentalis strain
5. Dentition:
   - Extract all four third molars before orthodontic treatment.
   - Relieve upper arch crowding.
   - Align the upper midline as close to the facial midline as possible.
   - Optimize the intermaxillary occlusion and mandibular midline.
   - Achieve ideal overjet and overbite.

Treatment Alternatives

First Option: Establish symmetry by extracting three teeth (*UR4, UL4, LL2*), and substitute lower canines for lateral incisors. Correct upper and lower midlines and protrusive lips by differential retraction of anterior segments. Disadvantages for this treatment option are lack of a Class I relationship and substituted canines usually have more crown exposure compared to the adjacent central incisors.

Second Option: Asymmetric extraction of three teeth (*UR4, UL4, LL4*). Correct upper midline and lip protrusion by retracting the anterior maxillary segment. Disadvantages for this treatment option include more difficult mechanics for the lower dental midline and finish with an asymmetric dental alignment.

Third Option: Extract all four third molars, use infrazygomatic crest (*IZC*) bone screws and a passive self-ligating (*PSL*) appliance to retract the full dentition to optimize incisor alignment and the lateral lip profile. The disadvantages for this treatment are a compromised mandibular midline and asymmetric intermaxillary alignment.

At the consultation, all three options were presented to the patient, along with the pros and cons for each approach. She selected the third option.

Treatment Plan

- Extractions: *All four third molars*
- Full Fixed PSL Appliance: *Bypass the UR3 with the initial archwire.*
- Anterior Bite Turbo: *Open the bite to facilitate arch retraction.*
- IZC Bone Screws: *2x8mm SS screws bilaterally to retract the maxillary arch and make room for the UR3.*
- Intermaxillary Elastics: *Retract the mandibular arch to optimize overjet, overbite, interdigitation, midline correction, and arch coordination.*
- Interproximal Reduction: *Optimize intermaxillary tooth size, detail and finish.*
- Retention: *Upper and lower Hawley retainers full time for first 6 months after fixed appliances removal and nights only thereafter.*

Treatment Progress

A full fixed 0.22-in slot Damon Q® PSL appliance (*Ormco, Glendora, CA*) was utilized, and all brackets were standard torque. The same supplier provided all the arch wires and auxiliaries as specified in the Archwire Sequence Chart, at the end of this report. At the initiation of active treatment, arch wires were 0.013-in CuNiTi in both arches, and bilateral IZC bone screws were installed buccal to the interproximal area between the upper first and second molars (*Figs. 6 and 7*). Maxillary buccal segments were retracted with elastomeric chains from each IZC bone screw to the corresponding upper 2nd premolars (*U5*). Class III elastics (*Fox, 1/4-in 3.5-oz*) from the maxillary first molars to the lower canines retracted the lower arch to create overjet.

At two months (*2M*) into treatment (*Fig. 8*), arch wires were changed to 0.014x0.025-in CuNiTi. Both arches were retracted with elastomeric chains from the IZC bone screws to the UR4 and UL3. Class III elastics force was increased (*Kangaroo, 3/16-in 4.5-oz*). At four months (*4M*) into treatment (*Fig. 9*), the same mechanics were continued.

At eleven months (*11M*) (*Fig. 10*), UR3 was bonded and engaged on a 0.013-in CuNiTi archwire. The

Fig. 6:
At the start of comprehensive orthodontic treatment, the UR3 was not bonded. Upper arch retraction was initiated by applying a chain of elastics from each IZC BS to the corresponding upper 2nd premolar. Class III elastics were used to retract the lower arch. See text for details.

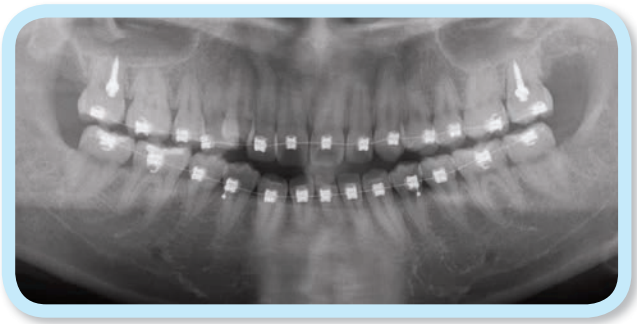


Fig. 7:
A panoramic radiograph documents the post-operative position the 2x8mm SS bone screws that were placed in each IZC.

Fig. 8:
Two months (2M) into active treatment, a 0.014x0.025-in CuNiTi archwire was placed in each arch.

Fig. 9:
After four months (4M) of active treatment, the force of the Class III elastics was increased to 4.5-oz bilaterally.

lower arch wire changed to the 0.018x0.025-in NiTi. Lingual buttons were bonded on all lower molars, and intermaxillary cross elastics (*Fox, 1/4-in 3.5-oz*) were applied from the buccal to the lower lingual surfaces. The chains of elastics from IZC bone screws to the UR4 and UL3 were continued.

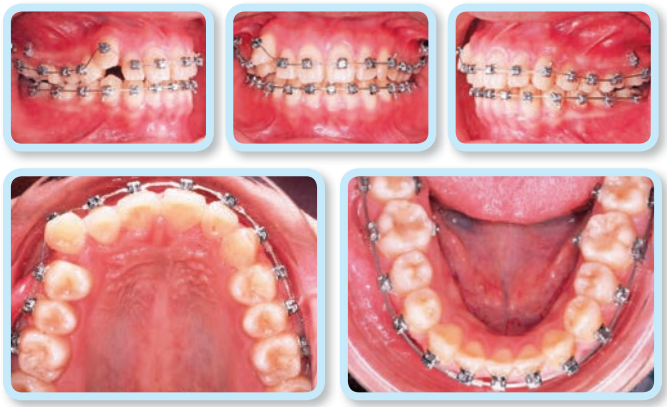


Fig. 10:
Eleven months (11M) into treatment, the UR3 was bonded and engaged on a 0.013-in CuNiTi archwire. Cross elastics (Fox, ¼-in 3.5-oz) were applied from the upper buccal to the lower lingual surfaces on all molars bilaterally. See text for details.

In the twelfth month (*Fig. 11*), the posterior overjet was improved, and then cross elastics (*Penguin, 5/16-in, 3.5-oz*) were applied from the UR3 and UR4 to the LR3 and LR4 to reduce excessive buccal overjet.

In the sixteenth month (*Fig. 12*), the UR3 had been moved into the upper arch form, so the arch wire was changed to 0.018x0.025-in NiTi. Upper arch retraction was continued with bilateral elastomeric chains from each IZC to the respective maxillary canine. Class III elastic force was reduced (*Fox, 1/4-in 3.5-oz*).

Fig. 11:
Twelve months (12M) into treatment, cross elastics (Penguin, 5/16-in, 3.5-oz) were applied from the buccal of the UR3 and UR4 to the lingual surfaces of the LR3 and LR4. See text for details.

Fig. 12:
Sixteen months treatment time, the upper arch wire was changed to 0.018x0.025-in NiTi.

At nineteen months (*Fig. 13*), the upper archwire was replaced with 0.016x0.022-in stainless steel. There was a 2mm overbite so anterior bite-turbos (*BTs*) composed of glass ionomer cement[2] were bonded on the lingual surfaces of the upper central incisors to facilitate retraction of the maxillary arch. Note the space that has been opened distal to the maxillary lateral incisors.

At twenty months (*Fig. 14*), the maxillary incisors were retracted with IZC anchored elastomeric chains that were attached to the maxillary archwire via crimpable hooks distal to the lateral incisors. Note there is a 2-3mm midline discrepancy between

Fig. 13:
Nineteen months into treatment, an occlusal bite-turbo (BT) was bonded on the lingual surfaces of the upper central incisors. See text for details.

Fig. 14:
Twenty months into treatment, the maxillary arch was retracted with IZC BS anchorage. See text for details.

the upper and lower midlines because of the asymmetric tooth loss (*missing LR2*).

At twenty-one months (*Fig. 15*), the anterior bite-turbo was removed and IPR was performed from UR4 to UL4 to help compensate for the missing LR2, and the spaces were closed with an elastomeric chain. Differential IPR would have improved the upper to lower midline discrepancy, but enhanced the facial to upper midline discrepancy. Symmetrical upper IPR from first premolar to first premolar was deemed preferable.

Fig. 15:
Twenty-one months treatment time, the BT was removed and IPR was used to reduce the width of the maxillary incisors.

At 22 months (*Fig. 16*), detailing and finishing were performed, and the Class III elastics were continued. One month later (*23 months*), all the fixed appliances were removed (*Fig. 17*). Post-treatment casts were made (*Fig. 18*), but the interdigitation of the buccal segments were different from photographs (*Fig. 17*) because of the angulation of the views. Finish radiographs were exposed (*Figs. 19-21*).

Results achieved

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

- A - P: *Retracted (posterior rotation)*
- Vertical: *Increased*
- Transverse: *Expanded*

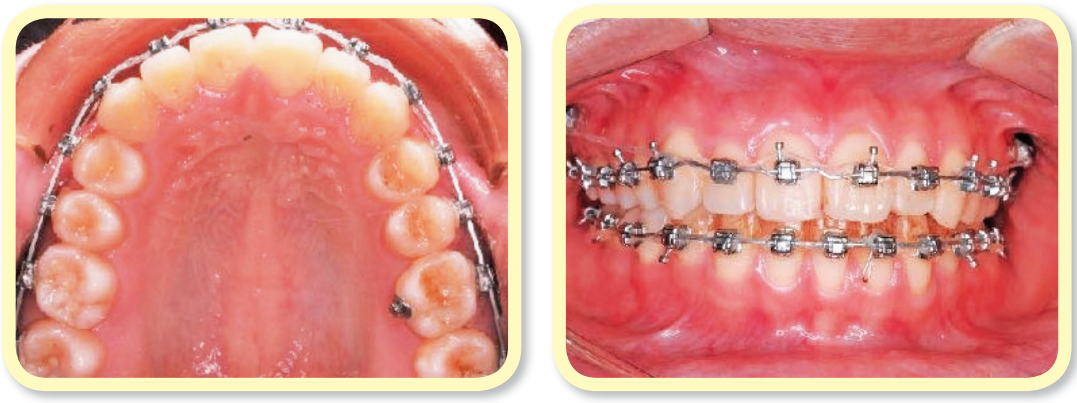


Fig. 16: Twenty-two months into treatment, finishing and detailing was performed in both arches. See text for details.

Fig. 17:
After twenty-three months of active treatment, fixed appliances were removed and post-treatment facial and intraoral photographs were taken.

Fig. 18:
Post-treatment dental models (casts) show about the same midline deviation as the intraoral photographs but the buccal segments are different. See text for details.

Fig. 19: Post-treatment panoramic radiograph

Maxillary Dentition

- A - P: *Retracted*
- Vertical: *Incisors maintained, molars extruded*
- Inter-molar / Inter-canine Width: *Increased*

Mandibular Dentition

- A - P: *Maintained*
- Vertical: *Slight incisor and molar extrusion*
- Inter-molar / Inter-canine Width: *Maintained*

Facial Esthetics

- LFH: *Increased from 2˚ by posterior (clockwise) rotation of the mandible*
- Lips: *Retracted to improve facial balance*
- Mentalis Strain: *Improved by incisal retraction but compromised by increased LFH*
- Lip protrusion: *Improved*
- Facial Profile: *Maintained*

Retention

Hawley retainers were delivered for both arches with instructions for full time wear the first 6 months and nights only thereafter.

Final evaluation of treatment

The anterior bite turbos resulted in extrusion of the upper and lower molars, producing a posterior (*clockwise*) rotation of the mandible (*Fig. 22*). For the present patient, the mechanics employed were acceptable because the decreased lip protrusion masked the more retrusive chain, resulting in no change in facial convexity (*18˚*). Furthermore there was no evidence of mentalis strain in the lateral cephalometric film at the finish (*Fig. 20*), and the frontal view of the face was more tapered and attractive face (*"Botox-like effect"*) due to the opening of the VDO. The final alignment was assessed at 21 points with ABO Cast-Radiograph Evaluation (*CRE*),[3] as documented in the supplementary worksheet at the end of the report. The principal alignment discrepancies were: marginal ridges (*6 points*), occlusal contacts (*5 points*) and occlusal relationship on the right side (*4 points*). Overjet and overbite were near ideal. In the final dental photographs, the buccal relationships were Angle Class I on the left and slight Class III on the right due to the missing LR2. The final dental casts showed a slightly different relationship: Class I on the right and slight Class II on the left. The discrepancy between the photographs and the casts may reflect the orientation of the photographs and/or distorted impressions. The interior photographs are more consistent with the expectations for a finished occlusion with a missing LR2. The Pink and White esthetic scores was 6 points, as subsequently documented in worksheet, which is consistent with esthetic outcomes as recommended by Sarver and Yanosky.[4]

Discussion

Average eruption time of the maxillary canines is 11.5 years, and the only permanent teeth to erupt later are second and third molars.[5] There are a variety of factors that can lead to unilateral malocclusion of a maxillary canine. Genetics and family history may play a role,[6] particularly with regard to the early loss of a maxillary deciduous second molar with mesial tipping or mesial migration of the permanent first molar.[7] When associated with a maxillary to facial midline discrepancy, the most likely etiology

Fig. 20: Post-treatment lateral cephalometric radiograph

Fig. 21: Post-treatment P-A radiograph of the head

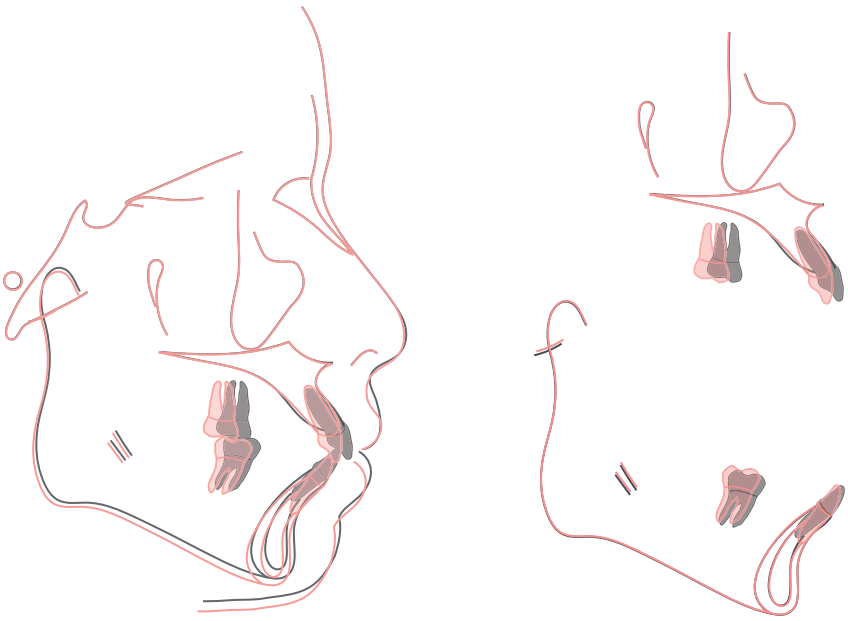
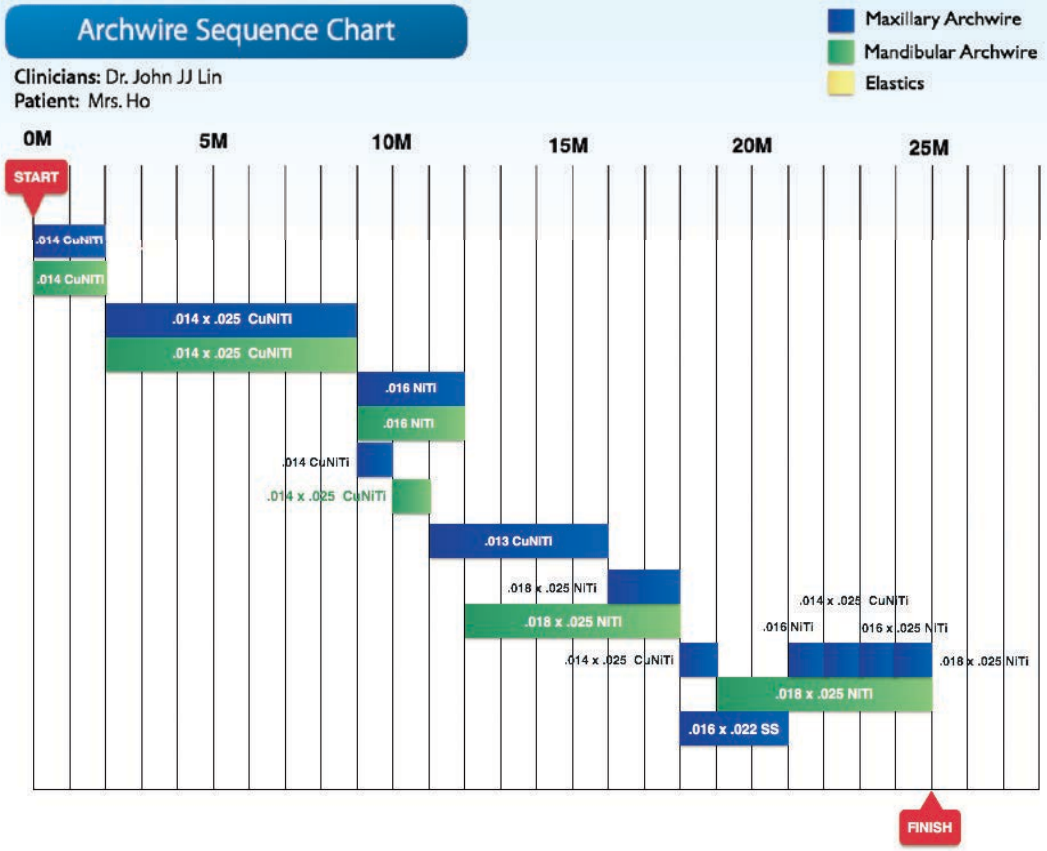


Fig. 22:
Cephalometric tracings superimposed on the anterior cranial base (left) show dentofacial changes over 23 months of treatment: pre-treatment is black and post-treatment is red. The lips are retracted slightly and the VDO is increased by posterior rotation of the mandible, but there is no net change in facial convexity. Maxillary superimposition (upper right) documents the retraction and slight extrusion of the maxillary arch. Mandibular superimposition (lower right) reveals the molars were slightly extruded. See text for details.



is ectopic eruption of the UR2 causing premature loss of the UR deciduous canine. The maxillary incisors subsequently tip into the edentulous space blocking out the eruption of the permanent canine (*Fig. 1*). This problem can lead to both esthetic and periodontal compromises.[8]

The most common congenitally missing teeth are maxillary lateral incisors (*U2*), upper and lower second premolars (*U5/L5*), and the upper third molars (*U8*) are missing more frequently than other teeth.[5] Missing lower incisors is a rare trait worldwide, but is more common in Asia.[9] Mandibular lateral incisors are more frequently missing than the adjacent central incisors,[10] which is consistent with the time-honored morphogenetic field concept.[11]

The present case report is consistent with these data because the distal tipping of the three mandibular incisor to the right (*Fig. 3*), indicates the LR2 was the missing tooth.

Space analysis and facial esthetics are critical considerations when formulating a treatment plan. Lip protrusion (*Figs. 1 and 4*) is commonly treated with symmetric or asymmetric premolar extraction, but crowding and differential anchor requirements must be carefully considered. Temporary anchorage devices (*TADs*) are an important asset for managing asymmetries. Mini-plates are effective TADs, but they are a relatively aggressive approach for most missing teeth.[12] Interradicular miniscrews are appealing,[13] but they often block the path of tooth movement

when arches are retracted[14] and may interfere with complete closure of a space. If TADs are moved outside the root area (*extra-radicular position*), the entire maxillary arch can be retracted.[15] When bone screws are placed buccal to the root area, they are outside the alveolar process that supports the roots of the teeth, and are deemed extra-alveolar (*E-A*) bone screws (*BS*).[16] The IZC is an extra-radicular area buccal to the upper molars that is a useful site for TADs to reliably retract the maxillary arch.[15,17]

The current patient was concerned about the high canine on the upper right side, but was satisfied with her convex facial profile (*Fig. 1*). Correction of the upper crowding, midline shift and lip protrusion required extractions or E-A TADs to differentially retract the maxilla. The patient selected the latter option and the mechanics were very effective for correction incise axial inclinations (*Fig. 19*).

The anterior BT opened the bite to facilitate retraction of the maxillary arch, but they were also associated with a subsequent increase in the VDO and FMA. In retrospect, the BT was a problem because the patient appeared to have slightly incompetent lips pre-treatment (*Fig. 4*). However, the BT did facilitate arch alignment and probably decreased the overall treatment time. Maxillary molar extrusion (*Fig. 22*) due to the BT was controllable with intrusive force from the IZC bone screws, but the lower molars were still free to extrude. The increase in VDO complicated correction of lip incompetence, but resulted in improved facial esthetics in the frontal plane (*Figs. 1 and 17*). Increasing LFH within the limit of lip competence (*Fig. 22*) improves the frontal facial appearance of patients with wide and short lower face (*brachyfacial pattern*). This is a conservative approach to achieving a more attractive tapered facial pattern which is similar to the "*Botox® effect*" achieved by injecting botulinum toxin type A (*Botox®*) into hypertrophic masseter muscles.[18]

Conclusion

A challenging asymmetric malocclusion with a missing LR2 and an topically erupted UR3 (*DI=27*), was treated conservatively in 23 months to an attractive facial result with a good dental alignment (*CRE=21*). PSL brackets, IZC bone screw anchorage, and Class III elastics were effective mechanics for Intermaxillary retraction to relive crowding and lip protrusion. Bite turbos were associated with molar extrusion, posterior rotation of the mandible, and an increase in facial height. However, lip competence was maintained so facial form in the frontal plane was improved.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 27

OVERJET

0 mm. (edge-to-edge)	=	
1 – 3 mm.	=	0 pts.
3.1 – 5 mm.	=	2 pts. 4mm
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 = 2

OVERBITE

0 – 3 mm.	=	0 pts 0.5mm
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 = 1

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

8 mm (upper)

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 = 2

End-on class II (left)

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° _____ x 1 pt. = _____

1 to MP ≥ 99° = 1 pt.

Each degree > 99° 12 x 1 pt. = 12

Total = 13

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

Identify:

Total = 2

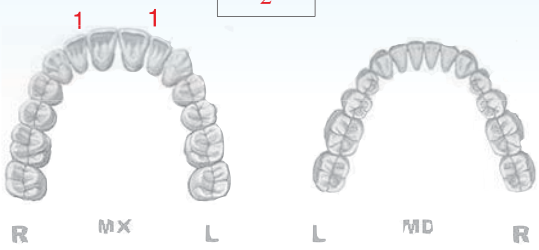
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 21

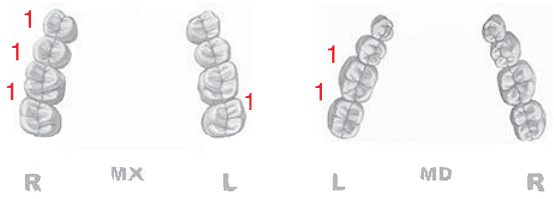
Alignment/Rotations

2



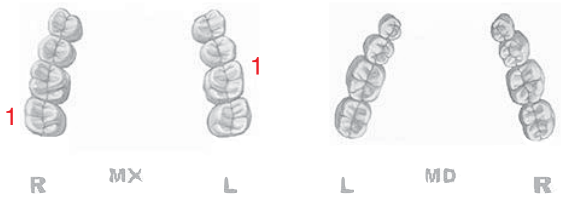
Marginal Ridges

6



Buccolingual Inclination

2

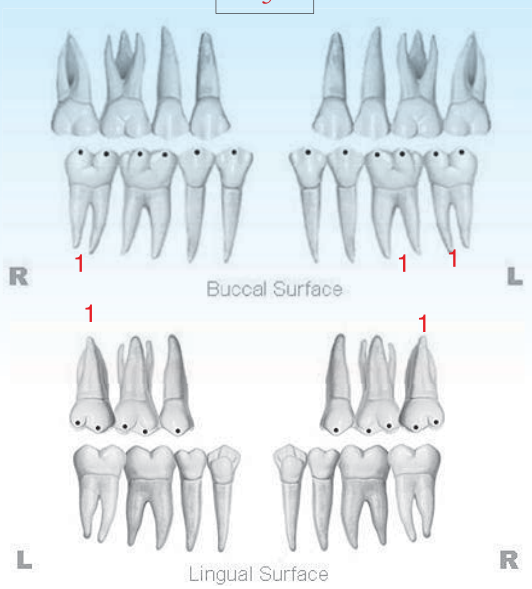


Overjet

2

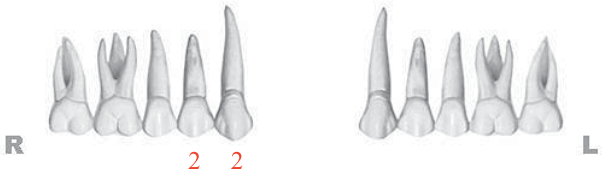
Occlusal Contacts

5



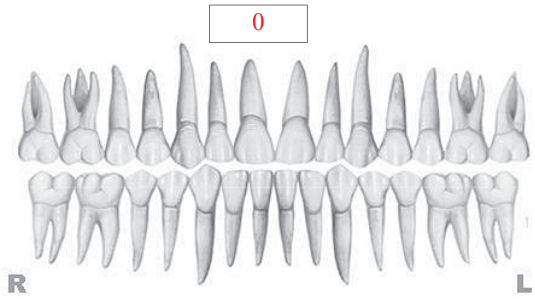
Occlusal Relationships

4



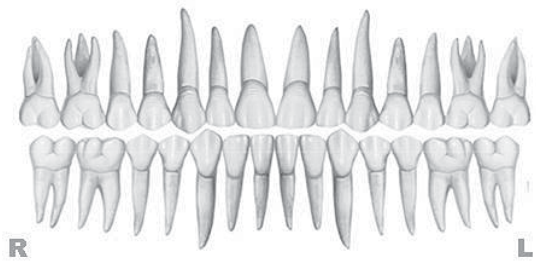
Interproximal Contacts

0



Root Angulation

0

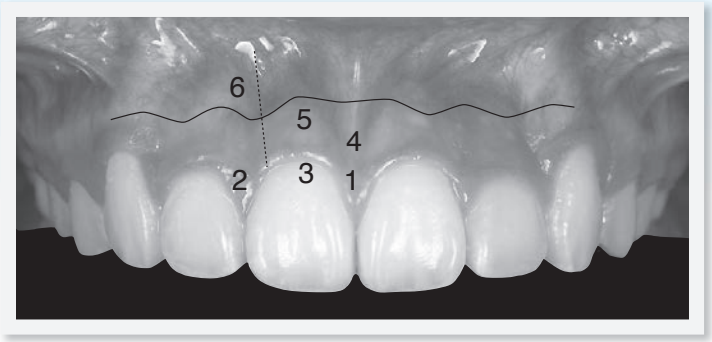


INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score (Before Surgical Crown Lengthening)

Total Score: = 6

1. Pink Esthetic Score

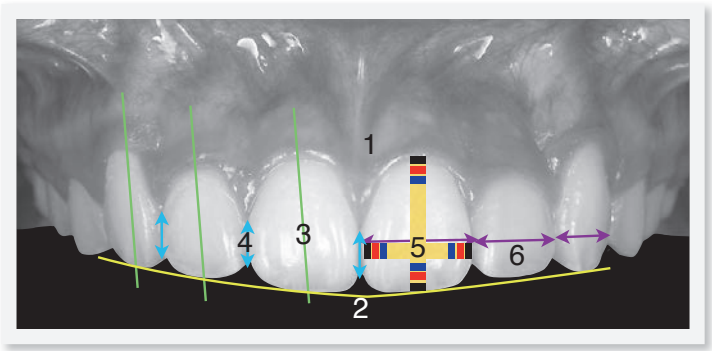


Total = 1

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 Papilla	**0**	1	2
2. Keratinized Gingiva	**0**	1	2
3. Curvature of Gingival Margin	**0**	1	2
4. Level of Gingival Margin	0	**1**	2
5. Root Convexity (Torque)	**0**	1	2
6. Scar Formation	**0**	1	2

2. White Esthetic Score (for Micro-esthetics)



Total = 5

1. Midline	0	1	2
2. Incisor Curve	0	1	2
3. Axial Inclination (5°, 8°, 10°)	0	1	2
4. Contact Area (50%, 40%, 30%)	0	1	2
5. Tooth Proportion (1:0.8)	0	1	2
6. Tooth to Tooth Proportion	0	1	2

1. Midline	0	**1**	2
2. Incisor Curve	**0**	1	2
3. Axial Inclination (5°, 8°, 10°)	0	**1**	2
4. Contact Area (50%, 40%, 30%)	0	**1**	2
5. Tooth Proportion (1:0.8)	0	**1**	2
6. Tooth to Tooth Proportion	0	**1**	2

2018

iAOI Symposium

Dr. Diego Peydro

05 / 27 (Sun)

Location:
National Tsing Hua University, Delta Building
B1 Conference Hall
(No. 101, Section 2, Kuang-Fu Road, Hsinchu, Taiwan)

ALIGNER ORTHODONTICS: New Paradigm and challenges

Dr. Peydro Diego is the Associate Professor of the Master program in Orthodontics at the European University of Madrid and Master Collaborator Professor of Orthodontics at the University of Valencia, Spain. Dr. Peydro is the co-director of two continuing training programs focusing on the Invisalign system and teaches globally on Invisalign. His lecture will address some of most common problems that clinicians face as they begin to offer aligner therapy, including effective communication with technicians, setting up treatment plan using Clincheck, attachment selection and offer his recommended protocols.

New Vision of Aligner Orthodontics Aligner

The winning FORMULA: THINK + PLAN + EXECUTE

Attachment selection based on the treatment plan: When and why we should change the attachments?

A New Paradigm of the Transversal Dimension to Get Amazing Results

Planning for critical simultaneous movement

Miniscrews and elastics: Exceeding the limits of the expansion

How to Deal with Vertical Malocclusions?

Big mistakes to avoid in Clincheck planification

Attachments vs sequence of movements. Which is more important?

Treating Severe Open Bite and Deep Bite with Miniscrews

G5 protocol modification, Bite turbos and more

	By 2018/03/01	After 2018/03/01
Registration	USD 250	USD 300

▲ Payment: wire transfer (no credit card)

Beneficiary Bank	JIH SUN INTERNATIONAL BANK (SWIFT CODE : JSIBTWTP)
Beneficiary Bank Address	NO.10, SEC. 1, CHONGQING S. RD., TAIPEI CITY, TAIWAN R.O.C.
Beneficiary Name	IAOI
Beneficiary A/C NO.	326-2737621-00

Cancellation policy:
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Phone: +886-3-573-5676 Registration: http://iaoi.pro Contact: Michelle Tsai contact@iaoi.pro

International Association for Orthodontists & Implantologists

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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.

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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.

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iAOI Diplomate

國際矯正植牙院士

* *Ambassador（大使）:*
  One who has published 9+ case reports in IJOI.

▲ *Case report(s) published at least once in AJODO.*

● *AJODO/Research paper - 3 points*
ABO case report - 2 points
Clinical tip - 1 point

Dr. 張銘珍* Ming-Jen Chang

18 pts

Dr. 曾令怡*▲ Linda Tseng

14 pts

Dr. 葉信吟 Hsin-Yin Yeh

18 pts

Dr. 李雙安▲ Angle Lee

17 pts

Dr. 徐玉玲▲ Lynn Hsu

16 pts

Dr. 林詩詠 Joshua Lin

16 pts

Dr. 蘇筌瑋 Bill Su

14 pts

Dr. 曾淑萍 Shu-Ping Tseng

12 pts

Dr. 黃祈 Richie Huang

12 pts

Dr. 黃瓊嬋 Sabrina Huang

8 pts

Dr. 黃育新 Yu-Hsin Huang

8 pts

Dr. 林曉鈴 Sheau-Ling Lin

7 pts

Dr. 張銘津 Ariel Chang

7 pts

Dr. 邱上珍▲ Grace Chiu

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. 林森田 Chris Lin

6 pts

Dr. 呂詩薇 Julie Lu

4 pts

Dr. 彭緯綸 Wei-Lun Peng

4 pts

2018~2019 第十年度

貝多芬 矯正精修班

時間：每月中週二上午 9:00-12:00
地點：金牛頓教育中心（新竹市建中一路25號2樓）

上課日期：

2019

8/14、9/4、10/16、11/13、12/11、
1/8、3/19、4/16、5/14、6/25、7/23

- 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

全新的第十年度 2018-19 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。

2017-18 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＃219，詹雅婷

Newton's A

隱適美數位矯正：
複雜案例處理與拔牙解決方案

Invisalign

10.4 Thu

宋 揚

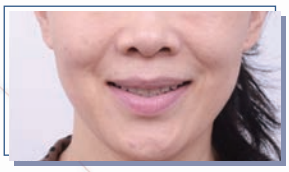
賽德陽光口腔醫療技術總監
賽德陽光 Invisalign 中國中心資深專家、講師
北京大學口腔醫院正畸專科醫師、口腔正畸專家
世界正畸聯盟（WFO）專科會員
香港大學口腔正畸學博士
英國愛丁堡皇家外科學院口腔正畸專科院員 (M.Orth R.C.S.(Edin))

關 心

賽德陽光口腔醫療培訓總監
賽德陽光 Invisalign 中國中心主任、首席培訓專家
世界正畸聯盟（WFO）專科會員
中國 Invisalign 隱適美白金醫生
Invisalign 隱適美認證講師
北京大學口腔正畸學臨床、理學雙博士

課程日期：
10月4日 (四) 9:00–17:00

上課地點：
新竹市建中一路25號2樓
(金牛頓藝術科技)



講師：關心（上午）

- 隱適美矯正的生物力學基礎及附件設計原則
- G6 解決方案在第一小臼齒拔除中的應用

講師：宋揚（下午）

- 深覆合的隱適美矯正
- 隱適美矯正與多學科聯合治療

關心醫師為北京大學正畸雙博士、宋揚醫師為香港大學口腔正畸學博士。關心與宋揚皆為中國第一批利用隱適美技術診療病人的醫師。兩位醫師雖然年輕，在中國隱適美領域裡已擁有很高的知名度和多項個人紀錄。其中關心醫師是中國最先開展隱適美和首位在國際學術會議進行隱適美專題演講的中國醫生，國際優秀病例庫中她的病例獲選數量居中國首位，曾經有三例病例入選隱適美亞太區十佳病例。

本次特別邀請關心與宋揚醫師分享隱適美複雜案例處理，內容亦包括如何利用G6方案處理第一小臼齒拔牙問題，以及與其他牙科領域聯合治療案例。

主持人：張慧男醫師

03-573-5676　新竹市建中一路25號2樓　余承勳 yuebucy@newtonsa.com.tw

Asymmetric Class II Malocclusion Acquired from Early Loss of a LR6 and UL Primary Canine: Reverse the Etiology and Align a Horizontally Impacted LR8 with a Ramus Bone Screw

Abstract

***Introduction**: A 26 yr female presented with a chief complaint of "missing and crooked teeth."*

***Diagnosis**: Compensated Class II, division 2 malocclusion was complicated with severe crowding, reduced axial inclination of upper and lower incisors, decreased lip protrusion, blocked-in UL5, lingual crossbite LL7, missing LR6, and horizontally impacted LR8. The American Board of Orthodontics (ABO) Discrepancy Index (DI) was 24.*

***Etiology**: The cause of this severe acquired malocclusion was deemed premature loss of two teeth: LR6 due to Molar Incisor Hypomineralization (MIH), and UL deciduous canine due to UL2 ectopic eruption.*

***Treatment**: Reverse the maxillary portion of the etiology by opening space to align the UL5. Correct the mandibular discrepancy by moving the LR7 mesially, uprighting LR8 with ramus bone scarew (RBS) anchorage, and align the LR7 and LR8 in the LR6 and LR7 positions. Extract the UR8 and LL7, and then align the LL8 in the LL7 position. Active treatment time: 36 months.*

***Outcomes**: Facial, dental and smile esthetics were near ideal. Both arches were well aligned. The LR7 and LR8 were substituted into the first and second molar positions. Despite successful molar substitution, correction of incisal axial inclinations, and achieving excellent dentofacial esthetics, there was a residual Class II intermaxillary relationship. The Cast-Radiograph Evaluation (CRE) was 33, and the Pink & White dental esthetic score was 0.*

***Conclusion**: RBS anchorage is efficient mechanics for recovering a severe horizontal impaction in the posterior aspect of the mandibular arch. Substitution of a recovered impaction for a missing mandibular molar is a viable clinical option. However, uprighting and aligning impactions is a technique sensitive approach that requires careful planning and execution. (J Digital Orthod 2018;50:26-46)*

Key words:
Adult complex treatment, ramus bone screw, horizontal impaction, third molar, uprighting mechanics, molar substitution, space closure, midline correction, pegged lateral incisor, camouflage treatment, MIH

Mandibular first molars are usually the first permanent teeth to erupt and their development is frequently affected by Molar-Incisor Hypomineralization (*MIH*), a dental developmental disorder related to childhood illness and high fever prior to the age of 3 years.[1] Permanent teeth erupting during the early transitional dentition (*6-8yr*) are the most frequently affected. A defective molar is rarely noticed by the parents until there is a tooth ache, and then the hopelessly decayed tooth must be extracted, usually before the age of 8 years. The isolated loss of permanent first molars in the early transitional dentition (*6-8 years of age*) is pathognomonic for MIH, a worldwide problem affecting up to 20% of the population.[2] Occlusal development problems following the early loss of permanent first molars are a common etiology for acquired malocclusion in adolescents and adults.[3]

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Fig. 1: Pre-treatment facial and intraoral photographs

Moving second and third molars mesially to close a missing first molar space is a relatively common procedure,[3,4] probably because of the high prevalence of MIH.[1-3] However, many third molars are bony impactions, so it was unclear if attempting to upright and align them was efficient clinical practice. Lin[5] reviewed six methods for molar uprighting and concluded that surgical exposure of deeply impacted molars, followed by traction with elastomeric chains anchored by RBS, was an efficient approach.[6] More recent studies have established the mandibular ramus bone screw (*RBS*) as reliable anchorage for uprighting deep horizontally-impacted lower third molars.[7] This novel approach for restoring function after the loss of a LR6 is documented by the present case report. RBS anchorage was utilized to upright a horizontally impacted lower third molar (*LR8*), that was subsequently aligned to help restore normal occlusal function. The current carefully documented case report focuses on treatment details and clinical insights.

Diagnosis and Etiology

A 26-year-old female presented for orthodontic evaluation of missing and malaligned teeth. Initial records (*Figs. 1-4*) documented a severe malocclusion. There was no contributory medical history, but the dental history revealed a lower permanent molar (*LR6*) was extracted during early childhood, so it was probably related to MIH.[1-3] The subsequent mesial migration of the LR7 may have contributed to the horizontal impaction of the LR8 (*Fig. 5*). There were no other problems reported that would negatively impact comprehensive orthodontic treatment.

Facial examination revealed a relatively symmetrical, square frontal morphology, but the oral commissure was canted superiorly on the left side (*Fig. 1*). Smile evaluation showed an inadequate smile arc (*Fig. 2*), a dark buccal corridor on the left side, and greater commissure elevation on the left compared to the right side (*Fig. 1*). Facial convexity (*13.5°*) was within normal limits (*WNL*), but both axial inclination of the upper and lower incisors (*88/81.5°*), as well as lip protrusion (*-4.5/-3.0mm to the E-line*) were decreased (*Table 1*). The lower dental midline was coincident with the facial midline, but the maxillary midline was deviated 3-4mm to the left (*Fig. 1*). These data are consistent with physiologic drift after the unilateral loss of the left upper primary canine, probably due to ectopic eruption of the permanent lateral incisor (*UL2*).

Pre-treatment cast evaluation showed a Class II Division 2 malocclusion (*Fig. 3*) with a blocked-in UL5, missing LR6, and peg-shaped maxillary lateral incisors (*Fig. 2*). There was >10mm of crowding in the upper arch and a 5mm space deficiency in the lower anterior region. The UL5 and LL7 were in lingual crossbite, and the overbite was 5mm. The LR6

Fig. 2: Smile evaluation

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

Fig. 4: Pre-treatment cephalometric radiograph

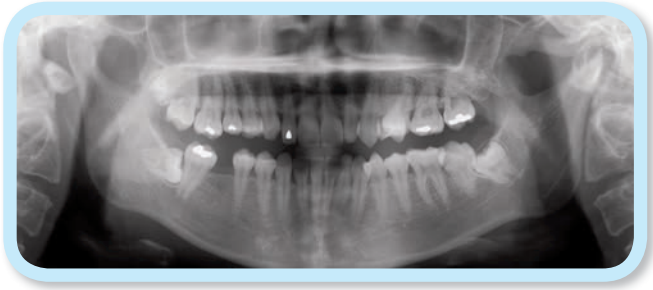


Fig. 5: Pre-treatment panoramic radiograph

extraction site was approximately 8mm in length, but the ridge width was judged to be inadequate for an implant without bone augmentation (*Figs. 1 and 3*).

The panoramic radiograph (*Fig. 5*) documented that the LR7 had drifted mesially into the missing LR6 space, and the LR8 was a deep horizontal impaction. On the left side, the LL8 was a mesioangular partial bony impaction. No significant periodontal bone defects were noted, and multiple amalgam restorations attest to a history of regular dental care (*Figs. 1 and 5*). There was no history of temporomandibular joint (*TMJ*) dysfunction, nor was a functional shift of the mandible detected in the closed or opened positions (*Fig. 6*). TMJ radiographic images with the mouth opened and closed were WNL (*Fig. 7*).

The pre-treatment cephalometric analysis revealed that the sagittal relationships of the maxilla (*SNA*) and mandible (*SNB*) are WNL, but there was a slightly elevated ANB of 3.5˚. The mandibular plane angle

Fig. 6:
A frontal open mouth photograph is used to determine if there is a functional shift of the mandible that contributes to the midline discrepancy. Note the asymmetry of the peg-shaped maxillary lateral incisors. See text for details.

(25.5˚) was WNL (*Fig. 4 & Table 1*). The American Board of Orthodontic (*ABO*) discrepancy index was 24 points, as shown in the supplementary worksheet 1.

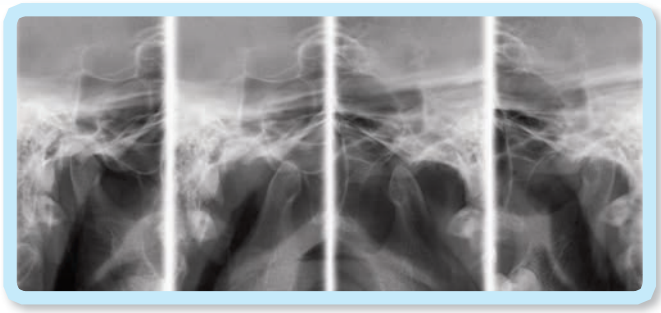


Fig. 7:
From left to right, pre-treatment temporomandibular joint (TMJ) transcranial radiographs are: R TMJ closed, R TMJ open, L TMJ open, and L TMJ closed.

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA˚ (82°)	82.5°	82.5°	0°
SNB˚ (80°)	79°	79°	0°
ANB˚ (2°)	3.5°	3.5°	0°
SN-MP˚ (32°)	32.5°	32.5°	0°
FMA˚ (25°)	25.5°	25.5°	0°
DENTAL ANALYSIS			
U1 To NA mm (4 mm)	-2 mm	2 mm	4 mm
U1 To SN˚ (104°)	88°	105°	17°
L1 To NB mm (4 mm)	2 mm	4 mm	2 mm
L1 To MP˚ (90°)	81.5°	90°	8.5°
FACIAL ANALYSIS			
E-LINE UL (2-3 mm)	-4.5 mm	-4 mm	0.5 mm
E-LINE LL (1-2 mm)	-3 mm	-2 mm	1 mm
Convexity: G-Sn-Pg' (13°)	13.5°	13.5°	0°
%FH: Na-ANS-Gn (53)	53.3%	53.3%	0%

Table 1: Cephalometric summary

Treatment Objectives

1. Install a full fixed passive self-ligating (*PSL*) appliance.
2. Maintain the skeletal relationships of the maxilla and mandible in all three planes.
3. Correct the maxillary arch alignment by opening space for the blocked-in UL5.
4. Increase the axial inclination of the upper and lower incisors to correct lip retrusion.
5. Extract UR8 and LL7.
6. Upright the LR8 with RBS anchorage.
7. Move the LR7, LR8 and LL8 mesially to close edentulous spaces in the mandibular arch.
8. Detail and finish the occlusion with bracket repositioning, archwire adjustments and vertical elastics.

Treatment Alternatives

Extraction of the LL8 rather than the LL7 was an unfavorable option because the third molar roots were near the mandibular canal (*Fig. 5*), and surgery posed a risk of paraesthesia. Uprighting the LL7 would probably result in occlusal prematurities that would complicate and probably lengthen the treatment time. Furthermore, the LL7 root was conical, while the third molar root was divergent. Longterm periodontal prognosis for divergent roots is better than for conical roots.[8-10] Assuming the LL8

Fig. 8:
At three months (left), the peg-shaped maxillary lateral incisors were restored with composite resin, and the brackets were positioned more gingivally. At five months (right), the maxillary incisors are aligned on a straight archwire. See text for details.

was not ankylosed, the best option was extraction of the LL7 and orthodontic movement of the LL8 to substitute for the LL7. After discussing the pros and cons for each treatment option, the patient selected extraction of the LL7 and substitution with the LL8.

Treatment Progress

The patient preferred to initially pursue the esthetic goals in the maxillary arch, and delay the extractions and molar corrections until the end of treatment. A 0.022-in Damon Q® (*Ormco, Glendora, CA*) fixed appliance was installed. The mandibular anterior segment was bonded with normal torque brackets but the maxillary central incisors and canines were bonded with low torque brackets. The latter are preferred for managing severe crowding with a non-extraction treatment plan. The upper archwire sequence was: 0.014-in CuNiTi, 0.016-in CuNiTi, 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA and 0.019x0.025-in SS. The corresponding lower arch sequence was 0.014-in CuNiTi, 0.018-in CuNiTi, 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA and 0.016x0.025-in SS. Ni-Ti open coil springs were used to create space for the upper left peg lateral incisor, blocked-in upper left second premolar, and the severely rotated lower left lateral incisor.

In the first month of treatment, posterior bite turbos (*BTs*), made with Fuji® II type II glass ionomer cement (*GC America, Alsip IL*), were bonded on the occlusal surfaces of mandibular molars. The BTs opened the bite and prevented occlusal interference that might break the bond for the lower molar tubes and anterior brackets.

Fig. 9:
To open space for the blocked-in upper UL5, a Ni-Ti open coil spring was re-activated with flowable resin every month.

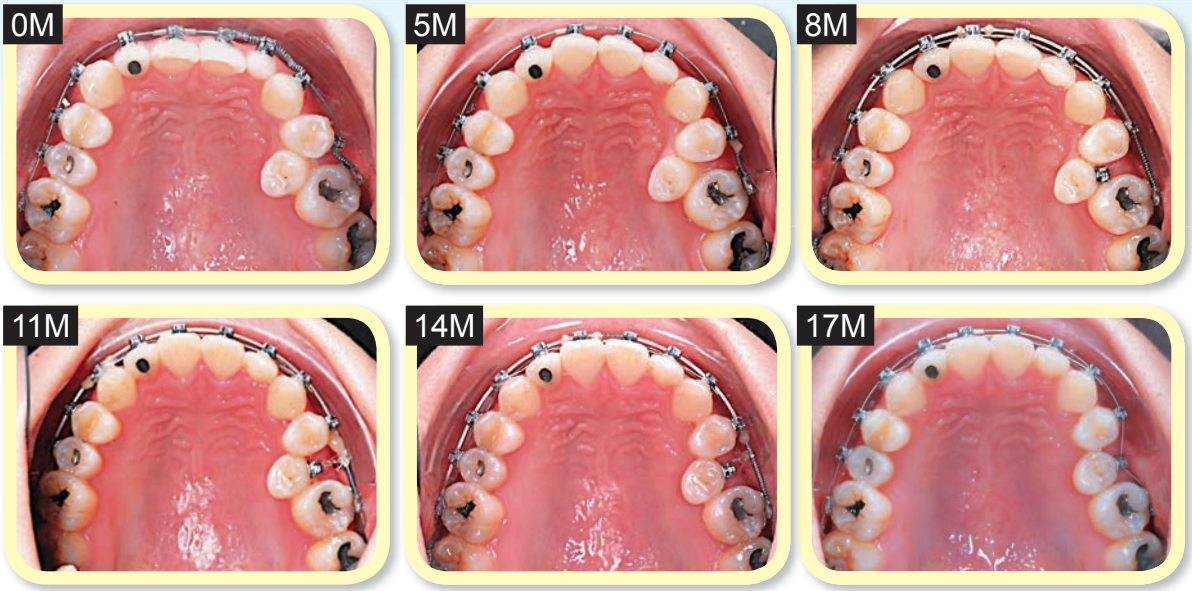


Fig. 10: Maxillary arch alignment is shown for the first seventeen months of treatment (0-17M). See text for details.

In the third month, the peg lateral incisors were restored to appropriate dimensions with composite resin, and the brackets were rebonded more gingivally to achieve an esthetic high-low-high relationship of the marginal gingiva (*Fig. 8*). A Ni-Ti open coil spring was reactivated with flowable resin every month (*Fig. 9*) to create space to align the UL5 (*Fig. 10*).

For the lower arch, the initial 0.014-in CuNiTi archwire was not engaged in the LR7 tube because it could be easily dislodged. In the fifth month, a 0.014x0.025-in NiTi archwire was engaged in the tube to upright the LR7. In the eighth month, a 0.016x0.025-in SS archwire was used to close the lower right molar space with a sliding mechanics. Lingual buttons were bonded on the LR4 and LR7 to facilitate space closure by balancing the force on the buccal and lingual surfaces with elastomeric chains.

In the fourteenth month, the LR space was closed and the LL7 was extracted, and the LL8 was free to erupt. At twenty-seven months (*27M*) the LR8 was surgically exposed and a RBS was placed to provide traction for uprighting (*Fig. 11*). The horizontally impacted LR8 was uprighted and efficiently aligned in about 9 months as shown in a progressive series of panoramic radiographs (*Fig. 12*).

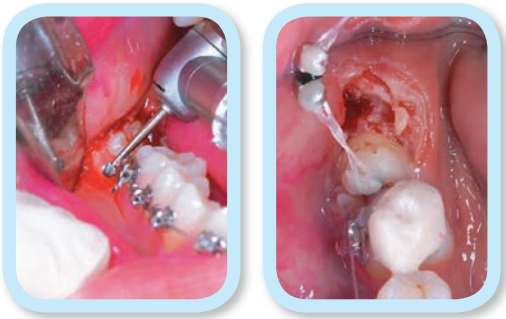
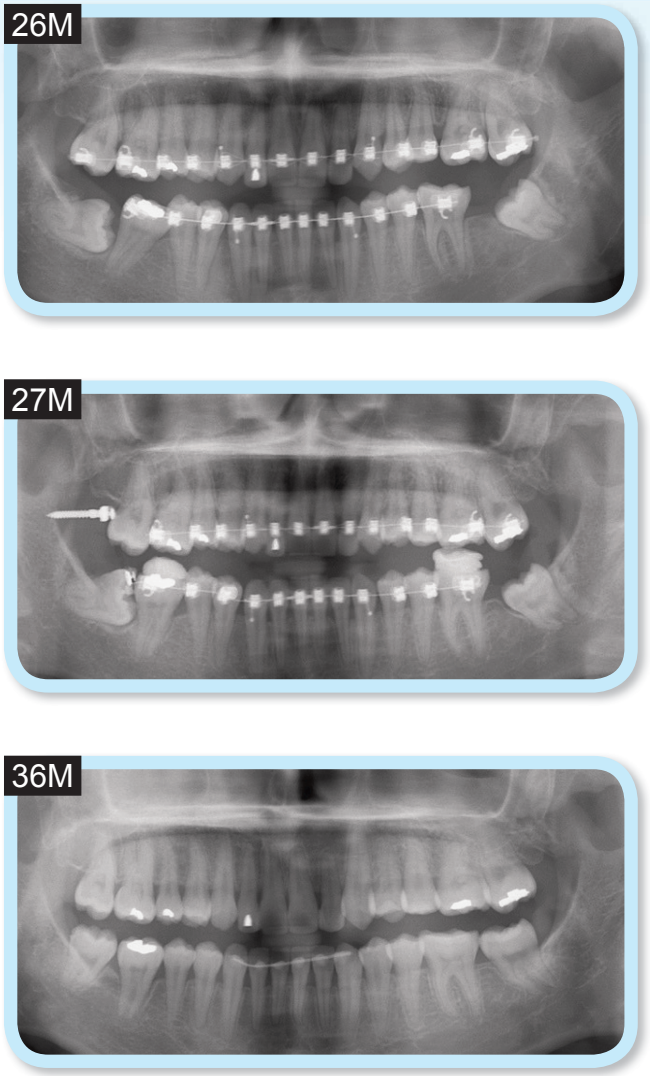


Fig. 11: The horizontally impacted LR8 is surgically exposed (left). Uprighting traction is applied via a RBS anchored elastomeric chain (right). See text for details.



■ *Fig. 12:*
A progressive series of panoramic radiographs from 26-36 months (M) show the uprighting and alignment of the LR8. See text for details.

After thirty-six months of active treatment, all appliances were removed (*Fig. 13*). Retention was accomplished with a lower lingual fixed retainer that was augmented with maxillary and mandibular clear overlay retainers.

Treatment Results

The post-treatment photographs illustrate that the enhanced facial esthetics in both the profile and frontal views (*Fig. 13*). In addition, the smile arc is improved resulting in a more youthful appearance, and the previously blocked-in UL5 is well aligned. The patient was well satisfied with the outcome.

The divergent root form of the LL8 was superior to the conical shape of the LL7 (*Fig. 14*), which was an important factor in deciding to extract the LL7 and retain the LL8 (*Figs. 5 and 15*). Uprighting and substantial movement of mandibular molars is a risk factor for external root resorption.[4,7] However, no significant root resorption or other problems were noted for the current patient (*Fig. 15*). In addition, all molars remained vital, there was no excessive mobility, and the periodontal condition was satisfactory.

The post-treatment lateral cephalometric radiograph (*Fig. 16*) documents the improved facial profile, and TMJ radiography shows that normal joint morphology was retained (*Fig. 17*). Superimposed cephalometric tracings demonstrate increased axial inclination of the upper and lower incisors, maxillary molar retraction, and mesial moment of lower third molars to close space. There was no mandibular rotation so the LFH was unchanged (*Fig. 19, Table 1*).

The post-treatment casts (*Fig. 18*) were scored at 33 points with the ABO Cast-Radiograph Evaluation (*CRE*) method (*Worksheet 2*). The major CRE discrepancies were Class II occlusal relationships on the right side

Fig. 13: Post-treatment facial and intraoral photographs

Fig. 14:
Root form, divergence and trunk area are related to the periodontal prognosis as the level of bone support decreases. This is an important factor in deciding which molars to extract. See text for details.

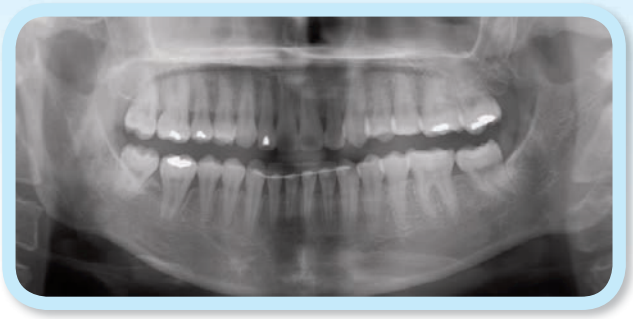


Fig. 15: Post-treatment panoramic radiograph

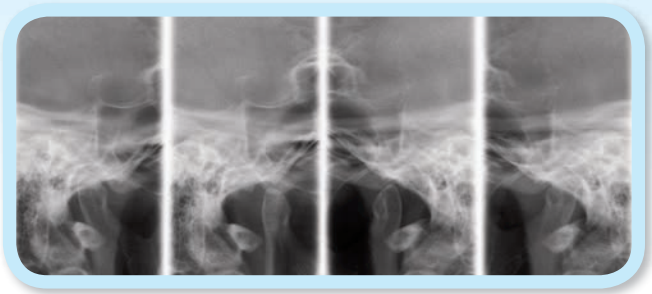


Fig. 17: Post-treatment TMJ radiography

Fig. 16: Post-treatment cephalometric radiograph

Fig. 18: Post-treatment study models (casts)

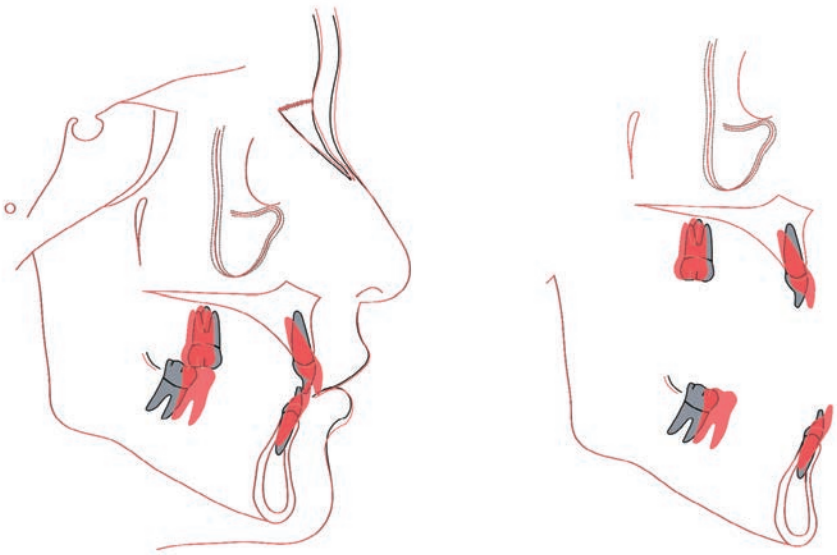


Fig. 19:
Cephalometric tracings from the start (black) and end (red) of active treatment are superimposed on the anterior cranial base (left), maxilla (upper right), and mandible (lower right). See text for details.

and buccolingual inclination bilaterally. Despite these discrepancies in dental alignment, the overall facial and dental esthetics were excellent (*Fig. 13*).

Discussion

Etiology

Two independent etiologies for this complex malocclusion were identified:

- MIH-related loss of the LR6 appeared to contribute to horizontal impaction of the LR8, as the LR7 drifted mesially (*Fig. 5*). This unusual scenario was compared to the typical pattern after loss of a lower first molar: mesial tipping of the erupting second molar, which is intensified by the erupting pressure of the third molar.[4] However, if the LR8 was mesioangular, as suggested by the third molar on the opposite side (*Fig. 5*), the LR8 probably became a full horizontal impaction as the LR7 moved mesially. The evidence for this scenario is the lack of LR7 tipping (*Fig. 5*), which apparently reflects eruptive pressure against the root of the LR7 as the LR8 tipped into a more horizontal position. In effect, the LR7 was translated into the edentulous space by a resultant force through the center of resistance of its roots (*Fig. 5*).

- Ectopic eruption of upper lateral incisors resulted in the premature loss of adjacent deciduous canine. The probable developmental scenario is: 1. all four maxillary incisors tipped lingually and to the left resulting in a midline discrepancy, 2. decreased axial inclination of upper and lower incisors (*88/81.5°*), 3. reduced lip prominence (*-4.5/-3.0mm to Ricketts E-line*), 4. deep overbite (*5mm*), 5. Class II buccal segments, and 6. upper left arch length deficiency ultimately resulted in ectopic eruption of the UL5 into the palate (*blocked-in*).

There are no known interceptive measures for an MIH-related loss of a lower first molar, but the occlusion could have been stabilized after the ectopic loss of the deciduous canine. Relatively simple interceptive treatment at age 7-8 years would have prevented a substantial portion of this asymmetric Class II malocclusion that proved difficult to completely correct (*DI 24*).

Reversing the etiology of malocclusion in the maxillary arch is illustrated in a series of occlusal photographs from the start of treatment (*0M*) to seventeen months (*17M*) into treatment (*Fig. 10*). The arch was lengthened by increasing the axial inclination of the incisors with a progression from round to rectangular archwires. At the same time, space was opened for the blocked-in UL5 with open coil spring, and it was moved buccally with a 0.014-in CuNiTi archwire inserted at seventeen months into treatment. A second progression from soft round to stiff rectangular archwires was used to finish the upper arch. In effect, a substantial series of applied mechanics was required to reverse the physiologic drift of the incisors lingually and to the left (*Figs. 1 and 3*).

RBS Anchorage

Substantial effort was required to close the previously missing molar space and to upright the horizontal impaction for alignment in the arch (*Figs. 20-30*). Since the uprighting of the LR8 did not begin until 27 months into treatment, there was concern about excessive overall treatment time. However, alignment of the upper arch (*Fig. 10*), followed by posterior space closure and molar alignment was the preferred treatment sequence. This approach corrected the patient's esthetic concerns early in treatment. In addition, alignment of the maxillary arch and space closure in the LR posterior segment prior to uprighting the LR8, resulted in longterm stability (*Fig. 31*) and an optimal periodontal result (*Fig. 32*). However, the preferred treatment sequence failed to completely correct the Class II sagittal relationship in the buccal segments (*Fig. 18*). It was not possible to achieve ideal buccal interdigitation within the designated treatment time without a potentially unesthetic retraction of the maxillary dentition. In addition, the decreased width of the maxilla relative to the mandible resulted in excessive buccal orientation of the maxillary molars. These complications resulted in a less than ideal final alignment (*CRE 33*), but that was deemed an acceptable compromise to achieve a good posterior occlusion (*Fig. 15*) and excellent dentofacial esthetics (*Fig. 13*). Additional advantages of the current approach were optimal periodontal health (*Fig. 31*) and longterm stability (*Figs. 32 & 33*).

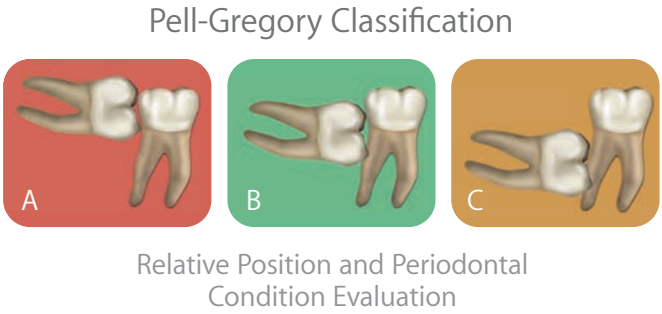


Fig. 20:
Relative position of a horizontal impaction is assessed according to Pell-Gregory Classification. Position A has the worst prognosis and B has the best prognosis. See text for details

Periodontal Health

Complex surgical and mechanical procedures such as uprighting of a deep, horizontal impaction may compromise the periodontium in areas where it is difficult to maintain oral hygiene. Careful periodontal assessment is indicated prior to, during and after treatment:

- Impaction prognosis evaluation: The root form, divergence, and trunk area are important considerations relative to periodontal prognosis.[8] Divergence of roots is preferable to fusion[9] because the former are easier to maintain long-term (*Fig. 14*).[10] Careful evaluation is indicated for all impacted molars being considered for uncovering and uprighting.[11] The decision to pursue the uprighting of an impaction is largely dependent on the clinician's experience.[8-10]

- Position of the impacted molar: There are 3 types of horizontally impacted molars according to the Pell-Gregory Classification (*Fig. 20*).[11] Position B is

the best candidate for uprighting, and Position A is the worst, even though it is more superficial. Uprighting a Position A impaction can result in occlusal trauma and opening of space distal to the erupted posterior segment. Subsequent tooth movement, under potentially traumatic conditions, may compromise periodontal health. Position C is the most favorable for uprighting mechanics, but RBS anchorage is required because conventional orthodontics for deep impactions is often difficult and risky for the periodontium.

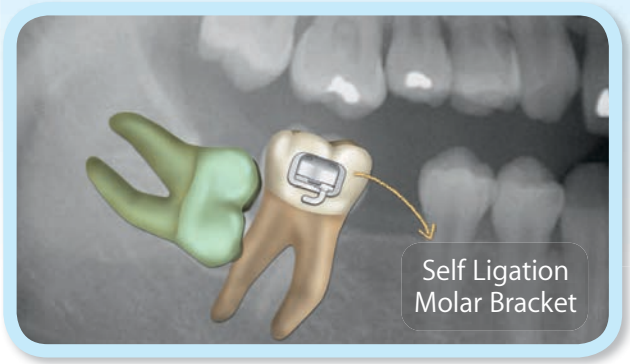


Fig. 21:
A self ligating molar bracket is the best choice for the erupted molar (LR7), so that an archwire can be inserted from the buccal.

Ramus Bone Screws

The RBS technique is an efficient posterior anchorage mechanism for producing an uprighting moment to rotate deep, horizontal impactions in the sagittal plane.[6,7,12,13] The procedures for this technique-sensitive clinical method are challenging, so a guideline for clinical efficiency is provided:

Fig. 22:
Rather than the ideal bracket position (upper), the molar bracket should be positioned more gingivally on the mesial (slight clockwise rotation) to provide a root forward moment as the missing first molar space is closed (lower). This procedure is deemed Dumping Prevention.

1. **Bond a PSL bracket on the LR7 mesial to the impaction**: archwires can be inserted into PSL brackets from the anterior or buccal direction, which is helpful for the surgical and orthodontic procedures shown in Figs. 21-30. It is difficult to feed a flexible wire through two molar tubes, especially when there is a substantial discrepancy (*Fig. 28*). Also, an open coil spring may be useful for uprighting the impaction. After the spring is activated, the archwire can be seated in the bracket of the mesial molar from the buccal direction (*Fig. 28*). PSL brackets are just as easy to bond on a first molar as a tube, but they are much more versatile (*Fig. 21*).

2. **Rotate the LR7 bracket down on the mesial**: Moving the molar mesially to close space will tip it to the mesial unless the bracket delivers a counter moment to maintain the axial inclination (*Fig. 22*). The bracket on a tooth tipped mesially during space closure results in more friction at the archwire interface and may notch it, thereby decreasing the rate of tooth movement.[12]

3. **Lingual buttons and an elastomeric chain**: Balance the buccal and lingual force for space closure to avoid mesial-in rotation as the space is closed. Similar to mesial tipping, mesial-in rotation increases friction on the archwire, decreases the rate of tooth movement, and results in an undesirable position of the molar after space closure.[12]

4. **Protract the second molar to create space to upright the third molar**: Creating space mesial to the impacted third molar has a number of advantages. First, it avoids disrupting the epithelial attachment on the second molar when the third molar is uncovered. Second, the space insures that the undercut at the cementoenamel junction (*CEJ*) is avoided as the third molar is uprighted. Three, as space is opened by mesial molar movement, the third molar may have a tendency for some spontaneous vertical movement and uprighting[14] which simplifies the recovery procedure (*Fig. 23*).

5. **Surgical exposure and removal of all obstacles**: Overlying bone must be removed in 3D to the level of the CEJ (*Fig. 24*).[7] When enamel contacts bone during the uprighting process, little bone resorption occurs because osteoclasts to achieve tooth movement are sourced from the periodontal ligament.

Fig. 23:
Move the LR7 mesially into the missing LR6 space to initiate self-uprighting and vertical movement in preparation for recovering the LR8.

Fig. 24:
Surgically uncover the LR8 and remove all bone down the CEJ (upper drawing). In the frontal plane remove any obstacle to eruption especially bone (lower drawing).

6. **Luxate the impacted molar with an elevator**: this procedure ensures the impaction is not ankylosed (*Fig. 25*) and also stimulates turnover in adjacent bone via the regional accelerator phenomenon.[15]

7. **Second molar should be a "free body" when the third molar is uprighted**: To prevent root resorption, the second molar should be free to move out of the path of eruption for the third molar (*Fig. 26*). If the second molar is engaged on an archwire, it should be of small diameter and flexible.[12]

8. **A RBS should be a 2x14mm SS self-drilling screw**: Pilot hole drilling is not a viable procedure in the anterior ramus because of the thickness of the overlying soft tissue. A self-drilling screw with a length of 14mm is necessary to provide adequate head to mucosa clearance, within the oral cavity, to avoid soft tissue irritation.[6,7,12,13]

9. **Eyelet bonding**: once the crown of the third molar is prepared, the area should be carefully isolated to permit a chalky white etching of the enamel surface, without saliva or blood contamination.

Fig. 25:
Loosen the impacted molar with an elevator to make sure it is not ankylosed.

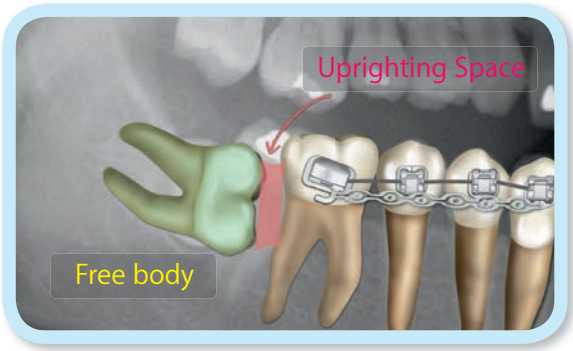
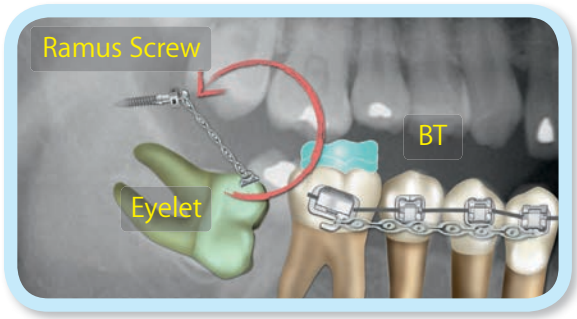


Fig. 26:
Make sure the anterior molar (LR7) is a free body, meaning it is allowed to move out of the path of eruption of the LR8 during the uprighting process. The space created by moving the LR7 mesially is the uprighting space (pink). See text for details.



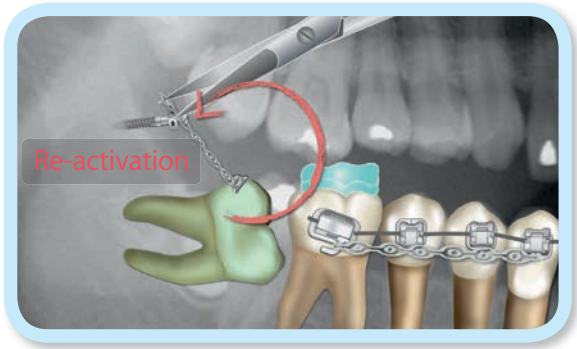


Fig. 27:
Upper Drawing: The ramus screw anchors an elastomeric chain attached to the eyelet on the LR8. A moment (pink curved arrow) uprights the impaction with a counterclockwise rotation. The bite turbo (BT) bonded to the occlusal surface of the LR7 (blue) opens the bite to prevent occlusal trauma.

Lower Drawing: The monthly activation procedure is to stretch the elastomeric chain one loop, and then reengage it on the RBS. The increase in force reactivates the moment (pink curved arrow). Then the extra link superior to the RBS is excised with the scissors as shown.

10. **Bite turbos**: Glass ionomer cement about 4-5mm thick should be bonded on lower molars bilaterally to provide space for uprighting the impaction without occlusal or bone screw interference.

11. **Activation**: A chain of elastics is attached from the RBS to the eyelet on the impaction, and it is reactivated by removing a loop from the chain once per month (*Fig. 27*).

12. **Adequate uprighting to permit bonding a buccal tube on the third molar**: Carefully monitor progress and stop the uprighting activation when sufficient buccal enamel is exposed to bond a bracket. Excessive extrusion due to uprighting results in occlusal trauma and requires complex mechanics for intrusion.

13. **Bond a buccal tube and apply archwire mechanics**: Mount the tube more gingivally on its mesial surface to produce an uprighting moment when an 0.018-in or 0.014x0.025-in CuNiTi archwire is inserted (*Fig. 28*).

14. **Occlusal adjustment**: Patients should be warned that occlusal adjustment may be necessary (*Fig. 29*) because uncontrolled occlusal trauma may result in failure of the impaction recovery procedure.

15. **Progressively reposition the third molar tube and remove the bite turbos**: Repositioning the tube is usually more predictable than archwire adjustment for detailing the position of the recovered impaction. Progressively remove the bite turbos as the third molar is aligned (*Fig. 30*).

Fig. 28:
The bracket on the impaction is bonded in a position that is slightly clockwise the ideal buccal position. This procedure is deemed Overcorrection Bonding. Uprighting of the LR8 is continued with a 0.014-in NiTi archwire with an open coil spring between the molars.

Fig. 29:
Occlusal adjustment may be required to prevent functional trauma.

Fig. 30:
Detail the positioning of the recovered LR8 by rebonding the bracket as needed.

Fig. 31:
Two years post-treatment follow up records: facial and intraoral photographs

Fig. 32:
Two years follow up shows that periodontal health is normal. There was minimal pocket depth with no bleeding on the mesial surface of both lower terminal molars.

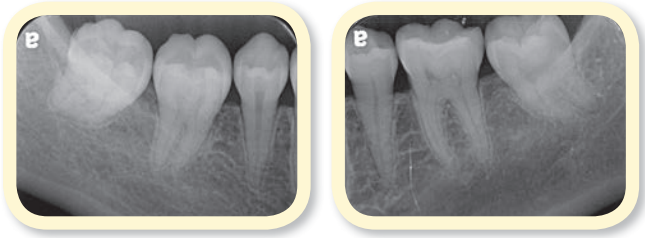


Fig. 33:
The three-year, follow-up peri-apical film shows that the bone height around 3rd molar was within normal range.

Conclusions

The etiology of a malocclusion is the basis for planning efficient treatment. Simplicity is the ultimate sophistication. Even through ramus screw mechanics may seem easy and intuitive, the devil is in the details. RBSs are an elegant solution for recovering deep, horizontal impactions and aligning them in normal occlusion, but it is a complex procedure. This case report presents the successful treatment for a severe acquired malocclusion with RBS anchorage. Important treatment details are outlined and illustrated. Two year and three year follow-up showed excellent stability with good periodontal health. Intermaxillary alignment may be improved by uprighting horizontal impactions earlier in treatment.

Acknowledgment

Thanks to Mr. Paul Head for proofreading this article.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 24

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 = 0

OVERBITE

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

Total = 2

ANTERIOR OPEN BITE

0 mm. (edge-to-edge), 1 pt. per tooth
then 1 pt. per additional full mm. per tooth

Total = 0

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 0

CROWDING (only one arch)

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

Total = 7

OCCLUSION

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

Total = 4

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 2

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 2

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. =	2
Midline discrepancy (≥3mm)	@ 2 pts. =	2
Missing teeth (except 3rd molars)	_____ x 1 pts. =	2
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	0 x 2 pts. =	0

Identify:

Total = 6

IMPLANT SITE

Lip line : Low (0 pt), Medium (1 pt), High (2 pts) =_

Gingival biotype : Low-scalloped, thick (0 pt), Medium-scalloped, medium-thick (1 pt) High-scalloped, thin (2 pts) =_

Shape of tooth crowns : Rectangular (0 pt), Triangular (2 pts) =_

Bone level at adjacent teeth : ≤ 5 mm to contact point (0 pt), 5.5 to 6.5 mm to contact point (1 pt), ≥ 7mm to contact point (2 pts) =_ 1

Bone anatomy of alveolar crest : H&V sufficient (0 pt), Deficient H, allow simultaneous augment (1 pt), Deficient H, require prior grafting (2 pts), Deficient V or Both H&V (3 pts) =_

Soft tissue anatomy : Intact (0 pt), Defective (2 pts) =_

Infection at implant site : None (0 pt), Chronic (1 pt), Acute(2 pts) =_

Total = 1

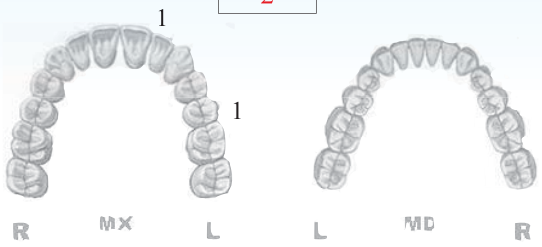
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 33

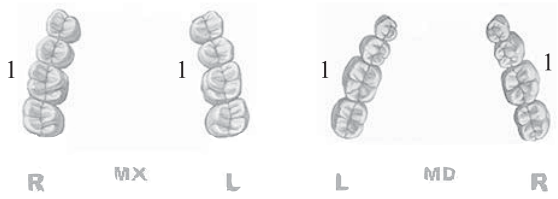
Alignment/Rotations

2



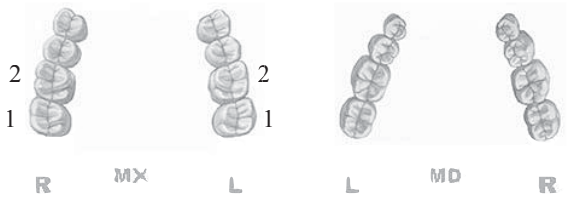
Marginal Ridges

4



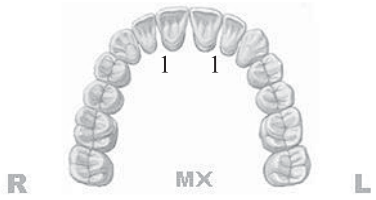
Buccolingual Inclination

6



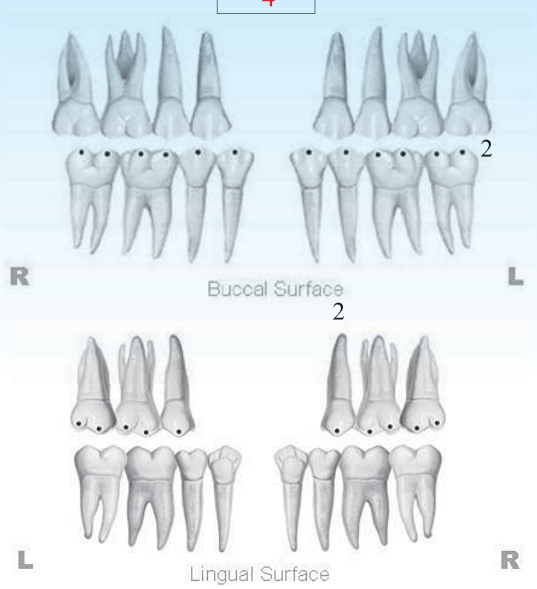
Overjet

2



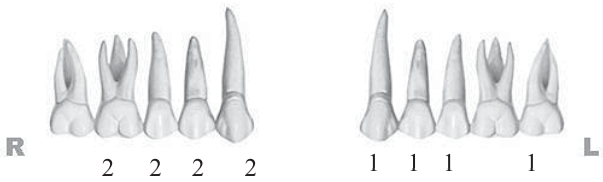
Occlusal Contacts

4



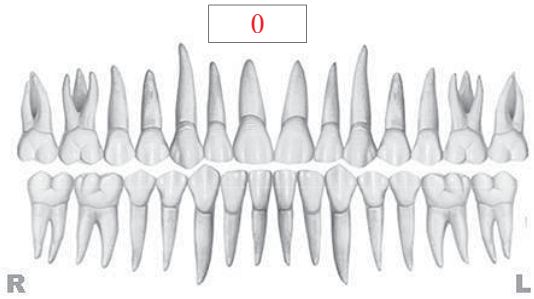
Occlusal Relationships

12



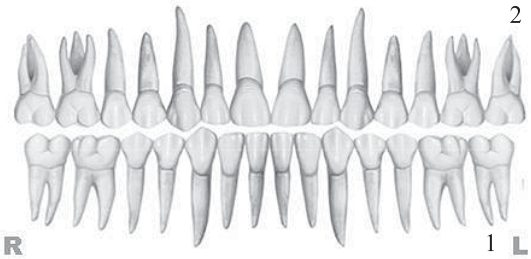
Interproximal Contacts

0



Root Angulation

3



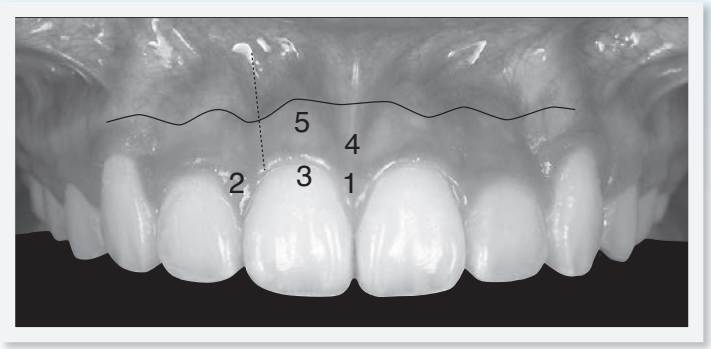
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

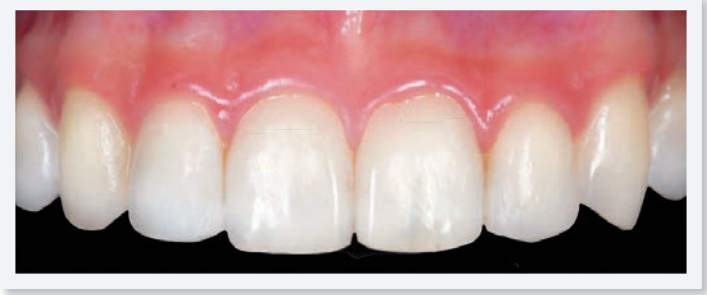
Total Score: = 0

1. Pink Esthetic Score

Total = 0



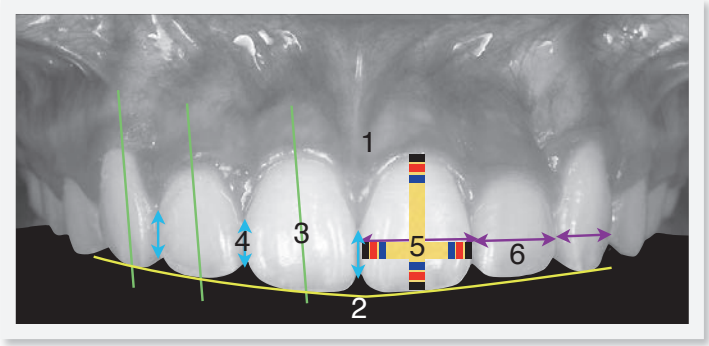
1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2



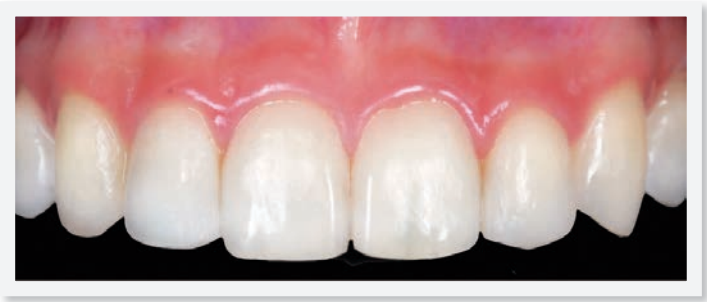
1. M & D Papilla	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	(0)	1	2
4. Level of Gingival Margin	(0)	1	2
5. Root Convexity (Torque)	(0)	1	2
6. Scar Formation	(0)	1	2

2. White Esthetic Score (for Micro-esthetics)

Total = 0

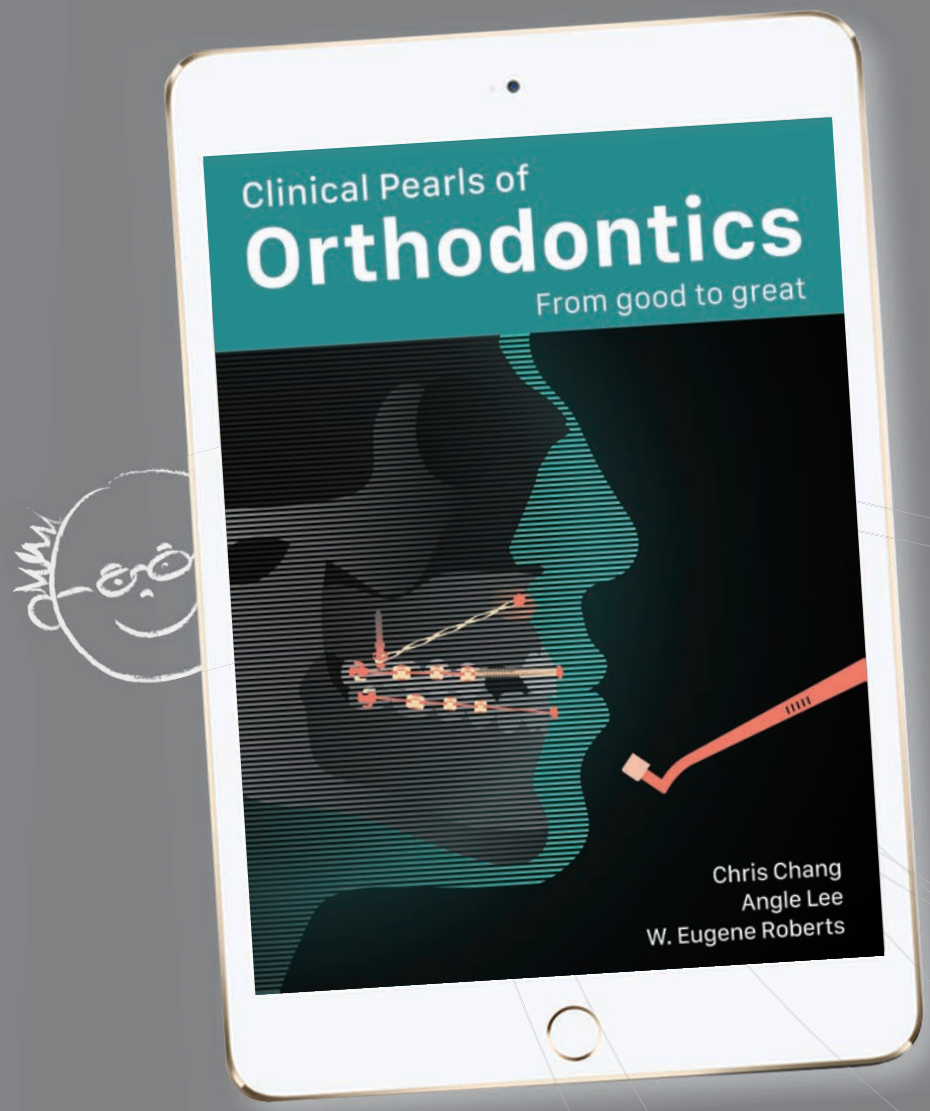


1. Midline	0	1	2
2. Incisor Curve	0	1	2
3. Axial Inclination (5°, 8°, 10°)	0	1	2
4. Contact Area (50%, 40%, 30%)	0	1	2
5. Tooth Proportion (1:0.8)	0	1	2
6. Tooth to Tooth Proportion	0	1	2



1. Midline	(0)	1	2
2. Incisor Curve	(0)	1	2
3. Axial Inclination (5°, 8°, 10°)	(0)	1	2
4. Contact Area (50%, 40%, 30%)	(0)	1	2
5. Tooth Proportion (1:0.8)	(0)	1	2
6. Tooth to Tooth Proportion	(0)	1	2

New Release!



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Sept. 9 (SUN)

		Speaker
09:00	Inside the Insignia: Diagnosis, Tx planning, Digital set-up and Clinical Execution.	Dr. Chris Chang
12:00	Lunch	
13:00	Insignia Approver software hands-on workshop I	Drs. Joshua Lin & Chris Chang
15:30	6 keys to write an effective Approver plan for Insignia	Drs. Eric Hsu & Chris Chang
17:30	Gala Dinner	

Sept. 10 (MON)

09:00	Indirect bonding hands-on workshop	Drs. Judy Yeh & Chris Chang
10:00	Indirect bonding & wire progression for Insignia -How to fix 10 common mistakes?	Drs. Judy Yeh & Chris Chang
12:00	Lunch	
13:00	Insignia Approver software hands-on workshop II	Drs. Angle Lee & Chris Chang
15:30	Chair-side Observation including bonding and case demos Location: In Beethoven Orthodontic Center	

- Pre-requisite: participants must have at least two years of orthodontic experiences.
- A course certificate will be provided upon completion of the workshop.

Max. number of participants: **30** doctors

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Management of an Impacted Maxillary Canine with the Vertical Incision Subperiosteal Tunnel (VISTA) Technique

Abstract

***Introduction**: A 11 yr 1 mo male presented with a chief complaint (CC) of unerupted maxillary left canine (UL3).*

***Diagnosis**: Bimaxillary protrusion (SNA 84, SNB 84) was associated with a full-cusp Class II Division 1 malocclusion with an overjet of 12mm and an overbite of 6mm (80%). This severe malocclusion was complicated by a horizontally impacted UL3 that was associated with substantial root resorption on the labial surfaces of both maxillary central incisors (UR1 and UL1). The discrepancy index (DI) was 36.*

***Etiology**: The cause of the severe impaction was apparently a deviated path of eruption that may be related to inadequate space in the arch due to a relatively small UL primary canine.*

***Treatment**: Phase I treatment began by placing Infrazygomatic crest (IZC) bone screws (BSs) bilaterally. The right IZC BS was used as anchorage for a VISTA submucosal procedure to retract the UL3 to its correct sagittal relationship in the arch, and then aligning it in the normal canine position. Once the UL3 was aligned, bilateral IZC anchorage was utilized to retract the entire maxillary arch to correct the full cusp Class II relationship. The occlusion terminating with the first molars was finished with vertical elastics and fixed appliances were removed. The active treatment time was 31 months. Phase II treatment for six months was indicated to improve the final alignment of the dentition after the second molars erupted. Final records were collected at the two year recall appointment.*

***Outcomes**: The impacted UL3 was recovered and aligned in an ideal relationship. Phase I Cast-Radiograph Evaluation (CRE) was 36, due to major discrepancies in alignment and marginal ridges of the erupting 7s. After 6 months follow-up treatment, the final CRE was 26.*

***Conclusions**: Phase I treatment with the VISTA procedure was indicated to correct the impacted UL3 before it caused further root resorption of adjacent teeth. Phase II treatment is best delayed until the second molars are erupted. The VISTA approach for submucosal retraction of maxillary canine impactions is an ideal procedure for the critical esthetic zone. (J Digital Orthod 2018;50:52-71)*

***Key words**:*

Impaction, impacted maxillary canine, vertical incision subperiosteal tunnel access, VISTA, infra-zygomatic crest, OBS

Introduction

The prevalence for impacted canines in adolescents is from 0.2-2.8%.[1,2] Third molars are more commonly impacted than canines, but their recovery (*if indicated*) rarely presents significant esthetic and functional challenges.[3] Recovering severely displaced, impacted canines is among the most challenging clinical problems in orthodontics. Coordination of treatment phases is very important for achieving the desirable outcomes: proper alignment, periodontal stability and longterm esthetics.[4] Compromised surgical and biomechanics procedures may result in complications and unpredictable outcomes.

Dr. Bill Chuanwei Su,
Director, Newton Implant Center
Associate Editor, Journal of Digital Orthodontics (Left)

Dr. Chris Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Center)

Dr. W. Eugene Roberts,
Editor-in-chief, Journal of Digital Orthodontics (Right)

Fig. 1: Pre-treatment facial photographs

Fig. 2: Pre-treatment intraoral photographs

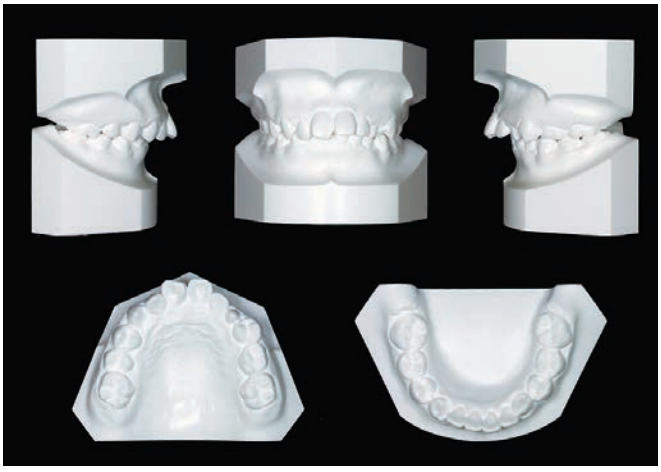


Fig. 3: Pre-treatment study models (casts)

Fig. 4: Post-treatment facial photographs (Phase I)

Fig. 5: Post-treatment intraoral photographs (Phase I)

Fig. 6: Post-treatment study models (casts) (Phase I)

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA° (82°)	84°	84°	0°
SNB° (80°)	82°	83°	1°
ANB° (2°)	2°	1°	1°
SN-MP° (32°)	24°	27°	3°
FMA° (25°)	17°	20°	3°
DENTAL ANALYSIS			
U1 To NA mm (4 mm)	9 mm	6 mm	3 mm
U1 To SN° (104°)	124°	111°	13°
L1 To NB mm (4 mm)	3 mm	4 mm	1 mm
L1 To MP° (90°)	101°	103°	2°
FACIAL ANALYSIS			
E-LINE UL (2-3 mm)	1 mm	0 mm	1 mm
E-LINE LL (1-2 mm)	0 mm	0 mm	0 mm
%FH: Na-ANS-Gn (53%)	55%	58%	3%
Convexity: G-Sn-Pg' (13°)	8°	8°	0°

■ Table 1: Cephalometric summary for Phase I treatment

Kokich[4] proposed three surgical methods for uncovering labially impacted maxillary canines based on the position of the cuspid crown relative to the mucogingival junction (*MGJ*). If the crown is occlusal to the MGJ, it is exposed by excising the overlying gingiva. For crowns penetrating the labial plate of bone, but apical to the MGJ, an apically repositioned gingival flap is recommended. Deep bony impactions require the closed eruption technique. However, the latter may be difficult to apply if the impaction is horizontal, severely displaced and/or contacting the roots of adjacent teeth. Routine traction in the occlusal direction may result in severe root resorption of adjacent teeth.

Zadeh[5] developed a novel periodontal surgical procedure that is a minimally invasive approach for managing multiple contiguous defects in the maxillary anterior region. Vestibular incision subperiosteal tunnel access (*VISTA*) was originally designed to coronally reposition gingival margins to correct periodontal defects.[5-7] Chang[8] adapted the VISTA technique for the surgical management of labially impacted, transposed canines. The procedure minimizes invasive surgery, optimizes esthetic outcomes, and limits the threat of external root resorption. The purpose of this case report is to document the use of the VISTA method for managing a transposed, labial impaction of a maxillary canine.

Diagnosis and Etiology

A 11 yr 1 mo male presented with his parents for orthodontic consultation to evaluate an unerupted maxillary left canine (*UL3*) (*Figs. 1-3*). There was no contributing medical or dental history other than a small unilateral UL deciduous canine that was retained. Clinical examination revealed an acceptable facial profile, with overbite and overjet of about 10 and 7mm, respectively (*Figs. 2 and 3*). There was a buccal posterior cross-bite of the upper left first premolar and about 7mm of crowding in the upper arch. The sagittal relationship was a full-cusp Class II malocclusion (*Figs. 2 and 3*). For direct comparison with the pretreatment condition, the Phase I post-treatment records are presented in Figs. 4-6 The treatment is also documented with pretreatment (*Fig. 7*) and post-treatment (*Fig. 8*) radiographs. Cephalometric measurements are

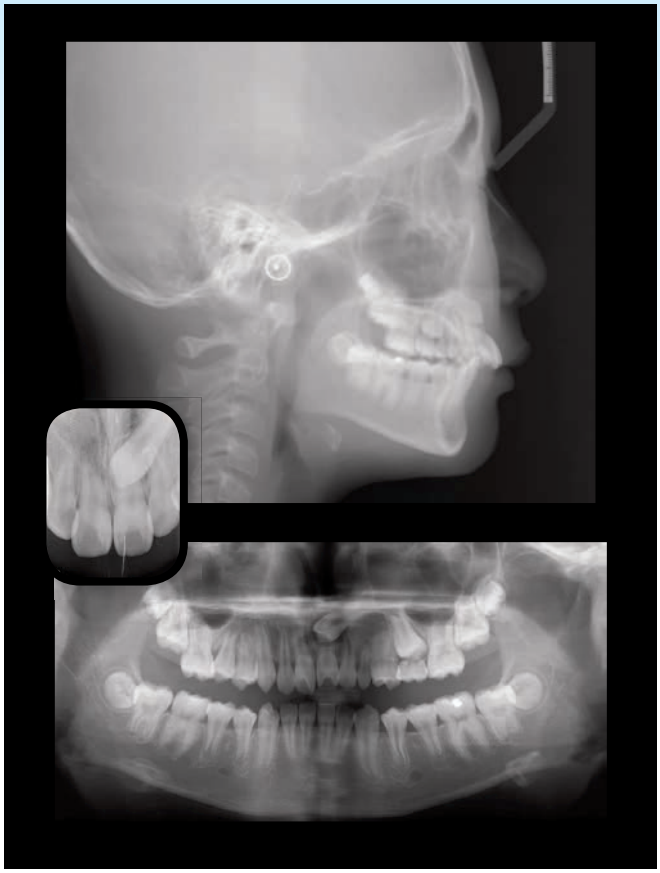


Fig. 7:
Pre-treatment panoramic and lateral cephalometric radiographs show a large overjet and a highly positioned impacted canine.

Fig. 8: Phase I
Post-treatment panoramic and lateral cephalometric radiographs show a normal overjet and overbite, and repositioned impacted canine.

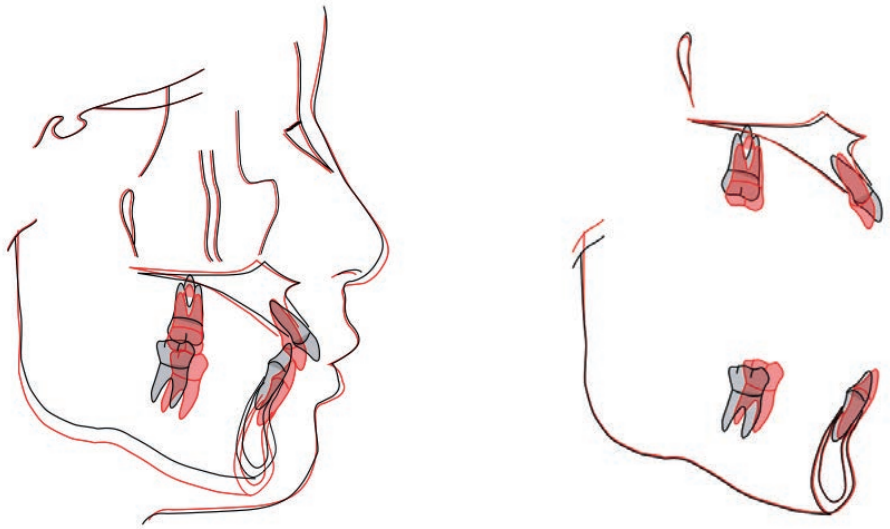


Fig. 9: Phase I
Initial (black) and completed (red) cephalometric tracings are superimposed on the anterior cranial base (left), as well as on the stable skeletal structures of the maxilla (upper right), and mandible (lower right). The superimposed mandibular image shows the growth in condylar length that contributes to the increased facial height.

presented in Table I, and superimposed tracings are shown in Fig. 9.

Pre-treatment CBCT images (*Figs. 10 and 11*) show the position of the impacted and transposed UL3. The high position of the horizontal impaction requires some form of closed eruption.[4] Severe transposed labial impactions are best managed with Zadeh's[5] VISTA procedure (*Fig. 12*) as modified by Chang et al.[6-8] (*Fig. 13*) for submucosal retraction of the transposed impaction (*Fig. 14*).

Specific Objectives of Treatment

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

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

Maxillary Dentition

- A - P: *Retract incisors*
- Vertical: *Allow extrusion consistent with normal growth*
- Inter-molar Width: *Maintain*

Mandibular Dentition

- A - P: *Slight protraction consistent with normal growth*
- Vertical: *Allow extrusion consistent with normal growth*
- Inter-molar / Inter-canine width: *Maintain*

Facial Esthetics

- Increase lower facial height and lower lip protrusion

Treatment Alternatives

The ideal objective(s) for full fixed appliance treatment was to resolve the malocclusion and align the impacted cuspid. Two treatment plans were proposed: Option 1 was a non-extraction treatment to align the entire permanent dentition, and Option 2 was a surgical removal of the impacted canine, substitution of the missing canine with the adjacent first premolar, and extraction of the other three first premolars. After discussing the pros and cons of each option with the patient and her parents, they selected Option 1: Non-extraction treatment divided into two phases to initially correct the impaction and then complete the final alignment after the second molars erupted.

Fig. 10:
CBCT image shows a labially-positioned and impacted UL3 impinging on the root of the UL1.

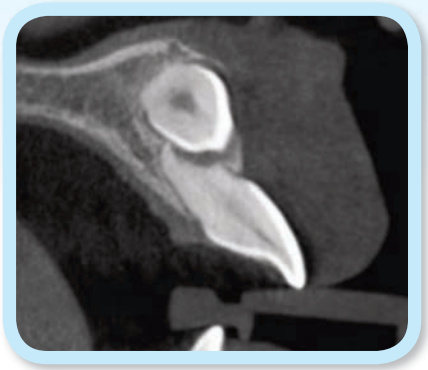


Fig. 11:
The image shows that half of the root of the central incisor is resorbed as result of the impaction.

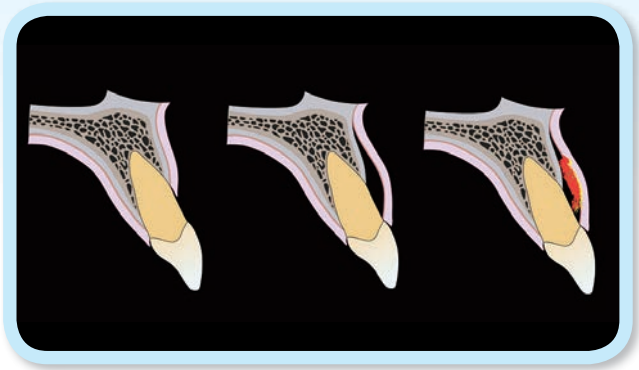


Fig. 12:
As shown from left to right, the VISTA procedure is a novel, minimally invasive approach for undermining the labial mucosa to correct soft tissue defects in the maxillary anterior region. See text for details.

1. Phase I:
    - Use of the vertical incision subperiosteal tunnel access (*VISTA*) technique to uncover the impacted canine, and then reposition it (*Fig. 14*) with a power chain anchored with an IZC OBS.
    - Damon Q® brackets (*Ormco, Glendora, CA*) a passive self-ligating (*PSL*) fixed appliance utilizing low torque brackets in the maxillary segment.
    - Class II elastics as needed to correct the sagittal molar discrepancy.
    - Frenectomy of the maxillary labial frenum.
2. Phase II: after the second molars are in full occlusion, align the entire dentition with a full fixed appliance.
3. Final Records: at two year follow-up after completion of Phase I treatment

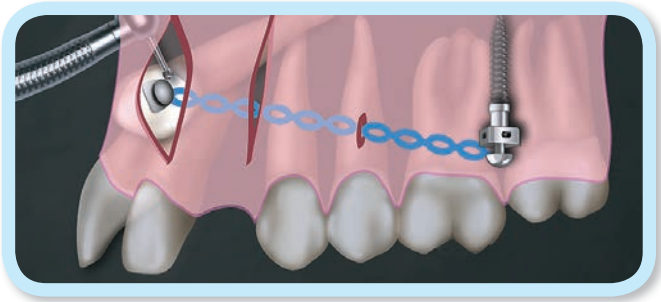


Fig. 13:
The VISTA technique is modified for submucosal retraction and uprighting of a labially positioned and transposed canine impaction. See text for details. The illustration was provided by Rungsi Thavarungkul.

Fig. 14:
VISTA retraction of the impaction is superimposed on an intraoral labial photograph to show the interior and exterior aspects of the mechanism. See text for details.

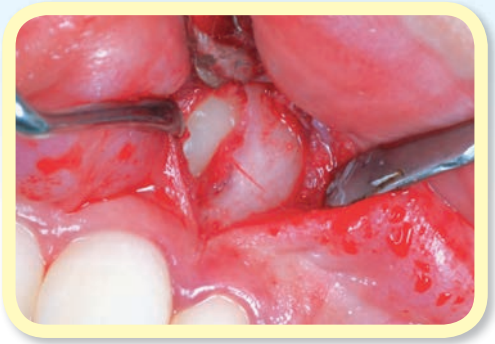


Fig. 15:
The first incision is made to expose the bone covering the crown of the impaction prior to removing it.

Fig. 16:
The second incision exposes the bone along the traction route in preparation for removing all obstacles.

Appliances and Treatment Progress

If the impacted UL3 was moved inferiorly, with a routine closed eruption method,[4] additional root resorption is likely. It was necessary to design a sequence of treatment that retracted the impacted canine and moved it distally into its correct position in the arch. The method selected was the VISTA periodontal surgery procedure, devised by Zadeh[5] in 2011 (*Fig. 12*), and modified by Chang et al.[6-8] for the management of labiobuccal impactions in the maxillary arch (*Fig. 13*). The method is well suited for retracting maxillary canines that impinge on the labial surface of the adjacent incisors (*Fig. 14*). The original design[5] of the VISTA procedure utilized vertical, parallel incisions in the alveolar mucosa to produce tunnels for soft tissue grafts. However, a variation of the procedure (*Figs. 15-20*) utilizes the same subperiosteal tunneling procedure to produce a path for submucosal retraction of the impacted canine.

Fig. 17:
A button with a power chain attached is bonded on the crown of the impaction.

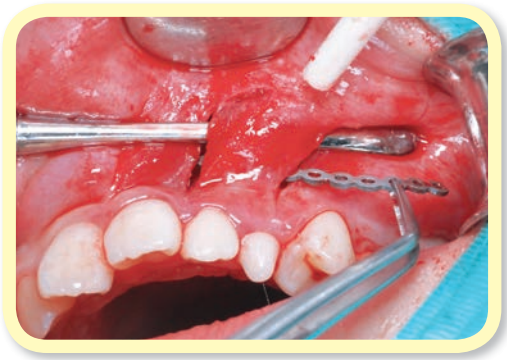


Fig. 18:
The power chain is pulled through the undermined tunnel between the first two incisions.

The initial surgery to expose the impaction involved a variation of the VISTA procedure designed to coordinate with an orthodontic retraction mechanism anchored by an OBS® (*Newton's A, Hsinchu City, Taiwan*) placed in the left infra-zygomatic crest (*IZC*). A button was bonded to the crown of the impaction and an elastic chain was attached to provide anchorage for the traction and uprighting. Bone in the planned path of retraction was removed with a #4 carbide round bur to facilitate tooth movement.

A 3-D image (*CBCT*) provided accurate and detailed information on the location of the impaction relative to the maxillary incisors. With that knowledge a vertical incision (*1st incision*) was performed between the central and lateral incisors (*Fig. 13*). VISTA technique uses only vertical incisions (*Fig. 14*) because horizontal incisions may disrupt the blood supply of the gingiva.[5,6] Following the initial incision, a periosteal elevator was used to detach the periosteum and expose the impaction (*Fig. 15*), after which the bone covering the crown was removed down to the cementoenamel junction (*CEJ*). Then a second incision was performed above the primary canine to expose and remove the bone in the proposed path of tooth movement (*traction route*) (*Fig. 16*). When the crown had been fully exposed, a button was bonded on the labial surface, and a power chain was attached (*Figs. 17 and 18*). A third incision was performed to allow the power chain to exit the soft tissue and extend to the IZC OBS (*Figs. 18 and 19*). This independent force system provided the necessary retraction force, without producing undesired side effects on other teeth. After engaging

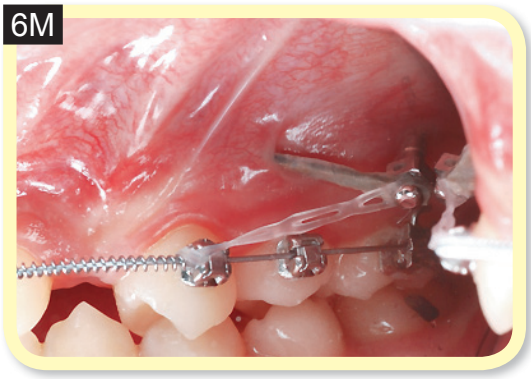
Fig. 19:
The first two incisions are closed and the power chain exits a third small incision en route to the IZC bone screw. See text for details.

Fig. 20:
This buccal view shows the wound one month after VISTA surgery.

Fig. 21:
Five months after VISTA surgery, a 0.014-in CuNiTi maxillary arch wire is placed with a plastic sleeve to prevent soft tissue irritation.

the force, the two vertical incisions were sutured using 6-0 Nylon to ensure minimal damage to the mucosa (*Fig. 19*). Fig. 20 shows good wound healing of the incision around the exit tunnel for the power chain.

■ *Fig. 22:*
The occlusal view in the 5th month of treatment shows that the UL1 and UL2 were not bonded. An open coil spring was inserted to open space between the UR1 and UL4.



■ *Fig. 23:*
At the 6th month of treatment, the soft tissue is well healed and healthy. An IZC miniscrew anchors the power chains that retract the impaction and the UL4. See text for details.

Five months after the VISTA surgery, a self-ligating fixed appliance (*Damon Q®, Ormco Corporation, Glendora, CA*) were bonded on all permanent teeth, except for the left central and lateral incisors, and an 0.014-in CuNiTi arch wire was engaged (*Fig. 21*). One month later, a closed coil spring was inserted between the brackets on the right central incisor and the left first premolar to create space for the impacted cuspid (*Fig. 22*). Note that the unbonded left central and lateral incisors act as free bodies to avoid interference with the path of retraction which might result in more root resorption.[11] A light power chain from the OBS was attached to the archwire mesial to the upper first premolar bracket (*Fig. 23*) to retract the Class II left buccal segment (*Fig. 3*). After 6 months of VISTA retraction, the impaction was aligned to extrude into the desired position. A series of panoramic x-rays demonstrate this sequence of pre-eruptive tooth movement (*Figs. 24-26*).

In the 7th month of active treatment, a follow up surgery was performed to attach a new power chain from the impacted cuspid to the main wire (*Fig. 27*). Six months of traction extruded the impacted canine so that it could be bonded with a bracket and engaged on the 0.016-in CuNiTi archwire.

Once the canine recovery was completed, at 17 months of active treatment, Damon Q® low torque brackets were bonded on the lower arch (*Fig. 28*). The initial lower archwire was 0.014-in CuNiTi and Class II elastics (*Parrot 5/16-in 2-oz, Ormco, Glendora, CA*) were worn from the upper canines to the lower first

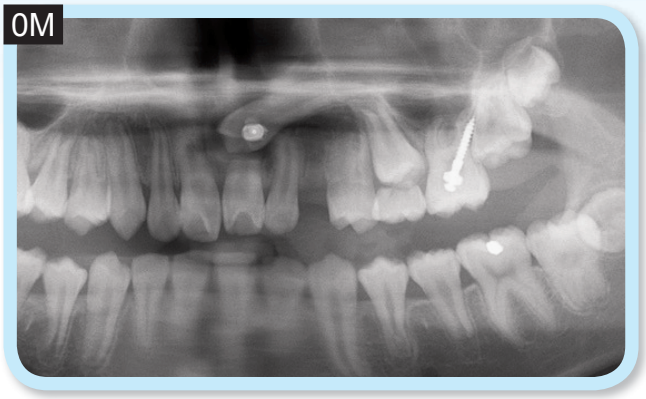


Fig. 24:
A panoramic radiograph was exposed on the day of surgery. The original position of the impaction is labial to the apex of the central incisor (UL1).

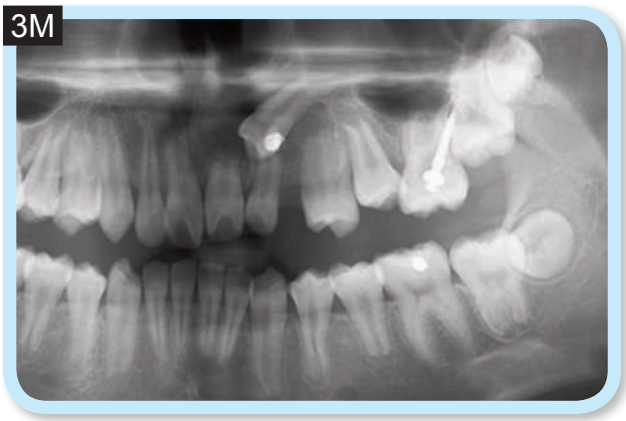


Fig. 25:
After 3 months of distal traction, the impaction is passing labial to the root of the lateral incisor (UL2).

Fig. 26:
After 6 months of distal traction, the crown of the impacted UL3 is well positioned for efficient extrusion into the maxillary arch.

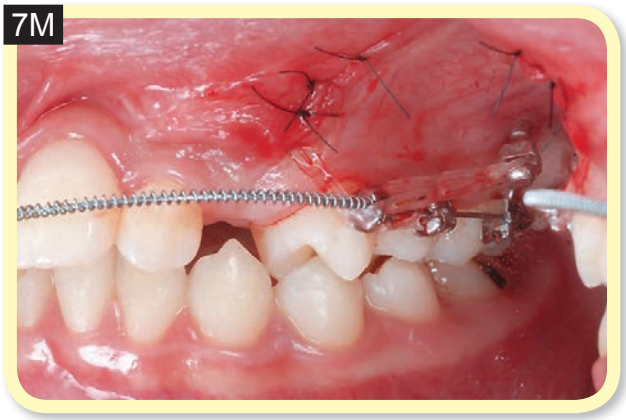


Fig. 27:
At 7 months of active treatment a power chain is surgically connected between the impaction and the UL4. See text for details.

molars bilaterally. Bite turbos were bonded on the occlusal surfaces of both lower first molars (*Fig. 29*) to enhance patient comfort as the bite was opened. The patient was instructed to wear the 2-oz elastics full time, and to replace them with new ones at least four times per day, preferably after meals or snacks. Following four months of intermaxillary elastics, the Class II molar relationships were improved. Torque springs were used on the maxillary canines to increase their axial inclination (*Fig. 30*).

In the 26th month of active treatment, a second OBS was inserted in the right IZC, and an elastomeric chain was attached to the upper right canine to

correct the buccal interdigitation and midline discrepancy (*Fig. 31*). Four months later (*30th month of treatment*), adjustments in a 0.017x0.025-in TMA archwire were used to finish the maxillary anterior segment (*Fig. 32*).[10] During the last two weeks of treatment, occlusal contacts were improved with bilateral intermaxillary elastics (*Fox 1/4-in 3.5-oz*) (*Fig. 33*). After 31 months of active treatment, all appliances were removed and two retainers were delivered: an upper clear overlay and a maxillary

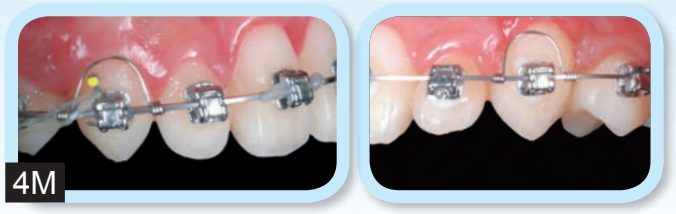


Fig. 30:
In the 4th month of lower arch treatment, torque springs were used for palatal torque on the maxillary canines bilaterally.

Fig. 28:
At 17 months of active treatment the impacted canine is fully erupted and aligned. See text for details.

Fig. 31:
At 26 months into treatment, the Class II molar relationships were improved, and torque springs were continued on the maxillary canines to deliver palatal root torque.

Fig. 29:
Bite turbos were bonded to the occlusal surface of the lower first molars.

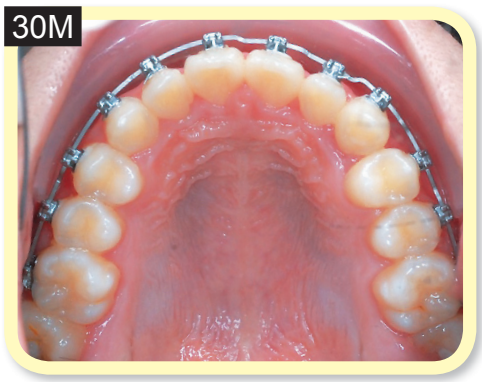


Fig. 32:
At the 30th month of treatment, finishing bends were made in the 0.017x0.025-in TMA archwire.

Fig. 33:
During the last two weeks of active treatment, vertical elastics (Fox ¼-in 3.5-oz) were used to improve occlusal contacts.

Fig. 34:
Following the termination of active treatment, the maxillary labial frenum was removed with a diode laser and post-op healing is shown two months later.

anterior 2-2 fixed. The maxillary labial frenum was reduced with a diode laser (*Fig. 34*). Fig. 35 is panel of intraoral photographs and radiographs showing the alignment of the impacted canine pre-treatment, post-treatment, and at two year follow-up. One year post-treatment, all four second molar were erupted and a similar fixed appliance was installed to correct posterior tooth alignment (*Fig. 36*). Six months later, fixed appliances were removed and post-treatment intraoral photos were obtained (*Fig. 37*).

Results Achieved

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

- A - P: *Maintained*
- Vertical: *Growth and clockwise rotation to improve the mandibular plane angle*
- Transverse: *Maintained*

Maxillary Dentition

- A - P: *Incisors retracted to improve axial inclination (124 to 111˚)*
- Vertical: *Molars extruded*
- Inter-molar / Inter-canine Width: *Increased*

Mandibular Dentition

- A - P: *Incisors slightly protracted from 101 to 103˚*
- Vertical: *Molars extruded*
- Inter-molar / Inter-canine Width: *Maintained*

Facial Esthetics

- Upper and lower lip: *Position maintained*

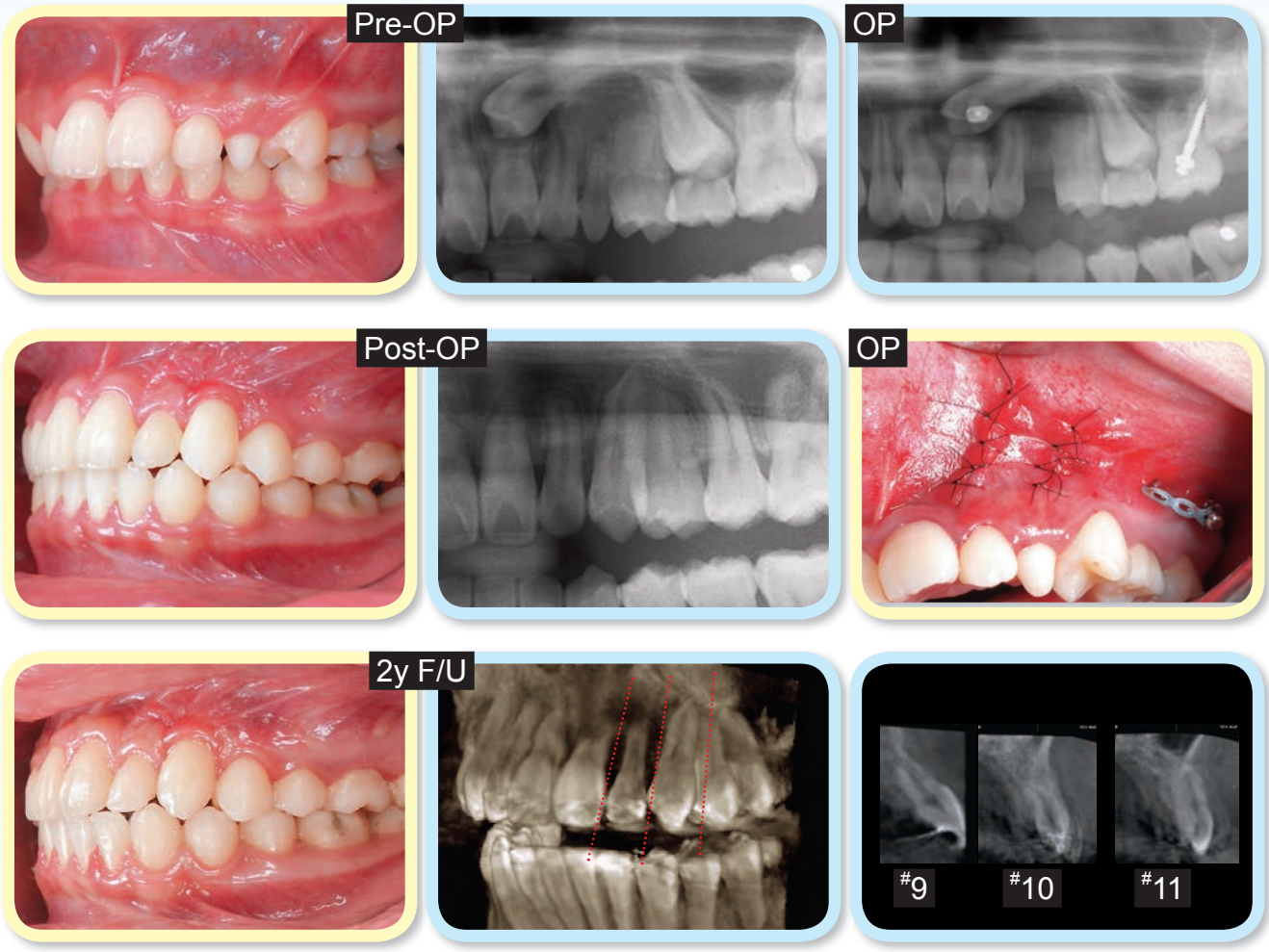


Fig. 35:
A panel of six intraoral photographs and radiographs on the left shows the pre-treatment condition, post-treatment outcome, and two year stability of an impacted UL3. The vertical panel of three shows the VISTA post-op radiograph (upper) and intraoral view (middle). The bottom right shows CBCT cuts from the post-treatment scan revealing the optimal healing and post-treatment recovery of the UL1(#9), UL2 (#10), and UL3 (#11). See text for details.

Retention

A fixed retainer was bonded on the palatal surface of all maxillary incisors. A clear overlay retainer was delivered for the upper arch and the patient was instructed to wear it full time for the first 6 months and nights only thereafter. Instructions were provided for oral hygiene and maintenance of the retainers.

Fig. 36:
Phase II Treatment: After the second molars erupted, a full fixed appliance was installed for final alignment.

Fig. 37:
Phase II Treatment Finish: The final facial and intraoral photographs were obtained at the two year follow-up which, which is six months after completion of Phase II treatment to improve the final alignment. See text for details.

Final Evaluation of Treatment

The facial profile was maintained and the lower dental midline was shifted slightly to the right. The pre-treatment and post-treatment cephalometric tracings reveal that the SN to mandibular plane angle were increased 3˚ due to condylar growth and the clockwise rotation of the mandible. The axial inclination of the upper incisors to SN was decreased from 124˚ to 111˚. The lower incisors were flared about 2˚. All of the molars were extruded as the vertical dimension of occlusion was increased. The CRE score was 26 points as shown in the subsequent work sheet as described by Huang.[12] Most of the points deducted were for alignment and marginal ridges. A post treatment panoramic radiograph was exposed to check the root angulation (*Fig. 8*). Seven points were deducted from the P&W esthetic score, as documented in the form at the end of this report.[9]

Although the conservative treatment plan required 31 months of active treatment, the patient and parents were very pleased with the outcome. However, the second molars were erupting in undesirable positions so at one year recall the dentition was realigned as previously described. At the two year follow-up, intraoral photographs and a CBCT were obtained and compared to the pre-treatment and post-treatment records (*Fig. 35*). Despite the initial root resorption of the incisors, teeth #9-11 (*UL6-8*) achieved good bone support and all of the teeth were vital.

Discussion

This patient had a high labial impaction of the UL3 that was transposed to the midline and infringing on the labial root surface of the UL1 and UL2. When determining the optimal treatment plan, it is helpful to tabulate the advantages and disadvantages of each plan to determine if extraction of the impaction or first premolars is indicated. No treatment plan is perfect so a decision must be made on the pros and cons of each approach. If the impacted canine was extracted and substituted with the adjacent first premolar, the main problems would be asymmetric smile esthetics and a Class II molar relationship on the left side. Surgical uncovering and orthodontic traction were started immediately because there was a concern that the impacted canine could cause further damage to the roots of the central and lateral incisors (*Fig. 11*). A disadvantage of commencing comprehensive fixed appliance treatment prior to eruption of the second molars is the final alignment is compromised if the 7s do not erupt in an ideal position. To achieve an ideal result, two phases of active treatment were needed. Phase I corrected the impaction and alighed the teeth from first molar to first molar, but a second phase of treatment was required to align the second molars and finish the occlusion.

Three surgical approaches were proposed based on the position of the impaction.[4] The open window method is recommended for palatal impactions because they usually erupt spontaneously into the oral cavity. The closed eruption technique and an apically positioned flap (*APF*) are the most common procedures for impactions on the facial surface of the arch. The optimal approach depends on the position of the impaction to adjacent tooth roots and the condition of the supporting soft tissue. One of the main problems with the closed eruption technique is the difficulty in obtaining tension release of the flap during the uncovering procedure. Conversely APF presents a similar challenge during wound closure. The apical repositioning of the soft tissue makes it difficult to precisely control the flap margin. The closed eruption and APF techniques are suitable for vertical but not horizontal traction to recover impactions.[8] For the present patient, the labially impacted canine is considered to be "*high*" because it is positioned against the roots of the UL1 and UL2. Neither vertical or distal traction is possible without further compromising the incisor roots. The VISTA approach is an excellent alternative because the impaction can be tipped to the labial and away from the incisor roots, and then uprighted and retracted to its correct position in the arch.

Zadeh[5] developed a novel, minimally invasive approach for isolated recession defects and multiple contiguous periodontal defects in the maxillary anterior region (*Fig. 12*). The VISTA approach avoids several of the shortcomings of the intrasulcular tunneling techniques used for periodontal root

coverage. It provides broader access to the vestibule and a single vestibular incision can provide access to the entire region. VISTA allows visualization of the underlying alveolar bone and root dehiscences. In addition it is compatible with connective tissue and particle bone grafts for managing gingival recession with a bony defect (*Fig. 12*). This article describes a minimally invasive modification of the VISTA technique for managing canine impactions that are positioned labially to the adjacent incisors. This approach has the esthetic advantage of positioning the IZC screw head near MGJ so that the mechanics are less noticable. An IZC anchored power chain to the transposed canine provides a more superior line of force to retract and upright it, while avoiding further root resorption of the adjacent incisors (*Fig. 13*). The IZC is on the inferior aspect of the zygomatic process. The osseous process terminates on the buccal aspect of the alveolar process between the first and second molars.[13-15] This position allows the bone screw to pass buccal to the molar roots and then penetrate the thick bone superior to the molars. A properly positioned head of an IZC screw provides the correct line of force to retract labially impacted canines.

Conclusions

The VISTA method was designed as a flapless surgical technique to minimize trauma to soft tissue associated with gingival revisions. It facilitated wound care and the healing process was more comfortable for the patient. An additional advantage is decreased tension of the wound edges to facilitate closure with direct loop interrupted sutures. The VISTA approach, as modified for recovery of labial impactions, is more comfortable for the patient, enhances the wound healing process, and provides for submucosal retraction of a transposed tooth. This approach is well suited for surgical management of labial impactions in the esthetic zone (*Fig. 13*).

Acknowledgement

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 36

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 = 5

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 = 4

OCCLUSION

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

Total = 8

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 2

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. = 3

1 to MP ≥ 99° = 1 pt.

Each degree > 99° _____ x 1 pt. = 3

Total = 6

OTHER (See Instructions)

Supernumerary teeth	_____	x 1 pt. =	_____
Ankylosis of perm. teeth	_____	x 2 pts. =	_____
Anomalous morphology	_____	x 2 pts. =	_____
Impaction (except 3rd molars)	1	x 2 pts. =	2
Midline discrepancy (≥3mm)		@ 2 pts. =	_____
Missing teeth (except 3rd molars)	_____	x 1 pts. =	_____
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	2	x 2 pts. =	4

Identify: Highly positioned impacted canine
Severe root resoption

Total = 6

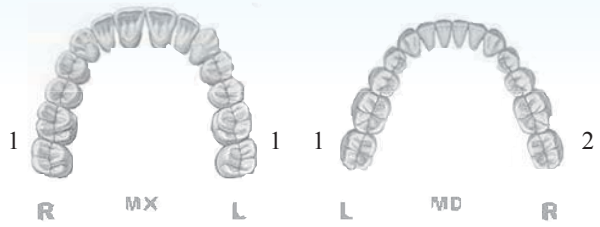
Cast-Radiograph Evaluation

Case # 1 **Patient**

Total Score: 26

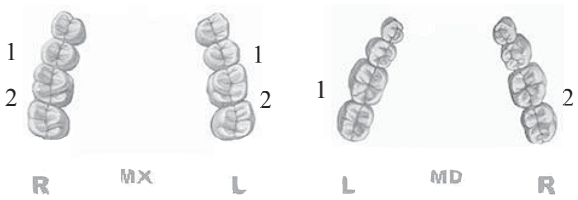
Alignment/Rotations

5



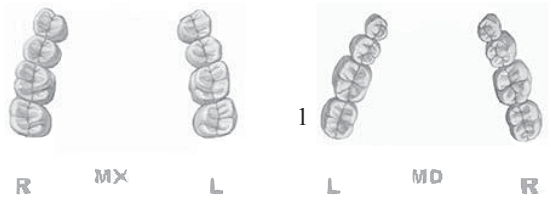
Marginal Ridges

9



Buccolingual Inclination

1

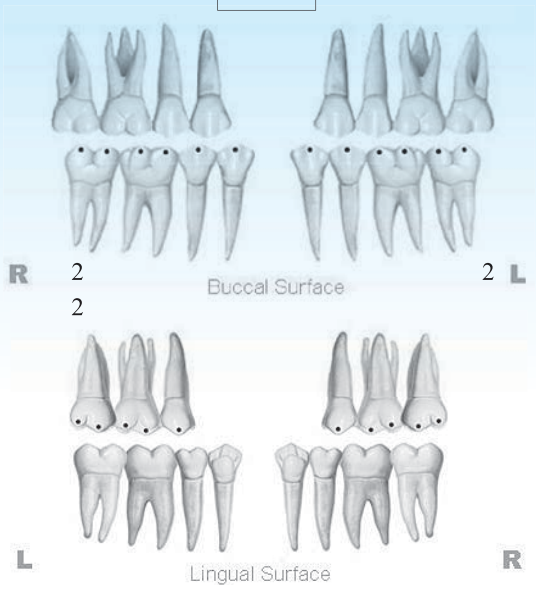


Overjet

3

Occlusal Contact

6

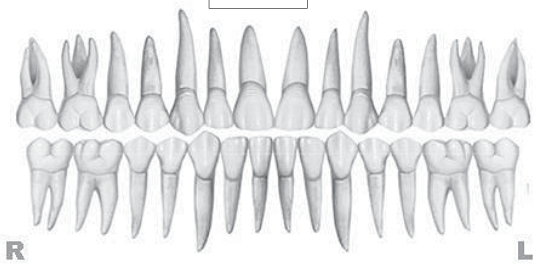


Occlusal Relationships

0

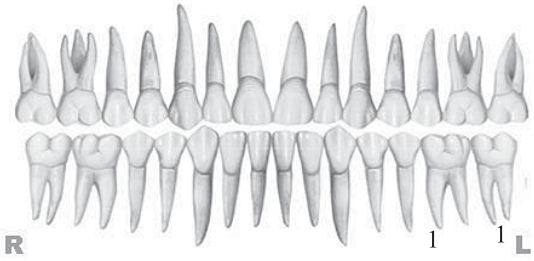
Interproximal Contacts

0



Root Angulation

2



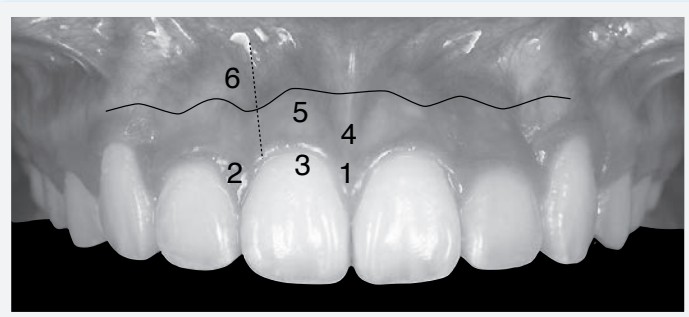
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

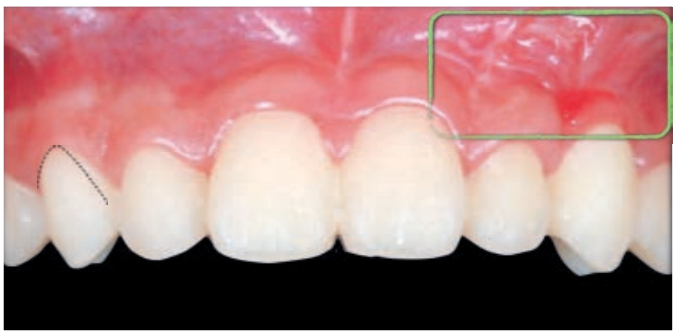
Total Score: = 7

1. Pink Esthetic Score

Total = 3



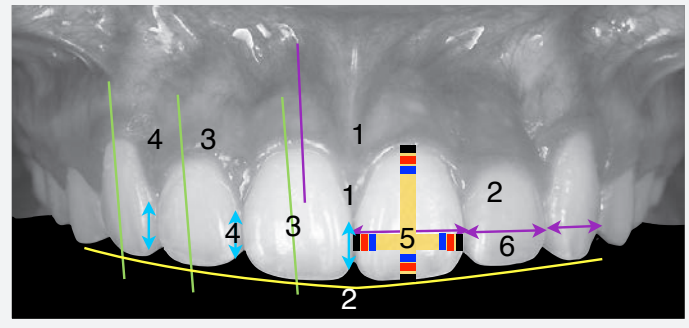
1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2



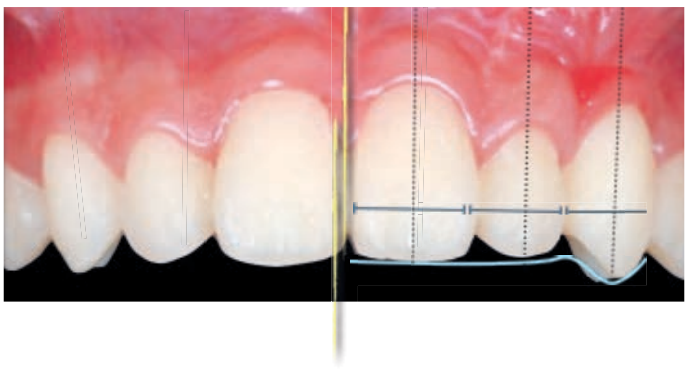
1. M & D Papilla	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	(0)	1	2
4. Level of Gingival Margin	0	(1)	2
5. Root Convexity (Torque)	0	(1)	2
6. Scar Formation	0	(1)	2

2. White Esthetic Score (for Micro-esthetics)

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 (1:0.8)	0	1	2
6. Tooth to Tooth Proportion	0	1	2



1. Midline	0	(1)	2
2. Incisor Curve	0	(1)	2
3. Axial Inclination (5°, 8°, 10°)	0	(1)	2
4. Contact Area (50%, 40%, 30%)	(0)	1	2
5. Tooth Proportion (1:0.8)	(0)	1	2
6. Tooth to Tooth Proportion	0	(1)	2

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1/25~26, 2019 (五，六 - 美國演講，畢業典禮)
9/22~24, 2018 (六，一 - 演講與實作 workshop)
1/21~22, 2019 (一 ，二 - 美國演講)
1/24, 2019 (四 - 美國可選修的 cadaver workshop)
1/27, 2019 (日 - 美國可選修的cadaver workshop)

地點：

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Millennium Biltmore Hotel Los Angeles. 506 South Grand Avenue. Los Angeles, CA 90071-2607 (2018年1月)

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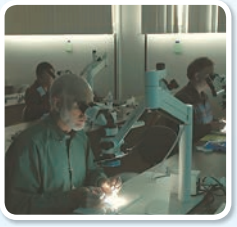


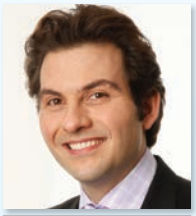
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Dental Clinic Established 1996

2018 Session A: 05/22-25 (Full) Session B:12/04-07 (Full)
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Course Schedule

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1. VISTA for Screw Placement
2. VISTA for Connective Tissue Graft
3. Suture Techniques

Day 1	Chair-side observation
Day 2	Lecture, Model workshop, Chair-side observation
Day 3	VISTA Lecture, Lecture by Dr. John Lin, VISTA workshop
Day 4	Keynote workshop

KEYNOTE

Dr. Rungsi Thavarungkul, Thailand
Lecturer, Advanced Keynote Workshop

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

THE LECTURERS

Dr. Chris Chang

CEO, Beethoven Orthodontic and Implant Group. He received his PhD in bone physiology and Certificate in Orthodontics from Indiana University in 1996. As publisher of ***International Journal of Orthodontics & Implantology,*** he has been actively involved in the design and application of orthodontic bone screws.

Dr. John Lin

President of the Jin-Jong Lin Orthodontic Clinic. Dr. Lin received his MS. from Marquette University and is an internationally renowned lecturer. He's also the author of Creative Orthodontics and consultant to ***International Journal of Orthodontics & Implantology.***

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International Workshop

Damon, Insignia, OBS & VISTA

2019

	Session A	Session B
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Keynote optional	05/24	12/06

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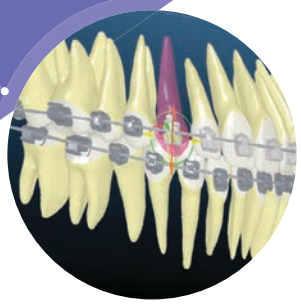

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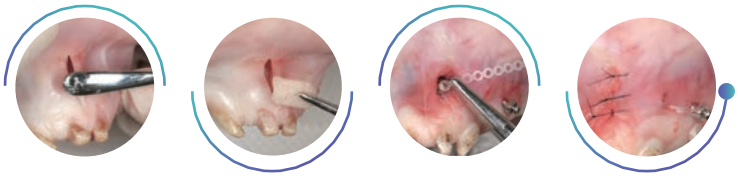

VISTA Vertical Incision Subperiosteal Tunnel Access

Registration:

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

For more information and registration, visit

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Course Schedule

Day 1

Damon Lecture, OBS model workshop, chair-side observation

Chris' Lecture:
Optimized Orthodontic Treatment with Damon system

Day 2

Insignia Lecture, Insignia Chair-side observation

Chris' Lecture:
CBCT-enhanced treatment plannning for Insignia

Day 3

CI III Lecture by Dr. John Lin, VISTA Lecture & workshop

* The topics for VISTA workshop:

1. VISTA with Screw Placement
2. VISTA with Connective Tissue Graft
3. Suture Technique

Prof. Dr. Paulo Fernandes Retto, Portugal

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

Damon, OBS & VISTA

Day 4

Keynote workshop (Optional)

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

Dr. Rungsi Thavarungkul, Thailand
Lecturer, Advanced Keynote Workshop

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

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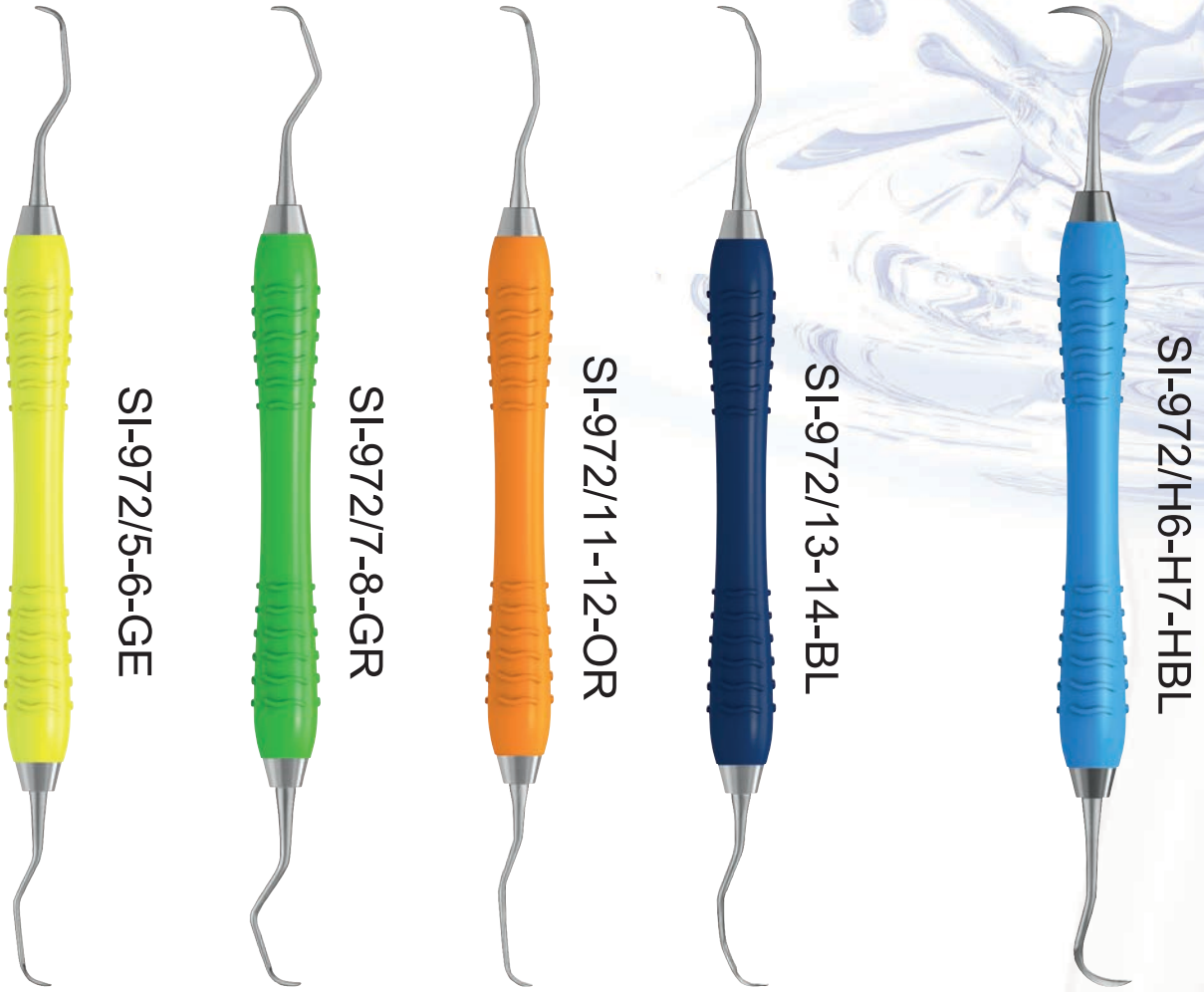

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Non-Extraction Treatment of Pseudo-Class III Anterior Cross-Bite Complicated by Severe Crowding, Deep-Bite and Clenching

Abstract

Anterior cross-bite is a major esthetic and functional concern for patients and their parents. Based on the Lin 3-ring diagnosis, a 13 year-old boy was diagnosed as a pseudo-Class III malocclusion, associated with anterior cross-bite (overjet = -3mm), deep-bite (overbite = 8mm), severe crowding (-9/-2mm), concave profile, and inadequate maxillary incisor exposure. There was an anterior functional shift on mandibular closure, and the mandible could be manipulated to an edge-to-edge incisal occlusion, when the condyles were positioned in centric relation. The Discrepancy Index (DI) was 23. A passive self-ligation appliance, bite turbos on lower first molars, and early light short intermaxillary Class III elastics (ELSE) were used to correct this severe malocclusion in only 20 months. The Cast-Radiograph Evaluation (CRE) score was 23. At the finish, several morphologic features were noted that appear to reflect parafunction (clenching): relatively deep-bite, increased axial inclination (flaring) of the maxillary incisors, and the mandibular plane failed to open as expected. The flared maxillary incisors resulted in an unfavorable Pink & White dental esthetic score of 6. Long term follow up is indicated to control parafunction, open the bite, retract the maxillary incisors, and evaluate the potential for late mandibular growth to produce a skeletal Class III malocclusion. (J Digital Orthod 2018;50:78-94)

Key words:

pseudo-Class III, non extraction, crowding, cross-bite, deep-bite, passive self-ligating appliance, parafunction, clenching

Introduction

A 13 year-old male presented for orthodontics consultation with blocked-out maxillary canines, severe crowding, anterior cross-bite and deep overbite. He had a decreased vertical dimension of occlusion (*VDO*), lip redundancy, mildly concave profile, and a slightly protrusive lower lip (*Figs. 1-3*). This case report demonstrates effective treatment with passive self-ligating brackets, open coil springs, and early light short elastics (*ELSE*), bilaterally. Conservative treatment was completed in 20 months without extractions or orthognathic surgery. The key to efficient treatment was an accurate diagnosis. It is important to define the etiology, and design a treatment plan that effectively reverses it.

Dr. Eric Hsu,
Instructor, Beethoven Orthodontic Course (left)

Dr. Chris Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Center)

Dr. W. Eugene Roberts,
Editor-in-chief, Journal of Digital Orthodontics (Right)

Fig. 1: Pre-treatment facial photographs, 13 y/o male

Fig. 2: Pre-treatment intraoral photographs

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

Diagnosis

The chief complaint was poor dental esthetics and function due to an anterior cross-bite. Medical and dental histories were non-contributory. A functional examination revealed that the mandible could be manipulated from centric occlusion (C_O) to a centric relation (C_R) to achieve an edge-to-edge incisal occlusion (*Fig. 4*). The probable etiology of the anterior cross-bite was deemed to be palatal ectopic eruption of the maxillary central incisors. The deep curve of Spee in the lower arch and >100% overbite suggested a history of parafunction (*clenching*).

Fig. 4: Bilateral views of occlusion in centric relation (C_R)

Fig. 5:
Pre-treatment cephalometric and panoramic radiographs document the original dentofacial morphology. The panoramic film reveals that the upper canines are impacted and/or subject to high labial eruption.

Cephalometric and panoramic radiographs documented the dentofacial patterns before treatment (*Fig. 5*).

Skeletal:

- Class I malocclusion (*SNA 82˚, SNB 83.5˚, ANB -1.5˚ in centric occlusion* (C_O).
- Normal mandibular plane angle (*SN-MP 31˚, FMA 24˚*).

Dental:

- Molar relationship in CO: *Class I on both sides*
- Canine relationship: *Class II due to ectopic eruption of both upper canines*
- Negative overjet: *-3mm*
- Deep overbite: *8mm (>100%)*
- Crowding: *-9mm in the upper and -2mm in the lower arch*
- Third molars: *All four still developing*
- Midlines: *Lower dental midline coincident with the facial midline, upper dental midline was shifted to the left ~2mm of the facial midline*
- Arch forms: *Symmetrical square in the maxilla, V-shape in the mandible*

Facial:

- Profile: *Slightly concave*
- Lips: *Short upper lip, slightly protrusive lower lip*
- Vertical dimension of occlusion (*VDO*): *Decreased*

The ABO Discrepancy Index (*DI*) was 23 as shown in the subsequent worksheet.

Based on Lin's 3-ring diagnosis,[1] the patient was diagnosed as a Pseudo-Class III malocclusion, associated with anterior cross-bite and deep-bite in C_O.

Treatment Objectives

Maxilla (*all three planes*):

- A - P: *Allow for normal expression of growth*

- Vertical: *Allow for normal expression of growth*
- Transverse: *Expand to correct crowding and occlude with the lower arch*

Mandible (*all three planes*):

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

Maxillary Dentition:

- A - P: *Increase the axial inclination of the upper incisors*
- Vertical: *Maintain*
- Inter-molar / Inter-canine Width: *Expand to occlude with expanded lower dentition*

Mandibular Dentition:

- A - P: *Decrease by retracting the incisors*
- Vertical: *Decrease by intruding the incisors*
- Inter-molar / Inter-canine Width: *Expand to an ideal arch form*

Facial Esthetics:

- Retract the lower lip, and increase the maxillary incisor exposure

Treatment Plan

Traditional treatment approaches are extraction, headgear or rapid palatal expansion (*RPE*). However, careful evaluation of the malocclusion and its etiology indicated a conservative non-extraction treatment with a full fixed orthodontic appliance to align and level the arches, as well as to correct the anterior cross-bite and deep-bite.

Appliances and Treatment Progress

A 0.022-in slot passive self-ligating (*PSL*) bracket system (*Damon D3MX®, Ormco, Glendora, CA*) was bonded on the lower arch, with standard torque brackets in the anterior segment. All archwires, elastics and accessories were supplied by the same manufacturer. Bite turbos were constructed by bonding self-cured glass ionomer cement on the occlusal surface of both mandibular first molars (*Fig. 6*). The bite was opened ~8mm at the incisors to correct the anterior crossbite. The initial lower archwire was 0.014-in CuNiTi, fitted with resin balls that were bonded on the ends of the archwires to avoid mucosal irritation.

The upper PSL bracket was bonded a month later with low torque brackets on central incisors.[2] NiTi open coil springs opened the maxillary canine spaces. To avoid root resorption, it was important to avoid engaging the maxillary lateral incisors on the archwire, when the canines were moved past their roots (*Fig. 7*).[3]

Fig. 6:
Bite turbos are constructed on the occlusal surfaces of the lower first molars for the correction of the anterior crossbite.

After 3 months of active treatment, two drop-in hooks were fitted into the vertical slots of lower first premolars for an ELSE[4] (*Quail 3/16-in 2-oz*). The patient was instructed to use a wooden tongue depressor to correct the anterior crossbite. The maxillary canines erupted spontaneously as space was provided (*Fig. 8*).

In the 7th month of treatment, brackets were bonded on the upper right (*UR*) and left (*UL*) canines, and the lower arch wire was changed to 0.018-in CuNiTi. Two months later, brackets were bonded on the UR and UL lateral incisors. The bite opening relative to the height of bite turbos was checked at every appointment to maintain the desired VDO. This maintenance is particularly important for patients prone to parafunction.

In the 11th month, the upper arch wire was changed to 0.014x0.025-in CuNiTi. There was an unexplained gumboil on the mucosa apical to the UR lateral incisor, but no other signs or symptoms of pathology. The following month, the lesion was gone, and there have been no further problems (*Fig. 9*). At the same appointment an 0.014x0.025-in CuNiTi lower arch wire was engaged.

In the 15th month, both archwires were changed to 0.017x0.025-in TMA. Two months later, a lingual

Fig. 7:
Open-coil springs were used for space creation and arch development.

Fig. 8:
Flowable resin was used to re-activate the open coil springs.

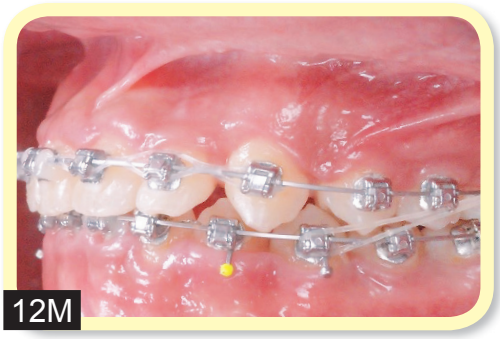


Fig. 9:
At eleven months (11M) a gumboil appeared of the root of the UL2 (yellow circle). One month later (12M) the unexplained gumboil disappeared.

button was bonded on each lower second molar and intermaxillary cross-elastics (*Chipmunk 1/8-in 3.5-oz*) were applied to correct the lingual inclination of the lower buccal segments.

In the 18th month, the anterior segments were ligated together with a stainless steel ligature, tied in a figure-eight pattern to maintain firm contact. The axial inclination of the lingually tipped mandibular second molars was corrected, so the bite turbos were removed. The upper arch wire was cut distal to the canines bilaterally, and intermaxillary elastics (*Kangaroo 3/16-in 4.5-oz*) were prescribed to settle the occlusion (*Fig. 10*).

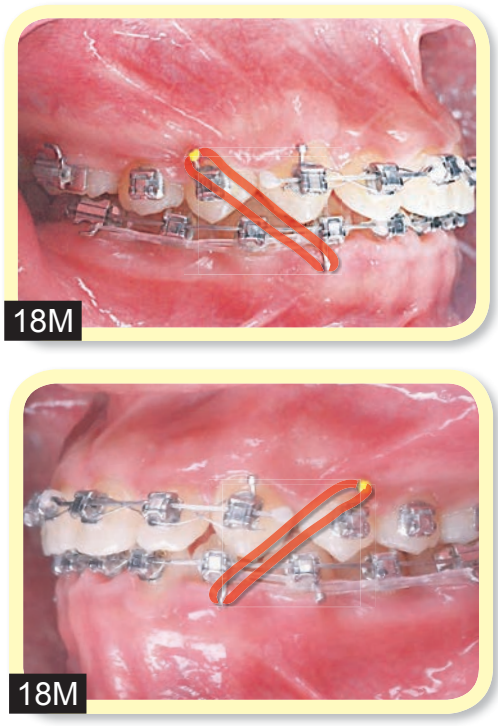


Fig. 10:
At eighteenth months (18M) the maxillary archwire was cut off distal to the canines, and the occlusion was settled with intermaxillary elastics.

After 20 months of active treatment, all fixed appliances were removed.

Results Achieved

As documented in Figs. 11-13, the patient was treated to the desired result, except for the ability to readily display his maxillary incisors when smiling. The cephalometric and panoramic radiographs before and after treatment are shown in Figs. 5 and 14, respectively. Superimposed cephalometric tracings are presented in Fig. 15, and a summary of cephalometric measurements is provided in Table 1.

Fig. 11:
Post-treatment facial photographs, after 20 months of active treatment.

Fig. 12: Post-treatment intra-oral photographs

Fig. 13: Post-treatment study models (casts)

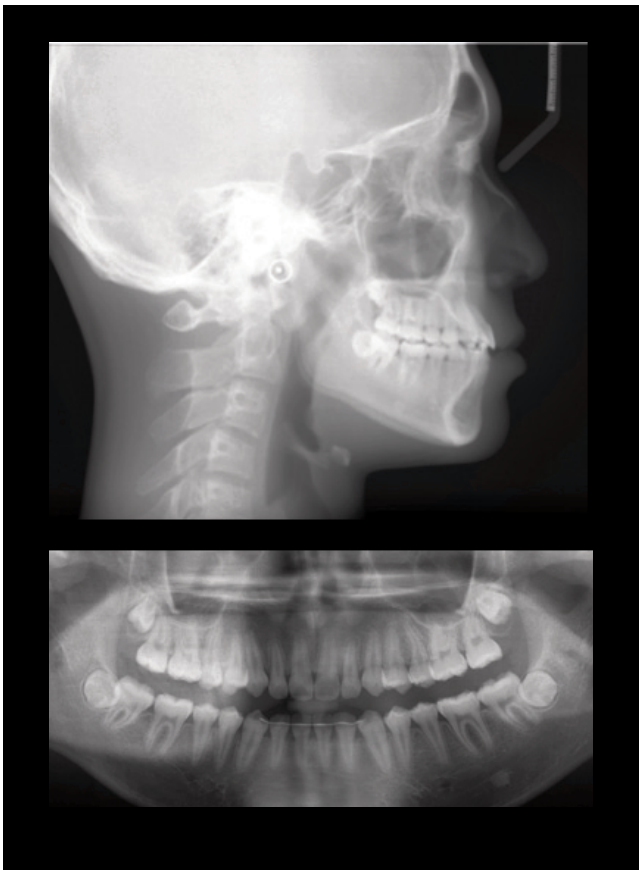


Fig. 14:
Post-treatment cephalometric and panoramic radiographs reveal the dentofacial morphology immediately after fixed appliances were removed.

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA° (82°)	82°	85°	3°
SNB° (80°)	83.5°	84.5°	1°
ANB° (2°)	-1.5°	0.5°	2°
SN-MP° (32°)	31°	31°	0°
FMA° (25°)	24°	24°	0°
DENTAL ANALYSIS			
U1 TO NA mm *(4mm)*	2 mm	7 mm	5 mm
U1 TO SN° (104°)	98°	119°	21°
L1 TO NB mm *(4mm)*	4.5 mm	2 mm	2.5 mm
L1 TO MP° (90°)	79°	78°	1°
FACIAL ANALYSIS			
E-LINE UL *(-1mm)*	-2 mm	-1 mm	1 mm
E-LINE LL *(0mm)*	2.5 mm	1 mm	1.5 mm

Table 1: Cephalometric summary

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

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

Maxillary Dentition:

- A - P: *Alveolar process was protracted as the incisors were tipped labially*
- Vertical: *Maintained*

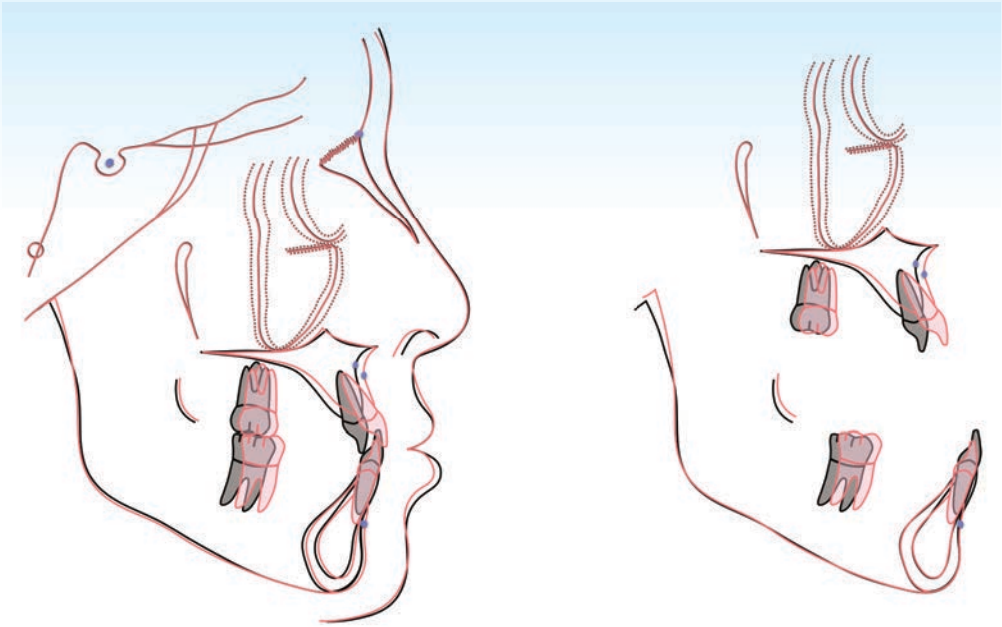


Fig. 15:
Pre- (black) and post- (red) treatment cephalometric tracings are superimposed on the anterior cranial base (left), the maxilla (upper right), and the stable internal structures of the mandible (lower right). Principal changes during treatment were protraction of the maxillary process, labial tipping of the incisors, and decreased lower lip protrusion.

- Inter-molar / Inter-canine Width: *Maintained*

Mandibular Dentition

- A - P: *Alveolar process retracted as incisors are tipped lingually*
- Vertical: *Maintained*
- Inter-molar / Inter-canine Width: *Expanded*

Facial Esthetics: Protrusive lower lip retracted

Superimpositions: The lower incisors and the protrusive lips were retracted.

This challenging malocclusion (*DI=23*) (*Worksheet 1*), was treated in 20 months to an ABO Cast-Radiograph Evaluation (*CRE*) score of 23 points (*Worksheet 2*). The major residual CRE discrepancies were buccolingual inclination of the posterior teeth (*5 points*), marginal ridges (*4 points*), and occlusal contacts (*4 points*).

Overall, there was significant improvement in both dental esthetics and occlusion. The profile was treated to an appropriate result with no esthetic problems. The only significant concern was the flaring and relative intrusion of the maxillary central incisors, as they were tipped labially. This side effect of treatment resulted in inadequate incisal exposure when smiling and an unfavorable Pink & White dental esthetic score of 6 (*Worksheet 3*).

Retention

An anterior fixed retainer was bonded on the lingual surfaces of the lower dentition from canine to canine. Removable clear overlay retainers were delivered for both arches, and the patient was instructed to wear them full time for the first 6 months and nights only thereafter. Instructions were provided for home hygiene, as well as for maintenance of the retainers.

Discussion

Pseudo-Class III malocclusion is usually much easier to manage than a skeletal Class III discrepancy. An accurate diagnosis is essential for devising an appropriate treatment plan. The Lin 3-Ring Diagnosis (*Fig. 16*) is an effective method for differential diagnosis.[5] There are three critical considerations:

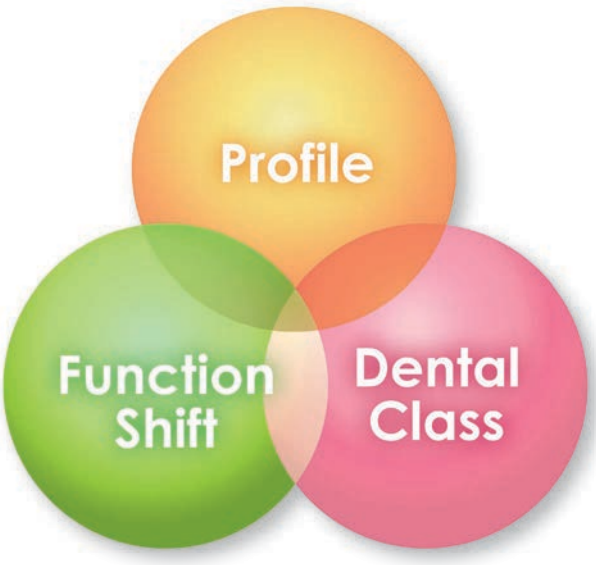


Fig. 16:
The 3-ring diagnosis scheme introduced by John Lin.

Profile in Central Relation (C_R): If the facial profile is orthognathic, or at least acceptable in the C_R position, the patient is a good candidate for conservative dentoalveolar treatment. Patients with a severely prognathic mandible and concave profile in C_R, usually require orthognathic surgery or extra-alveolar bone screw anchorage.[6,7]

Class: Evaluate the sagittal position of the canines and first molars in centric occlusion (C_O). An anterior cross-bite is more readily resolved when the molars are Class I in C_O (*pseudo Class III*) compared to Class III in C_O (*true skeletal Class III*).[6,7]

Functional Shift: The presence or absence of a functional shift from $C_R \rightarrow C_O$ is an essential aspect of the diagnosis. Class III patients with a functional shift (*pseudo-Class III*) have an improved prognosis for conservative treatment, that is proportional to the magnitude of the shift.

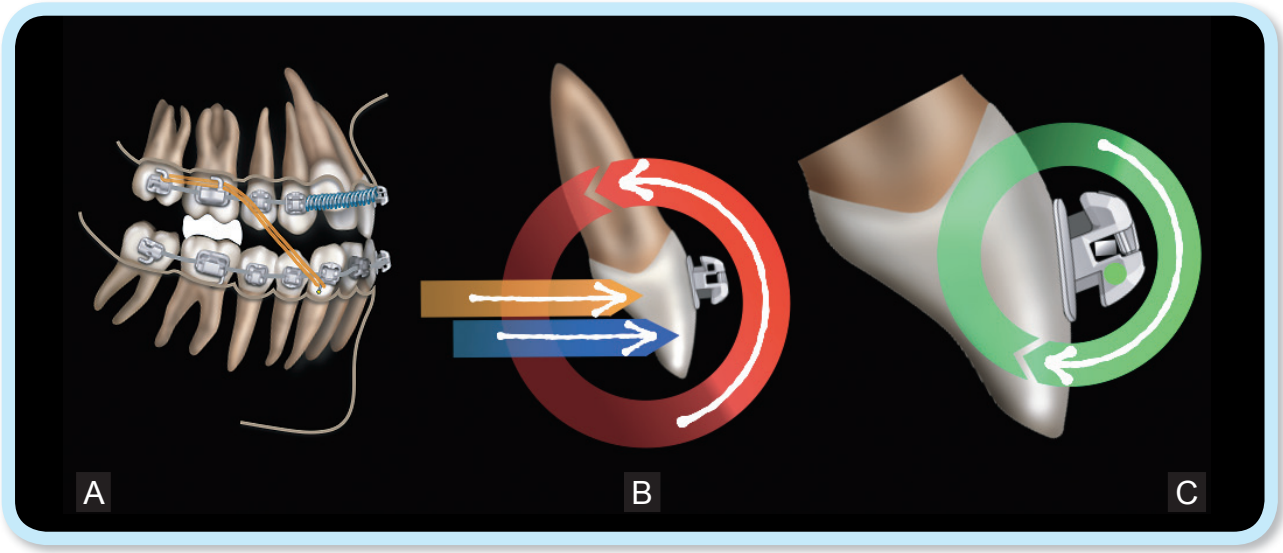
Many treatment approaches are reported for orthopedic and orthodontic treatment of skeletal class III malocclusion: RPE with extra-oral face mask (*FM*) protraction device,[8] functional regulator-3 appliance of Frankel,[9] removable mandibular retractor,[10] chincup,[11] Class III elastics with a chincup,[12] RPE,[13] and mandibular cervical headgear.[14,15] RPE combined with FM therapy is the most common treatment for skeletal Class III malocclusion, but recent reports document an ideal resolution of severe skeletal Class III malocclusions with extra-alveolar bone screw anchorage.[6,7] A recent review of 23 skeletal Class III patients treated in this

manner demonstrates that even Class III open bite patients can be managed conservatively, i.e. without orthognathic surgery.[6]

On the other hand, a patient with pseudo-class III malocclusion[16,17] (*Fig. 16*) has an excellent prognosis for a relatively simple dentoalveolar correction if the following conditions are met: functional shift, Class I in C_R, and an acceptable profile. Fortunately, uncomfortable appliances like RPE and FM are unnecessary. Most pseudo-Class III patients can be effectively managed without extractions, bone screws or orthognathic surgery, but these mechanics can result in excessive flaring of the upper incisors (*Fig. 17*).

For the present patient, the major mechanics were bite turbos on the lower first molars, Class III elastics, upper incisor tipping to the labial, space opening for the maxillary canines, and expansion of the lower arch (*Figs. 17-20*). The patient appeared to have a parafunctional habit (*clenching*), which caused attrition and periodic fractures of the bite turbos. Furthermore, the clenching prevented opening the VDO (*Figs. 14 and 15*), so the space opening mechanics and Class III elastics excessively tipped the upper incisors labially (*Fig. 17*).

In retrospect, it would have been wise to use brackets with more negative torque in the maxillary anterior region to control tipping (*Fig. 17*). Also, placing the bite turbos on the premolars would have permitted molar extrusion to open the bite, thereby relieving some of the tendency for the upper



■ *Fig. 17:*
A: Open coil springs, glass ionomer cement type II, and Class III elastics were used to correct the anterior cross-bite and crowding. B: Both the forces of elastic (orange arrow) and open coil spring (blue arrow) increase the labial crown torque (red circle) on upper incisors. C: When the rectangular arch wire is engaged in low torque bracket, it creates lingual crown torque (green arrow) to compensate the side effect of Class III elastics and open coil springs.

incisors to flare. Despite the clenching problems, the simple methods described managed the pseudo-Class III malocclusion with a constricted mandibular arch in only 20 months. Effective treatment of pseudo-Class III malocclusion requires an accurate diagnosis, and frequent monitoring of progress to ensure that adequate bite opening limits the excessive flaring and relative intrusion of the maxillary incisors.

Fig. 18:
Intraoral frontal views of the treatment sequence are shown in clockwise order from pretreatment in the upper (0M) to post-treatment in the lower left (20M). The months (M) of treatment are shown in the black box in the lower right corner of each photograph. The correction of anterior cross-bite was achieved in 11 months.

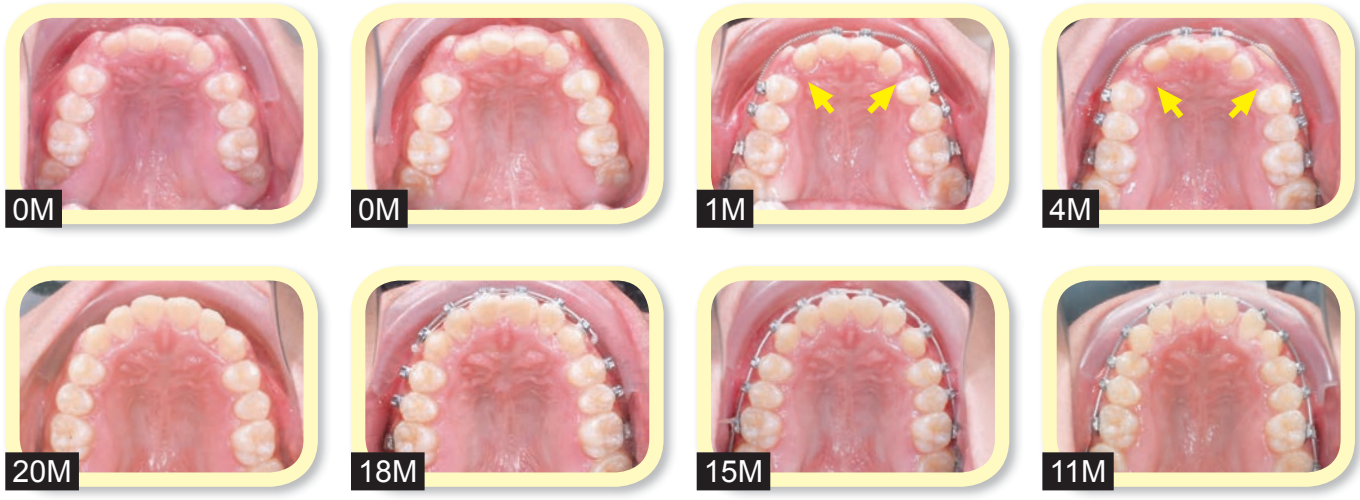


Fig. 19:
Maxillary occlusal views of the treatment sequence show the arch length was increased, and space was created by using open coil springs (yellow arrows).

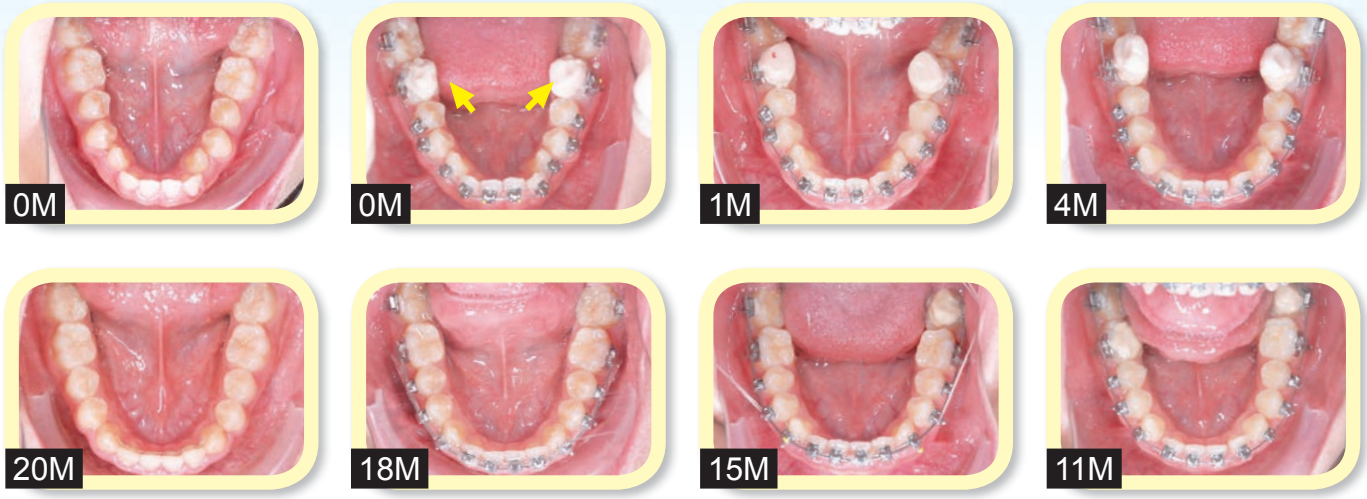


Fig. 20:
Mandibular occlusal views of the treatment sequence show that bite turbos made of glass ionomer cement (arrows) and Class III elastic were used to correct the anterior crossbite. Note the arch development as the arch width was increased, and the inclination of posterior teeth was corrected.

A Hawley bite-plate can be used to extrude the molars, open the bite, and retract the maxillary incisors, if adequate space is available. If no interproximal space is present, differential enamel stripping is indicted. For the present patient, nocturnal parafunction (*clenching*) may continue to contribute to flaring of the maxillary incisors after treatment. Parafunction during the sleeping hours is best managed with a Hawley bite-plate prepared with a premature occlusal stop for the lower incisors, that prevents the molars from contacting (*Fig. 21 and 22*).[17] When worn only at night, this appliance is a long-term neurologic orthotic because it utilizes a polysynaptic reflex to inhibit the firing of the motor nucleus of cranial nerve V (*masseteric silent period*).[18-21]

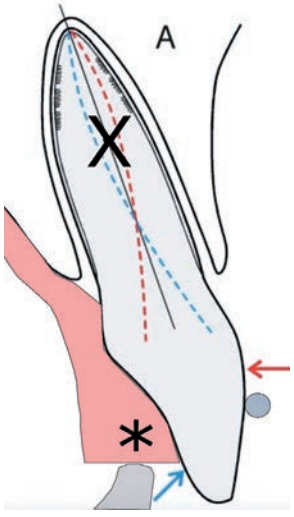


Fig. 21:
A schematic drawing shows a cut-away view of a Hawley biteplate. The acrylic bite-plate (pink) creates an occlusal stop (*) for the lower incisor. Incisal flaring is presented by the labial wire, gray circle in cross-section. The stabilization of the bite-plate prevents (X) the root flexure (dotted red and blue lines), due to an occlusal prematurity (blue arrow) combined with the retracting force (red arrow) due to an orthodontic appliance. Drawing adapted from Roberts, reference 17.

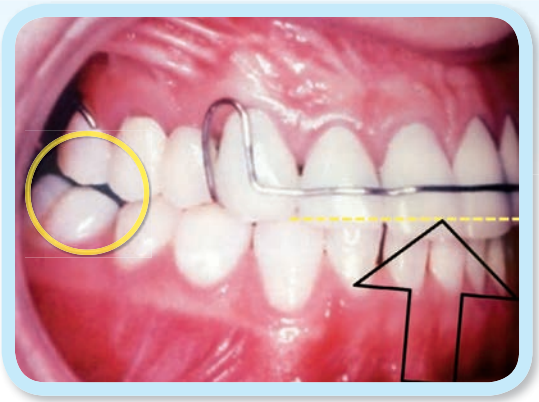


Fig. 22:
An intraoral photograph of a Hawley bite-plate is a clinical view of the appliance constructed as shown in Fig. 21. Note that the path of the lower incisors on closing (arrow) strikes the bite-plate (yellow dotted line). This premature contact of the lower incisors on the bite-plate prevents the molars from contacting (yellow circle). If worn continuously, this appliance will result in extrusion of the molars to open the bite. With nights only wear, this appliance becomes a neurologic orthotic that prevents occlusal damage due to parafunction, by inhibiting the contraction of the mandibular elevator muscles. See text for details. Illustration adapted from Roberts, reference 17.

Conclusion

1. Diagnosis is the key to the successful management of an anterior crossbite. Use the 3-ring diagnosis to distinguish pseudo from true Class III anterior cross-bite.

2. Anterior crossbite is usually a pseudo Class III malocclusion if there is a functional shift of the mandible to achieve maximal intercuspation.

3. Keep the treatment as simple as possible to achieve the patient's objectives.

4. Manage clenching as needed if bite opening is indicated.

Acknowledgment

Thanks to Mr. Paul Head for proofreading this article.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 23

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 = 7

Total = 7

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 = 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 = 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° _____ 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 pts. =	_____
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	2 x 2 pts. =	4

Identify:
ectopic eruption of maxillary canines

Total = 4

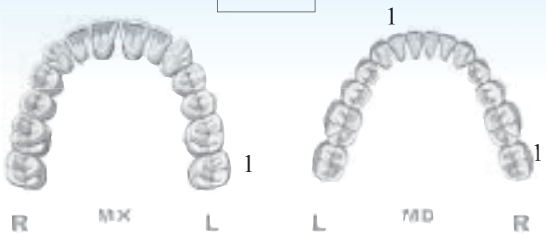
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 23

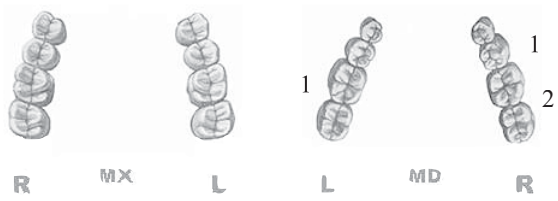
Alignment/Rotations

3



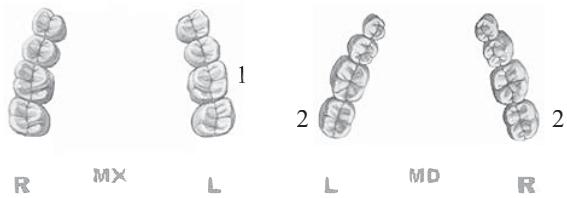
Marginal Ridges

4



Buccolingual Inclination

5

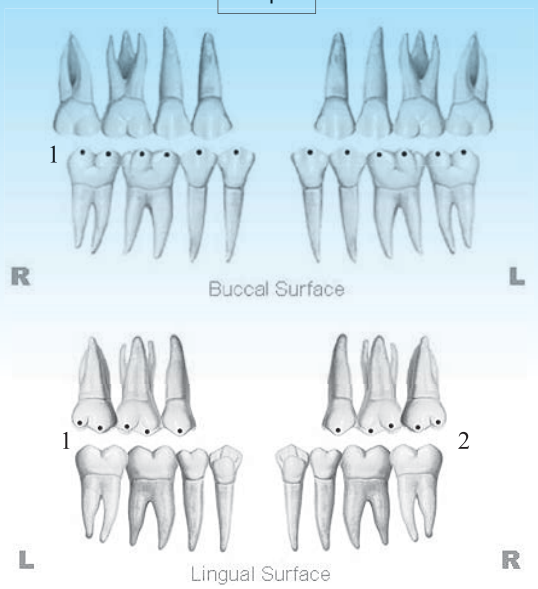


Overjet

3

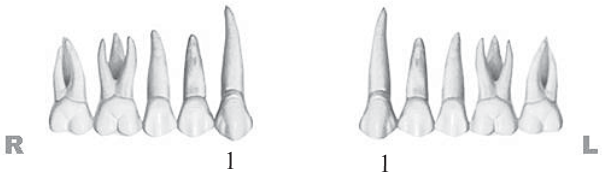
Occlusal Contacts

4



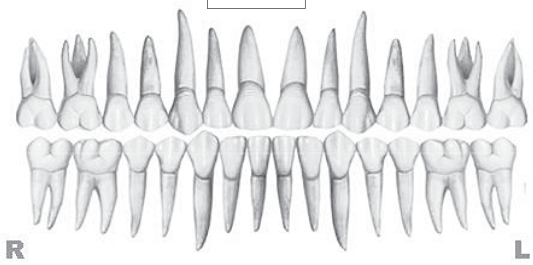
Occlusal Relationships

2



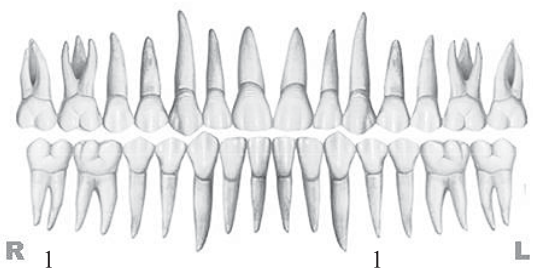
Interproximal Contacts

0



Root Angulation

2



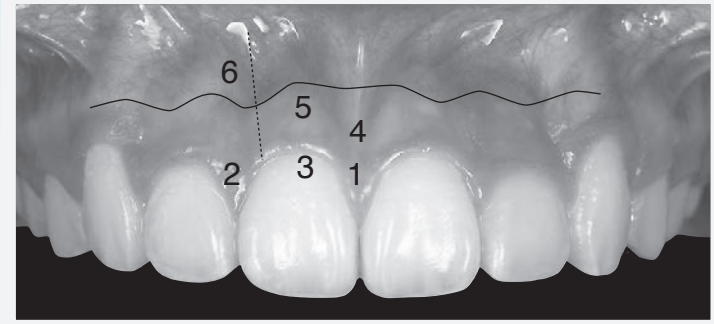
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score (Before Surgical Crown Lengthening)

Total Score: = 6

1. Pink Esthetic Score

Total = 2

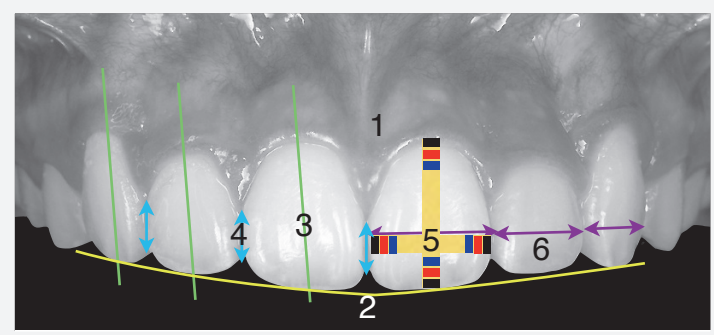


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

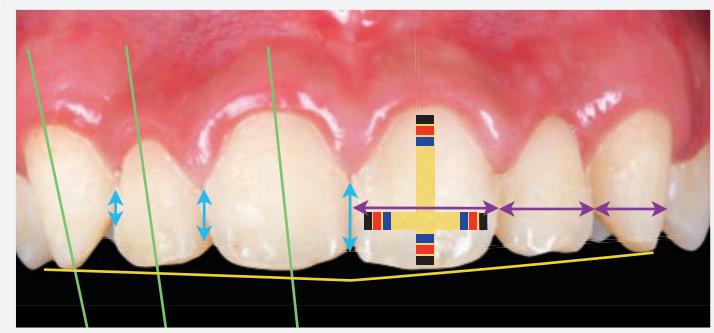
1. M & D Papilla	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	0	(1)	2
4. Level of Gingival Margin	0	(1)	2
5. Root Convexity (Torque)	(0)	1	2
6. Scar Formation	(0)	1	2

2. White Esthetic Score (for Micro-esthetics)

Total = 4



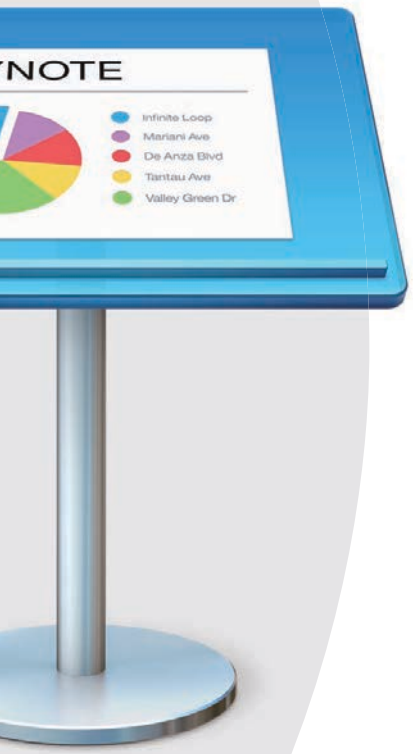
1. Midline	0	1	2
2. Incisor Curve	0	1	2
3. Axial Inclination (5°, 8°, 10°)	0	1	2
4. Contact Area (50%, 40%, 30%)	0	1	2
5. Tooth Proportion (1:0.8)	0	1	2
6. Tooth to Tooth Proportion	0	1	2



1. Midline	(0)	1	2
2. Incisor Curve	0	(1)	2
3. Axial Inclination (5°, 8°, 10°)	0	(1)	2
4. Contact Area (50%, 40%, 30%)	0	(1)	2
5. Tooth Proportion (1:0.8)	0	(1)	2
6. Tooth to Tooth Proportion	(0)	1	2

2018 Keynote Workshop

高效簡報學習法



技巧班 強化你的 Keynote 簡報力

(四) 7/26

無論是 Keynote 新手或是略有經驗的使用者，在一天的簡報課程中，將精選介紹 Keynote 的重要工具，幫助你設計合適的動畫，分享設計資料視覺化的秘訣，並搭配 Mac 內建常用的影音工具來編修圖片和影像剪輯，金牛頓的教學團隊將教你如何使用 Keynote 創造出動人的專業簡報。

講師：金牛頓工程師

大師班 賈伯斯的簡報秘訣與設計要素

(四) 8/9

由國際知名的牙科講師張慧男醫師主講的一天課程，將以他幽默風趣的演講風格來剖析賈柏斯的美學概念以及演講秘訣，利用實例來說明如何設計出視覺優美且知識性豐富的專業演講。

講師：張慧男醫師

動畫班 精修繪圖及動畫技巧

(六~一) 12/1-3

數位化潮流下的牙科簡報，不僅需要清晰的臨床照片，也需要精確的圖表和流暢的動畫來吸引觀眾，而優秀的視覺化工具更使您的演講獨樹一格且令人難忘。

Keynote 456 課程中，Dr. Rungsi 將分享他利用 Keynote 軟體繪製精美牙科插圖的經驗，並一步步教會您如何從構想和草圖創建出令人驚艷的成果。跟隨簡報美學大師的腳步，您也可以秀出創意、站上世界舞台！

講師：Dr. Rungsi Thavarungkul

- 報名 2018 K456 課程即贈送 2017 及 2018 課程視訊。
- 名額有限，以繳費順序為依據。
- 舊生享特惠優惠價，限額4名。

- 若取消報名：開課30天前退款將扣除10%行政手續費；開課30天內退款將扣除30%行政手續費。
- 若請假延課：開課30天前提出，可免費延課一次；開課30天內提出，下次補課則以「舊生重溫價」計費。

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International Insignia™ Workshop

數位客製化矯正系統

2018
7月19-20日
@Taiwan

張慧男
新竹貝多芬齒顎矯正中心負責人

李雙安 副院長

葉信吟 副院長

新竹貝多芬齒顎矯正中心

INSIGNIA™

「以終為始」！這是第一個結合美國矯正學會所設計的客觀個案術前及術後評量標準的 Insiginia 專業課程，利用可測量的專業基準和最新的數位科技來幫助醫師進行診斷和治療計畫的擬定，以達到可靠的、高品質的臨床治療結果。除了課程演講之外還特別設計了實用的 Insignia Approver workshop，搭配貝多芬矯正中心的助教群，務必要教會您所有在和技師溝通確認治療計畫時的眉眉角角。

任何想要在這個競爭激烈的矯正市場中突顯自己領先地位的資深醫師，都不該錯過這堂第一次在台灣舉辦的 Insiginia 專業課程。座位有限，錯過可惜！

課程特色：

1 簡易上手
延續貝多芬團隊一貫的教學風格，由淺入深，並提供 SOP 診療方案，讓您無痛上手，立刻開始 Insignia 客製化矯正。

2 操作課程
課程包含 indirect bonding 以及 Insignia Approver 軟體實際操作，學習中即可突破盲點，快速熟悉數位矯正。

3 臨床教學
特別安排貝多芬診所見習，了解 Insignia 客製化矯正器臨床診療過程。

4 案例輔導
課後免費諮詢兩個案例，初始階段若遇到困難，可獲得資深醫師的經驗回饋。

本課程免費提供：1. 完整 Bonding 操作模型一套 2. Insignia 3D ebook

報名專線　湧傑 Yong Chieh　北區 楊文君 02-27788315 #122　中區 張馨云 04-23058915　南區 蔡淑玲 07-2260030

2018 Insignia Workshop Schedule

上課地點：
新竹市建中一路25號2樓
（金牛頓藝術科技）

7/ 19 (四)

	講者
09:00 | Inside the Insignia: Diagnosis, Tx planning, Digital set-up and Clinical Execution.	張慧男
12:00 | Lunch	
13:00 | Insignia Approver software hands-on workshop I	林詩詠、張慧男
15:30 | 6 keys to write an effective Approver plan for Insignia	徐重興、張慧男
17:30 | Gala Dinner	

7/ 20 (五)

	講者
09:00 | Indirect bonding hands-on workshop	葉信吟、張慧男
10:00 | Indirect bonding & wire progression for Insignia –How to fix 10 common mistakes?	葉信吟、張慧男
12:00 | Lunch	
13:00 | Insignia Approver software hands-on workshop II	李雙安、張慧男
15:30 | **Chair-side Observation** including bonding and case demos 地點：貝多芬齒顎矯正中心	

- 報名資格：需具備兩年臨床矯正經驗。
- 課程結束後，可獲頒課程證書乙份。
- 人數限制：30 位

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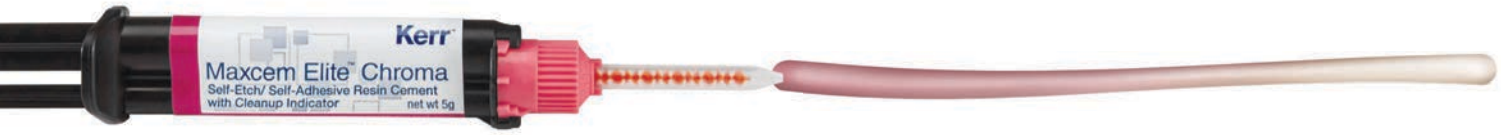

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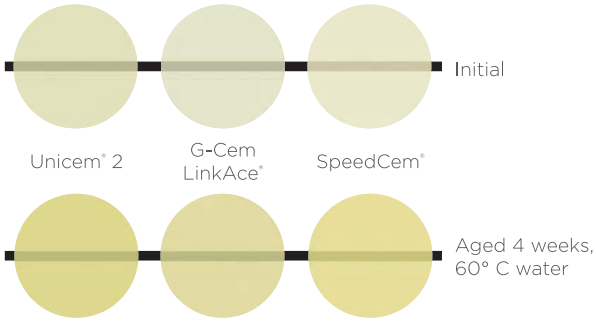

HIGH BOND STRENGTH

- Reliable and predictable[4]
- One of the most secure holds on the market compared to other self-adhesive cements[4]
- 90% higher bond strength on dentin[4]
- 65% higher bond strength on enamel[4]
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Feedback from the Beethoven International Workshop, Mar, 2018

The course overall was very informative and well organized. The lectures were interesting and Dr. Chris made it humorous as well. A great experience for anyone practicing the Damon System and wanting to get more out of the appliance.

Excellent clinical tips given by Dr. Chang and his young associates throughout the chair side observations made it very interesting and educational. Split into two groups, both teams were able to get a good view of all the clinical procedures.

Sam Thomas
INDIA

I'm very impressed with treatment observation because I can see how Dr. Chris Chang manages his patient from the chairside.

Won-Gun Chang,
SOUTH KOREA

Dear Chris,

Labeeb and I have arrived back in Israel and have had plenty of time together to both enjoy the sights of China, which were superb, and discuss our visit to Taiwan. We are both delighted and privileged to have been on your course and in your practice and to get to know you really one on one.

It's no small effort to leave one's home and workplace and travel almost halfway across the globe for a hands-on seminar such as yours but when the feeling is that you have something to take back to your practice and utilise it to improve the orthodontic service one provides, especially as experienced practitioners, the overall result is a win win for both the orthodontist and his staff and the patients.

Your hospitality and the service from your staff was superb and I would to like to thank you both for myself and for all the participating members of our study group.

"So enjoy every day because every day is a bonus"

Karl Yorke,
ISRAEL

Animation & Illustration

Advanced Keynote Workshop

2018 12/1-3 (Sat-Mon) 09:00-17:00

Effective dental presentation in today's digital world requires not only clear clinical photos but also diagrams and animation to engage the audience. Moreover, these visual tools are excellent aids to make your presentation unique and memorable. In this workshop Dr. Rungsi will share his dental illustration experiences and demonstrate step by step how to create an illustration from an initial sketch to a finished piece. Active participation and completion of workshop assignments are required for workshop participants.

Topics:

1. Design illustration in Keynote.
2. Showcase your own drawing with stunning animation in Keynote.
3. Animation composition.

Lecturer:
Dr. Rungsi Thavarungkul,
Thailand

Early Bird

by 2018/10/01

Newton's A course@newtonsa.com.tw

Requirements: MacBook with the lastest system and Keynote version

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2018 全面回饋

自1/1－6/25止

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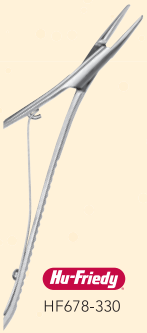

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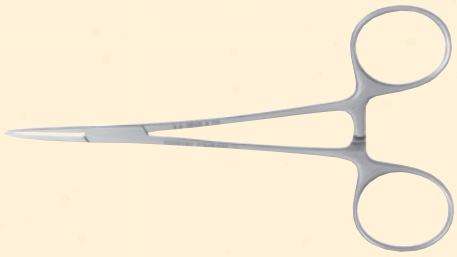

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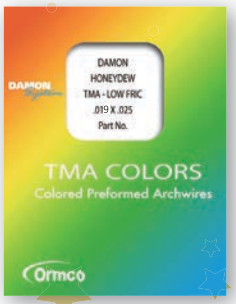

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Note:

1. Most video course are available in both English and Chinese and are sold separately.
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3. Some courses, including Damon Q and Advanced, are renewed annually and each renewal is to be purchased separately with a 50% discount.

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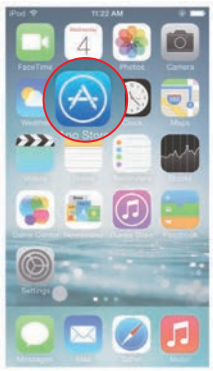

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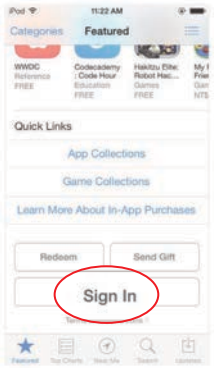
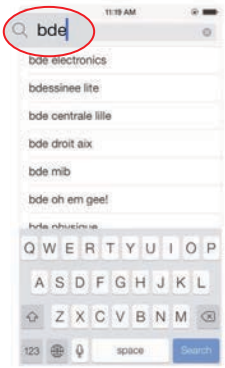


2. "Sign in" with your Apple ID.

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



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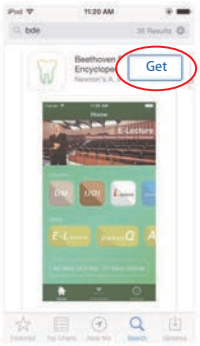
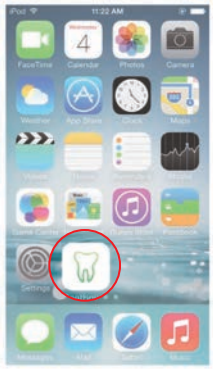


5. Click "FREE" and "INSTALL APP."



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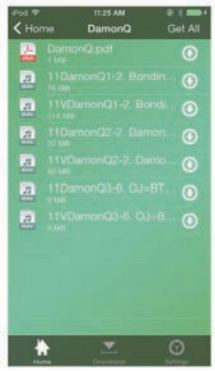

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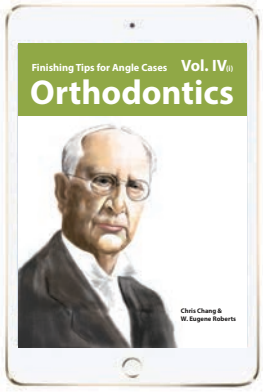

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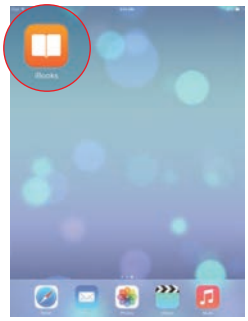
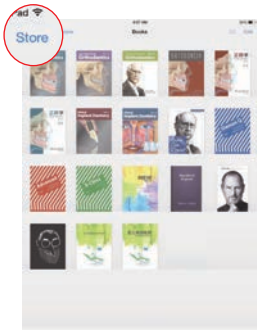
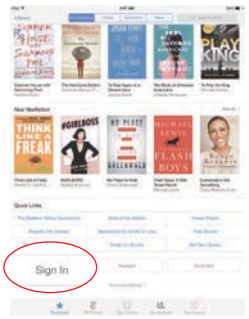


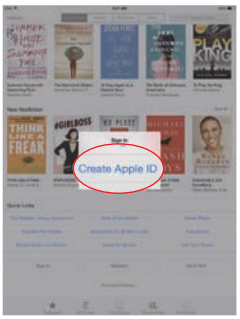
1. Launch "iBooks" app on your iPad.



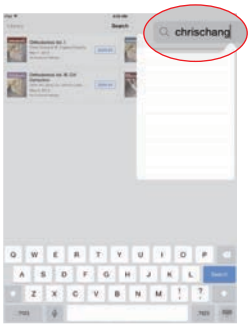
2. Click "Store."



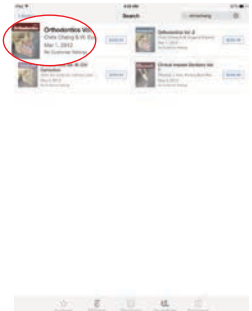
3. "Sign in" with your Apple ID.



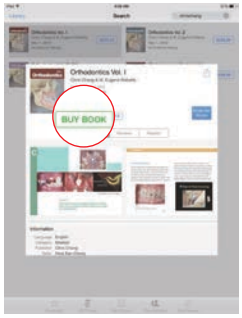
4. "Create Apple ID" if you don't have one.



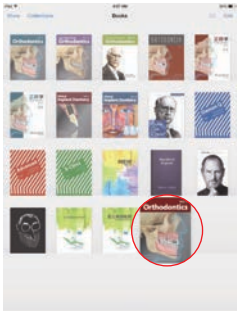
5. Search for "chrischang."



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.

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見習獎學金

2018/7/26-28

為促進國內牙科學術教育與牙科實務工作間的學習交流，並鼓勵國內牙醫系所學生在學期間能認識牙科實務操作環境，貝多芬齒顎矯正中心、安徒生兒童牙科、金牛頓植牙中心與金牛頓藝術科技特聯合提供本獎學金以及三天觀摩見習的機會。

目標

- 提昇對牙醫實務操作環境與診所管理的認識。
- 學習如何應用資訊科技來提昇實務工作效率。
- 觀摩矯正、兒童專科診所與植牙中心的經營模式。
- 模型操作課程。

對象

- 全台灣牙醫系四升五年級學生，每校3-5名。
- 學期成績在全班前30%或成績平均在75分以上，且對牙科實務展現積極學習的態度。
- 獎助內容：三天二夜五星級飯店住宿以及見習期間餐飲費補助。

申請截止日期：2018/6/30，現在就填寫表單報名！

報名線上表單

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